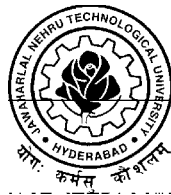


**ACADEMIC REGULATIONS  
COURSE STRUCTURE  
AND  
DETAILED SYLLABUS**

**19**

**ELECTRONICS AND  
COMPUTER  
ENGINEERING**

**For**  
**B.TECH. FOUR YEAR DEGREE COURSE**  
**(Applicable for the batches admitted from 2013-14)**  
**(I - IV Years Syllabus)**



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**  
**KUKATPALLY, HYDERABAD - 500 085.**



**ACADEMIC REGULATIONS R13 FOR B. TECH. (REGULAR)**

**Applicable for the students of B. Tech. (Regular) from the Academic Year 2013-14 and onwards**

1. **Award of B. Tech. Degree**

A student will be declared eligible for the award of B. Tech. Degree if he fulfils the following academic regulations:

- 1.1 The candidate shall pursue a course of study for not less than four academic years and not more than eight academic years.
- 1.2 After eight academic years of course of study, the candidate is permitted to write the examinations for two more years.
- 1.3 The candidate shall register for 224 credits and secure 216 credits with compulsory subjects as listed in Table-1.

**Table 1: Compulsory Subjects**

| Serial Number | Subject Particulars            |
|---------------|--------------------------------|
| 1             | All practical subjects         |
| 2             | Industry oriented mini project |
| 3             | Comprehensive Viva-Voce        |
| 4             | Seminar                        |
| 5             | Project work                   |

- 2 The students, who fail to fulfill all the academic requirements for the award of the degree within ten academic years from the year of their admission, shall forfeit their seats in B. Tech. course.

3 **Courses of study**

The following courses of study are offered at present as specializations for the B. Tech. Course:

| Branch Code | Branch                                      |
|-------------|---|
| 01          | Civil Engineering                           |
| 02          | Electrical and Electronics Engineering      |
| 03          | Mechanical Engineering                      |
| 04          | Electronics and Communication Engineering   |
| 05          | Computer Science and Engineering            |
| 08          | Chemical Engineering                        |
| 10          | Electronics and Instrumentation Engineering |

|    |  |
|----|--|
| 11 | Bio-Medical Engineering                  |
| 12 | Information Technology                   |
| 14 | Mechanical Engineering (Mechatronics)    |
| 17 | Electronics and Telematics Engineering   |
| 18 | Metallurgy and Material Technology       |
| 19 | Electronics and Computer Engineering     |
| 20 | Mechanical Engineering (Production)      |
| 21 | Aeronautical Engineering                 |
| 22 | Instrumentation and Control Engineering  |
| 23 | Biotechnology                            |
| 24 | Automobile Engineering                   |
| 25 | Mining Engineering                       |
| 26 | Mining Machinery                         |
| 27 | Petroleum Engineering                    |
| 28 | Civil and Environmental Engineering      |
| 29 | Mechanical Engineering (Nano Technology) |
| 30 | Agricultural Engineering                 |
| 31 | Computer Science & Technology            |

**4 Credits**

|                         | I Year         |         | Semester       |          |
|-------------------------|----------------|---------|----------------|----------|
|                         | Periods / Week | Credits | Periods / Week | Credits  |
| Theory                  | 03+1/03        | 06      | 04             | 04       |
|                         | 02             | 04      | —              | —        |
| Practical               | 03             | 04      | 03             | 02       |
| Drawing                 | 02+03          | 06      | 03<br>06       | 02<br>04 |
| Mini Project            | —              | —       | —              | 02       |
| Comprehensive Viva Voce | —              | —       | —              | 02       |
| Seminar                 | —              | —       | 6              | 02       |
| Project                 | —              | --      | 15             | 10       |

**5 Distribution and Weightage of Marks**

- 5.1 The performance of a student in each semester or I year shall be evaluated subject-wise for a maximum of 100 marks for a theory and 75 marks for a practical subject. In addition, industry-oriented mini-project, seminar and project work shall be evaluated for 50, 50 and 200 marks, respectively.
- 5.2 For theory subjects the distribution shall be 25 marks for Internal Evaluation and 75 marks for the End-Examination.
- 5.3 For theory subjects, during a semester there shall be 2 mid-term examinations. Each mid-term examination consists of one objective paper, one essay paper and one assignment. The objective paper and the essay paper shall be for 10 marks each with a total duration of 1 hour 20 minutes (20 minutes for objective and 60 minutes for essay paper). The Objective paper is set with 20 bits of multiple choice, fill-in the blanks and matching type of questions for a total of 10 marks. The essay paper shall contain 4 full questions (one from each unit) out of which, the student has to answer 2 questions, each carrying 5 marks. While the first mid-term examination shall be conducted on 1 to 2.5 units of the syllabus, the second mid-term examination shall be conducted on 2.5 to 5 units. Five (5) marks are allocated for Assignments (as specified by the subject teacher concerned). The first Assignment should be submitted before the conduct of the first mid-examination, and the second Assignment should be submitted before the conduct of the second mid-examination. The total marks secured by the student in each mid-term examination are evaluated for 25 marks, and the average of the two mid-term examinations shall be taken as the final marks secured by each candidate. However, in the I year, there shall be 3 mid term examinations, each for 25 marks, along with 3 assignments in a similar pattern as above (1<sup>st</sup> mid shall be from Unit-I, 2<sup>nd</sup> mid shall be 2 & 3 Units and 3<sup>rd</sup> mid shall be 4 & 5 Units) and the average marks of the examinations secured (each evaluated for a total of 25 marks) in each subject shall be considered to be final marks for the internals/sessionals. If any candidate is absent from any subject of a mid-term examination, an on-line test will be conducted for him by the University.

***The details of the Question Paper pattern without deviating from the R13 regulations as notified in the website is as follows:***

- ***The End semesters Examination will be conducted for 75 marks which consists of two parts viz. i). Part-A for 25 marks, ii). Part –B for 50 marks.***
- ***Part-A is compulsory question which consists of ten sub-questions. The first five sub-questions are from each unit and carries 2 marks each. The next five sub-questions***

- are one from each unit and carries 3 marks each.**

    - ***Part-B consists of five Questions (numbered from 2 to 6) carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. For each question there will be an “either” “or” choice (that means there will be two questions from each unit and the student should answer any one question)***
- 5.4 For practical subjects there shall be a continuous evaluation during a semester for 25 sessional marks and 50 end semester examination marks. Out of the 25 marks for internal evaluation, day-to-day work in the laboratory shall be evaluated for 15 marks and internal practical examination shall be evaluated for 10 marks conducted by the laboratory teacher concerned. The end semester examination shall be conducted with an external examiner and the laboratory teacher. The external examiner shall be appointed from the clusters of colleges which are decided by the examination branch of the University.
- 5.5 For the subject having design and/or drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing) and Estimation, the distribution shall be 25 marks for internal evaluation (15 marks for day-to-day work and 10 marks for internal tests) and 75 marks for end semester examination. There shall be two internal tests in a Semester and the average of the two shall be considered for the award of marks for internal tests. However, in the I year class, there shall be three tests and the average will be taken into consideration.
- 5.6 There shall be an industry-oriented Mini-Project, in collaboration with an industry of their specialization, to be taken up during the vacation after III year II Semester examination. However, the mini-project and its report shall be evaluated along with the project work in IV year II Semester. The industry oriented mini-project shall be submitted in a report form and presented before the committee. It shall be evaluated for 50 marks. The committee consists of an external examiner, head of the department, the supervisor of the mini-project and a senior faculty member of the department. There shall be no internal marks for industry-oriented mini-project.
- 5.7 There shall be a seminar presentation in IV year II Semester. For the seminar, the student shall collect the information on a specialized topic and prepare a technical report, showing his understanding of the topic, and submit it to the department. It shall be evaluated by the departmental committee consisting of head of the department, seminar supervisor and a senior faculty member. The seminar report shall be evaluated for 50 marks. There shall be no external examination for the seminar.
- 5.8 There shall be a Comprehensive Viva-Voce in IV year II semester.

The Comprehensive Viva-Voce will be conducted by a Committee consisting of Head of the Department and two Senior Faculty members of the Department. The Comprehensive Viva-Voce is intended to assess the student's understanding of the subjects he studied during the B. Tech. course of study. The Comprehensive Viva-Voce is evaluated for 100 marks by the Committee. There are no internal marks for the Comprehensive Viva-Voce.

- 5.9 Out of a total of 200 marks for the project work, 50 marks shall be allotted for Internal Evaluation and 150 marks for the End Semester Examination (Viva Voce). The End Semester Examination of the project work shall be conducted by the same committee as appointed for the industry-oriented mini-project. In addition, the project supervisor shall also be included in the committee. The topics for industry oriented mini project, seminar and project work shall be different from one another. The evaluation of project work shall be made at the end of the IV year. The Internal Evaluation shall be on the basis of two seminars given by each student on the topic of his project.
- 5.10 The Laboratory marks and the sessional marks awarded by the College are subject to scrutiny and scaling by the University wherever necessary. In such cases, the sessional and laboratory marks awarded by the College will be referred to a Committee. The Committee will arrive at a scaling factor and the marks will be scaled accordingly. The recommendations of the Committee are final and binding. The laboratory records and internal test papers shall be preserved in the respective institutions as per the University rules and produced before the Committees of the University as and when asked for.

## **6 Attendance Requirements**

- 6.1 A student is eligible to write the University examinations only if he acquires a minimum of 75% of attendance in aggregate of all the subjects.
- 6.2 Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester or I year may be granted by the College Academic Committee
- 6.3 Shortage of Attendance below 65% in aggregate shall not be condoned.
- 6.4 A student who is short of attendance in semester / I year may seek re-admission into that semester/I year when offered within 4 weeks from the date of the commencement of class work.
- 6.5 Students whose shortage of attendance is not condoned in any semester/I year are not eligible to write their end semester examination of that class and their registration stands cancelled.

- 6.6 A stipulated fee shall be payable towards condonation of shortage of attendance.
- 6.7 A student will be promoted to the next semester if he satisfies the attendance requirement of the present semester/I year, as applicable, including the days of attendance in sports, games, NCC and NSS activities.
- 6.8 If any candidate fulfills the attendance requirement in the present semester or I year, he shall not be eligible for readmission into the same class.

**7 Minimum Academic Requirements**

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no.6.

- 7.1 A student is deemed to have satisfied the minimum academic requirements if he has earned the credits allotted to each theory/practical design/drawing subject/project and secures not less than 35% of marks in the end semester exam, and minimum 40% of marks in the sum total of the mid-term and end semester exams.
- 7.2 A student shall be promoted from first year to second year if he fulfills the minimum attendance requirement.
- 7.3 A student will not be promoted from II year to III year unless he fulfills the academic requirement of 34 credits up to II year I semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in II year II semester.
- 7.4 A student shall be promoted from III year to IV year only if he fulfills the academic requirements of 56 credits up to III year I semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in III year II semester.
- 7.5 A student shall register and put up minimum attendance in all 224 credits and earn 216 credits. Marks obtained in the best 216 credits shall be considered for the calculation of percentage of marks.
- 7.6 Students who fail to earn 216 credits as indicated in the course structure within ten academic years (8 years of study + 2 years additionally for appearing for exams only) from the year of their admission, shall forfeit their seat in B.Tech. course and their admission stands cancelled.

**8 Course pattern**

- 8.1 The entire course of study is for four academic years. I year shall be on yearly pattern and II, III and IV years on semester pattern.
- 8.2 A student, eligible to appear for the end examination in a subject, but absent from it or has failed in the end semester examination, may



write the exam in that subject during the period of supplementary exams.

- 8.3 When a student is detained for lack of credits/shortage of attendance, he may be re-admitted into the next semester/year. However, the academic regulations under which he was first admitted, shall continue to be applicable to him.

**9 Award of Class**

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of B. Tech. Degree, he shall be placed in one of the following four classes:

| <b>Class Awarded</b>         | <b>% of marks to be secured</b> | <b>From the aggregate marks secured from 216 Credits.</b> |
|------------------------------|---------------------------------|---|
| First Class with Distinction | 70% and above                   |   |
| First Class                  | Below 70 but not less than 60%  |   |
| Second Class                 | Below 60% but not less than 50% |   |
| Pass Class                   | Below 50% but not less than 40% |   |

The marks obtained in internal evaluation and end semester / I year examination shall be shown separately in the memorandum of marks.

**10 Minimum Instruction Days**

The minimum instruction days for each semester/I year shall be 90/180 days.

- 11 There shall be no branch transfers after the completion of the admission process.
- 12 There shall be no transfer from one college/stream to another within the Constituent Colleges and Units of Jawaharlal Nehru Technological University Hyderabad.

**13 WITHHOLDING OF RESULTS**

If the student has not paid the dues, if any, to the university or if any case of indiscipline is pending against him, the result of the student will be withheld and he will not be allowed into the next semester. His degree will be withheld in such cases.

**14. TRANSITORY REGULATIONS**

- 14.1 Discontinued, detained, or failed candidates are eligible for readmission as and when next offered.
- 14.2 After the revision of the regulations, the students of the previous batches will be given two chances for passing in their failed subjects, one supplementary and the other regular. If the students cannot

clear the subjects in the given two chances, they shall be given equivalent subjects as per the revised regulations which they have to pass in order to obtain the required number of credits.

- 14.3 In case of transferred students from other Universities, the credits shall be transferred to JNTUH as per the academic regulations and course structure of the JNTUH.

**15. General**

- 15.1 Wherever the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".
- 15.2 The academic regulation should be read as a whole for the purpose of any interpretation.
- 15.3 In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.
- 15.4 The University may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the University.
- 15.5 The students seeking transfer to colleges affiliated to JNTUH from various other Universities/Institutions, have to pass the failed subjects which are equivalent to the subjects of JNTUH, and also pass the subjects of JNTUH which the candidates have not studied at the earlier Institution on their own without the right to sessional marks. Further, though the students have passed some of the subjects at the earlier institutions, if the same subjects are prescribed in different semesters of JNTUH, the candidates have to study those subjects in JNTUH in spite of the fact that those subjects are repeated.

\* \* \*

**Academic Regulations R13 For B.Tech. (Lateral Entry Scheme)**

Applicable for the students admitted into II year B. Tech. (LES) from the Academic Year 2013-14 and onwards

**1. Eligibility for award of B. Tech. Degree (LES)**

- I. The LES candidates shall pursue a course of study for not less than three academic years and not more than six academic years.
- II. They shall be permitted to write the examinations for two more years after six academic years of course work.

2. The candidate shall register for 168 credits and secure 160 credits from II to IV year B.Tech. Program (LES) for the award of B.Tech. degree with compulsory subjects as listed in Table-1.

**Table 1: Compulsory Subjects**

| Serial Number | Subject Particulars            |
|---------------|--------------------------------|
| 1             | All practical subjects         |
| 2             | Industry oriented mini project |
| 3             | Comprehensive Viva-Voce        |
| 4             | Seminar                        |
| 5             | Project work                   |

3. The students, who fail to fulfil the requirement for the award of the degree in 8 consecutive academic years (6 years of study + 2 years additionally for appearing exams only) from the year of admission, shall forfeit their seats.
4. The attendance regulations of B. Tech. (Regular) shall be applicable to B.Tech. (LES).
5. **Promotion Rule**  
A student shall be promoted from second year to third year if he fulfills the minimum attendance requirement.  
A student shall be promoted from III year to IV year only if he fulfils the academic requirements of 34 credits up to III year I semester from all the examinations, whether or not the candidate takes the examinations.
6. **Award of Class**  
After a student has satisfied the requirement prescribed for the completion of the program and is eligible for the award of B. Tech. Degree, he shall be placed in one of the following four classes:

| Class Awarded                | % of marks to be secured        | From the aggregate marks secured from 216 Credits. |
|------------------------------|---------------------------------|--|
| First Class with Distinction | 70% and above                   |  |
| First Class                  | Below 70 but not less than 60%  |  |
| Second Class                 | Below 60% but not less than 50% |  |
| Pass Class                   | Below 50% but not less than 40% |  |

The marks obtained in the internal evaluation and the end semester examination shall be shown separately in the marks memorandum.

7. All the other regulations as applicable to **B. Tech. 4-year degree course (Regular)** will hold good for **B. Tech. (Lateral Entry Scheme)**.

#### MALPRACTICES RULES

##### DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

|        | Nature of Malpractices/<br>Improper conduct  | Punishment  |
|--------|--|---|
|        | <i>If the candidate:</i>   |   |
| 1. (a) | Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination) | Expulsion from the examination hall and cancellation of the performance in that subject only.   |
| (b)    | Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.  | Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him. |

|    |   |   |
|----|---|---|
| 2. | Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing. | Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year.<br>The Hall Ticket of the candidate is to be cancelled and sent to the University.   |
| 3. | Impersonates any other candidate in connection with the examination.  | The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him. |

|    |  |  |
|----|--|--|
| 4. | Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.  | Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. |
| 5. | Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.   | Cancellation of the performance in that subject.   |
| 6. | Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or | In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is   |

|    |  |  |
|----|--|--|
|    | any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination. | registered against them.   |
| 7. | Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.  | Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. |
| 8. | Possess any lethal weapon or firearm in the examination hall.  | Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work  |

|     |   |  |
|-----|---|--|
|     |   | and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.   |
| 9.  | If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8. | Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.<br>Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them. |
| 10. | Comes in a drunken condition to the examination hall.   | Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.   |
| 11. | Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.   | Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical  |



|     |   |  |
|-----|---|--|
| 12. | If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action to award suitable punishment. |  |
|-----|---|--|

**Malpractices identified by squad or special invigilators**

1. Punishments to the candidates as per the above guidelines.
2. Punishment for institutions : (if the squad reports that the college is also involved in encouraging malpractices)
  - (i) A show cause notice shall be issued to the college.
  - (ii) Impose a suitable fine on the college.
  - (iii) Shifting the examination centre from the college to another college for a specific period of not less than one year.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD.****B. TECH. ELECTRONICS AND COMPUTER ENGINEERING****I YEAR**

| <b>Code</b> | <b>Subject</b>                                   | <b>L</b>  | <b>T/P/D</b> | <b>C</b>  |
|-------------|--|-----------|--------------|-----------|
| A10001      | English  | 2         | -            | 4         |
| A10002      | Mathematics – I                                  | 3         | 1            | 6         |
| A10003      | Mathematical Methods                             | 3         | -            | 6         |
| A10004      | Engineering Physics                              | 3         | -            | 6         |
| A10005      | Engineering Chemistry                            | 3         | -            | 6         |
| A10501      | Computer Programming                             | 3         | -            | 6         |
| A10301      | Engineering Drawing                              | 2         | 3            | 6         |
| A10581      | Computer Programming Lab.                        | -         | 3            | 4         |
| A10081      | Engineering Physics / Engineering Chemistry Lab. | -         | 3            | 4         |
| A10083      | English Language Communication Skills Lab.       | -         | 3            | 4         |
| A10082      | IT Workshop / Engineering Workshop               | -         | 3            | 4         |
|             | <b>Total</b>                                     | <b>19</b> | <b>16</b>    | <b>56</b> |

**II YEAR I SEMESTER**

| <b>Code</b> | <b>Subject</b>                         | <b>L</b>  | <b>T/P/D</b> | <b>C</b>  |
|-------------|--|-----------|--------------|-----------|
| A30007      | Mathematics - III                      | 4         | -            | 4         |
| A30404      | Electronic Devices & Circuits          | 4         | -            | 4         |
| A30210      | Fundamentals of Electrical Engineering | 4         | -            | 4         |
| A30503      | Java Programming                       | 4         | -            | 4         |
| A30407      | Switching Theory and Logic Design      | 4         | -            | 4         |
| A30502      | Data Structures                        | 4         | -            | 4         |
| A30482      | Electronic Devices and Circuits Lab    | -         | 3            | 2         |
| A30582      | Data Structures Lab                    | -         | 3            | 2         |
|             | <b>Total</b>                           | <b>24</b> | <b>6</b>     | <b>28</b> |

**II YEAR II SEMESTER**

| Code   | Subject                          | L         | T/P/D    | C         |
|--------|----------------------------------|-----------|----------|-----------|
| A40009 | Environmental Studies            | 4         | -        | 4         |
| A40412 | Electronic Circuit Analysis      | 4         | -        | 4         |
| A40506 | Computer Organization            | 4         | -        | 4         |
| A40512 | Web Technologies                 | 4         | -        | 4         |
| A40417 | Structured Digital System Design | 4         | -        | 4         |
| A40510 | Operating Systems                | 4         | -        | 4         |
| A40586 | Web Technologies Lab             | -         | 3        | 2         |
| A40483 | Electronic Circuit Analysis Lab  | -         | 3        | 2         |
|        | <b>Total</b>                     | <b>24</b> | <b>6</b> | <b>28</b> |

**III YEAR I SEMESTER**

| Code   | Subject                                     | L         | T/P/D    | C         |
|--------|---|-----------|----------|-----------|
| A50010 | Managerial Economics and Financial Analysis | 4         | -        | 4         |
| A50507 | Data Base Management Systems                | 4         | -        | 4         |
| A50425 | Linear and Digital IC Applications          | 4         | -        | 4         |
| A50414 | Principles of Communications                | 4         | -        | 4         |
| A50518 | Software Engineering                        | 4         | -        | 4         |
| A50508 | Design & Analysis of Algorithms             | 4         | -        | 4         |
| A50489 | Linear and Digital IC Applications Lab      | -         | 3        | 2         |
| A50590 | Software Engineering Lab                    | -         | 3        | 2         |
|        | <b>Total</b>                                | <b>24</b> | <b>6</b> | <b>28</b> |

**III YEAR II SEMESTER**

| Code   | Subject                                 | L         | T/P/D    | C         |
|--------|---|-----------|----------|-----------|
| A60014 | Management Science                      | 4         | -        | 4         |
| A60430 | Microprocessors and Microcontrollers    | 4         | -        | 4         |
|        | <b>Open Elective</b>                    | 4         | -        | 4         |
| A60018 | Human Values and Professional Ethics    |           |          |           |
| A60017 | Intellectual Property Rights            |           |          |           |
| A60117 | Disaster Management                     |           |          |           |
| A60514 | Compiler Design                         | 4         | -        | 4         |
| A60409 | Data Communications                     | 4         | -        | 4         |
| A60523 | Multimedia Technologies                 | 4         | -        | 4         |
| A60494 | Microprocessors and Microcontroller Lab | -         | 3        | 2         |
| A60086 | Advanced Communication Skills Lab       | -         | 3        | 2         |
|        | <b>Total</b>                            | <b>24</b> | <b>6</b> | <b>28</b> |

**IV YEAR I SEMESTER**

| Code   | Subject                          | L         | T/P/D    | C         |
|--------|----------------------------------|-----------|----------|-----------|
| A70432 | VLSI Design                      | 4         | -        | 4         |
| A70515 | Computer Networks                | 4         | -        | 4         |
| A70439 | Embedded Systems.                | 4         | -        | 4         |
| A70517 | Linux Programming                | 4         | -        | 4         |
|        | <b>Elective - I</b>              | 4         | -        | 4         |
| A70434 | Cellular & Mobile Communications |           |          |           |
| A70526 | Artificial Intelligence          |           |          |           |
| A70529 | Computer Graphics                |           |          |           |
|        | <b>Elective - II</b>             | 4         | -        | 4         |
| A70436 | Digital Image Processing         |           |          |           |
| A70519 | Cloud Computing                  |           |          |           |
| A70520 | Data Warehousing and Data Mining |           |          |           |
| A70594 | Computer Networks Lab            | -         | 3        | 2         |
| A70596 | Linux Programming Lab            | -         | 3        | 2         |
|        | <b>Total</b>                     | <b>24</b> | <b>6</b> | <b>28</b> |

**IV YEAR II SEMESTER**

| Code   | Subject                              | L         | T/P/D     | C         |
|--------|--------------------------------------|-----------|-----------|-----------|
|        | <b>Elective -III:</b>                | 4         | -         | 4         |
| A80545 | Information Systems                  |           |           |           |
| A80453 | Telecommunications Switching Systems |           |           |           |
| A80543 | Database Security                    |           |           |           |
|        | <b>Elective - IV</b>                 | 4         | -         | 4         |
| A80444 | Optical Communications               |           |           |           |
| A80455 | Wireless Sensor Networks             |           |           |           |
| A80549 | Real Time Operating Systems          |           |           |           |
| A80449 | Network Security                     | 4         | -         | 4         |
| A80087 | Industry Oriented Mini Project       | -         | -         | 2         |
| A80089 | Seminar                              | -         | 6         | 2         |
| A80087 | Work Project                         | -         | 15        | 10        |
| A80090 | Comprehensive Viva                   | -         | -         | 2         |
|        | <b>Total</b>                         | <b>12</b> | <b>21</b> | <b>28</b> |

**Note:** All End Examinations (Theory and Practical) are of three hours duration.

**T-Tutorial L - Theory P - Practical D-Drawing C - Credits**

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**(A10001) ENGLISH****Introduction:**

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competencies of Engineering students. The prescribed books and the exercises are meant to serve broadly as students' handbooks.

In the English classes, the focus should be on the skills of reading, writing, listening and speaking and for this the teachers should use the text prescribed for detailed study. For example, the students should be encouraged to read the texts/selected paragraphs silently. The teachers can ask comprehension questions to stimulate discussion and based on the discussions students can be made to write short paragraphs/essays etc.

The text for non-detailed study is for extensive reading/reading for pleasure. Hence, it is suggested that they read it on their own the topics selected for discussion in the class. The time should be utilized for working out the exercises given after each section, as also for supplementing the exercises with authentic materials of a similar kind for example, from newspaper articles, advertisements, promotional material etc.. However, the stress in this syllabus is on skill development, fostering ideas and practice of language skills.

**Objectives:**

- To improve the language proficiency of the students in English with emphasis on LSRW skills.
- To equip the students to study academic subjects more effectively using the theoretical and practical components of the English syllabus.
- To develop the study skills and communication skills in formal and informal situations.

**SYLLABUS:****Listening Skills:****Objectives**

1. To enable students to develop their listening skill so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation.
2. To equip students with necessary training in listening so that they

can comprehend the speech of people of different backgrounds and regions.

*Students should be given practice in listening to the sounds of the language to be able to recognise them, to distinguish between them to mark stress and recognise and use the right intonation in sentences.*

- Listening for general content
- Listening to fill up information
- Intensive listening
- Listening for specific information

#### **Speaking Skills:**

Objectives

1. To make students aware of the role of speaking in English and its contribution to their success.
  2. To enable students to express themselves fluently and appropriately in social and professional contexts.
- Oral practice
  - Describing objects/situations/people
  - Role play – Individual/Group activities (Using exercises from the five units of the prescribed text: **Skills Annexe -Functional English for Success**)
  - Just A Minute(JAM) Sessions.

#### **Reading Skills:**

Objectives

1. To develop an awareness in the students about the significance of silent reading and comprehension.
  2. To develop the ability of students to guess the meanings of words from context and grasp the overall message of the text, draw inferences etc.
- Skimming the text
  - Understanding the gist of an argument
  - Identifying the topic sentence
  - Inferring lexical and contextual meaning
  - Understanding discourse features
  - Scanning
  - Recognizing coherence/sequencing of sentences

*NOTE : The students will be trained in reading skills using the prescribed text for detailed study.*

*They will be examined in reading and answering questions using 'unseen' passages which may be taken from authentic texts, such as magazines/newspaper articles.*

### **Writing Skills :**

#### Objectives

1. To develop an awareness in the students about writing as an exact and formal skill.
2. To equip them with the components of different forms of writing, beginning with the lower order ones.
  - Writing sentences
  - Use of appropriate vocabulary
  - Paragraph writing
  - Coherence and cohesiveness
  - Narration / description
  - Note Making
  - Formal and informal letter writing
  - Describing graphs using expressions of comparison

#### **TEXTBOOKS PRESCRIBED:**

In order to improve the proficiency of the student in the acquisition of the four skills mentioned above, the following texts and course content, divided into Five Units, are prescribed:

**For Detailed study:** First Textbook: "Skills Annexe -Functional English for Success", Published by Orient Black Swan, Hyderabad

#### **For Non-detailed study**

1. **Second text book "Epitome of Wisdom"**, Published by Maruthi Publications, Guntur
  - The course content and study material is divided into Five Units.

#### **Unit –I:**

1. Chapter entitled '**Wit and Humour**' from '**Skills Annexe**' -Functional English for Success, Published by Orient Black Swan, Hyderabad
  2. Chapter entitled '**Mokshagundam Visvesvaraya**' from "**Epitome of Wisdom**", Published by Maruthi Publications, Hyderabad.
- L- Listening For Sounds, Stress and Intonation  
 S- Greeting and Taking Leave, Introducing Oneself and Others (Formal and Informal Situations)  
 R- Reading for Subject/ Theme  
 W- Writing Paragraphs

- G- Types of Nouns and Pronouns
- V- Homonyms, homophones synonyms, antonyms

**Unit –II**

1. Chapter entitled “**Cyber Age**” from “**Skills Annexe -Functional English for Success**” Published by Orient Black Swan, Hyderabad.
  2. Chapter entitled '**Three Days To See**' from “**Epitome of Wisdom**”, Published by Maruthi Publications, Hyderabad.
- L – Listening for themes and facts
  - S – Apologizing, interrupting, requesting and making polite conversation
  - R- for theme and gist
  - W- Describing people, places, objects, events
  - G- Verb forms
  - V- noun, verb, adjective and adverb

**Unit –III**

1. Chapter entitled '**Risk Management**' from “**Skills Annexe - Functional English for Success**” Published by Orient Black Swan, Hyderabad
  2. Chapter entitled '**Leela's Friend**' by R.K. Narayan from “**Epitome of Wisdom**”, Published by Maruthi Publications, Hyderabad
- L – for main points and sub-points for note taking
  - S – giving instructions and directions; Speaking of hypothetical situations
  - R – reading for details
  - W – note-making, information transfer, punctuation
  - G – present tense
  - V – synonyms and antonyms

**Unit –IV**

1. Chapter entitled '**Human Values and Professional Ethics**' from “**Skills Annexe -Functional English for Success**” Published by Orient Black Swan, Hyderabad
  2. Chapter entitled '**The Last Leaf**' from “**Epitome of Wisdom**”, Published by Maruthi Publications, Hyderabad
- L - Listening for specific details and information
  - S- narrating, expressing opinions and telephone interactions
  - R - Reading for specific details and information
  - W- Writing formal letters and CVs
  - G- Past and future tenses



V- Vocabulary - idioms and Phrasal verbs

**Unit –V**

1. Chapter entitled '**Sports and Health**' from “**Skills Annexe - Functional English for Success**” Published by Orient Black Swan, Hyderabad
  2. Chapter entitled '**The Convocation Speech**' by N.R. Narayanmurthy from “**Epitome of Wisdom**”, Published by Maruthi Publications, Hyderabad
- L- Critical Listening and Listening for speaker's tone/ attitude  
 S- Group discussion and Making presentations  
 R- Critical reading, reading for reference  
 W- Project proposals; Technical reports, Project Reports and Research Papers  
 G- Adjectives, prepositions and concord  
 V- Collocations and Technical vocabulary

Using words appropriately

- \* Exercises from the texts not prescribed shall also be used for classroom tasks.

**REFERENCES :**

1. Contemporary English Grammar Structures and Composition by David Green, MacMillan Publishers, New Delhi. 2010.
2. Innovate with English: A Course in English for Engineering Students, edited by T Samson, Foundation Books.
3. English Grammar Practice, Raj N Bakshi, Orient Longman.
4. Technical Communication by Daniel Riordan. 2011. Cengage Publications. New Delhi.
5. Effective English, edited by E Suresh Kumar, A RamaKrishna Rao, P Sreehari, Published by Pearson
6. Handbook of English Grammar & Usage, Mark Lester and Larry Beason, Tata Mc Graw –Hill.
7. Spoken English, R.K. Bansal & JB Harrison, Orient Longman.
8. Technical Communication, Meenakshi Raman, Oxford University Press
9. Objective English Edgar Thorpe & Showick Thorpe, Pearson Education
10. Grammar Games, Renuvolcuri Mario, Cambridge University Press.
11. Murphy's English Grammar with CD, Murphy, Cambridge University

Press.

12. Everyday Dialogues in English, Robert J. Dixon, Prentice Hall India Pvt Ltd.,
13. ABC of Common Errors Nigel D Turton, Mac Millan Publishers.
14. Basic Vocabulary Edgar Thorpe & Showick Thorpe, Pearson Education
15. Effective Technical Communication, M Ashraf Rizvi, Tata Mc Graw – Hill.
16. An Interactive Grammar of Modern English, Shivendra K. Verma and Hemlatha Nagarajan , Frank Bros & CO
17. A Communicative Grammar of English, Geoffrey Leech, Jan Svartvik, Pearson Education
18. Enrich your English, Thakur K B P Sinha, Vijay Nicole Imprints Pvt Ltd.,
19. A Grammar Book for You And I, C. Edward Good, MacMillan Publishers

**Outcomes:**

- Usage of English Language, written and spoken.
- Enrichment of comprehension and fluency
- Gaining confidence in using language in verbal situations.

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|                           | <b>3</b> | <b>1/-/-</b> | <b>6</b> |

**(A10002) MATHEMATICS -I****Objectives:** To learn

- The types of Matrices and their properties.
- Concept of rank of a matrix and applying the concept of rank to know the consistency of linear equations and to find all possible solutions, if exist.
- The concept of eigenvalues and eigenvectors of a matrix is to reduce a quadratic form into a canonical form through a linear transformation.
- The mean value theorems and to understand the concepts geometrically.
- The functions of several variables and optimization of these functions.
- The evaluation of improper integrals, Beta and Gamma functions.
- Multiple integration and its applications.
- Methods of solving the differential equations of 1<sup>st</sup> and higher order
- The applications of the differential equations to Newton's law of cooling, Natural growth and decay, Bending of beams etc.
- The definition of integral transforms and Laplace Transform.
- Properties of Laplace transform.
- Inverse Laplace Transform.
- Convolution theorem.
- Solution of Differential equations using Laplace transform.

**UNIT-I**

**Theory of Matrices:** Real matrices – Symmetric, skew – symmetric, orthogonal. Complex matrices: Hermitian, Skew-Hermitian and Unitary Matrices. Idempotent matrix, Elementary row and column transformations-Elementary matrix, Finding rank of a matrix by reducing to Echelon and normal forms. Finding the inverse of a non-singular square matrix using row/ column transformations (Gauss- Jordan method). Consistency of system of linear equations (homogeneous and non- homogeneous) using the rank of a matrix. Solving  $m \times n$  and  $n \times n$  linear system of equations by Gauss elimination.

Cayley-Hamilton Theorem (without proof) – Verification. Finding inverse of a matrix and powers of a matrix by Cayley-Hamilton theorem, Linear dependence and Independence of Vectors. Linear Transformation –

Orthogonal Transformation. Eigen values and eigen vectors of a matrix. Properties of eigen values and eigen vectors of real and complex matrices. Finding linearly independent eigen vectors of a matrix when the eigen values of the matrix are repeated.

Diagonalization of matrix – Quadratic forms up to three variables. Rank – Positive definite, negative definite, semi definite, index, signature of quadratic forms. Reduction of a quadratic form to canonical form.

#### UNIT – II

**Differential calculus methods:** Rolle's Mean value Theorem – Lagrange's Mean Value Theorem – Cauchy's mean value Theorem – (all theorems without proof but with geometrical interpretations), verification of the Theorems and testing the applicability of these theorem to the given function.

Functions of several variables: Functional dependence- Jacobian- Maxima and Minima of functions of two variables without constraints and with constraints-Method of Lagrange multipliers.

#### UNIT – III

**Improper integration, Multiple integration & applications:** Gamma and Beta Functions –Relation between them, their properties – evaluation of improper integrals using Gamma / Beta functions

Multiple integrals – double and triple integrals – change of order of integration-change of variables (polar, cylindrical and spherical) Finding the area of a region using double integration and volume of a region using triple integration.

#### UNIT – IV

**Differential equations and applications :** Overview of differential equations-exact, linear and Bernoulli (NOT TO BE EXAMINED). Applications of first order differential equations – Newton's Law of cooling, Law of natural growth and decay, orthogonal trajectories.

Linear differential equations of second and higher order with constant coefficients, Non-homogeneous term of the type  $f(X) = e^{ax}$ ,  $\sin ax$ ,

$\cos ax$ , and  $x^n$ ,  $e^{ax} V(x)$ ,  $x^n V(x)$ , method of variation of parameters.

Applications to bending of beams, Electrical circuits and simple harmonic motion.

#### UNIT – V

**Laplace transform and its applications to Ordinary differential equations**

Definition of Integral transform, Domain of the function and Kernel for the Laplace transforms. Existence of Laplace transform. Laplace transform of standard functions, first shifting Theorem, Laplace transform of functions when they are multiplied or divided by "t". Laplace transforms of derivatives and integrals of functions. – Unit step function – second shifting theorem –

Dirac's delta function, Periodic function – Inverse Laplace transform by Partial fractions( Heaviside method) Inverse Laplace transforms of functions when they are multiplied or divided by "s", Inverse Laplace Transforms of derivatives and integrals of functions, Convolution theorem -- Solving ordinary differential equations by Laplace transforms.

**TEXT BOOKS:**

1. Advanced engineering Mathematics by Kreyszig, John Wiley & Sons Publishers.
2. Higher Engineering Mathematics by B.S. Grewal, Khanna Publishers.

**REFERENCES:**

1. Advanced Engineering Mathematics by R.K. Jain & S.R.K. Iyengar, 3<sup>rd</sup> edition, Narosa Publishing House, Delhi.
2. Engineering Mathematics – I by T.K. V. Iyengar, B. Krishna Gandhi & Others, S. Chand.
3. Engineering Mathematics – I by D. S. Chandrasekhar, Prison Books Pvt. Ltd.
4. Engineering Mathematics – I by G. Shanker Rao & Others I.K. International Publications.
5. Advanced Engineering Mathematics with MATLAB, Dean G. Duffy, 3<sup>rd</sup> Edi, CRC Press Taylor & Francis Group.
6. Mathematics for Engineers and Scientists, Alan Jeffrey, 6<sup>th</sup> Edi, 2013, Chapman & Hall/ CRC
7. Advanced Engineering Mathematics, Michael Greenberg, Second Edition, Pearson Education.

**Outcome:**

- After learning the contents of this Unit the student is able to write the matrix representation of a set of linear equations and to analyze solutions of system of equations.
- The student will be able to understand the methods of differential calculus to optimize single and multivariable functions.
- The student is able to evaluate the multiple integrals and can apply the concepts to find the Areas, Volumes, Moment of Inertia etc., of regions on a plane or in space.
- The student is able to identify the type of differential equation and uses the right method to solve the differential equation. Also able to apply the theory of differential equations to the real world problems.
- The student is able to solve certain differential equations using Laplace Transform. Also able to transform functions on time domain to frequency domain using Laplace transforms.

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| 3 | -/-   | 6 |

**(A10003) MATHEMATICAL METHODS****Objectives:**

- The objective is to find the relation between the variables x and y out of the given data (x,y).
- This unit also aims to find such relationships which exactly pass through data or approximately satisfy the data under the condition of least sum of squares of errors.
- The aim of numerical methods is to provide systematic methods for solving problems in a numerical form using the given initial data.
- This topic deals with methods to find roots of an equation and solving a differential equation.
- The numerical methods are important because finding an analytical procedure to solve an equation may not be always available.
- In the diverse fields like electrical circuits, electronic communication, mechanical vibration and structural engineering, periodic functions naturally occur and hence their properties are very much required.
- Indeed, any periodic and non-periodic function can be best analyzed in one way by Fourier series and transforms methods.
- The unit aims at forming a partial differential equation (PDE) for a function with many variables and their solution methods. Two important methods for first order PDE's are learnt. While separation of variables technique is learnt for typical second order PDE's such as Wave, Heat and Laplace equations.
- In many Engineering fields the physical quantities involved are vector-valued functions.
- Hence the unit aims at the basic properties of vector-valued functions and their applications to line integrals, surface integrals and volume integrals.

**UNIT – I:****Interpolation and Curve fitting:**

**Interpolation:** Introduction- Errors in Polynomial Interpolation – Finite differences- Forward Differences- Backward differences –Central differences – Symbolic relations and separation of symbols- Difference Equations – Differences of a polynomial-Newton's formulae for interpolation – Central difference interpolation Formulae – Gauss Central Difference Formulae –

Interpolation with unevenly spaced points-Lagrange's Interpolation formula.  
B. Spline interpolation – Cubic spline.

**Curve fitting:** Fitting a straight line –Second degree curve-exponential curve-power curve by method of least squares.

#### UNIT – II :

##### Numerical techniques:

**Solution of Algebraic and Transcendental Equations and Linear system of equations:** Introduction – Graphical interpretation of solution of equations .The Bisection Method – The Method of False Position – The Iteration Method – Newton-Raphson Method .

Solving system of non-homogeneous equations by L-U Decomposition method(Crout's Method)Jacobi's and Gauss-Seidel Iteration method

**Numerical Differentiation, Integration, and Numerical solutions of First order differential equations:** Numerical differentiation, Numerical integration - Trapezoidal rule, Simpson's 1/3<sup>rd</sup> and 3/8 Rule , Generalized Quadrature.

**Numerical solution of Ordinary Differential equations:** Solution by Taylor's series method –Picard's Method of successive Approximation- single step methods-Euler's Method-Euler's modified method, Runge-Kutta Methods, Predictor –corrector methods(Milne's Method and Adams-Bashforth methods only).

#### UNIT – III:

**Fourier series and Fourier Transforms:** Definition of periodic function.

Fourier expansion of periodic functions in a given interval of length  $2\pi$   
Determination of Fourier coefficients – Fourier series of even and odd functions – Fourier series in an arbitrary interval – even and odd periodic continuation – Half-range Fourier sine and cosine expansions.

Fourier integral theorem - Fourier sine and cosine integrals. Fourier transforms – Fourier sine and cosine transforms – properties – inverse transforms – Finite Fourier transforms.

#### UNIT-IV:

**Partial differential equations :** Introduction and Formation of partial differential equation by elimination of arbitrary constants and arbitrary functions, solutions of first order linear (Lagrange) equation and non-linear equations (Charpit's method), Method of separation of variables for second order equations –Applications of Partial differential equations-Two dimensional wave equations, Heat equation.

#### UNIT – V

**Vector Calculus:** Vector Calculus: Scalar point function and vector point

function, Gradient- Divergence- Curl and their related properties - Laplacian operator, Line integral – work done – Surface integrals -Volume integral. Green's Theorem, Stoke's theorem and Gauss's Divergence Theorems (Statement & their Verification). Solenoidal and irrotational vectors, Finding Potential function.

**TEXT BOOKS:**

1. Advanced Engineering Mathematics by Kreyszig, John Wiley & Sons.
2. Higher Engineering Mathematics by Dr. B.S. Grewal, Khanna Publishers.

**REFERENCES:**

1. Mathematical Methods by T.K.V. Iyengar, B.Krishna Gandhi & Others, S. Chand.
2. Introductory Methods by Numerical Analysis by S.S. Sastry, PHI Learning Pvt. Ltd.
3. Mathematical Methods by G.Shankar Rao, I.K. International Publications, N.Delhi
4. Mathematical Methods by V. Ravindranath, Etl, Himalaya Publications.
5. Advanced Engineering Mathematics with MATLAB, Dean G. Duffy, 3<sup>rd</sup> Edi, 2013, CRC Press Taylor & Francis Group.
6. Mathematics for Engineers and Scientists, Alan Jeffrey, 6<sup>th</sup> Edi, 2013, Chapman & Hall/ CRC
7. Advanced Engineering Mathematics, Michael Greenberg, Second Edition. Pearson Education.

**Outcomes:**

From a given discrete data, one will be able to predict the value of the data at an intermediate point and by curve fitting, can find the most appropriate formula for a guessed relation of the data variables. This method of analysis data helps engineers to understand the system for better interpretation and decision making

- After studying this unit one will be able to find a root of a given equation and will be able to find a numerical solution for a given differential equation.
- Helps in describing the system by an ODE, if possible. Also, suggests to find the solution as a first approximation.
- One will be able to find the expansion of a given function by Fourier series and Fourier Transform of the function.
- Helps in phase transformation, Phase change and attenuation of coefficients in acoustics.



- After studying this unit, one will be able to find a corresponding Partial Differential Equation for an unknown function with many independent variables and to find their solution.
- Most of the problems in physical and engineering applications, problems are highly non-linear and hence expressing them as PDEs'. Hence understanding the nature of the equation and finding a suitable solution is very much essential.
- After studying this unit, one will be able to evaluate multiple integrals (line, surface, volume integrals) and convert line integrals to area integrals and surface integrals to volume integrals.
- It is an essential requirement for an engineer to understand the behavior of the physical system.

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|                           | <b>3</b> | <b>-/-</b>   | <b>6</b> |

**(A10004) ENGINEERING PHYSICS****Objectives:**

It gives

- to the students basic understanding of bonding in solids, crystal structures and techniques to characterize crystals.
- to understand the behavior of electron in a solid and thereby one can determine the conductivity and specific heat values of the solids.
- to study applications in Engineering like memory devices, transformer core and Electromagnetic machinery.
- to help the student to design powerful light sources for various Engineering Applications and also enable them to develop communication systems using Fiber Technology.
- to understand the working of Electronic devices, how to design acoustic proof halls and understand the behavior of the materials at Nano scale.

**UNIT-I**

**Crystallography:** Ionic Bond, Covalent Bond, Metallic Bond, Hydrogen Bond, Vander-Waal's Bond, Calculation of Cohesive Energy of diatomic molecule-Space Lattice, Unit Cell, Lattice Parameters, Crystal Systems, Bravais Lattices, Atomic Radius, Co-ordination Number and Packing Factor of SC, BCC, FCC, Miller Indices, Crystal Planes and Directions, Inter Planar Spacing of Orthogonal Crystal Systems, Structure of Diamond and NaCl.

**X-ray Diffraction & Defects in Crystals:** Bragg's Law, X-Ray diffraction methods: Laue Method, Powder Method: Point Defects: Vacancies, Substitutional, Interstitial, Frenkel and Schottky Defects, line defects (Qualitative) & Burger's Vector.

**UNIT-II**

**Principles of Quantum Mechanics:** Waves and Particles, de Broglie Hypothesis, Matter Waves, Davisson and Germer' Experiment, Heisenberg's Uncertainty Principle, Schrödinger's Time Independent Wave Equation - Physical Significance of the Wave Function – Infinite square well potential, extension to three dimensions

**Elements of Statistical Mechanics & Electron theory of Solids:** Phase space, Ensembles, Micro Canonical, Canonical and Grand Canonical Ensembles - Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac Statistics (Qualitative Treatment), Concept of Electron Gas, Density of States, Fermi

Energy- Electron in a periodic Potential, Bloch Theorem, Kronig-Penny Model (Qualitative Treatment), E-K curve, Origin of Energy Band Formation in Solids, Concept of Effective Mass of an Electron, Classification of Materials into Conductors, Semi Conductors & Insulators.

#### **UNIT-III**

**Dielectric Properties:** Electric Dipole, Dipole Moment, Dielectric Constant, Polarizability, Electric Susceptibility, Displacement Vector, Electronic, Ionic and Orientation Polarizations and Calculation of Polarizabilities: Ionic and Electronic - Internal Fields in Solids, Clausius - Mossotti Equation, Piezo - electricity and Ferro- electricity.

**Magnetic Properties & Superconducting Properties:** Permeability, Field Intensity, Magnetic Field Induction, Magnetization, Magnetic Susceptibility, Origin of Magnetic Moment, Bohr Magnetron, Classification of Dia, Para and Ferro Magnetic Materials on the basis of Magnetic Moment, Domain Theory of Ferro Magnetism on the basis of Hysteresis Curve, Soft and Hard Magnetic Materials, Properties of Anti-Ferro and Ferri Magnetic Materials and their Applications, Superconductivity, Meissner Effect, Effect of Magnetic field, Type-I & Type-II Superconductors, Applications of Superconductors.

#### **UNIT-IV**

**Optics:** Interference-Interference in thin films (Reflected light), Newton rings experiment- Fraunhofer diffraction due to single slit, N-slits, Diffraction grating experiment , Double refraction-construction and working of Nicol's Prism.

**Lasers & Fiber Optics:** Characteristics of Lasers, Spontaneous and Stimulated Emission of Radiation, Einstein's Coefficients and Relation between them, Population Inversion, Lasing Action, Ruby Laser, Helium-Neon Laser, Semiconductor Diode Laser, Applications of Lasers- Principle of Optical Fiber, Construction of fiber, Acceptance Angle and Acceptance Cone, Numerical Aperture, Types of Optical Fibers: Step Index and Graded Index Fibers, Attenuation in Optical Fibers, Application of Optical Fiber in communication systems.

#### **UNIT-V:**

**Semiconductor Physics:** Fermi Level in Intrinsic and Extrinsic Semiconductors, Calculation of carrier concentration in Intrinsic &, Extrinsic Semiconductors, Direct and Indirect Band gap semiconductors, Hall Effect-Formation of PN Junction, Open Circuit PN Junction, Energy Diagram of PN Diode, Diode Equation, I-V Characteristics of PN Junction diode, Solar cell, LED & Photo Diodes. Acoustics of Buildings & Acoustic Quieting: Reverberation and Time of Reverberation, Sabine's Formula for Reverberation Time, Measurement of Absorption Coefficient of a Material, factors affecting the Architectural Acoustics and their Remedies.

**Nanotechnology:** Origin of Nanotechnology, Nano Scale, Surface to Volume

Ratio, Quantum Confinement, Bottom-up Fabrication: Sol-gel, Top-down Fabrication: Chemical Vapour Deposition, Characterization by TEM.

**TEXT BOOKS:**

1. Engineering Physics, K. Malik, A. K. Singh, Tata Mc Graw Hill Book Publishers.
2. Engineering Physics, V. Rajendran, Tata Mc Graw Hill Book Publishers.

**REFERENCES:**

1. Fundamentals of Physics, David Halliday, Robert Resnick, Jearl Walker by John Wiley & Sons.
2. Sears and Zemansky's University Physics (10<sup>th</sup> Edition) by Hugh D. Young Roger A. Freedman, T. R. Sandin, A. Lewis Ford Addison-Wesley Publishers.
3. Applied Physics for Engineers – P. Madhusudana Rao (Academic Publishing company, 2013).
4. Solid State Physics – M. Arumugam (Anuradha Publications).
5. Modern Physics – R. Murugesan & K. Siva Prasath – S. Chand & Co. (for Statistical Mechanics).
6. A Text Book of Engg Physics – M. N. Avadhanulu & P. G. Khsirsagar – S. Chand & Co. (for acoustics).
7. Modern Physics by K. Vijaya Kumar, S. Chandralingam: S. Chand & Co.Ltd.
8. Nanotechnology – M. Ratner & D. Ratner (Pearson Ed.).
9. Introduction to Solid State Physics – C. Kittel (Wiley Eastern).
10. Solid State Physics – A.J. Dekker (Macmillan).
11. Applied Physics – Mani Naidu Pearson Education.

**Outcomes:**

- The student would be able to learn the fundamental concepts on behavior of crystalline solids.
- The knowledge on Fundamentals of Quantum Mechanics, Statistical Mechanics enables the student to apply to various systems like Communications Solar Cells, Photo Cells and so on.
- Design, Characterization and study of properties of materials help the student to prepare new materials for various Engineering applications.
- This course also helps the student exposed to non-destructive testing methods.
- Finally, Engineering Physics Course helps the student to develop problem solving skills and analytical skills.

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|                           | <b>3</b> | <b>-/-</b>   | <b>6</b> |

**(A10005) ENGINEERING CHEMISTRY****Objective:**

An engineer is as someone who uses scientific, natural and physical principles to design something of use for people or other living creatures. Much of what any engineer does involves chemistry because everything in our environment has a molecular make up. Engineering requires the concepts of applied chemistry and the more chemistry an engineer understands, the more beneficial it is. In the future, global problems and issues will require an in-depth understanding of chemistry to have a global solution. This syllabus aims at bridging the concepts and theory of chemistry with examples from fields of practical application, thus reinforcing the connection between science and engineering. It deals with the basic principles of various branches of chemistry which are fundamental tools necessary for an accomplished engineer.

**UNIT I:**

**Electrochemistry & Corrosion:** Electro Chemistry – Conductance - Specific, Equivalent and Molar conductance and their Units; Applications of Conductance (Conductometric titrations). **EMF:** Galvanic Cells, types of Electrodes – (Calomel, Quinhydrone and glass electrodes); Nernst equation and its applications ; concept of concentration cells, electro chemical series, Potentiometric titrations, determination of  $P^H$  using glass electrode-Numerical problems.

**Batteries:** Primary cells (dry cells) and secondary cells (lead-Acid cell, Ni-Cd cell, Lithium cells). Applications of batteries. **Fuel cells** – Hydrogen – Oxygen fuel cell; methanol – oxygen fuel cell ; Advantages and Applications.

**Corrosion and its control:** Causes and effects of corrosion; Theories of corrosion – Chemical & Electrochemical corrosion; Types of corrosion (Galvanic, Water line, Pitting and Intergranular); Factors affecting rate of corrosion – Nature of metal and Nature of Environment – Corrosion control methods – Cathodic protection (sacrificial anodic and impressed current). Surface coatings: Metallic coatings & methods of application of metallic coatings - hot dipping (galvanization & tinning), Cementation, cladding, electroplating (copper plating ) Electroless plating (Ni plating) - Organic coatings – Paints - constituents and their functions.

**UNIT II:**

**Engineering Materials: Polymers:** Types of Polymerization (Chain & Step growth). **Plastics:** Thermoplastic & Thermo setting resins; Compounding &

fabrication of plastics (Compression and injection moulding). Preparation, properties, engineering applications of PVC, Teflon and Bakelite.

**Fibers**- Characteristics of fibers – preparation, properties and uses of Nylon – 6,6 and Dacron – Fiber Reinforced Plastics (FRP) – applications. **Rubbers** – Natural rubber and its vulcanization. Elastomers – Buna-s, Butyl rubber and Thiokol rubber.

**Conducting polymers**: Polyacetylene, Polyaniline, Mechanism of Conduction, doping; applications of Conducting polymers. **Bio-degradable Polymers**- preparation and Applications of Poly vinyl acetate and Poly lactic acid - **Cement**: composition of Portland cement, setting & hardening of cement (reactions), **Lubricants**: Classification with examples- Characteristics of a good lubricant & mechanism of lubrication (thick film, thin film and extreme pressure) – properties of lubricants: viscosity, Cloud point, flash and fire points. **Refractories**: Classification, characteristics of a good refractory and applications.

**Nanomaterials**: Introduction, preparation by sol-gel & chemical vapour deposition methods. Applications of nanomaterials.

#### UNIT III:

**Water and its Treatment**: Hardness of Water: Causes of hardness, expression of hardness – units – types of hardness, estimation of temporary & permanent hardness of water by EDTA method - numerical problems. Boiler troubles – Scale & sludges, Priming and foaming, caustic embrittlement and boiler corrosion; Treatment of boiler feed water – Internal treatment (Phosphate, Colloidal and calgon conditioning) – External treatment – Lime Soda process, Zeolite process and ion exchange process. Numerical Problems. **Potable Water**- Its Specifications – Steps involved in treatment of potable water – Disinfection of water by chlorination and ozonisation. Reverse osmosis & its significance.

#### Unit – IV :

**Fuels & Combustion: Fuels** – Classification – solid fuels : coal – analysis of coal - proximate and ultimate analysis and their significance. Liquid fuels – petroleum and its refining – cracking – types – fixed bed catalytic cracking. Knocking – octane and cetane rating, synthetic petrol, Bergius and Fischer-Tropsch's process: Gaseous fuels - constituents, characteristics and applications of natural gas, LPG and CNG. Analysis of flue gas by Orsat's apparatus – Numerical Problems.

**Combustion** – Definition, Calorific value of fuel – HCV , LCV; Determination of calorific value by Junker's gas calorimeter – theoretical calculation of Calorific value by Dulong's formula – Numerical problems on combustion.

#### UNIT V:

**Phase Rule & Surface Chemistry : Phase Rule**: Definition of terms: Phase,

component, degree of freedom, phase rule equation. Phase diagrams – one component system- water system. Two component system Lead- Silver, cooling curves, heat treatment based on iron-carbon phase diagram - hardening, annealing and normalization.

**Surface Chemistry: Adsorption** – Types of Adsorption, Isotherms – Freundlich and Langmuir adsorption isotherm, applications of adsorption; **Colloids**: Classification of Colloids; Electrical & optical properties, micelles, applications of colloids in industry.

**TEXT BOOKS:**

1. Engineering Chemistry by R.P. Mani, K.N. Mishra, B. Rama Devi / CENGAGE learning.
2. Engineering Chemistry by P.C Jain & Monica Jain, Dhanpatrai Publishing Company (2008).

**REFERENCE BOOKS**

1. Engineering Chemistry by B. Siva Shankar Mc.Graw Hill Publishing Company Limited, New Delhi (2006).
2. Engineering Chemistry J.C. Kuriacase & J. Rajaram, Tata McGraw Hills Publishing Company Limited, New Delhi (2004).
3. Text Book of Engineering Chemistry by S.S. Dara & Mukkati S. Chand & Co Publishers, New Delhi (2006).
4. Chemistry of Engineering Materials by CV Agarwal, C.P Murthy, A.Naidu, BS Publications.

**Outcome:**

- Students will demonstrate a depth of knowledge and apply the methods of inquiry in a discipline of their choosing, and they will demonstrate a breadth of knowledge across their choice of varied disciplines.
- Students will demonstrate the ability to access and interpret information, respond and adapt to changing situations, make complex decisions, solve problems, and evaluate actions.
- Students will demonstrate awareness and understanding of the skills necessary to live and work in a diverse engineering world.

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**(A10501) COMPUTER PROGRAMMING****Objectives:**

- To understand the various steps in Program development.
- To understand the basic concepts in C Programming Language.
- To learn how to write modular and readable C Programs.
- To learn to write programs (using structured programming approach) in C to solve problems.
- To introduce the students to basic data structures such as lists, stacks and queues.
- To make the student understand simple sorting and searching methods.

**UNIT - I**

Introduction to Computers – Computer Systems, Computing Environments, Computer Languages, Creating and running programs, Program Development.

Introduction to the C Language – Background, C Programs, Identifiers, Types, Variables, Constants, Input / Output, Operators (Arithmetic, relational, logical, bitwise etc.), Expressions, Precedence and Associativity, Expression Evaluation, Type conversions, Statements- Selection Statements (making decisions) – if and switch statements, Repetition statements (loops)-while, for, do-while statements, Loop examples, other statements related to looping – break, continue, goto, Simple C Program examples.

**UNIT - II**

Functions-Designing Structured Programs, Functions, user defined functions, inter function communication, Standard functions, Scope, Storage classes-auto, register, static, extern, scope rules, type qualifiers, recursion- recursive functions, Limitations of recursion, example C programs, Preprocessor commands.

Arrays – Concepts, using arrays in C, inter function communication, array applications, two – dimensional arrays, multidimensional arrays, C program examples.

**UNIT - III**

Pointers – Introduction (Basic Concepts), Pointers for inter function communication, pointers to pointers, compatibility, Pointer Applications-Arrays and Pointers, Pointer Arithmetic and arrays, Passing an array to a function,



memory allocation functions, array of pointers, programming applications, pointers to void, pointers to functions.

Strings – Concepts, C Strings, String Input / Output functions, arrays of strings, string manipulation functions, string / data conversion, C program examples.

#### **UNIT - IV**

Enumerated, Structure, and Union Types– The Type Definition (typedef), Enumerated types, Structures –Declaration, initialization, accessing structures, operations on structures, Complex structures, structures and functions, Passing structures through pointers, self referential structures, unions, bit fields, C programming examples, command –line arguments.

Input and Output – Concept of a file, streams, text files and binary files, Differences between text and binary files, State of a file, Opening and Closing files, file input / output functions (standard library input / output functions for files), file status functions (error handling), Positioning functions, C program examples.

#### **UNIT – V**

Searching and Sorting – Sorting- selection sort, bubble sort, Searching-linear and binary search methods.

Lists- Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, Stacks-Push and Pop Operations, Queues- Enqueue and Dequeue operations.

#### **TEXT BOOKS:**

1. Computer Science: A Structured Programming Approach Using C, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.
2. Programming in C. P. Dey and M Ghosh , Oxford University Press.

#### **REFERENCE BOOKS:**

1. C& Data structures – P. Padmanabham, Third Edition, B.S. Publications.
2. C for All, S. Thamarai Selvi, R.Murugesan, Anuradha Publications.
3. Problem Solving and Program Design in C, J.R. Hanly and E.B. Koffman, 7<sup>th</sup> Edition, Pearson education.
4. Programming in C, Ajay Mittal, Pearson.
5. Programming with C, B.Gottfried, 3<sup>rd</sup> edition, Schaum's outlines, TMH.
6. Problem solving with C, M.T.Somasekhara, PHI
7. Programming with C, R.S.Bickar, Universities Press.
8. Computer Programming & Data Structures, E.Balagurusamy, 4<sup>th</sup> edition, TMH.

9. Programming in C – Stephen G. Kochan, III Edition, Pearson Education.
10. The C Programming Language, B.W. Kernighan and Dennis M.Ritchie, PHI.
11. C Programming with problem solving, J.A. Jones & K. Harrow, Dreamtech Press.

**Outcomes:**

- Demonstrate the basic knowledge of computer hardware and software.
- Ability to apply solving and logical skills to programming in C language and also in other languages.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****I Year B.Tech. ECM**

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**(A10301) ENGINEERING DRAWING****UNIT – I**

**Introduction to Engineering Drawing:** Principles of Engineering Drawing/ Graphics – Various Drawing Instruments – Conventions in Drawing – **Lettering practice** – BIS Conventions.

**Curves:** Constructions of Curves used in Engineering Practice:

- a) Conic Sections including the Rectangular Hyperbola – General method only.
- b) Cycloid, Epicycloid and Hypocycloid.
- c) Involute.

**Scales:** Construction of different types of Scales, Plain, Diagonal, Vernier scale.

**UNIT – II****Orthographic Projections in First Angle**

**Projection:** Principles of Orthographic Projections – Conventions – First and Third Angle projections.

**Projections of Points :** including Points in all four quadrants.

**Projections of Lines :** Parallel, perpendicular, inclined to one plane and inclined to both planes. True length and true angle of a line. Traces of a line.

**Projections of Planes:** Plane parallel, perpendicular and inclined to one reference plane. Plane inclined to both the reference planes.

**UNIT – III**

**Projections of Solids:** Projections of regular solids, cube, prisms, pyramids, tetrahedron, cylinder and cone, axis inclined to both planes.

**Sections and Sectional Views:** Right Regular Solids – Prism, Cylinder, Pyramid, Cone – use of Auxiliary views.

**UNIT – IV**

**Development of Surfaces:** Development of Surfaces of Right, Regular Solids – Prisms, Cylinder, Pyramids, Cone and their parts. frustum of solids.

**Intersection of Solids:-** Intersection of Cylinder Vs Cylinder, Cylinder Vs Prism, Cylinder Vs Cone.

**UNIT – V**

**Isometric Projections :** Principles of Isometric Projection – Isometric Scale – Isometric Views– Conventions – Plane Figures, Simple and Compound

Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of parts with Spherical surface.

**Transformation of Projections** : Conversion of Isometric Views to Orthographic Views. Conversion of orthographic views to isometric views – simple objects.

**Perspective Projections** : Perspective View : Points, Lines and Plane Figures, Vanishing Point Methods (General Method only).

**TEXT BOOKS**

1. Engineering Drawing – Basant, Agrawal, TMH
2. Engineering Drawing, N.D. Bhatt

**REFERENCES :**

1. Engineering Graphics. P I Varghese Tata McGraw Hill Education Pvt. Ltd.
2. Engineering drawing – P.J. Shah .S.Chand Publishers.
3. Engineering Drawing- Johle/Tata Macgraw Hill Book Publishers.
4. Engineering Drawing – M.B. Shah and B.C. Rana, Pearson.
5. Engineering Drawing by K.Venu Gopal & V.Prabu Raja New Age Publications.
6. Engineering Drawing by John. PHI Learning Publisher.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**

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**(A10581) COMPUTER PROGRAMMING LAB****Objectives:**

- To write programs in C to solve the problems.
- To implement linear data structures such as lists, stacks, queues.
- To implement simple searching and sorting methods.

**Recommended Systems/Software Requirements:**

- Intel based desktop PC
- ANSI C Compiler with Supporting Editors

**Week 1**

- a) Write a C program to find the sum of individual digits of a positive integer.
- b) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
- c) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

**Week 2**

- a) Write a C program to calculate the following Sum:  
Sum= $1-x^2/2! +x^4/4!-x^6/6!+x^8/8!-x^{10}/10!$
- b) Write a C program to find the roots of a quadratic equation.

**Week 3**

- a) The total distance travelled by vehicle in 't' seconds is given by distance  $s = ut+1/2at^2$  where 'u' and 'a' are the initial velocity (m/sec.) and acceleration (m/sec<sup>2</sup>). Write C program to find the distance travelled at regular intervals of time given the values of 'u' and 'a'. The program should provide the flexibility to the user to select his own time intervals and repeat the calculations for different values of 'u' and 'a'.
- b) Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +, -, \*, /, % and use Switch Statement)

**Week 4**

- a) Write C programs that use both recursive and non-recursive functions
- i) To find the factorial of a given integer.

- ii) To find the GCD (greatest common divisor) of two given integers.

**Week 5**

- a) Write a C program to find the largest integer in a list of integers.
- b) Write a C program that uses functions to perform the following:
  - i) Addition of Two Matrices
  - ii) Multiplication of Two Matrices

**Week 6**

- a) Write a C program that uses functions to perform the following operations:
  - i) To insert a sub-string in to a given main string from a given position.
  - ii) To delete n Characters from a given position in a given string.
- b) Write a C program to determine if the given string is a palindrome or not

**Week 7**

- a) Write a C program that displays the position or index in the string S where the string T begins, or – 1 if S doesn't contain T.
- b) Write a C program to count the lines, words and characters in a given text.

**Week 8**

- a) Write a C program to generate Pascal's triangle.
- b) Write a C program to construct a pyramid of numbers.

**Week 9**

Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression:

$$1+x+x^2+x^3+\dots+x^n$$

For example: if n is 3 and x is 5, then the program computes 1+5+25+125.

Print x, n, the sum

Perform error checking. For example, the formula does not make sense for negative exponents – if n is less than 0. Have your program print an error message if  $n < 0$ , then go back and read in the next pair of numbers of without computing the sum. Are any values of x also illegal? If so, test for them too.

**Week 10**

- a) 2's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C program to find the 2's complement of a binary number.
- b) Write a C program to convert a Roman numeral to its decimal equivalent.

**Week 11**

Write a C program that uses functions to perform the following operations:

- i) Reading a complex number
- ii) Writing a complex number
- iii) Addition of two complex numbers
- iv) Multiplication of two complex numbers

(Note: represent complex number using a structure.)

**Week 12**

a) Write a C program which copies one file to another.

b) Write a C program to reverse the first n characters in a file.

(Note: The file name and n are specified on the command line.)

**Week 13**

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

b) Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file)

**Week 14**

a) Write a C program that uses non recursive function to search for a Key value in a given list of integers using Linear search.

b) Write a C program that uses non recursive function to search for a Key value in a given sorted list of integers using Binary search.

**Week 15**

a) Write a C program that implements the Selection sort method to sort a given array of integers in ascending order.

b) Write a C program that implements the Bubble sort method to sort a given list of names in ascending order.

**Week 16**

Write a C program that uses functions to perform the following operations:

- i) Create a singly linked list of integer elements.
- ii) Traverse, the above list and display the elements.

**Week 17**

Write a C program that implements stack (its operations) using a singly linked list to display a given list of integers in reverse order. Ex. input: 10 23 4 6 output: 6 4 23 10

**Week 18**

Write a C program that implements Queue (its operations) using a singly linked list to display a given list of integers in the same order. Ex. input: 10

23 4 6 output: 10 23 4 6

**Week 19**

Write a C program to implement the linear regression algorithm.

**Week 20**

Write a C program to implement the polynomial regression algorithm.

**Week 21**

Write a C program to implement the Lagrange interpolation.

**Week 22**

Write C program to implement the Newton- Gregory forward interpolation.

**Week 23**

Write a C program to implement Trapezoidal method.

**Week 24**

Write a C program to implement Simpson method.

**TEXT BOOKS:**

1. C programming and Data Structures, P. Padmanabham, Third Edition, BS Publications.
2. Computer Programming in C, V. Rajaraman, PHI Publishers.
3. C Programming, E.Balagurusamy, 3<sup>rd</sup> edition, TMH Publishers.
4. C Programming, M.V.S.S.N.Prasad, ACME Learning Pvt. Ltd.
5. C and Data Structures, N.B.Venkateswarlu and E.V.Prasad,S.Chand Publishers
6. Mastering C, K.R. Venugopal and S.R. Prasad, TMH Publishers.



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****I Year B.Tech. ECM****L T/P/D C****- -/3/- 4****(A10081) ENGINEERING PHYSICS / ENGINEERING CHEMISTRY LAB****ENGINEERING PHYSICS LAB****(Any TEN experiments compulsory)****Objectives**

This course on Physics lab is designed with 13 experiments in an academic year. It is common to all branches of Engineering in B.Tech 1<sup>st</sup> year.

The objective of the course is that the student will have exposure to various experimental skills which is very essential for an Engineering student.

The experiments are selected from various areas of Physics like Physical Optics, Lasers, Fiber Optics, Sound, Mechanics, Electricity & Magnetism and Basic Electronics.

Also the student is exposed to various tools like Screw gauge, Vernier Callipers, Physics Balance, Spectrometer and Microscope.

1. Dispersive power of the material of a prism – Spectrometer
2. Determination of wavelength of a source – Diffraction Grating.
3. Newton's Rings - Radius of curvature of plano convex lens.
4. Melde's experiment – Transverse and longitudinal modes.
5. Time constant of an R-C circuit.
6. L-C-R circuit.
7. Magnetic field along the axis of current carrying coil – Stewart and Gees method.
8. Study the characteristics of LED and LASER sources.
9. Bending losses of fibres & Evaluation of numerical aperture of a given fibre.
10. Energy gap of a material of p-n junction.
11. Torsional pendulum.
12. Wavelength of light –diffraction grating - using laser.
13. Characteristics of a solar cell

**LABORATORY MANUAL:**

1. Laboratory Manual of Engineering Physics by Dr.Y.Aparna & Dr.K.Venkateswara Rao (V.G.S Publishers)

**Outcomes**

The student is expected to learn from this laboratory course the concept of error and its analysis. It also allows the student to develop experimental skills to design new experiments in Engineering.

With the exposure to these experiments the student can compare the theory and correlate with experiment.

**ENGINEERING CHEMISTRY LAB**

List of Experiments ( Any 12 of the following)

**Titrimetry:**

1. Estimation of ferrous iron by dichrometry.
2. Estimation of hardness of water by EDTA method.

**Mineral analysis:**

3. Determination of percentage of copper in brass.
4. Estimation of manganese dioxide in pyrolusite.

**Instrumental Methods:****Colorimetry:**

5. Determination of ferrous iron in cement by colorimetric method
6. Estimation of copper by colorimetric method.

**Conductometry:**

7. Conductometric titration of strong acid vs strong base.
8. Conductometric titration of mixture of acids vs strong base.

**Potentiometry:**

9. Titration of strong acid vs strong base by potentiometry.
10. Titration of weak acid vs strong base by potentiometry.

**Physical properties:**

11. Determination of viscosity of sample oil by redwood / oswald's viscometer.
12. Determination of Surface tension of lubricants.

**Preparations:**

13. Preparation of Aspirin
14. Preparation of Thiokol rubber

**Adsorption:**

15. Adsorption of acetic acid on charcoal.

**TEXT BOOKS:**

1. Practical Engineering Chemistry by K. Mukkanti, etal, B.S. Publications, Hyderabad.
2. Inorganic quantitative analysis, Vogel.

**REFERENCE BOOKS:**

1. Text Book of engineering chemistry by R. N. Goyal and Harmendra Goel, Ane Books Private Ltd.,
2. A text book on experiments and calculation Engg. S.S. Dara.
3. Instrumental methods of chemical analysis, Chatwal, Anand, Himalaya Publications.

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**(A10083) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB**

The **Language Lab** focuses on the production and practice of sounds of language and familiarises the students with the use of English in everyday situations and contexts.

**Objectives**

- ☒ To facilitate computer-aided multi-media instruction enabling individualized and independent language learning.
- ☒ To sensitise the students to the nuances of English speech sounds, word accent, intonation and rhythm.
- ☒ To bring about a consistent accent and intelligibility in their pronunciation of English by providing an opportunity for practice in speaking.
- ☒ To improve the fluency in spoken English and neutralize mother tongue influence.
- ☒ To train students to use language appropriately for interviews, group discussion and public speaking.

**Syllabus: English Language Communication Skills Lab shall have two parts:**

- a. **Computer Assisted Language Learning (CALL) Lab**
- b. **Interactive Communication Skills (ICS) Lab**

The following course content is prescribed for the **English Language Communication Skills Lab**.

**Exercise – I**

**CALL Lab:** Introduction to Phonetics – Speech Sounds – Vowels and Consonants.

**ICS Lab:** Ice-Breaking activity and JAM session.

Articles, Prepositions, Word formation- Prefixes & Suffixes, Synonyms & Antonyms.

**Exercise – II**

**CALL Lab:** Structure of Syllables - Past Tense Marker and Plural Marker – Weak Forms and Strong Forms - Consonant Clusters.

**ICS Lab:** Situational Dialogues – Role-Play- Expressions in Various Situations – Self-introduction and Introducing Others – Greetings – Apologies –

Requests – Social and Professional Etiquette - Telephone Etiquette.

Concord (Subject in agreement with verb) and Words often misspelt-confused/misused

**Exercise - III**

**CALL Lab:** Minimal Pairs- Word accent and Stress Shifts- Listening Comprehension.

**ICS Lab:** Descriptions- Narrations- Giving Directions and guidelines. Sequence of Tenses, Question Tags and One word substitutes.

**Exercise – IV**

**CALL Lab:** Intonation and Common errors in Pronunciation.

**ICS Lab:** Extempore- Public Speaking

Active and Passive Voice, –Common Errors in English, Idioms and Phrases

**Exercise – V**

**CALL Lab:** Neutralization of Mother Tongue Influence and Conversation Practice

**ICS Lab:** Information Transfer- Oral Presentation Skills

Reading Comprehension and Job Application with Resume preparation.

**Minimum Requirement of infra structural facilities for ELCS Lab:**

**1. Computer Assisted Language Learning (CALL) Lab:**

**The Computer aided Language Lab** for 40 students with 40 systems, one master console, LAN facility and English language software for self- study by learners.

**System Requirement (Hardware component):**

*Computer network with Lan with minimum 60 multimedia systems with the following specifications:*

- (i) P – IV Processor
  - a) Speed – 2.8 GHZ
  - b) RAM – 512 MB Minimum
  - c) Hard Disk – 80 GB
- (ii) Headphones of High quality

**2. Interactive Communication Skills (ICS) Lab :**

**The Interactive Communication Skills Lab:** A Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V., a digital stereo –audio & video system and camcorder etc.

**Books Suggested for English Language Lab Library (to be located within**

**the lab in addition to the CDs of the text book which are loaded on the systems):**

1. Suresh Kumar, E. & Sreehari, P. 2009. *A Handbook for English Language Laboratories*. New Delhi: Foundation
2. *Speaking English Effectively* 2<sup>nd</sup> Edition by Krishna Mohan and N. P. Singh, 2011. Macmillan Publishers India Ltd. Delhi.
3. Sasi Kumar, V & Dhamija, P.V. *How to Prepare for Group Discussion and Interviews*. Tata McGraw Hill
4. Hancock, M. 2009. *English Pronunciation in Use. Intermediate*. Cambridge: CUP
5. Spoken English: A Manual of Speech and Phonetics by R. K. Bansal & J. B. Harrison. 2013. Orient Blackswan. Hyderabad.
6. Hewings, M. 2009. *English Pronunciation in Use. Advanced*. Cambridge: CUP
7. Marks, J. 2009. *English Pronunciation in Use. Elementary*. Cambridge: CUP
8. Nambiar, K.C. 2011. *Speaking Accurately. A Course in International Communication*. New Delhi : Foundation
9. Soundararaj, Francis. 2012. *Basics of Communication in English*. New Delhi: Macmillan
10. **Spoken English** (CIEFL) in 3 volumes with 6 cassettes, OUP.
11. **English Pronouncing Dictionary** Daniel Jones Current Edition with CD.
12. **A textbook of English Phonetics for Indian Students** by T. Balasubramanian (Macmillan)
13. **Prescribed Lab Manual:** A Manual entitled "*English Language Communication Skills (ELCS) Lab Manual- cum- Work Book*", published by Cengage Learning India Pvt. Ltd, New Delhi. 2013

**DISTRIBUTION AND WEIGHTAGE OF MARKS**

***English Language Laboratory Practical Examination:***

1. The practical examinations for the English Language Laboratory shall be conducted as per the University norms prescribed for the core engineering practical sessions.
2. For the Language lab sessions, there shall be a continuous evaluation during the year for 25 sessional marks and 50 year-end Examination marks. Of the 25 marks, 15 marks shall be awarded for day-to-day work and 10 marks to be awarded by conducting Internal Lab Test(s).

The year- end Examination shall be conducted by the teacher concerned with the help of another member of the staff of the same department of the same institution.

**Outcomes:**

- Better Understanding of nuances of language through audio- visual experience and group activities.
- Neutralization of accent for intelligibility.
- Speaking with clarity and confidence thereby enhancing employability skills of the students.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**

I Year B.Tech. ECM

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**(A10082) IT WORKSHOP / ENGINEERING WORKSHOP****Objectives:**

The IT Workshop for engineers is a training lab course spread over 54 hours. The modules include training on PC Hardware, Internet & World Wide Web and Productivity tools including Word, Excel and Power Point.

**PC Hardware** introduces the students to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like MS Windows, Linux and the required device drivers. In addition hardware and software level troubleshooting process, tips and tricks would be covered. **The students should work on working PC to disassemble and assemble to working condition and install Windows and Linux on the same PC. Students are suggested to work similar tasks in the Laptop scenario wherever possible.**

**Internet & World Wide Web** module introduces the different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet. Usage of web browsers, email, newsgroups and discussion forums would be covered. In addition, awareness of cyber hygiene, i.e., protecting the personal computer from getting infected with the viruses, worms and other cyber attacks would be introduced.

**Productivity tools** module would enable the students in crafting professional word documents, excel spread sheets and power point presentations using the Microsoft suite of office tools and LaTeX. **(Recommended to use Microsoft office 2007 in place of MS Office 2003)**

**PC Hardware**

**Week 1 – Task 1** : Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

**Week 2 – Task 2** : Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

**Week 3 – Task 3** : Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.



**Week 4 – Task 4 :** Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

**Week 5 – Task 5: Hardware Troubleshooting:** Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva

**Week 6 – Task 6 : Software Troubleshooting :** Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva.

#### **Internet & World Wide Web**

**Week 7 - Task 1 : Orientation & Connectivity Boot Camp :** Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

**Week 8 - Task 2 : Web Browsers, Surfing the Web :** Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

**Week 9 - Task 3 : Search Engines & Netiquette :** Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

**Week 10 - Task 4: Cyber Hygiene:** Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to first install antivirus software, configure their personal firewall and windows update on their computer. Then they need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

**Week 11- Task 5:** Develop your home page using HTML Consisting of your photo, name, address and education details as a table and your skill set as a list.

#### **Productivity tools**

##### **LaTeX and Word**

**Week 12 – Word Orientation:** The mentor needs to give an overview of LaTeX and Microsoft (MS) office 2007/ equivalent (FOSS) tool word: Importance of LaTeX and MS office 2007/ equivalent (FOSS) tool Word as word Processors, Details of the three tasks and features that would be covered in each, using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter.

**Task 1 : Using LaTeX and Word** to create project certificate. Features to be covered:-Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

**Week 13 - Task 2: Creating project abstract** Features to be covered:- Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

**Week 14 - Task 3 : Creating a Newsletter** : Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

#### **Excel**

**Week 15 - Excel Orientation:** The mentor needs to tell the importance of MS office 2007/ equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the two tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

**Task 1: Creating a Scheduler** - Features to be covered:- Gridlines, Format Cells, Summation, auto fill, Formatting Text

**Week 16 - Task 2 : Calculating GPA** - .Features to be covered:- Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP, Sorting, Conditional formatting

#### **LaTeX and MS/equivalent (FOSS) tool Power Point**

**Week 17 - Task1:** Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this week includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in both LaTeX and Power point. Students will be given model power point presentation which needs to be replicated (exactly how it's asked).

**Week 18- Task 2:** Second week helps students in making their presentations

interactive. Topic covered during this week includes: Hyperlinks, Inserting – Images, Clip Art, Audio, Video, Objects, Tables and Charts

**Week 19 - Task 3:** Concentrating on the in and out of Microsoft power point and presentations in LaTeX. Helps them learn best practices in designing and preparing power point presentation. Topic covered during this week includes: - Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), Inserting – Background, textures, Design Templates, Hidden slides.

**REFERENCE BOOKS:**

1. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
2. LaTeX Companion – Leslie Lamport, PHI/Pearson.
3. Introduction to Computers, Peter Norton, 6/e Mc Graw Hill Publishers.
4. Upgrading and Repairing, PC's 18<sup>th</sup> e, Scott Muller QUE, Pearson Education
5. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dreamtech
6. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. – CISCO Press, Pearson Education.
7. PC Hardware and A+Handbook – Kate J. Chase PHI (Microsoft)

**Outcomes:**

- Apply knowledge for computer assembling and software installation.
- Ability how to solve the trouble shooting problems.
- Apply the tools for preparation of PPT, Documentation and budget sheet etc.

**ENGINEERING WORKSHOP**

**1. TRADES FOR EXERCISES:**

**At least two exercises from each trade:**

1. Carpentry
2. Fitting
3. Tin-Smithy and Development of jobs carried out and soldering.
4. Black Smithy
5. House-wiring

6. Foundry
7. Welding
8. Power tools in construction, wood working, electrical engineering and mechanical Engineering.

**2. TRADES FOR DEMONSTRATION & EXPOSURE:**

1. Plumbing
2. Machine Shop
3. Metal Cutting (Water Plasma)

**TEXT BOOK:**

1. Work shop Manual - P.Kannaiah/ K.L.Narayana/ Scitech Publishers.
2. Workshop Manual / Venkat Reddy/ BS Publications/Sixth Edition.

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**(A30007) MATHEMATICS – III****Objectives:** To learn

- Transforming the given variable coefficient equation (Cauchy's and Lagrange's) into the one with constant coefficients.
- Identifying ordinary points, singular points and regular singular points for the given ODE.
- Finding the series solution around a regular singular point.
- Solve the given ODE with variable coefficients by Frobenius method and test the convergence of its series solution.
- Series solutions for Legendre and Bessel differential equations, analyzing the properties of Legendre and Bessel polynomials.
- Differentiation and Integration of complex valued functions.
- Evaluation of integrals using Cahchy's integral formula.
- Taylor's series, Maclaurin's series and Laurent's series expansions of complex functions
- Evaluation of integrals using residue theorem.
- Transform a given function from z - plane to w – plane.
- Identify the transformations like translation, magnification, rotation and reflection and inversion.
- Properties of bilinear transformations.

**UNIT – I:**

**Linear ODE with variable coefficients and series solutions(second order only):** Equations reducible to constant coefficients-Cauchy's and Lagrange's differential equations. Motivation for series solutions, Ordinary point and Regular singular point of a differential equation , Transformation of non-zero singular point to zero singular point. Series solutions to differential equations around zero, Frobenius Method about zero.

**Unit-II**

**Special Functions :** Legendre's Differential equation, General solution of Legendre's equation, Legendre polynomials Properties: Rodrigue's formula – Recurrence relations, Generating function of Legendre's polynomials – Orthogonality. Bessel's Differential equation, Bessel functions properties: – Recurrence relations, Orthogonality, Generating function , Trigonometric expansions involving Bessel functions.

**UNIT-III:**

**Complex Functions –Differentiation and Integration :** Complex functions and its representation on Argand plane, Concepts of limit Continuity, Differentiability, Analyticity, Cauchy-Riemann conditions, Harmonic functions – Milne – Thompson method. Line integral – Evaluation along a path and by indefinite integration – Cauchy’s integral theorem – Cauchy’s integral formula – Generalized integral formula.

**UNIT-IV:**

**Power series expansions of complex functions and contour Integration:** Radius of convergence – Expansion in Taylor’s series, Maclaurin’s series and Laurent series. Singular point –Isolated singular point – pole of order m – essential singularity. Residue – Evaluation of residue by formula and by Laurent series – Residue theorem. Evaluation of integrals of the type

(a) Improper real integrals  $\int_{-\infty}^{\infty} f(x)dx$

(b)  $\int_c^{c+2\pi} f(\cos \theta, \sin \theta)d\theta$

**UNIT-V:**

**Conformal mapping:** Transformation of z-plane to w-plane by a function, Conformal transformation. Standard transformations- Translation; Magnification and rotation; inversion and reflection, Transformations like  $\log z$ ,  $z^2$ , and Bilinear transformation. Properties of Bilinear transformation, determination of bilinear transformation when mappings of 3 points are given .

**TEXT BOOKS:**

1. Advanced Engineering Mathematics by Kreyszig, John Wiley & Sons.
2. Higher Engineering Mathematics by Dr. B.S. Grewal, Khanna Publishers.

**REFERENCES:**

- 1) Complex Variables Principles and Problem Sessions By A.K.Kapoor, World Scientific Publishers.
- 2) Engineering Mathematics-3 by T.K.V.Iyengar and B.Krishna Gandhi Etc.
- 3) A Text Book of Engineering Mathematics by N P Bali, Manesh Goyal.
- 4) Mathematics for Engineers and Scientists, Alan Jeffrey, 6<sup>th</sup> Edit. 2013, Chapman & Hall/CRC.

- 5) Advanced Engineering Mathematics, Michael Greenberg, Second Edition, Pearson Education.
- 6) Mathematics For Engineers by K.B.Datta and M.A S.Srinivas,Cengage Publications.

**Outcome:** After going through this course the student will be able to:

- Apply the Frobenius method to obtain a series solution for the given linear 2<sup>nd</sup> ODE.
- Identify Bessel equation and Legendre equation and solve them under special conditions with the help of series solutions method. Also recurrence relations and orthogonality properties of Bessel and Legendre polynomials.

After going through this course the student will be able to

- a. analyze the complex functions with reference to their analyticity, Integration using Cauchy's integral theorem,
- b. Find the Taylor's and Laurent series expansion of complex functions
- c. The conformal transformations of complex functions can be dealt with ease.

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**(A30404) ELECTRONIC DEVICES AND CIRCUITS****Objectives:**

This is a fundamental course, basic knowledge of which is required by all the circuit branch engineers. This course focuses:

- To familiarize the student with the principle of operation, analysis and design of Junction diode, BJT and FET transistors and amplifier circuits.
- To understand diode as rectifier.
- To study basic principle of filter circuits and various types.

**UNIT -I:**

**P-N Junction Diode:** Qualitative Theory of P-N Junction, P-N Junction as a Diode, Diode Equation, Volt-Ampere Characteristics, Temperature dependence of VI characteristic, Ideal versus Practical – Resistance levels (Static and Dynamic), Transition and Diffusion Capacitances, Diode Equivalent Circuits, Load Line Analysis, Breakdown Mechanisms in Semiconductor Diodes, Zener Diode Characteristics.

**Special Purpose Electronic Devices:** Principle of Operation and Characteristics of Tunnel Diode (with the help of Energy Band Diagram), Varactor Diode, SCR and Semiconductor Photo Diode.

**UNIT-II:**

**Rectifiers and Filters :** The P-N junction as a Rectifier, Half wave Rectifier, Full wave Rectifier, Bridge Rectifier, Harmonic components in a Rectifier Circuit, Inductor Filters, Capacitor Filters, L- Section Filters, p- Section Filters, Comparison of Filters, Voltage Regulation using Zener Diode.

**UNIT-III:**

**Bipolar Junction Transistor and UJT:** The Junction Transistor, Transistor Current Components, Transistor as an Amplifier, Transistor Construction, BJT Operation, BJT Symbol, Common Base, Common Emitter and Common Collector Configurations, Limits of Operation , BJT Specifications, BJT Hybrid Model, Determination of h-parameters from Transistor Characteristics, Comparison of CB, CE, and CC Amplifier Configurations, UJT and Characteristics.

**UNIT-IV:**

**Transistor Biasing and Stabilization:** Operating Point, The DC and AC Load lines, Need for Biasing, Fixed Bias, Collector Feedback Bias, Emitter Feedback Bias, Collector - Emitter Feedback Bias, Voltage Divider Bias,



Bias Stability, Stabilization Factors, Stabilization against variations in  $V_{BE}$  and  $\beta$ , Bias Compensation using Diodes and Transistors, Thermal Runaway, Thermal Stability, Analysis of a Transistor Amplifier Circuit using h-Parameters.

**UNIT-V:**

**Field Effect Transistor and FET Amplifiers**

**Field Effect Transistor:** The Junction Field Effect Transistor (Construction, principle of operation, symbol) – Pinch-off Voltage - Volt-Ampere characteristics, The JFET Small Signal Model, MOSFET (Construction, principle of operation, symbol), MOSFET Characteristics in Enhancement and Depletion modes.

**FET Amplifiers:** FET Common Source Amplifier, Common Drain Amplifier, Generalized FET Amplifier, Biasing FET, FET as Voltage Variable Resistor, Comparison of BJT and FET.

**TEXT BOOKS:**

1. Millman's Electronic Devices and Circuits – J. Millman, C.C.Halkias, and Satyabrata Jit, 2 Ed.,1998, TMH.
2. Electronic Devices and Circuits – Mohammad Rashid, Cengage Learning, 2013.
3. Electronic Devices and Circuits – David A. Bell, 5 Ed, Oxford.

**REFERENCE BOOKS:**

1. Integrated Electronics – J. Millman and Christos C. Halkias, 1991 Ed., 2008, TMH.
2. Electronic Devices and Circuits – R.L. Boylestad and Louis Nashelsky, 9 Ed., 2006, PEI/PHI.
3. Electronic Devices and Circuits – B. P. Singh, Rekha Singh, Pearson, 2Ed, 2013.
4. Electronic Devices and Circuits --K. Lal Kishore, 2 Ed., 2005, BSP.
5. Electronic Devices and Circuits – Anil K. Maini, Varsha Agarwal, 1 Ed., 2009, Wiley India Pvt. Ltd.
6. Electronic Devices and Circuits – S.Salivahanan, N.Suresh Kumar, A.Vallavaraj, 2 Ed., 2008, TMH.

**Course Outcomes:**

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

- Understand and Analyse the different types of diodes, operation and its characteristics
- Design and analyse the DC bias circuitry of BJT and FET
- Design biasing circuits using diodes and transistors.
- To analyze and design diode application circuits, amplifier circuits and oscillator employing BJT, FET devices.

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**(A30210) FUNDAMENTALS OF ELECTRICAL ENGINEERING****Objective:**

This course introduces the basic concepts of circuit analysis which is the foundation for all subjects of the Electrical Engineering discipline. The emphasis of this course is laid on the basic analysis of circuits which includes Single phase circuits, magnetic circuits, theorems, transient analysis and network topology.

**UNIT-I:**

**Introduction to Electrical Circuits and Magnetic Circuits:** Circuit Concept – R-L-C parameters – Voltage and Current sources – Independent and dependent sources-Source transformation – Voltage – Current relationship for passive elements – Kirchhoff's laws – network reduction techniques – series, parallel, series parallel, star-to-delta or delta-to-star transformation.

Magnetic Circuits – Faraday's laws of electromagnetic induction – concept of self and mutual inductance – dot convention – coefficient of coupling – composite magnetic circuit - Analysis of series and parallel magnetic circuits.

**UNIT – II:**

**Single Phase A.C Circuits:** R.M.S and Average values and form factor for different periodic wave forms, Steady state analysis of R, L and C (in series, parallel and series parallel combinations) with sinusoidal excitation – Concept of Reactance, Impedance, Susceptance and Admittance – Phase and Phase difference – concept of power factor, Real and Reactive powers – J-notation, Complex and Polar forms of representation, Complex power – Resonance – series, parallel circuits, concept of band width and Q factor.

**UNIT – III:**

**Network Theorems (Without Proofs):** Tellegen's, Superposition, Reciprocity, Thevenin's, Norton's, Maximum Power Transfer, Millman's and Compensation theorems for d.c. and a.c. excitations.

**UNIT – IV:**

**DC Machines:** Dc Machine- Principle & operation of DC Generators and DC Motors , Different types of generator and motors, characteristics of generator and motor, simple problems.(elementary treatment only).

**UNIT – V:**

**AC Machines :** Principle, construction and operation if 1- $\phi$  transformer, equivalent circuit, DC & AC test on 1- $\phi$  transformer, transformer regulation, 1- $\phi$  synchronous generator, principle, construction & operation,

characteristics. Principle operation construction of 1- $\phi$  induction motor, characteristics. (Elementary treatment only).

**TEXT BOOKS:**

1. Basic concepts of Electrical Engineering, PS Subramanyam, BS Publications.
2. Basic Electrical Engineering, S.N. Singh, PHI.

**REFERENCE BOOKS:**

1. Basic Electrical Engineering, Abhijit Chakrabarthy, Sudipta nath, Chandrakumar Chanda, Tata-McGraw-Hill.
2. Principles of Electrical Engineering, V.K Mehta, Rohit Mehta, S.Chand Publications.
3. Basic Electrical Engineering, T.K.Nagasarkar and M.S. Sukhija, Oxford University Press.
4. Fundamentals of Electrical Engineering, RajendraPrasad, PHI.
5. Basic Electrical Engineering by D.P.Kothari , I.J. Nagrath, McGraw-Hill.

**Outcome:**

After going through this course the student gets a thorough knowledge on basic electrical parameters and different types electrical (DC and AC) circuits and magnetic, the different methods to solve the voltages, currents , powers of the circuits , the network theorems to solve the circuits, electromechanical energy conversion principle , construction operation characteristics DC and AC machines, with which he/she can able to apply the above conceptual things to real-world electrical and electronics problems and applications.

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**(A30503) JAVA PROGRAMMING****Objectives:**

- To understand object oriented programming concepts, and apply them in problem solving
- To learn the basics of java Console and GUI based programming.

**Unit I**

**OOP concepts** – Data abstraction, encapsulation, inheritance, benefits of inheritance, polymorphism, classes and objects, Procedural and object oriented programming paradigms.

**Java programming** - History of Java, comments, data types, variables, constants, scope and life time of variables, operators, operator hierarchy, expressions, type conversion and casting, enumerated types, control flow - block scope, conditional statements, loops, break and continue statements, simple java stand alone programs, arrays, console input and output, formatting output, constructors, methods, parameter passing, static fields and methods, access control, this reference, overloading methods and constructors, recursion, garbage collection, building strings, exploring string class.

**Unit II**

**Inheritance** - Inheritance hierarchies, super and sub classes, Member access rules, super keyword, preventing inheritance: final classes and methods, the Object class and its methods.

**Polymorphism**- dynamic binding, method overriding, abstract classes and methods.

**Interfaces** – Interfaces vs. Abstract classes, defining an interface, implementing interfaces, accessing implementations through interface references, extending interface.

**Inner classes** – Uses of inner classes, local inner classes, anonymous inner classes, static inner classes, examples.

**Packages**-Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages.

**Unit III**

**Exception handling** – Dealing with errors, benefits of exception handling, the classification of exceptions- exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally, re-throwing exceptions, exception specification, built in exceptions, creating

own exception sub classes.

**Multithreading** - Differences between multiple processes and multiple threads, thread states, creating threads, interrupting threads, thread priorities, synchronizing threads, inter-thread communication, producer consumer pattern.

#### **Unit IV**

**Collection Framework in Java** – Introduction to Java Collections, Overview of Java Collection frame work, Generics, Commonly used Collection classes– Array List, Linked List, Vector, Hash table, Stack, Enumeration, Iterator, String Tokenizer, Random, Scanner, Properties.

**Files** – streams- byte streams, character streams, text Input/output, binary input/output, random access file operations, File management using File class.

**Connecting to Database** - JDBC Type 1 to 4 drivers, connecting to a database, querying a database and processing the results.

#### **Unit V**

**GUI Programming with Java** - The AWT class hierarchy, Introduction to Swing, Swing vs. AWT, Hierarchy for Swing components, Containers – JFrame, JApplet, JDialog, JPanel, Overview of some swing components- JButton, JLabel, JTextField, JTextArea, simple swing applications, Layout management - Layout manager types – border, grid and flow.

**Event handling** - Events, Event sources, Event classes, Event Listeners, Relationship between Event sources and Listeners, Delegation event model, Examples: handling a button click, handling mouse events, Adapter classes.

**Applets** – Inheritance hierarchy for applets, differences between applets and applications, life cycle of an applet, passing parameters to applets, applet security issues.

#### **TEXT BOOK:**

1. Java Fundamentals – A comprehensive Introduction, Herbert Schildt and Dale Skrien, TMH.

#### **REFERENCE BOOKS:**

1. Java for Programmers, P.J.Deitel and H.M.Deitel, Pearson education (OR) Java: How to Program P.J.Deitel and H.M.Deitel, PHI.
2. Object Oriented Programming through Java, P.Radha Krishna, Universities Press.
3. Thinking in Java, Bruce Eckel, Pearson Education.
4. Programming in Java, S.Malhotra and S.Choudhary, Oxford Univ. Press.

**Expected Outcome:**

The student is expected to have

- Understanding of OOP concepts and basics of java programming (Console and GUI based).
- The skills to apply OOP and Java programming in problem solving.
- Should have the ability to extend his knowledge of Java programming further on his/her own.

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**(A30407) SWITCHING THEORY AND LOGIC DESIGN****Objectives:**

This course provides in-depth knowledge of switching theory and the design techniques of digital circuits, which is the basis for design of any digital circuit. The main objectives are:

- To learn basic tools for the design of digital circuits and fundamental concepts used in the design of digital systems.
- To understand common forms of number representation in digital electronic circuits and to be able to convert between different representations.
- To implement simple logical operations using combinational logic circuits.
- To design combinational logic circuits, sequential logic circuits.
- To impart to student the concepts of sequential circuits, enabling them to analyze sequential systems in terms of state machines.
- To implement synchronous state machines using flip-flops.

**UNIT -I:**

**Number System and Boolean Algebra And Switching Functions:** Number Systems, Base Conversion Methods, Complements of Numbers, Codes-Binary Codes, Binary Coded Decimal Code and its Properties, Unit Distance Codes, Alpha Numeric Codes, Error Detecting and Correcting Codes.

**Boolean Algebra:** Basic Theorems and Properties, Switching Functions, Canonical and Standard Form, Algebraic Simplification of Digital Logic Gates, Properties of XOR Gates, Universal Gates, Multilevel NAND/NOR realizations.

**UNIT -II:**

**Minimization and Design of Combinational Circuits:** Introduction, The Minimization with theorem, The Karnaugh Map Method, Five and Six Variable Maps, Prime and Essential Implications, Don't Care Map Entries, Using the Maps for Simplifying, Tabular Method, Partially Specified Expressions, Multi-output Minimization, Minimization and Combinational Design, Arithmetic Circuits, Comparator, Multiplexers, Code Converters, Wired Logic, Tristate Bus System, Practical Aspects related to Combinational Logic Design, Hazards and Hazard Free Relations.

**UNIT -III:**

**Sequential Machines Fundamentals:** Introduction, Basic Architectural Distinctions between Combinational and Sequential circuits, The Binary Cell, Fundamentals of Sequential Machine Operation, The Flip-Flop, The D-Latch Flip-Flop, The “Clocked T” Flip-Flop, The “ Clocked J-K” Flip-Flop, Design of a Clocked Flip-Flop, Conversion from one type of Flip-Flop to another, Timing and Triggering Consideration, Clock Skew.

**UNIT -IV:**

**Sequential Circuit Design and Analysis:** Introduction, State Diagram, Analysis of Synchronous Sequential Circuits, Approaches to the Design of Synchronous Sequential Finite State Machines, Design Aspects, State Reduction, Design Steps, Realization using Flip-Flops.

Counters - Design of Single mode Counter, Ripple Counter, Ring Counter, Shift Register, Shift Register Sequences, Ring Counter Using Shift Register.

**UNIT -V:**

**Sequential Circuits:** Finite state machine-capabilities and limitations, Mealy and Moore models-minimization of completely specified and incompletely specified sequential machines, Partition techniques and Merger chart methods-concept of minimal cover table.

**Algorithmic State Machines:** Salient features of the ASM chart-Simple examples-System design using data path and control subsystems-control implementations-examples of Weighing machine and Binary multiplier.

**TEXT BOOKS:**

1. Switching and Finite Automata Theory- Zvi Kohavi & Niraj K. Jha, 3<sup>rd</sup> Edition, Cambridge.
2. Digital Design- Morris Mano, PHI, 3<sup>rd</sup> Edition.

**REFERENCE BOOKS:**

1. Introduction to Switching Theory and Logic Design – Fredriac J. Hill, Gerald R. Peterson, 3<sup>rd</sup> Ed, John Wiley & Sons Inc.
2. Digital Fundamentals – A Systems Approach – Thomas L. Floyd, Pearson, 2013.
3. Digital Logic Design - Ye Brian and HoldsWorth, Elsevier.
4. Fundamentals of Logic Design- Charles H. Roth, Cengage LEarning, 5<sup>th</sup>, Edition, 2004.
5. Digital Logic Applications and Design- John M. Yarbrough, Thomson Publications, 2006.
6. Digital Logic and State Machine Design – Comer, 3<sup>rd</sup>, Oxford, 2013.



**Outcomes:**

Upon completion of the course, students should possess the following skills:

- Be able to manipulate numeric information in different forms, e.g. different bases, signed integers, various codes such as ASCII, gray, and BCD.
- Be able to manipulate simple Boolean expressions using the theorems and postulates of Boolean algebra and to minimize combinational functions.
- Be able to design and analyse small combinational circuits and to use standard combinational functions/building blocks to build larger more complex circuits.
- Be able to design and analyse small sequential circuits and devices and to use standard sequential functions/building blocks to build larger more complex circuits.

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**(A30502) DATA STRUCTURES****Objectives:**

- To understand the basic concepts such as Abstract Data Types, Linear and Non Linear Data structures.
- To understand the notations used to analyze the Performance of algorithms.
- To understand the behavior of data structures such as stacks, queues, trees, hash tables, search trees, Graphs and their representations.
- To choose the appropriate data structure for a specified application.
- To understand and analyze various searching and sorting algorithms.
- To write programs in C to solve problems using data structures such as arrays, linked lists, stacks, queues, trees, graphs, hash tables, search trees.

**UNIT- I**

Basic concepts- Algorithm Specification-Introduction, Recursive algorithms, Data Abstraction Performance analysis- time complexity and space complexity, Asymptotic Notation-Big O, Omega and Theta notations, Introduction to Linear and Non Linear data structures.

Singly Linked Lists-Operations-Insertion, Deletion, Concatenating singly linked lists, Circularly linked lists-Operations for Circularly linked lists, Doubly Linked Lists- Operations- Insertion, Deletion.

Representation of single, two dimensional arrays, sparse matrices-array and linked representations.

**UNIT- II**

Stack ADT, definition, operations, array and linked implementations in C, applications-infix to postfix conversion, Postfix expression evaluation, recursion implementation, Queue ADT, definition and operations ,array and linked Implementations in C, Circular queues-Insertion and deletion operations, Deque (Double ended queue) ADT, array and linked implementations in C.

**UNIT- III**

Trees – Terminology, Representation of Trees, Binary tree ADT, Properties of Binary Trees, Binary Tree Representations-array and linked representations, Binary Tree traversals, Threaded binary trees, Max Priority Queue ADT-implementation-Max Heap-Definition, Insertion into a Max Heap,

Deletion from a Max Heap.

Graphs – Introduction, Definition, Terminology, Graph ADT, Graph Representations- Adjacency matrix, Adjacency lists, Graph traversals- DFS and BFS.

#### **UNIT- IV**

Searching- Linear Search, Binary Search, Static Hashing-Introduction, hash tables, hash functions, Overflow Handling.

Sorting-Insertion Sort, Selection Sort, Radix Sort, Quick sort, Heap Sort, Comparison of Sorting methods.

#### **UNIT- V**

Search Trees-Binary Search Trees, Definition, Operations- Searching, Insertion and Deletion, AVL Trees-Definition and Examples, Insertion into an AVL Tree ,B-Trees, Definition, B-Tree of order m, operations-Insertion and Searching, Introduction to Red-Black and Splay Trees(Elementary treatment-only Definitions and Examples), Comparison of Search Trees.

Pattern matching algorithm- The Knuth-Morris-Pratt algorithm, Tries (examples only).

#### **TEXT BOOKS:**

1. Fundamentals of Data structures in C, 2<sup>nd</sup> Edition, E.Horowitz, S.Sahni and Susan Anderson-Freed, Universities Press.
2. Data structures A Programming Approach with C, D.S.Kushwaha and A.K.Misra, PHI.

#### **REFERENCE BOOKS:**

1. Data structures: A Pseudocode Approach with C, 2<sup>nd</sup> edition, R.F.Gilberg and B.A.Forouzan, Cengage Learning.
2. Data structures and Algorithm Analysis in C, 2<sup>nd</sup> edition, M.A.Weiss, Pearson.
3. Data Structures using C, A.M.Tanenbaum, Y. Langsam, M.J.Augenstein, Pearson.
4. Data structures and Program Design in C, 2<sup>nd</sup> edition, R.Kruse, C.L.Tondo and B.Leung, Pearson.
5. Data Structures and Algorithms made easy in JAVA, 2<sup>nd</sup> Edition, Narsimha Karumanchi, CareerMonk Publications.
6. Data Structures using C, R.Thareja, Oxford University Press.
7. Data Structures, S.Lipschutz, Schaum's Outlines, TMH.
8. Data structures using C, A.K.Sharma, 2<sup>nd</sup> edition, Pearson..
9. Data Structures using C & C++, R.Shukla, Wiley India.

10. Classic Data Structures, D.Samanta, 2<sup>nd</sup> edition, PHI.
11. Advanced Data structures, Peter Brass, Cambridge.

**Outcomes:**

- Learn how to use data structure concepts for realistic problems.
- Ability to identify appropriate data structure for solving computing problems in respective language.
- Ability to solve problems independently and think critically.

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**(A30482) ELECTRONIC DEVICES AND CIRCUITS LAB****PART A: (Only for Viva-voce Examination)****Electronic Workshop Practice (In 3 Lab Sessions):**

1. Identification, Specifications, Testing of R, L, C Components (Color Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Boards, PCB's.
2. Identification, Specifications and Testing of Active Devices, Diodes, BJT's, Low power JFET's, MOSFET's, Power Transistors, LED's, LCD's, SCR, UJT.
3. Study and operation of
  - i. Multimeters (Analog and Digital)
  - ii. Function Generator
  - iii. Regulated Power Supplies
  - iv. CRO

**PART B: (For Laboratory Examination – Minimum of 10 experiments)**

1. Forward & Reverse Bias Characteristics of PN Junction Diode.
2. Zener diode characteristics and Zener as voltage Regulator.
3. Input & Output Characteristics of Transistor in CB Configuration and h-parameter calculations.
4. Input & Output Characteristics of Transistor in CE Configuration and h-parameter calculations.
5. Half Wave Rectifier with & without filters.
6. Full Wave Rectifier with & without filters.
7. FET characteristics.
8. Design of Self-bias circuit.
9. Frequency Response of CC Amplifier.
10. Frequency Response of CE Amplifier.
11. Frequency Response of Common Source FET amplifier .
12. SCR characteristics.
13. UJT Characteristics

**PART C: Equipment required for Laboratories:**

1. Regulated Power supplies (RPS)     -0-30 V

2. CRO's -0-20 MHz.
3. Function Generators -0-1 MHz.
4. Multimeters
5. Decade Resistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital) -0-20  $\mu$ A, 0-50 $\mu$ A, 0-100 $\mu$ A, 0-200 $\mu$ A, 0-10 mA.
8. Voltmeters (Analog or Digital) -0-50V, 0-100V, 0-250V
9. Electronic Components -Resistors, Capacitors, BJTs, LCDs, SCRs, UJTs, FETs, LEDs, MOSFETs Diodes- Ge & Si type, Transistors – NPN, PNP type)

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**(A30582) DATA STRUCTURES LAB****Objectives:**

- To write and execute programs in C to solve problems using data structures such as arrays, linked lists, stacks, queues, trees, graphs, hash tables and search trees.
- To write and execute write programs in C to implement various sorting and searching methods.

**Recommended Systems/Software Requirements:**

- Intel based desktop PC with minimum of 166 MHZ or faster processor with at least 64 MB RAM and 100 MB free disk space.
- C compiler.

**Week1:**

Write a C program that uses functions to perform the following:

- Create a singly linked list of integers.
- Delete a given integer from the above linked list.
- Display the contents of the above list after deletion.

**Week2:**

Write a C program that uses functions to perform the following:

- Create a doubly linked list of integers.
- Delete a given integer from the above doubly linked list.
- Display the contents of the above list after deletion.

**Week3:**

Write a C program that uses stack operations to convert a given infix expression into its postfix Equivalent, Implement the stack using an array.

**Week 4:**

Write C programs to implement a double ended queue ADT using i)array and ii)doubly linked list respectively.

**Week 5 :**

Write a C program that uses functions to perform the following:

- Create a binary search tree of characters.
- Traverse the above Binary search tree recursively in Postorder.

**Week 6 :**

Write a C program that uses functions to perform the following:

- a) Create a binary search tree of integers.
- b) Traverse the above Binary search tree non recursively in inorder.

**Week 7:**

Write C programs for implementing the following sorting methods to arrange a list of integers in Ascending order :

- a) Insertion sort
- b) Merge sort

**Week 8 :**

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

- a) Quick sort
- b) Selection sort

**Week 9:**

i) Write a C program to perform the following operation:

- a) Insertion into a B-tree.

ii) Write a C program for implementing Heap sort algorithm for sorting a given list of integers in ascending order.

**Week 10:**

Write a C program to implement all the functions of a dictionary (ADT) using hashing.

**Week 11:**

Write a C program for implementing Knuth-Morris- Pratt pattern matching algorithm.

**Week 12:**

Write C programs for implementing the following graph traversal algorithms:

- a) Depth first traversal
- b) Breadth first traversal

**TEXT BOOKS:**

1. C and Data Structures, Third Edition, P.Padmanabham, BS Publications.
2. C and Data Structures, Prof. P.S.Deshpande and Prof. O.G. Kakde, Dreamtech Press.
3. Data structures using C, A.K.Sharma, 2<sup>nd</sup> edition, Pearson.
4. Data Structures using C, R.Thareja, Oxford University Press.
5. C and Data Structures, N.B.Venkateswarlu and E.V.Prasad,S.Chand.



6. C Programming and Data Structures, P.Radha Krishna, Hi-Tech Publishers.

**Outcomes:**

- Ability to identify the appropriate data structure for given problem.
- Graduate able to design and analyze the time and space complexity of algorithm or program.
- Ability to effectively use compilers includes library functions, debuggers and trouble shooting.

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**(A40009) ENVIRONMENTAL STUDIES****Objectives:**

- Understanding the importance of ecological balance for sustainable development.
- Understanding the impacts of developmental activities and mitigation measures.
- Understanding the environmental policies and regulations.

**UNIT-I :**

**Ecosystems:** Definition, Scope and Importance of ecosystem. Classification, structure and function of an ecosystem, Food chains, food webs and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

**UNIT-II:**

**Natural Resources: Classification of Resources:** Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non renewable energy sources, use of alternate energy source, case studies.

**UNIT-III:**

**Biodiversity and Biotic Resources:** Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

**UNIT-IV:**

**Environmental Pollution and Control Technologies: Environmental Pollution:** Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and

characteristics of e-Waste and its management. **Pollution control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary,

Overview of air pollution control technologies, Concepts of bioremediation.

**Global Environmental Problems And Global Efforts:** Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol and Montréal Protocol.

#### **UNIT-V:**

**Environmental Policy, Legislation & EIA:** Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). **Towards Sustainable Future:** Concept of Sustainable Development, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

#### **SUGGESTED TEXT BOOKS:**

- 1 Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
- 2 Environmental Studies by R. Rajagopalan, Oxford University Press.

#### **REFERENCE BOOKS:**

1. Environmental Science: towards a sustainable future by Richard T.Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M.Masters and Wendell P. Ela .2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B.Botkin & Edward A.Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4<sup>th</sup> Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.

#### **Outcomes:**

Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which inturn helps in sustainable development .

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**(A40412) ELECTRONIC CIRCUIT ANALYSIS****Objective:**

The main objective of the course is:

- To familiarize the student with the analysis and design of basic transistor amplifier circuits and their frequency response characteristics, feedback amplifiers, oscillators, large signal amplifiers and tuned amplifiers.

**UNIT -I:****Single Stage and Multi Stage Amplifiers**

**Single Stage Amplifiers:** Classification of Amplifiers – Distortion in Amplifiers, Analysis of CE, CC, and CB Configurations with simplified Hybrid Model, Analysis of CE amplifier with Emitter Resistance and Emitter follower, Miller's Theorem and its dual, Design of Single Stage RC Coupled Amplifier using BJT.

**Multi Stage Amplifiers:** Analysis of Cascaded RC Coupled BJT amplifiers, Cascode Amplifier, Darlington Pair, Different Coupling Schemes used in Amplifiers - RC Coupled Amplifier, Transformer Coupled Amplifier, Direct Coupled Amplifier.

**UNIT –II:****BJT Amplifiers and MOS Amplifiers**

**BJT Amplifiers - Frequency Response:** Logarithms, Decibels, General frequency considerations, Frequency response of BJT Amplifier, Analysis at Low and High frequencies, Effect of coupling and bypass Capacitors, The Hybrid-  $\pi$  - Common Emitter Transistor Model, CE Short Circuit Current Gain, Current Gain with Resistive Load, Single Stage CE Transistor Amplifier Response, Gain-Bandwidth Product, Emitter follower at higher frequencies.

**MOS Amplifiers [3]:** Basic concepts, MOS Small signal model, Common source amplifier with Resistive load.

**UNIT –III:****Feedback Amplifiers and Oscillators**

**Feedback Amplifiers:** Concepts of Feedback, Classification of Feedback Amplifiers, General characteristics of Negative Feedback Amplifiers, Effect of Feedback on Amplifier Characteristics, Voltage Series, Voltage Shunt, Current Series and Current Shunt Feedback Configurations, Illustrative Problems.

**Oscillators:** Classification of Oscillators, Conditions for Oscillations, RC Phase Shift Oscillator, Generalized analysis of LC oscillators - Hartley, and Colpitts Oscillators, Wien-Bridge & Crystal Oscillators, Stability of Oscillators.

**UNIT –IV:**

**Large Signal Amplifiers:** Classification, Class A Large Signal Amplifiers, Transformer Coupled Class A Audio Power Amplifier, Efficiency of Class A Amplifier, Class B Amplifier, Efficiency of Class B Amplifier, Class-B Push-Pull Amplifier, Complementary Symmetry Class B Push-Pull Amplifier, Distortion in Power Amplifiers, Thermal Stability and Heat Sinks.

**UNIT –V:**

**Tuned Amplifiers:** Introduction, Q-Factor, Small Signal Tuned Amplifiers, Effect of Cascading Single Tuned Amplifiers on Bandwidth, Effect of Cascading Double Tuned Amplifiers on Bandwidth, Stagger Tuned Amplifiers, Stability of Tuned Amplifiers.

**TEXT BOOKS:**

1. Integrated Electronics - Jacob Millman and Christos C Halkias, 1991 Ed., 2008, TMH.
2. Electronic Devices and Circuits, B. P. Singh, Rekha Singh, Pearson, 2013.
3. Design of Analog CMOS Integrated Circuits – Behzad Razavi, 2008, TMH.

**REFERENCE BOOKS:**

1. Electronic Circuit Analysis – Rashid, Cengage Learning, 2013
2. Electronic Devices and Circuit Theory - Robert L.Boylestad, Louis Nashelsky, 9 Ed., 2008 PE.
3. Microelectric Circuits – Sedra and Smith – 5 Ed., 2009, Oxford University Press.
4. Electronic Circuit Analysis – K. Lal Kishore, 2004, BSP.
5. Electronic Devices and Circuits - S. Salivahanan, N.Suresh Kumar, A Vallavaraj, 2 Ed., 2009, TMH.

**Course Outcomes:**

Upon completion of the subject, students will be able to:

- Design and analyse the DC bias circuitry of BJT and FET
- Analyse the different types of amplifiers, operation and its characteristics
- Design circuits like amplifiers, oscillators using the transistors diodes and oscillators

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**(A40506) COMPUTER ORGANIZATION****Objectives:**

- To understand basic components of computers.
- To explore the I/O organizations in depth.
- To explore the memory organization.
- To understand the basic chip design and organization of 8086 with assembly language programming.

**UNIT-I**

Basic Computer Organization – Functions of CPU, I/O Units, Memory: Instruction: Instruction Formats- One address, two addresses, zero addresses and three addresses and comparison; addressing modes with numeric examples: Program Control- Status bit conditions, conditional branch instructions, Program Interrupts: Types of Interrupts.

**UNIT-II**

Input-Output Organizations- I/O Interface, I/O Bus and Interface modules: I/O Vs memory Bus, Isolated Vs Memory-Mapped I/O, Asynchronous data Transfer- Strobe Control, Hand Shaking: Asynchronous Serial transfer- Asynchronous Communication interface, Modes of transfer- Programmed I/O, Interrupt Initiated I/O, DMA; DMA Controller, DMA Transfer, IOP-CPU-IOP Communication , Intel 8089 IOP.

**UNIT-III**

Memory Organizations

Memory hierarchy, Main Memory, RAM, ROM Chips, Memory Address Map, Memory Connection to CPU, associate memory , Cache Memory, Data Cache, Instruction cache, Miss and Hit ratio, Access time, associative, set associative, mapping , waiting into cache, Introduction to virtual memory.

**UNIT-IV**

8086 CPU Pin Diagram- Special functions of general purpose registers, Segment register, concept of pipelining, 8086 Flag register, Addressing modes of 8086.

**UNIT-V**

8086-Instruction formats: assembly Language Programs involving branch & Call instructions, sorting, evaluation of arithmetic expressions.

**TEXT BOOKS:**

- 1) Computer system Architecture: Morris Mano (UNIT-1,2,3).

- 2) Advanced Micro Processor and Peripherals- Hall/ A K Ray(UNIT-4,5).

**REFERENCE BOOKS:**

- 1) Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI.
- 2) Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition PHI/Pearson.
- 3) Fundamentals of Computer Organization and Design, - Sivarama Dandamudi Springer Int. Edition.
- 4) Computer Architecture a quantitative approach, John L. Hennessy and David A. Patterson, Fourth Edition Elsevier.
- 5) Computer Architecture: Fundamentals and principles of Computer Design, Joseph D. Dumas II, BS Publication.

**Outcomes:**

After this course students understand in a better way the I/O and memory organization in depth. They should be in a position to write assembly language programs for various applications.

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**(A40512) WEB TECHNOLOGIES****Objectives:**

- To introduce PHP language for server side scripting
- To introduce XML and processing of XML Data with Java
- To introduce Server side programming with Java Servlets and JSP
- To introduce Client side scripting with Javascript and AJAX.

**UNIT- I**

**Introduction to PHP:** Declaring variables, data types, arrays, strings, operators, expressions, control structures, functions, Reading data from web form controls like text boxes, radio buttons, lists etc., Handling File Uploads, Connecting to database (MySQL as reference), executing simple queries, handling results, Handling sessions and cookies.

**File Handling in PHP:** File operations like opening, closing, reading, writing, appending, deleting etc. on text and binary files, listing directories.

**UNIT- II**

**XML:** Introduction to XML, Defining XML tags, their attributes and values, Document Type Definition, XML Schemas, Document Object Model, XHTML.

**Parsing XML Data** - DOM and SAX Parsers in java.

**UNIT- III**

**Introduction to Servlets:** Common Gateway Interface (CGI), Lifecycle of a Servlet, deploying a servlet, The Servlet API, Reading Servlet parameters, Reading Initialization parameters, Handling Http Request & Responses, Using Cookies and Sessions, connecting to a database using JDBC.

**UNIT- IV**

**Introduction to JSP:** The Anatomy of a JSP Page, JSP Processing, Declarations, Directives, Expressions, Code Snippets, implicit objects, Using Beans in JSP Pages, Using Cookies and session for session tracking, connecting to database in JSP.

**UNIT- V**

**Client side Scripting:** Introduction to Javascript: Javascript language - declaring variables, scope of variables, functions, event handlers (onclick, onsubmit etc.), Document Object Model, Form validation.

Simple AJAX application.



**TEXT BOOKS:**

1. Web Technologies, Uttam K Roy, Oxford University Press.
2. The Complete Reference PHP – Steven Holzner, Tata McGraw-Hill.

**REFERENCE BOOKS:**

1. Web Programming, building internet applications, Chris Bates 2<sup>nd</sup> edition, Wiley Dreamtech.
2. Java Server Pages –Hans Bergsten, SPD O'Reilly.
3. Java Script, D.Flanagan, O'Reilly,SPD.
4. Beginning Web Programming-Jon Duckett WROX.
5. Programming world wide web, R.W.Sebesta, Fourth Edition, Pearson.
6. Internet and World Wide Web – How to program, Dietel and Nieto, Pearson.

**Outcomes:**

- gain knowledge of client side scripting, validation of forms and AJAX programming.
- have understanding of server side scripting with PHP language.
- have understanding of what is XML and how to parse and use XML Data with Java.
- To introduce Server side programming with Java Servlets and JSP.

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**(A40417) STRUCTURED DIGITAL SYSTEM DESIGN**

**Objective:** To provide the basic concepts of digital system design.

**UNIT I**

Introduction, Concepts of digital design, the logic operators, Hardware Aspects related to asserted and not-asserted conditions, Mechanical switches for signal sources, Concept of inverter, General Implementation procedures, Arithmetic circuits, comparators(7485), multiplexers( 74151 IC), Code converters.

**UNIT II**

Wired logic, Practical aspects of Wired logic and Bus-oriented Structures, Tristate Bus Systems, Practical aspects related to Combinational Logic Design, Fan-in Fan-out, Propagation Delay.

**UNIT III**

Introduction Sequential Machine Design, The need for sequential Circuits, Basic Architectural Distinctions between Combinational and Sequential Circuits, Fundamental differences between Sequential machines, Fundamentals of Sequential Machine operation, Clock and Oscillators, The design of a Clocked Flip-Flop (D-FlipFlop 7474 IC, JK-Flip-flop 7483 IC), Flip-Flop conversion from one type to another, Practical clocking Aspects Concerning Flip-Flops, Timing and Triggering Considerations, Clock Skew

**UNIT IV**

Introduction Sequential Analysis and Design, The State Diagram, Analysis of Synchronous Sequential Circuits, A Synchronous Analysis Process, Approaches to the Design of Synchronous Sequential Finite State machines, Design steps For Traditional Synchronous sequential circuits, State Reduction, Minimizing the next door Decoders with JK or T Flip-Flop, Output Decoder Design.

**UNIT V**

Counters, Design of Single - Mode Counters, Decade Counter ( IC 7490 ), Up-Down counter ( IC 74963) , Design of Specialized Multi-mode Counters, Ripple Counters, Shift Register, Shift Registers (Universal Shift Register IC 74194 / 195) and Memory.

**TEXT BOOK:**

1. An Engineering Approach to Digital Design – by William I. Fletcher, Prentice-Hall of India Pvt. Ltd.

2. Digital Design Morris Mano, Michel D. Ciletti –Pearson , 5<sup>th</sup> Edition 2013.

**REFERENCES:**

1. Digital Systems Testing & Testable Design –Miron Abramoviu, Melvin A. Breuer and Arthur D.Friedman-Jaico Books.
2. Switching & Finite Automata Theory. Z.Kohavi, Jha, 2nd Edition. Cambridge.

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**(A40510) OPERATING SYSTEMS****Objectives:**

- To understand main components of OS and their working
- To study the operations performed by OS as a resource manager
- To understand the scheduling policies of OS
- To understand the different memory management techniques
- To understand process concurrency and synchronization
- To understand the concepts of input/output, storage and file management
- To study different OS and compare their features.

**UNIT- I**

Operating System Introduction: Operating Systems objectives and functions, Computer System Architecture, OS Structure, OS Operations, Evolution of Operating Systems - Simple Batch, Multi programmed, time-shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, Special - Purpose Systems, Operating System services, User OS Interface, System Calls, Types of System Calls, System Programs, Operating System Design and Implementation, OS Structure, Virtual Machines.

**UNIT- II**

Process and CPU Scheduling - Process concepts-The Process, Process State, Process Control Block, Threads, Process Scheduling-Scheduling Queues, Schedulers, Context Switch, Preemptive Scheduling, Dispatcher, Scheduling Criteria, Scheduling algorithms, Multiple-Processor Scheduling, Real-Time Scheduling, Thread scheduling, Case studies: Linux, Windows.

Process Coordination – Process Synchronization, The Critical Section Problem, Peterson's solution, Synchronization Hardware, Semaphores, and Classic Problems of Synchronization, Monitors, Case Studies: Linux, Windows.

**UNIT- III**

Memory Management and Virtual Memory - Logical & Physical Address Space, Swapping, Contiguous Allocation, Paging, Structure of Page Table, Segmentation, Segmentation with Paging, Virtual Memory, Demand Paging,

Performance of Demanding Paging, Page Replacement Page Replacement Algorithms, Allocation of Frames, Thrashing.

#### **UNIT- IV**

File System Interface - The Concept of a File, Access methods, Directory Structure, File System Mounting, File Sharing, Protection, File System Implementation - File System Structure, File System Implementation, Allocation methods, Free-space Management, Directory Implementation, Efficiency and Performance.

Mass Storage Structure – Overview of Mass Storage Structure, Disk Structure, Disk Attachment, Disk Scheduling, Disk Management, Swap space Management .

#### **UNIT- V**

Deadlocks - System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery from Deadlock.

Protection – System Protection, Goals of Protection, Principles of Protection, Domain of Protection, Access Matrix, Implementation of Access Matrix, Access Control, Revocation of Access Rights, Capability-Based Systems, Language-Based Protection.

#### **TEXT BOOKS:**

1. Operating System Principles , Abraham Silberchatz, Peter B. Galvin, Greg Gagne, 8th Edition, Wiley Student Edition
2. Operating Systems – Internals and Design Principles, W. Stallings, 6th Edition, Pearson.

#### **REFERENCE BOOKS:**

1. Modern Operating Systems, Andrew S Tanenbaum, 3rd Edition, PHI
2. Operating Systems A concept-based Approach, 2nd Edition, D.M.Dhamdhare, TMH.
3. Principles of Operating Systems, B.L.Stuart, Cengage learning, India Edition.
4. Operating Systems, A.S.Godbole, 2nd Edition, TMH
5. An Introduction to Operating Systems, P.C.P. Bhatt, PHI.
6. Operating Systems, S.Haldar and A.A.Aravind,Pearson Education.
7. Operating Systems, R.Elmasri, A,G.Carrick and D.Levine, Mc Graw Hill.
8. Operating Systems in depth, T.W. Doeppner, Wiley.

**Outcomes:**

- Apply optimization techniques for the improvement of system performance.
- Ability to understand the synchronous and asynchronous communication mechanisms in their respective OS.
- Learn about minimization of turnaround time, waiting time and response time and also maximization of throughput with keeping CPU as busy as possible.
- Ability to compare the different OS.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****II Year B.Tech. ECM-II Sem****L T/P/D C****- -/3/- 2****(A40586) WEB TECHNOLOGIES LAB****Objectives:**

- To enable the student to program web applications using the following technologies HTML, Javascript, AJAX, PHP, Tomcat Server, Servlets, JSP.

**Note:**

1. **Use LAMP Stack (Linux, Apache, MySQL and PHP) for the Lab Experiments. Though not mandatory, encourage the use of Eclipse platform wherever applicable.**
2. **The list suggests the minimum program set. Hence, the concerned staff is requested to add more problems to the list as needed.**
  1. Install the following on the local machine
    - Apache Web Server (if not installed)
    - Tomcat Application Server locally
    - Install MySQL (if not installed)
    - Install PHP and configure it to work with Apache web server and MySQL (if not already configured).
  2. Write an HTML page including any required Javascript that takes a number from one text field in the range of 0 to 999 and shows it in another text field in words. If the number is out of range, it should show "out of range" and if it is not a number, it should show "not a number" message in the result box.
  3. Write an HTML page that has one input, which can take multi-line text and a submit button. Once the user clicks the submit button, it should show the number of characters, words and lines in the text entered using an alert message. Words are separated with white space and lines are separated with new line character.
  4. Write an HTML page that contains a selection box with a list of 5 countries. When the user selects a country, its capital should be printed next to the list. Add CSS to customize the properties of the font of the capital (color, bold and font size).
  5. Create an XML document that contains 10 users information. Write a Java program, which takes User Id as input and returns the user details by taking the user information from the XML document using

(a) DOM Parser and (b) SAX parser

6. Implement the following web applications using (a) PHP, (b) Servlets and (c) JSP:
  - i. A user validation web application, where the user submits the login name and password to the server. The name and password are checked against the data already available in Database and if the data matches, a successful login page is returned. Otherwise a failure message is shown to the user.
  - ii. Modify the above program to use an xml file instead of database.
  - iii. Modify the above program to use AJAX to show the result on the same page below the submit button.
  - iv. A simple calculator web application that takes two numbers and an operator (+, -, /, \* and %) from an HTML page and returns the result page with the operation performed on the operands.
  - v. Modify the above program such that it stores each query in a database and checks the database first for the result. If the query is already available in the DB, it returns the value that was previously computed (from DB) or it computes the result and returns it after storing the new query and result in DB.
  - vi. A web application takes a name as input and on submit it shows a hello <name> page where <name> is taken from the request. It shows the start time at the right top corner of the page and provides a logout button. On clicking this button, it should show a logout page with Thank You <name> message with the duration of usage (hint: Use session to store name and time).
  - vii. A web application that takes name and age from an HTML page. If the age is less than 18, it should send a page with "Hello <name>, you are not authorized to visit this site" message, where <name> should be replaced with the entered name. Otherwise it should send "Welcome <name> to this site" message.
  - viii. A web application for implementation:

The user is first served a login page which takes user's name and password. After submitting the details the server checks these values against the data from a database and takes the following decisions.

If name and password matches, serves a welcome page with user's full name.

If name matches and password doesn't match, then serves "password mismatch" page.

If name is not found in the database, serves a registration page, where user's full name is asked and on submitting the full name, it



stores, the login name, password and full name in the database (hint: use session for storing the submitted login name and password)

- ix. A web application that lists all cookies stored in the browser on clicking "List Cookies" button. Add cookies if necessary.

**TEXT BOOKS:**

1. Web Technologies, Uttam K Roy, Oxford University Press.
2. The Complete Reference PHP – Steven Holzner, Tata McGraw-Hill .

**REFERENCE BOOKS:**

1. Web Programming, building internet applications, Chris Bates 2<sup>nd</sup> edition, Wiley Dreamtech.
2. Java Server Pages –Hans Bergsten, SPD O'Reilly.
3. Java Script, D.Flanagan, O'Reilly, SPD.
4. Beginning Web Programming-Jon Duckett WROX.
5. Programming world wide web, R.W.Sebesta, Fourth Edition, Pearson.
6. Internet and World Wide Web – How to program, Dietel and Nieto, Pearson.

**Outcomes:**

- Use LAMP Stack for web applications
- Use Tomcat Server for Servlets and JSPs
- Write simple applications with Technologies like HTML, Javascript, AJAX, PHP, Servlets and JSPs
- Connect to Database and get results
- Parse XML files using Java (DOM and SAX parsers)

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****II Year B.Tech. ECM-II Sem****L T/P/D C****- -/3/- 2****(A40483) ELECTRONIC CIRCUIT ANALYSIS LAB****List of Experiments (12 experiments to be done) :****I) Design and Simulation in Simulation Laboratory using any Simulation Software (Any 6 Experiments):**

1. Common Emitter Amplifier
2. Common Source Amplifier
3. Two Stage RC Coupled Amplifier
4. Current shunt and Voltage Series Feedback Amplifier
5. Cascode Amplifier
6. Wien Bridge Oscillator using Transistors
7. RC Phase Shift Oscillator using Transistors
7. Class A Power Amplifier (Transformer less)
9. Class B Complementary Symmetry Amplifier
10. Common Base (BJT) / Common Gate (JFET) Amplifier.

**II) Testing in the Hardware Laboratory (6 Experiments)**

- A) Any Three circuits simulated in Simulation laboratory
- B) Any Three of the following:
  1. Class A Power Amplifier (with transformer load)
  2. Class C Power Amplifier
  3. Single Tuned Voltage Amplifier
  4. Hartley & Colpitt's Oscillators
  5. Darlington Pair
  6. MOS Common Source Amplifier

**Equipment required for the Laboratory:**

1. For software simulation of Electronic circuits
  - i) Computer Systems with latest specifications
  - ii) Connected in LAN (Optional)
  - iii) Operating system (Windows XP)
  - iv) Suitable Simulations software

2. For Hardware simulations of Electronic Circuits
  - i) Regulated Power Supply (0-30V)
  - ii) CRO's
  - iii) Functions Generators
  - iv) Multimeters
  - v) Components
3. Win XP/ Linux etc.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**

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**(A50010) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS****Objectives:**

To enable the student to understand and appreciate, with a practical insight, the importance of certain basic issues governing the business operations namely: demand and supply, production function, cost analysis, markets, forms of business organisations, capital budgeting and financial accounting and financial analysis.

**Unit I**

**Introduction & Demand Analysis:** Definition, Nature and Scope of Managerial Economics. Demand Analysis: Demand Determinants, Law of Demand and its exceptions. *Elasticity of Demand:* Definition, Types, Measurement and Significance of Elasticity of Demand. *Demand Forecasting,* Factors governing demand forecasting, methods of demand forecasting.

**Unit II**

**Production & Cost Analysis:** *Production Function* – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale. *Cost Analysis:* Cost concepts. Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems) - Managerial Significance.

**Unit III**

**Markets & New Economic Environment:** Types of competition and Markets, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly. *Pricing:* Objectives and Policies of Pricing. Methods of Pricing. *Business:* Features and evaluation of different forms of Business Organisation: Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, *New Economic Environment:* Changing Business Environment in Post-liberalization scenario.

**Unit IV**

**Capital Budgeting:** Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising capital - Trading Forecast, Capital Budget, Cash Budget. Capital Budgeting: features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (simple problems).

**Unit V**

**Introduction to Financial Accounting & Financial Analysis:** Accounting concepts and Conventions - Introduction IFRS - Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). *Financial Analysis:* Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability ratios. Du Pont Chart.

**TEXT BOOKS:**

1. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2009.
2. S.A. Siddiqui & A.S. Siddiqui, Managerial Economics and Financial Analysis, New Age international Publishers, Hyderabad 2013.
3. M. Kasi Reddy & Saraswathi, Managerial Economics and Financial Analysis, PHI New Delhi, 2012.

**REFERENCES:**

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.2012.
2. H. Craig Peterson & W. Cris Lewis, Managerial Economics, Pearson, 2012.
3. Lipsey & Chrystel, Economics, Oxford University Press, 2012
4. Domnick Salvatore: Managerial Economics in a Global Economy, Thomson, 2012.
5. Narayanaswamy: Financial Accounting—A Managerial Perspective, Pearson, 2012.
6. S.N.Maheswari & S.K. Maheswari, Financial Accounting, Vikas, 2012.
7. Truet and Truet: Managerial Economics: Analysis, Problems and Cases, Wiley, 2012.
8. Dwivedi: Managerial Economics, Vikas, 2012.
9. Shailaja & Usha : MEFA, University Press, 2012.
10. Aryasri: Managerial Economics and Financial Analysis, TMH, 2012.
11. Vijay Kumar & Appa Rao, Managerial Economics & Financial Analysis, Cengage 2011.
12. J. V. Prabhakar Rao & P.V. Rao, Managerial Economics & Financial Analysis, Maruthi Publishers, 2011.

**Outcomes:**

At the end of the course, the student will

- Understand the market dynamics namely, demand and supply, demand forecasting , elasticity of demand and supply, pricing methods and pricing in different market structures.

- Gain an insight into how production function is carried out to achieve least cost combination of inputs and cost analysis
- Develop an understanding of Analyse how capital budgeting decisions are carried out
- Understand the framework for both manual and computerised accounting process
- Know how to analyse and interpret the financial statements through ratio analysis.

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**(A50507) DATABASE MANAGEMENT SYSTEMS****Objectives:**

- To understand the basic concepts and the applications of database systems.
- To master the basics of SQL and construct queries using SQL.
- To understand the relational database design principles.
- To become familiar with the basic issues of transaction processing and concurrency control.
- To become familiar with database storage structures and access techniques.

**UNIT- I**

- Introduction-Database System Applications, Purpose of Database Systems, View of Data – Data Abstraction, Instances and Schemas, Data Models, Database Languages – DDL, DML, Database Access from Application Programs, Transaction Management, Data Storage and Querying, Database Architecture, Database Users and Administrators, History of Data base Systems.
- Introduction to Data base design, ER diagrams, Beyond ER Design, Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of ER Model, Conceptual Design with the ER Model, Conceptual Design for Large enterprises. Relational Model: Introduction to the Relational Model – Integrity Constraints over Relations, Enforcing Integrity constraints, Querying relational data, Logical data base Design, Introduction to Views – Destroying /altering Tables and Views.

**UNIT- II**

Relational Algebra and Calculus: Relational Algebra – Selection and Projection, Set operations, Renaming, Joins, Division, Examples of Algebra Queries, Relational calculus – Tuple relational Calculus – Domain relational calculus – Expressive Power of Algebra and calculus.

Form of Basic SQL Query – Examples of Basic SQL Queries, Introduction to Nested Queries, Correlated Nested Queries, Set – Comparison Operators, Aggregate Operators, NULL values – Comparison using Null values – Logical connectives – AND, OR and NOT – Impact on SQL Constructs, Outer Joins, Disallowing NULL values, Complex Integrity Constraints in SQL Triggers and Active Data bases.

**UNIT- III**

Introduction to Schema Refinement – Problems Caused by redundancy, Decompositions – Problem related to decomposition, Functional Dependencies - Reasoning about FDS, Normal Forms – FIRST, SECOND, THIRD Normal forms – BCNF –Properties of Decompositions- Loss less-join Decomposition, Dependency preserving Decomposition, Schema Refinement in Data base Design – Multi valued Dependencies – FOURTH Normal Form, Join Dependencies, FIFTH Normal form, Inclusion Dependencies.

**UNIT- IV**

Transaction Management-Transaction Concept- Transaction State-Implementation of Atomicity and Durability – Concurrent – Executions – Serializability- Recoverability – Implementation of Isolation – Testing for serializability.

Concurrency Control- Lock –Based Protocols – Timestamp Based Protocols-Validation- Based Protocols – Multiple Granularity.

Recovery System-Failure Classification-Storage Structure-Recovery and Atomicity – Log – Based Recovery – Recovery with Concurrent Transactions – Buffer Management – Failure with loss of nonvolatile storage-Advance Recovery systems- Remote Backup systems.

**UNIT- V**

Overview of Storage and Indexing: Data on External Storage, File Organization and Indexing – Clustered Indexes, Primary and Secondary Indexes, Index data Structures – Hash Based Indexing, Tree based Indexing, Comparison of File Organizations.

Tree Structured Indexing: Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM) B+ Trees: A Dynamic Index Structure, Search, Insert, Delete.

Hash Based Indexing: Static Hashing, Extendable hashing, Linear Hashing, Extendible vs. Linear Hashing.

**TEXT BOOKS:**

1. Data base Management Systems, Raghu Ramakrishnan, Johannes Gehrke, TMH, 3<sup>rd</sup> Edition, 2003.
2. Data base System Concepts, A.Silberschatz, H.F. Korth, S.Sudarshan, McGraw hill, VI edition, 2006.

**REFERENCE BOOKS:**

1. Database Systems, 6<sup>th</sup> edition, Ramez Elmasri, Shamkant B.Navathe, Pearson Education, 2013.
2. Database-Principles, Programming, and Performance, P.O'Neil,



E.O'Neil, 2<sup>nd</sup>ed., ELSEVIER.

3. Database Systems, A Practical approach to Design Implementation and Management Fourth edition, Thomas Connolly, Carolyn Begg, Pearson education.
4. Database System Concepts, Peter Rob & Carlos Coronel, Cengage Learning, 2008.
5. Fundamentals of Relational Database Management Systems, S.Sumathi, S.Esakkirajan, Springer.
6. Database Management System Oracle SQL and PL/SQL, P.K.Das Gupta, PHI.
7. Introduction to Database Management, M.L.Gillenson and others, Wiley Student Edition.
8. Database Development and Management, Lee Chao, Auerbach publications, Taylor & Francis Group.
9. Introduction to Database Systems, C.J.Date, Pearson Education.
10. Database Management Systems, G.K.Gupta, TMH.

**Outcomes:**

- Demonstrate the basic elements of a relational database management system.
- Ability to identify the data models for relevant problems.
- Ability to design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data.
- Apply normalization for the development of application software's.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****III Year B.Tech. ECM-I Sem**

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**(A50425) LINEAR AND DIGITAL IC APPLICATIONS****Objectives:**

The main objectives of the course are:

- To introduce the basic building blocks of linear integrated circuits.
- To teach the linear and non - linear applications of operational amplifiers.
- To introduce the theory and applications of analog multipliers and PLL.
- To teach the theory of ADC and DAC
- To introduce the concepts of waveform generation and introduce some special function ICs.
- To understand and implement the working of basic digital circuits

**UNIT -I:**

**Operational Amplifier** : Ideal and Practical Op-Amp, Op-Amp Characteristics, DC and AC Characteristics, Features of 741 Op-Amp, Modes of Operation - Inverting, Non-Inverting, Differential, Instrumentation Amplifier, AC Amplifier, Differentiators and Integrators, Comparators, Schmitt Trigger, Introduction to Voltage Regulators, Features of 723 Regulator, Three Terminal Voltage Regulators.

**UNIT -II:**

**Op-Amp, IC-555 & IC 565 Applications:** Introduction to Active Filters, Characteristics of Band pass, Band reject and All Pass Filters, Analysis of 1st order LPF & HPF Butterworth Filters, Waveform Generators – Triangular, Sawtooth, Square Wave, IC555 Timer - Functional Diagram, Monostable and Astable Operations, Applications, IC565 PLL - Block Schematic, Description of Individual Blocks, Applications.

**UNIT -III:**

**Data Converters** : Introduction, Basic DAC techniques, Different types of DACs-Weighted resistor DAC, R-2R ladder DAC, Inverted R-2R DAC, Different Types of ADCs - Parallel Comparator Type ADC, Counter Type ADC, Successive Approximation ADC and Dual Slope ADC, DAC and ADC Specifications.

**UNIT -IV:**

**Digital Integrated Circuits:** Classification of Integrated Circuits, Comparison of Various Logic Families, CMOS Transmission Gate, IC interfacing- TTL

Driving CMOS & CMOS Driving TTL, Combinational Logic ICs – Specifications and Applications of TTL-74XX & CMOS 40XX Series ICs - Code Converters, Decoders, Demultiplexers, LED & LCD Decoders with Drivers , Encoders, Priority Encoders, Multiplexers, Demultiplexers, Priority Generators/Checkers, Parallel Binary Adder/Subtractor, Magnitude Comparators.

**UNIT -V:**

**Sequential Logic IC's and Memories:** Familiarity with commonly available 74XX & CMOS 40XX Series ICs – All Types of Flip-flops, Synchronous Counters, Decade Counters, Shift Registers.

Memories - ROM Architecture, Types of ROMS & Applications, RAM Architecture, Static & Dynamic RAMs.

**TEXT BOOKS:**

1. Op-Amps & Linear ICs – Ramakanth A. Gayakwad, PHI, 2003.
2. Linear Integrated Circuits –D. Roy Chowdhury, New Age International (p) Ltd, 2<sup>nd</sup> Ed., 2003.
3. Digital Fundamentals – Floyd and Jain, Pearson Education, 8<sup>th</sup> Edition, 2005.

**REFERENCE BOOKS:**

1. Op Amps and Linear Integrated Circuits-Concepts and Applications James M. Fiore, Cengage Learning/ Jaico, 2009.
2. Operational Amplifiers with Linear Integrated Circuits by K.Lal Kishore – Pearson, 2009.
3. Linear Integrated Circuits and Applications – Salivahana, TMH.
4. Modern Digital Electronics – RP Jain – 4/e – TMH, 2010.
5. Digital Design Principles and Practices – John. F. Wakerly 3/e, 2005.
6. Operational Amplifiers with Linear Integrated Circuits, 4/e William D.Stanley, Pearson Education India, 2009.

**Course Outcomes:**

On completion of this course, the students will have:

- A thorough understanding of operational amplifiers with linear integrated circuits.
- Understanding of the different families of digital integrated circuits and their characteristics.

Also students will be able to design circuits using operational amplifiers for various applications.

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**(A50414) PRINCIPLES OF COMMUNICATIONS****Objective:** To provide the basic concepts of communication systems.**UNIT-I**

Introduction : Block diagram of Electrical communication system, Radio communication : Types of communications, Analog, pulse and digital Types of signals, Noise – Types of noise, sources of noise, calculation of noise in Linear systems, and noise figure.

**UNIT-II**

Amplitude Modulation : Need for modulation, Types of Amplitude modulation, AM, DSB SC, SSB SC, Power and BW requirements, generation of AM, DSB SC, SSB SC, Demodulation of AM : Diode detector, Product demodulation for DSB SC & SSB SC.

Angle Modulation : Frequency & Phase modulations, advantages of FM over AM, Bandwidth consideration, Narrow band and Wide band FM, Comparison of FM & PM.

**UNIT- III**

Pulse Modulations : Sampling, Nyquist rate of sampling, Sampling theorem for Band limited signals, PAM, regeneration of base band signal, PWM and PPM, Time Division Multiplexing, Frequency Division Multiplexing, Asynchronous Multiplexing.

**UNIT- IV**

Digital Communication : Advantages, Block diagram of PCM, Quantization, effect of quantization, quantization error, Base band digital signal, DM, ADM, ADPCM and comparison.

Digital Modulation : ASK, FSK, PSK, DPSK, QPSK demodulation, coherent and incoherent reception, Modems.

**UNIT-V**

Information Theory : Concept of information, rate of information and entropy, Source coding for optimum rate of information, Coding efficiency, Shannon-Fano and Huffman coding.

Error control coding : Introduction, Error detection and correction codes, block codes, convolution codes.

**TEXT BOOKS:**

1. Communication Systems Analog and Digital – R.P. Singh and SD Sapre, TMH, 20<sup>th</sup> reprint, 2004.

2. Principles of Communications – H. Taub and D. Schilling, TMH, 2003.

**REFERENCES:**

1. Electronic Communication Systems – Kennedy and Davis, TMH, 4th edition, 2004.
2. Communication Systems Engineering – John. G. Proakis and Masoud Salehi, PHI, 2nd Ed. 2004.

**Outcome:**

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

- explain the main concepts of analogue and digital communication systems;
- analyze and design an AM and FM modulator/demodulator;
- explain, discuss, and compare different binary digital modulation techniques;
- explain types of noise & effects of noise on communication system

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**(A50518) SOFTWARE ENGINEERING****Objectives:**

- To understanding of software process models such as waterfall and evolutionary models.
- To understanding of software requirements and SRS document.
- To understanding of different software architectural styles.
- To understanding of software testing approaches such as unit testing and integration testing.
- To understanding on quality control and how to ensure good quality software.

**UNIT- I**

Introduction to Software Engineering: The evolving role of software, Changing Nature of Software, legacy software, Software myths.

A Generic view of process: Software engineering- A layered technology, a process framework, The Capability Maturity Model Integration (CMMI), Process patterns, process assessment, personal and team process models.

Process models: The waterfall model, Incremental process models, Evolutionary process models, Specialized process models, the Unified process.

**UNIT- II**

Software Requirements: Functional and non-functional requirements, User requirements, System requirements, Interface specification, the software requirements document.

Requirements engineering process: Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management.

System models: Context Models, Behavioral models, Data models, Object models, structured methods.

**UNIT- III**

Design Engineering: Design process and Design quality, Design concepts, the design model, pattern based software design.

Creating an architectural design: software architecture, Data design, Architectural styles and patterns, Architectural Design, assessing alternative architectural designs, mapping data flow into a software architecture.

Modeling component-level design : Designing class-based components, conducting component-level design, Object constraint language, designing conventional components.

Performing User interface design: Golden rules, User interface analysis and design, interface analysis, interface design steps, Design evaluation.

#### **UNIT- IV**

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing, Validation testing, System testing, the art of Debugging.

Product metrics: Software Quality, Frame work for Product metrics, Metrics for Analysis Model, Metrics for Design Model, Metrics for source code, Metrics for testing, Metrics for maintenance.

Metrics for Process and Products: Software Measurement, Metrics for software quality.

#### **UNIT- V**

Risk management: Reactive vs Proactive Risk strategies, software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMM Plan.

Quality Management: Quality concepts, Software quality assurance, Software Reviews, Formal technical reviews, Statistical Software quality Assurance, Software reliability, The ISO 9000 quality standards.

#### **TEXT BOOKS:**

1. Software Engineering A practitioner's Approach, Roger S Pressman, sixth edition McGrawHill International Edition.
2. Software Engineering, Ian Sommerville, seventh edition, Pearson education.

#### **REFERENCE BOOKS:**

1. Software Engineering, A Precise Approach, Pankaj Jalote, Wiley India,2010.
2. Software Engineering : A Primer, Waman S Jawadekar, Tata McGraw-Hill, 2008
3. Fundamentals of Software Engineering, Rajib Mall,PHI, 2005
4. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press.
5. Software Engineering1: Abstraction and modeling, Diner Bjorner, Springer International edition, 2006.
6. Software Engineering2: Specification of systems and languages, Diner Bjorner, Springer International edition 2006.
7. Software Engineering Foundations, Yingxu Wang, Auerbach

Publications,2008.

8. Software Engineering Principles and Practice, Hans Van Vliet,3<sup>rd</sup> edition, John Wiley & Sons Ltd.
9. Software Engineering 3:Domains,Requirements,and Software Design, D.Bjorner, Springer International Edition.
10. Introduction to Software Engineering, R.J.Leach, CRC Press.

**Outcomes:**

1. Ability to identify the minimum requirements for the development of application.
2. Ability to develop, maintain, efficient, reliable and cost effective software solutions
3. Ability to critically thinking and evaluate assumptions and arguments.



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****III Year B.Tech. ECM-I Sem**

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**(A50508) DESIGN AND ANALYSIS OF ALGORITHMS****Objectives:**

- To analyze performance of algorithms.
- To choose the appropriate data structure and algorithm design method for a specified application.
- To understand how the choice of data structures and algorithm design methods impacts the performance of programs.
- To solve problems using algorithm design methods such as the greedy method, divide and conquer, dynamic programming, backtracking and branch and bound.
- Prerequisites (Subjects) Data structures, Mathematical foundations of computer science.

**UNIT- I**

Introduction: Algorithm, Pseudo code for expressing algorithms, Performance Analysis-Space complexity, Time complexity, Asymptotic Notation- Big oh notation, Omega notation, Theta notation and Little oh notation, Probabilistic analysis, Amortized complexity.

Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort, Strassen's Matrix Multiplication.

**UNIT- II**

Searching and Traversal Techniques: Efficient non-recursive binary tree traversal algorithms,

Disjoint set operations, union and find algorithms, Spanning trees, Graph traversals- Breadth first search and Depth first search, AND/OR graphs, game trees, Connected Components, Bi-connected components.

**UNIT- III**

Greedy method: General method, applications-Job sequencing with deadlines, 0/1 knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

Dynamic Programming: General method, applications-Multistage graphs, Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Traveling sales person problem, Reliability design.

**UNIT- IV**

Backtracking: General method, applications-n-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles.

Branch and Bound: General method, applications - Traveling sales person problem, 0/1 knapsack problem-LC Branch and Bound solution, FIFO Branch and Bound solution.

#### **UNIT- V**

NP-Hard and NP-Complete problems: Basic concepts, Non-deterministic algorithms, NP - Hard and NP- Complete classes, NP-Hard problems, Cook's theorem.

#### **TEXT BOOKS:**

1. Fundamentals of Computer Algorithms, 2nd Edition, Ellis Horowitz, Satraj Sahni and S.Rajasekharan, Universities Press, 2008.
2. Foundations of Algorithms, 4<sup>th</sup> edition, R.Neapolitan and K.Naimipour, Jones and Bartlett Learning.
3. Design and Analysis of Algorithms, P.H.Dave, H.B.Dave, Pearson Education, 2008.

#### **REFERENCE BOOKS:**

1. Computer Algorithms, Introduction to Design and Analysis, 3rd Edition, Sara Baase, Allen, Van, Gelder, Pearson Education.
2. Algorithm Design: Foundations, Analysis and Internet examples, M.T.Goodrich and R.Tomassia, John Wiley and sons.
3. Fundamentals of Sequential and Parallel Algorithms, K.A.Berman and J.L.Paul, Cengage Learning.
4. Introduction to the Design and Analysis of Algorithms, A.Levitin, Pearson Education.
5. Introduction to Algorithms, 3<sup>rd</sup> Edition, T.H.Cormen, C.E.Leiserson, R.L.Rivest, and C.Stein, PHI Pvt.Ltd.
6. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson Education, 2004.

#### **Outcomes:**

- Be able to analyze algorithms and improve the efficiency of algorithms.
- Apply different designing methods for development of algorithms to realistic problems, such as divide and conquer, greedy and etc.
- Ability to understand and estimate the performance of algorithm.

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**(A50489) LINEAR AND DIGITAL IC APPLICATIONS LAB****Note:**

- To perform any twelve experiments (choosing at least five from each part).
- Verify the functionality of the IC in the given application.

**Part-I****Linear IC Experiments**

1. OP AMP Applications – Adder, Subtractor, Comparators.
2. Integrator and Differentiator Circuits using IC 741.
3. Active Filter Applications – LPF, HPF (first order)
4. IC 741 Waveform Generators – Sine, Squarewave and Triangular waves.
5. IC 555 Timer – Monostable and Astable Multivibrator Circuits.
6. Schmitt Trigger Circuits – using IC 741.
7. IC 565 – PLL Applications.
8. Voltage Regulator using IC 723, Three Terminal Voltage Regulators – 7805, 7809, 7912.

**Part-II****Digital IC Applications**

1. 3-8 decoder using 74138
2. 4-bit comparator using 7485.
3. 8\*1 Multiplexer using 74151 and 2\*4 Demultiplexer using 74155.
4. D, JK Flip Flops using 7474, 7483.
5. Decade counter using 7490.
6. UP/DOWN counter using 74163
7. Universal shift registers using 74194/195.
8. RAM (16\*4) using 74189 (Read and Write operations).

**EQUIPMENT REQUIRED:**

1. 20 MHz/ 40 MHz/60 MHz Oscilloscope.
2. 1 MHz Function Generator (Sine, Square, Triangular and TTL) .
3. Regulated Power Supply.
4. Multimeter / Volt Meter.

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**(A50590) SOFTWARE ENGINEERING LAB****Objectives**

The goal of this course is to teach practical software development methods and tools in the context of developing a software system with other students in collaboration. Practical development tools include

- To analysis tools (e.g., debuggers, profilers, automated bug-finders, style-checkers, program differencing tools, program investigation tools)
- To design the tools (e.g. UML-based modeling tool)
- To design the Object-oriented techniques such as design patterns
- Requirements elicitation and formal specification
- Unit testing and regression testing
- Pair programming
- To analyse the Basic static and dynamic program

Students are divided into batches of 5 each and each batch has to draw the following diagrams using UML for an ATM system whose description is given below.

UML diagrams to be developed are:

1. Use Case Diagram.
2. Class Diagram.
3. Sequence Diagram.
4. Collaboration Diagram.
5. State Diagram
6. Activity Diagram.
7. Component Diagram
8. Deployment Diagram.
9. Test Design.

**Description for an ATM System**

The software to be designed will control a simulated automated teller machine (ATM) having a magnetic stripe reader for reading an ATM card, a customer console (keyboard and display) for interaction with the customer, a slot for depositing envelopes, a dispenser for cash (in multiples of Rs. 100, Rs. 500

and Rs. 1000), a printer for printing customer receipts, and a key-operated switch to allow an operator to start or stop the machine. The ATM will communicate with the bank's computer over an appropriate communication link. (The software on the latter is not part of the requirements for this problem.)

The ATM will service one customer at a time. A customer will be required to insert an ATM card and enter a personal identification number (PIN) - both of which will be sent to the bank for validation as part of each transaction. The customer will then be able to perform one or more transactions. The card will be retained in the machine until the customer indicates that he/she desires no further transactions, at which point it will be returned - except as noted below.

The ATM must be able to provide the following services to the customer:

1. A customer must be able to make a cash withdrawal from any suitable account linked to the card, in multiples of Rs. 100 or Rs. 500 or Rs. 1000. Approval must be obtained from the bank before cash is dispensed.
2. A customer must be able to make a deposit to any account linked to the card, consisting of cash and/or checks in an envelope. The customer will enter the amount of the deposit into the ATM, subject to manual verification when the envelope is removed from the machine by an operator. Approval must be obtained from the bank before physically accepting the envelope.
3. A customer must be able to make a transfer of money between any two accounts linked to the card.
4. A customer must be able to make a balance inquiry of any account linked to the card.
5. A customer must be able to abort a transaction in progress by pressing the Cancel key instead of responding to a request from the machine.

The ATM will communicate each transaction to the bank and obtain verification that it was allowed by the bank. Ordinarily, a transaction will be considered complete by the bank once it has been approved. In the case of a deposit, a second message will be sent to the bank indicating that the customer has deposited the envelope. (If the customer fails to deposit the envelope within the timeout period, or presses cancel instead, no second message will be sent to the bank and the deposit will not be credited to the customer.)

If the bank determines that the customer's PIN is invalid, the customer will be required to re-enter the PIN before a transaction can proceed. If the customer is unable to successfully enter the PIN after three tries, the card will be permanently retained by the machine, and the customer will have to contact the bank to get it back.

If a transaction fails for any reason other than an invalid PIN, the ATM will display an explanation of the problem, and will then ask the customer whether he/she wants to do another transaction.

The ATM will provide the customer with a printed receipt for each successful transaction

The ATM will have a key-operated switch that will allow an operator to start and stop the servicing of customers. After turning the switch to the “on” position, the operator will be required to verify and enter the total cash on hand. The machine can only be turned off when it is not servicing a customer. When the switch is moved to the “off” position, the machine will shut down, so that the operator may remove deposit envelopes and reload the machine with cash, blank receipts, etc.

**Outcomes:**

- Students will gain knowledge in objective-oriented design, analysis, and testing techniques.
- Students will gain hands-on learning experience in collaborative software design and development and also become familiar with practical tools that enable them to construct and evolve a large-scale software system; this course will make our undergraduate students attractive to software engineering industry.

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**(A60014) MANAGEMENT SCIENCE****Objectives:**

This course is intended to familiarise the students with the framework for the managers and leaders available for understanding and making decisions relating to issues related organisational structure, production operations, marketing, Human resource Management, product management and strategy.

**UNIT -I:**

**Introduction to Management and Organisation:** Concepts of Management and organization- nature, importance and Functions of Management, Systems Approach to Management - Taylor's Scientific Management Theory – Fayal's Principles of Management – Maslow's theory of Hierarchy of Human Needs – Douglas McGregor's Theory X and Theory Y – Hertzberg Two Factor Theory of Motivation - Leadership Styles, Social responsibilities of Management. Designing Organisational Structures: Basic concepts related to Organisation - Departmentation and Decentralisation, Types and Evaluation of mechanistic and organic structures of organisation and suitability.

**UNIT -II:**

**Operations and Marketing Management:** Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production), Work Study -Basic procedure involved in Method Study and Work Measurement – Business Process Reengineering (BPR) - Statistical Quality Control: control charts for Variables and Attributes (simple Problems) and Acceptance Sampling, TQM, Six Sigma, Deming's contribution to quality. Objectives of Inventory control, EOQ, ABC Analysis, Purchase Procedure, Stores Management and Stores Records – JIT System, Supply Chain Management, Functions of Marketing, Marketing Mix, and Marketing Strategies based on Product Life Cycle, Channels of distribution.

**UNIT -III:**

**Human Resources Management (HRM):** Concepts of HRM, HRD and Personnel Management and Industrial Relations (PMIR), HRM vs PMIR, Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Placement, Wage and Salary Administration, Promotion, Transfer, Separation, Performance Appraisal, Grievance Handling and Welfare Administration, Job Evaluation and Merit Rating – Capability Maturity Model (CMM) Levels – Performance Management System.

**UNIT -IV:**

**Project Management (PERT/CPM):** Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing (simple problems).

**UNIT -V:**

**Strategic Management and Contemporary Strategic Issues:** Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of Corporate Planning Process, Environmental Scanning, Value Chain Analysis, SWOT Analysis, Steps in Strategy Formulation and Implementation, Generic Strategy alternatives. Bench Marking and Balanced Score Card as Contemporary Business Strategies.

**TEXT BOOKS:**

1. Stoner, Freeman, Gilbert, *Management*, 6th Ed, Pearson Education, New Delhi, 2004.
2. P. Vijaya Kumar, N. Appa Rao and Ashima B. Chhalill, Cengage Learning India Pvt Ltd., 2012.

**REFERENCE BOOKS:**

1. Kotler Philip and Keller Kevin Lane: *Marketing Management*, Pearson, 2012.
2. Koontz and Wehrich: *Essentials of Management*, McGraw Hill, 2012.
3. Thomas N. Duening and John M. Ivancevich *Management—Principles and Guidelines*, Biztantra, 2012.
4. Kanishka Bedi, *Production and Operations Management*, Oxford University Press, 2012.
5. Samuel C. Certo: *Modern Management*, 2012.
6. Schermerhorn, Capling, Poole and Wiesner: *Management*, Wiley, 2012.
7. Parnell: *Strategic Management*, Cengage, 2012.
8. Lawrence R Jauch, R. Gupta and William F. Glueck: *Business Policy and Strategic Management*, Frank Bros. 2012.
9. Aryasri: *Management Science*, McGraw Hill, 2012

**outcomes:** By the end of the course, the student will be in a position to

- Plan an organisational structure for a given context in the organisation
- carry out production operations through Work study



- understand the markets, customers and competition better and price the given products appropriately.
- ensure quality for a given product or service
- plan and control the HR function better
- plan, schedule and control projects through PERT and CPM
- evolve a strategy for a business or service organisation

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**(A60430) MICROPROCESSORS AND MICROCONTROLLERS****Objective:**

- To develop an in-depth understanding of the operation of microprocessors and microcontrollers, machine language programming & interfacing techniques.

**UNIT -I:**

**8086 Architecture:** 8086 Architecture-Functional diagram, Register Organization, Memory Segmentation, Programming Model, Memory addresses, Physical Memory Organization, Architecture of 8086, Signal descriptions of 8086- Common Function Signals, Timing diagrams, Interrupts of 8086.

**UNIT -II:**

**Instruction Set and Assembly Language Programming of 8086:** Instruction formats, Addressing modes, Instruction Set, Assembler Directives, Macros, Simple Programs involving Logical, Branch and Call Instructions, Sorting, Evaluating Arithmetic Expressions, String Manipulations.

**UNIT -III:**

**I/O Interface:** 8255 PPI, Various Modes of Operation and Interfacing to 8086, Interfacing Keyboard, Display, D/A and A/D Converter.

**Interfacing with advanced devices:** Memory Interfacing to 8086, Interrupt Structure of 8086, Vector Interrupt Table, Interrupt Service Routine.

**Communication Interface:** Serial Communication Standards, Serial Data Transfer Schemes, 8251 USART Architecture and Interfacing.

**UNIT -IV:**

**Introduction to Microcontrollers:** Overview of 8051 Microcontroller, Architecture, I/O Ports, Memory Organization, Addressing Modes and Instruction set of 8051, Simple Programs.

**UNIT -V:**

**8051 Real Time Control:** Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the Serial Communication Interrupts, Programming 8051 Timers and Counters

**TEXT BOOKS:**

1. D. V. Hall, Microprocessors and Interfacing, TMGH, 2<sup>nd</sup> Edition 2006.
2. Kenneth. J. Ayala, The 8051 Microcontroller , 3<sup>rd</sup> Ed., Cengage Learning.

**REFERENCE BOOKS:**

1. Advanced Microprocessors and Peripherals – A. K. Ray and K.M. Bhurchandani, TMH, 2<sup>nd</sup> Edition 2006.
2. The 8051 Microcontrollers, Architecture and Programming and Applications -K.Uma Rao, Andhe Pallavi, Pearson, 2009.
3. Micro Computer System 8086/8088 Family Architecture, Programming and Design - Liu and GA Gibson, PHI, 2<sup>nd</sup> Ed.
4. Microcontrollers and Application - Ajay. V. Deshmukh, TMGH, 2005.
5. The 8085 Microprocessor: Architecture, programming and Interfacing – K.Uday Kumar, B.S.Umashankar, 2008, Pearson

**Outcome:**

- The student will learn the internal organization of popular 8086/8051 microprocessors/microcontrollers.
- The student will learn hardware and software interaction and integration.
- The students will learn the design of microprocessors/ microcontrollers-based systems.

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**(A60018) HUMAN VALUES AND PROFESSIONAL ETHICS****(Open Elective)**

**Objectives** : This introductory course input is intended

- To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
- To facilitate the development of a Holistic perspective among students towards life, profession and happiness, based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of Value based living in a natural way.
- To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually satisfying human behavior and mutually enriching interaction with Nature.

**Unit I:**

Course Introduction - Need, Basic Guidelines, Content and Process for Value Education: Understanding the need, basic guidelines, content and process for Value Education. Self Exploration—what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self exploration. Continuous Happiness and Prosperity- A look at basic Human Aspirations. Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario. Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

**Unit II:**

Understanding Harmony in the Human Being - Harmony in Myself! : Understanding human being as a co-existence of the sentient 'I' and the material 'Body'. Understanding the needs of Self ('I') and 'Body' - Sukh and Savidha. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer). Understanding the characteristics and activities of 'I' and harmony in 'I'. Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Swasthya.

**Unit III:**

Understanding Harmony in the Family and Society- Harmony in Human -

Human Relationship : Understanding harmony in the Family- the basic unit of human interaction. Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; **Trust (Vishwas) and Respect (Samman) as the foundational values of relationship.** Understanding the meaning of Vishwas; Difference between intention and competence. Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals. Visualizing a universal harmonious order in society- Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha )- from family to world family!

#### **Unit IV:**

Understanding Harmony in the Nature and Existence - Whole existence as Co-existence : Understanding the harmony in the Nature. Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature. Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space. Holistic perception of harmony at all levels of existence.

#### **Unit V:**

Implications of the above Holistic Understanding of Harmony on Professional Ethics : Natural acceptance of human values. Definitiveness of Ethical Human Conduct. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in professional ethics:

- a) Ability to utilize the professional competence for augmenting universal human order,
- b) Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems,
- c) Ability to identify and develop appropriate technologies and management patterns for above production systems.

Case studies of typical holistic technologies, management models and production systems. Strategy for transition from the present state to Universal Human Order:

- a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers
- b) At the level of society: as mutually enriching institutions and organizations

#### **TEXT BOOKS**

1. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.

2. Prof. KV Subba Raju, 2013, Success Secrets for Engineering Students, Smart Student Publications, 3<sup>rd</sup> Edition.

**REFERENCE BOOKS**

1. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
2. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
3. A Nagraj, 1998, Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.
4. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
5. PL Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
6. A.N. Tripathy, 2003, Human Values, New Age International Publishers.
7. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
8. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.
9. E G Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press
10. M Govindrajran, S Natrajan & V.S. Senthil Kumar, Engineering Ethichs (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.

**Relevant CDs, Movies, Documentaries & Other Literature:**

1. Value Education website, <http://www.uptu.ac.in>
2. Story of Stuff, <http://www.storyofstuff.com>
3. Al Gore, An Inconvenient Truth, Paramount Classics, USA
4. Charlie Chaplin, Modern Times, United Artists, USA
5. IIT Delhi, Modern Technology – the Untold Story

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**(A60017) INTELLECTUAL PROPERTY RIGHTS****(Open Elective)****UNIT – I**

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

**UNIT – II**

Trade Marks : Purpose and function of trade marks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

**UNIT – III**

Law of copy rights : Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents : Foundation of patent law, patent searching process, ownership rights and transfer

**UNIT – IV**

Trade Secrets : Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation.

Unfair competition : Misappropriation right of publicity, False advertising.

**UNIT – V**

New development of intellectual property: new developments in trade mark law ; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international – trade mark law, copy right law, international patent law, international development in trade secrets law.

**TEXT BOOKS & REFERENCES:**

1. Intellectual property right, Deborah. E. Bouchoux, cengage learning.
2. Intellectual property right – Unleashing the knowledge economy, prabuddha ganguli, Tate Mc Graw Hill Publishing company ltd.,

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**(A60117) DISASTER MANAGEMENT****(Open Elective)****Unit-I**

Environmental Hazards & Disasters: Meaning of Environmental hazards, Environmental Disasters and Environmental stress. Concept of Environmental Hazards, Environmental stress & Environmental Disasters. Different approaches & relation with human Ecology - Landscape Approach - Ecosystem Approach - Perception approach - Human ecology & its application in geographical researches.

**Unit –II**

Types of Environmental hazards & Disasters: Natural hazards and Disasters - Man induced hazards & Disasters - Natural Hazards- Planetary Hazards/ Disasters - Extra Planetary Hazards/ disasters - Planetary Hazards- Endogenous Hazards - Exogenous Hazards

**Unit –III**

Endogenous Hazards - Volcanic Eruption – Earthquakes – Landslides - Volcanic Hazards/ Disasters - Causes and distribution of Volcanoes - Hazardous effects of volcanic eruptions - Environmental impacts of volcanic eruptions - Earthquake Hazards/ disasters - Causes of Earthquakes - Distribution of earthquakes - Hazardous effects of - earthquakes - - Earthquake Hazards in India - - Human adjustment, perception & mitigation of earthquake.

**Unit –IV**

Exogenous hazards/ disasters - Infrequent events- Cumulative atmospheric hazards/ disasters

Infrequent events: Cyclones – Lightning – Hailstorms

Cyclones: Tropical cyclones & Local storms - Destruction by tropical cyclones & local storms (causes , distribution human adjustment, perception & mitigation) Cumulative atmospheric hazards/ disasters : - Floods- Droughts- Cold waves- Heat waves Floods:- Causes of floods- Flood hazards India- Flood control measures (Human adjustment, perception & mitigation) Droughts:- Impacts of droughts- Drought hazards in India- Drought control measures- Extra Palnetary Hazards/ Disasters- Man induced Hazards / Disasters- Physical hazards/ Disasters-Soil Erosion

Soil Erosion:— Mechanics & forms of Soil Erosion- Factors & causes of Soil Erosion- Conservation measures of Soil Erosion



Chemical hazards/ disasters:— Release of toxic chemicals, nuclear explosion- Sedimentation processes Sedimentation processes:- Global Sedimentation problems- Regional Sedimentation problems- Sedimentation & Environmental problems- Corrective measures of Erosion & Sedimentation  
Biological hazards/ disasters:- Population Explosion.

#### **Unit –V**

Emerging approaches in Disaster Management- Three Stages

1. Pre- disaster stage (preparedness)
2. Emergency Stage
3. Post Disaster stage-Rehabilitation

#### **TEXT BOOKS:**

1. Disaster Mitigation: Experiences And Reflections by Pardeep Sahni
2. Natural Hazards & Disasters by Donald Hyndman & David Hyndman – Cengage Learning

#### **REFERENCES**

1. R.B.Singh (Ed) Environmental Geography, Heritage Publishers New Delhi,1990
2. Savinder Singh Environmental Geography, Prayag Pustak Bhawan, 1997
3. Kates,B.I & White, G.F The Environment as Hazards, oxford, New York, 1978
4. R.B. Singh (Ed) Disaster Management, Rawat Publication, New Delhi, 2000
5. H.K. Gupta (Ed) Disaster Management, Universiters Press, India, 2003
6. R.B. Singh, Space Technology for Disaster Mitigation in India (INCED), University of Tokyo, 1994
7. Dr. Satender , Disaster Management t in Hills, Concept Publishing Co., New Delhi, 2003
8. A.S. Arya Action Plan For Earthquake,Disaster, Mitigation in V.K. Sharma (Ed) Disaster Management IIPA Publication New Delhi, 1994
9. R.K. Bhandani An overview on Natural & Man made Disaster & their Reduction,CSIR, New Delhi
10. M.C. Gupta Manuals on Natural Disaster management in India, National Centre for Disaster Management, IIPA, New Delhi, 2001

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**(A60514) COMPLIER DESIGN****Objectives:**

To describe the steps and algorithms used by language translators.

To discuss the effectiveness of optimization.

To explain the machine dependent aspects of Compilation

**UNIT – I**

**Overview of Compilation:** Phases of Compilation – Lexical Analysis, Regular Grammar and regular expression for common programming language features, pass and Phases of translation, interpretation, bootstrapping, data structures in compilation – LEX lexical analyzer generator.

**Top down Parsing:** Context free grammars, Top down parsing – Backtracking, LL (1), recursive descent parsing, Predictive parsing, Preprocessing steps required for predictive parsing.

**UNIT – II**

**Bottom up parsing :** Shift Reduce parsing, LR and LALR parsing, Error recovery in parsing , handling ambiguous grammar, YACC – automatic parser generator.

**UNIT – III**

**Semantic analysis :** Intermediate forms of source Programs – abstract syntax tree, polish notation and three address codes. Attributed grammars, Syntax directed translation, Conversion of popular Programming languages language Constructs into Intermediate code forms, Type checker.

**Symbol Tables :** Symbol table format, organization for block structures languages, hashing, tree structures representation of scope information. Block structures and non block structure storage allocation: static, Runtime stack and heap storage allocation, storage allocation for arrays, strings and records.

**UNIT – IV**

**Code optimization :** Consideration for Optimization, Scope of Optimization, local optimization, loop optimization, frequency reduction, folding, DAG representation.

**Data flow analysis :** Flow graph, data flow equation, global optimization, redundant sub expression elimination, Induction variable elements, Live variable analysis, Copy propagation.

**UNIT – V**

**Object code generation** : Object code forms, machine dependent code optimization, register allocation and assignment generic code generation algorithms, DAG for register allocation.

**TEXT BOOKS :**

1. Principles of compiler design -A.V. Aho . J.D.Ullman; Pearson Education.
2. Modern Compiler Implementation in C- Andrew N. Appel, Cambridge University Press.

**REFERENCE BOOKS :**

1. lex &yacc – John R. Levine, Tony Mason, Doug Brown, O'reilly
2. Modern Compiler Design- Dick Grune, Henry E. Bal, Cariel T. H. Jacobs, Wiley dreamtech.
3. Engineering a Compiler-Cooper & Linda, Elsevier.
4. Compiler Construction, Loudon, Thomson.

**Outcomes:**

- Ability to understand the design of a compiler given features of the languages.
- Ability to implement practical aspects of automata theory.
- Gain Knowledge of powerful compiler generation tools.

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**(A60409) DATA COMMUNICATIONS****UNIT - I:****Basic Concepts of Data Communications, Interfaces and Modems**

Data Communication Networks, Protocols and Standards, UART, USB, I2C, I2s, Line Configuration, Topology, Transmission Modes, Digital Data Transmission, DTE-DCE interface, Categories of Networks – TCP/IP Protocol suite and Comparison with OSI model.

**UNIT - II:**

**Error Correction:** Types of Errors, Vertical Redundancy Check (VRC), LRC, CRC, Checksum, Error Correction using Hamming code

**Data Link Control:** Line Discipline, Flow Control, Error Control

**Data Link Protocols:** Asynchronous Protocols, Synchronous Protocols, Character Oriented Protocols, Bit-Oriented Protocol, Link Access Procedures.

**UNIT - III:**

**Multiplexing:** Frequency Division Multiplexing (FDM), Time Division Multiplexing (TDM), Multiplexing Application, DSL.

**Switching:** Circuit Switching, Packet Switching, Message Switching.

**UNIT - IV:**

**Local Area Networks:** Ethernet, Other Ether Networks, Token Bus, Token Ring, FDDI.

**Metropolitan Area Networks:** IEEE 802.6, SMDS

**Networking and Interfacing Devices:** Repeaters, Bridges, Routers, Gateway, Other Devices.

**UNIT - V:****Multiple Access Techniques**

Random Access, Aloha- Carrier Sense Multiple Access (CSMA)- Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA), Controlled Access, Reservation, Polling, Token Passing, Channelization, Frequency-Division Multiple Access (FDMA), Time - Division Multiple Access (TDMA), Code - Division Multiple Access (CDMA).

**TEXT BOOKS:**

1. Data Communication and Computer Networking - B. A.Forouzan, 2<sup>nd</sup> Ed., 2003, TMH.

2. Advanced Electronic Communication Systems - W. Tomasi, 5 ed., 2008, PEI.

**REFERENCE BOOKS:**

1. Data Communications and Computer Networks - Prakash C. Gupta, 2006, PHI.
2. Data and Computer Communications - William Stallings, 8<sup>th</sup> ed., 2007, PHI.
3. Data Communication and Tele Processing Systems -T. Housely, 2<sup>nd</sup> Ed, 2008, BSP.
4. Data Communications and Computer Networks- Brijendra Singh, 2<sup>nd</sup> ed., 2005, PHI.

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**(A60523) MULTIMEDIA TECHNOLOGIES****Objectives:**

To introduce the concept of representing multimedia data like text, graphics, audio and video

To introduce the concept and necessity of compression

To introduce various file formats used in multimedia files

To introduce the compression techniques used in multimedia

**Unit I:**

Digitization principles: Analog signals, encoder and decoder design, unformatted, formatted and hyper text, Graphics, Digitized documents, Digitized pictures – principles of color and raster scan, pixel depth, aspect ratio, digital camera and scanner, Audio - PCM speech, CD quality audio, Synthesized audio, Video – broadcast TV, scanning sequence, color signal, chrominance components, signal bandwidth, Digital video formats (4:2:2, 4:2:0, HDTV, SIF, CIF and QCIF), PC Video.

**Unit II:**

Text and Image Compression: Source encoders and destination decoders, lossless and lossy compression, entropy encoding, statistical encoding, differential encoding, transform encoding

Text Compression – static Huffman coding, dynamic Huffman coding, Lempel-Ziv (LZ) coding, Lempel-Ziv-Welsh (LZW) coding.

**Unit III:**

Image Compression – GIF, TIFF and JPEG compression, digitized documents used by facsimile machine

**Unit IV:**

Audio and Video Compression: Audio compression –Pulse Code Modulation (PCM), Differential PCM, Adaptive Differential PCM (ADPCM), Adaptive predictive coding, linear predictive coding (LPC), perceptual coding, MPEG audio coders

**Unit V:**

Video compression – frame types, motion estimation and compensation, implementation issues, H.261 and H.263 video compression, MPEG-1, MPEG-2 and MPEG-4 compression

**TEXT BOOK:**

1. Multimedia Communications: Applications, Networks, Protocols and Standards, Fred Halsall, Pearson Education.

**REFERENCES:**

1. Fundamentals of Multimedia by Ze-Nian Li and Mark S. Drew PHI Learning
2. Introduction to multimedia communications and Applications, Middleware, Networks, K.R.Rao, Zoran, Dragored, Wiley India.
3. Multimedia Computing, Communications & Applications, Ralf Steinmetz and Klara Nahrstedt, Pearson Education
4. Principles of Multimedia, Ranjan Parekh, TMH.
5. Multimedia Systems design, Prabhat K. Andleigh, Kiran Thakrar, PHI.
6. Multimedia and Communications Technology, Steve Heath, Elsevier.

**Outcomes:**

The student should be able to:

- Understand how different multimedia data like text, graphics, audio and video are represented
- The fundamentals of data compression
- Understand the various file formats and compression techniques used in multimedia files

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****III Year B.Tech. ECM-II Sem****L T/P/D C****- -/3/- 2****(A60494) MICROPROCESSORS AND MICROCONTROLLERS LAB****Note:**

- Minimum of 12 experiments are to be conducted.
- The Following programs/experiments are to be written for assembler and to be executed the same with 8086 and 8051 kits.

**List of Experiments:**

1. Programs for 16 bit arithmetic operations for 8086 (using Various Addressing Modes).
2. Program for sorting an array for 8086.
3. Program for searching for a number or character in a string for 8086.
4. Program for string manipulations for 8086.
5. Program for digital clock design using 8086.
6. Interfacing ADC and DAC to 8086.
7. Parallel communication between two microprocessors using 8255.
8. Serial communication between two microprocessor kits using 8251.
9. Interfacing to 8086 and programming to control stepper motor.
10. Programming using arithmetic, logical and bit manipulation instructions of 8051.
11. Program and verify Timer/ Counter in 8051.
12. Program and verify Interrupt handling in 8051
13. UART Operation in 8051.
14. Communication between 8051 kit and PC.
15. Interfacing LCD to 8051.
16. Interfacing Matrix/ Keyboard to 8051.
17. Data Transfer from Peripheral to Memory through DMA controller 8237 / 8257.



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****III Year B.Tech. ECM-II Sem****L T/P/D C****- -/3/- 2****(A60086) ADVANCED COMMUNICATION SKILLS (ACS) LAB****Introduction**

The introduction of the Advanced Communication Skills Lab is considered essential at 3<sup>rd</sup> year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.

The proposed course should be a laboratory course to enable students to use 'good' English and perform the following:

- Gathering ideas and information to organise ideas relevantly and coherently.
- Engaging in debates.
- Participating in group discussions.
- Facing interviews.
- Writing project/research reports/technical reports.
- Making oral presentations.
- Writing formal letters.
- Transferring information from non-verbal to verbal texts and vice-versa.
- Taking part in social and professional communication.

**Objectives:**

This Lab focuses on using multi-media instruction for language development to meet the following targets:

- To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.
- To prepare all the students for their placements.

**Syllabus:**

The following course content to conduct the activities is prescribed for the Advanced Communication Skills (ACS) Lab:

1. **Activities on Fundamentals of Inter-personal Communication and Building Vocabulary** - Starting a conversation – responding appropriately and relevantly – using the right body language – Role Play in different situations & Discourse Skills- using visuals - Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.
2. **Activities on Reading Comprehension** –General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading & effective googling.
3. **Activities on Writing Skills** – Structure and presentation of different types of writing – *letter writing/Resume writing/ e-correspondence/ Technical report writing/ Portfolio writing* – planning for writing – improving one's writing.
4. **Activities on Presentation Skills** – Oral presentations (individual and group) through JAM sessions/seminars/**PPTs** and written presentations through posters/projects/reports/ e-mails/assignments etc.
5. **Activities on Group Discussion and Interview Skills** – Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation- Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video-conference and Mock Interviews.

**Minimum Requirement:**

The Advanced Communication Skills (ACS) Laboratory shall have the following infra-structural facilities to accommodate at least 35 students in the lab:

- **Spacious room with appropriate acoustics.**
- **Round Tables with movable chairs**
- **Audio-visual aids**
- **LCD Projector**
- **Public Address system**
- **P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ**
- **T. V, a digital stereo & Camcorder**
- **Headphones of High quality**

**Prescribed Lab Manual:** A book titled ***A Course Book of Advanced***

**Communication Skills (ACS) Lab** published by Universities Press, Hyderabad.

**Suggested Software:**

The software consisting of the prescribed topics elaborated above should be procured and used.

- **Oxford Advanced Learner's Compass**, 7<sup>th</sup> Edition
- **DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.**
- **Lingua TOEFL CBT Insider**, by Dreamtech
- **TOEFL & GRE**( KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
- **The following software from 'train2success.com'**
  - **Preparing for being Interviewed**
  - **Positive Thinking**
  - **Interviewing Skills**
  - **Telephone Skills**
  - **Time Management**

**Books Recommended:**

1. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.
2. Advanced Communication Skills Laboratory Manual by Sudha Rani, D, Pearson Education 2011.
3. Technical Communication by Paul V. Anderson. 2007. Cengage Learning Pvt. Ltd. New Delhi.
4. Business and Professional Communication: Keys for Workplace Excellence. Kelly M. Quintanilla & Shawn T. Wahl. Sage South Asia Edition. Sage Publications. 2011.
5. The Basics of Communication: A Relational Perspective. Steve Duck & David T. McMahan. Sage South Asia Edition. Sage Publications. 2012.
6. English Vocabulary in Use series, Cambridge University Press 2008.
7. Management Shapers Series by Universities Press(India)Pvt Ltd., Himayatnagar, Hyderabad 2008.
8. Handbook for Technical Communication by David A. McMurrey & Joanne Buckley. 2012. Cengage Learning.
9. Communication Skills by Leena Sen, PHI Learning Pvt Ltd., New Delhi, 2009.

10. Handbook for Technical Writing by David A McMurrey & Joanne Buckley CENGAGE Learning 2008.
11. Job Hunting by Colm Downes, Cambridge University Press 2008.
12. Master Public Speaking by Anne Nicholls, JAICO Publishing House, 2006.
13. English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata Mc Graw-Hil 2009.
14. Books on TOEFL/GRE/GMAT/CAT/ IELTS by Barron's/DELTA/ Cambridge University Press.
15. International English for Call Centres by Barry Tomalin and Suhashini Thomas, Macmillan Publishers, 2009.

#### **DISTRIBUTION AND WEIGHTAGE OF MARKS:**

##### ***Advanced Communication Skills Lab Practicals:***

1. The practical examinations for the ACS Laboratory practice shall be conducted as per the University norms prescribed for the core engineering practical sessions.
2. For the English Language lab sessions, there shall be continuous evaluation during the year for 25 sessional marks and 50 End Examination marks. Of the 25 marks, 15 marks shall be awarded for day-to-day work and 10 marks to be awarded by conducting Internal Lab Test(s). The End Examination shall be conducted by the teacher concerned, by inviting the External Examiner from outside. In case of the non-availability of the External Examiner, other teacher of the same department can act as the External Examiner.

##### **Mini Project: As a part of Internal Evaluation**

1. **Seminar/ Professional Presentation**
  2. **A Report on the same has to be prepared and presented.**
- \* ***Teachers may use their discretion to choose topics relevant and suitable to the needs of students.***
  - \* ***Not more than two students to work on each mini project.***
  - \* ***Students may be assessed by their performance both in oral presentation and written report.***

##### **Outcomes**

- ☞ Accomplishment of sound vocabulary and its proper use contextually.
- ☞ Flair in Writing and felicity in written expression.
- ☞ Enhanced job prospects.
- ☞ Effective Speaking Abilities

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**(A70432) VLSI DESIGN****Objectives:**

The objectives of the course are to:

- Give exposure to different steps involved in the fabrication of ICs using MOS transistor, CMOS/BICMOS transistors and passive components.
- Explain electrical properties of MOS and BiCMOS devices to analyze the behavior of inverters designed with various loads.
- Give exposure to the design rules to be followed to draw the layout of any logic circuit.
- Provide concept to design different types of logic gates using CMOS inverter and analyze their transfer characteristics.
- Provide design concepts to design building blocks of data path of any system using gates.
- Understand basic programmable logic devices and testing of CMOS circuits.

**UNIT –I:**

**Introduction:** Introduction to IC Technology – MOS, PMOS, NMOS, CMOS & BiCMOS

**Basic Electrical Properties:** Basic Electrical Properties of MOS and BiCMOS Circuits:  $I_{ds}$ - $V_{ds}$  relationships, MOS transistor threshold Voltage,  $g_m$ ,  $g_{ds}$ , Figure of merit  $\omega_0$ ; Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter analysis and design, Bi-CMOS Inverters.

**UNIT -II:**

**VLSI Circuit Design Processes:** VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, 2  $\mu$ m CMOS Design rules for wires, Contacts and Transistors Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits.

**UNIT –III:**

**Gate Level Design:** Logic Gates and Other complex gates, Switch logic, Alternate gate circuits, Time delays, Driving large capacitive loads, Wiring capacitance, Fan – in, Fan – out, Choice of layers.

**UNIT -IV:**

**Data Path Subsystems:** Subsystem Design, Shifters, Adders, ALUs, Multipliers, Parity generators, Comparators, Zero/One Detectors, Counters.

**Array Subsystems:** SRAM, DRAM, ROM, Serial Access Memories.

**UNIT -V:**

**Programmable Logic Devices:** PLAs, FPGAs, CPLDs, Standard Cells, Programmable Array Logic, Design Approach, Parameters influencing low power design.

**CMOS Testing:** CMOS Testing, Need for testing, Test Principles, Design Strategies for test, Chip level Test Techniques.

**TEXT BOOKS:**

1. Essentials of VLSI circuits and systems – Kamran Eshraghian, Eshraghian Douglas and A. Pucknell, PHI, 2005 Edition
2. CMOS VLSI Design – A Circuits and Systems Perspective, Neil H. E Weste, David Harris, Ayan Banerjee, 3<sup>rd</sup> Ed, Pearson, 2009.
3. VLSI Design – M. Michael Vai, 2001, CRC Press.

**REFERENCE BOOKS:**

1. Introduction to VLSI Systems: A Logic, Circuit and System Perspective – Ming-BO Lin, CRC Press, 2011
2. CMOS logic circuit Design - John .P. Uyemura, Springer, 2007.
3. Modern VLSI Design - Wayne Wolf, Pearson Education, 3rd Edition, 1997.
4. VLSI Design- K .Lal Kishore, V. S. V. Prabhakar, I.K International, 2009.
5. Introduction to VLSI – Mead & Convey, BS Publications, 2010.

**Course Outcomes:**

Upon successfully completing the course, the student should be able to:

- Acquire qualitative knowledge about the fabrication process of integrated circuit using MOS transistors.
- Choose an appropriate inverter depending on specifications required for a circuit
- Draw the layout of any logic circuit which helps to understand and estimate parasitics of any logic circuit
- Design different types of logic gates using CMOS inverter and analyze their transfer characteristics

- Provide design concepts required to design building blocks of data path using gates.
- Design simple memories using MOS transistors and can understand Design of large memories.
- design simple logic circuit using PLA, PAL, FPGA and CPLD.
- Understand different types of faults that can occur in a system and learn the concept of testing and adding extra hardware to improve testability of system.

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**(A70515) COMPUTER NETWORKS****Objectives:**

- To introduce the fundamental various types of computer networks.
- To demonstrate the TCP/IP and OSI models with merits and demerits.
- To explore the various layers of OSI Model.
- To introduce UDP and TCP Models.

**UNIT-I**

Overview of the Internet: Protocol, Layering Scenario, TCP/IP Protocol Suite: The OSI Model, Internet history standards and administration; Comparison of the OSI and TCP/IP reference model.

**Physical Layer:** Guided transmission media, wireless transmission media.

**Data Link Layer** – design issues, CRC Codes, Elementary Data link Layer protocols, sliding window protocol

**UNIT-II**

Multiple Access Protocols –ALOHA, CSMA, Collision free protocols, Ethernet-Physical Layer, Ethernet Mac Sub layer, data link layer switching & use of bridges, learning bridges, spanning tree bridges, repeaters , hubs, bridges , switches, routers and gateways.

**UNIT-III**

**Network Layer:** Network Layer Design issues, store and forward packet switching connection less and connection oriented networks-routing algorithms-optimality principle, shortest path, flooding, Distance Vector Routing, Count to Infinity Problem, Hierarchical Routing, Congestion control algorithms, admission control.

**UNIT-IV**

Internetworking: Tunneling, Internetwork Routing, Packet fragmentation, IPv4, Ipv6 Protocol, IP addresses, CIDR, IMCP, ARP, RARP, DHCP.

**Transport Layer:** Services provided to the upper layers elements of transport protocol-addressing connection establishment, connection release, Connection Release, Crash Recovery.

**UNIT-V**

The Internet Transport Protocols UDP-RPC, Real Time Transport Protocols, The Internet Transport Protocols- Introduction to TCP, The TCP Service Model, The TCP Segment Header, The Connection Establishment, The TCP Connection Release, The TCP Connection Management Modeling, The TCP



Sliding Window, The TCP Congestion Control, The future of TCP.

Application Layer-Introduction ,providing services, Applications layer paradigms, Client server model, Standard client-server application-HTTP, FTP, electronic mail, TELNET, DNS, SSH

**TEXT BOOKS:**

1. Data Communications and Networking – Behrouz A. Forouzan, Fifth Edition TMH, 2013.
2. Computer Networks — Andrew S Tanenbaum, 4th Edition, Pearson Education.

**REFERENCE BOOKS:**

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education.
2. Understanding communications and Networks, 3rd Edition, W.A.Shay, Cengage Learning.
3. Introduction to Computer Networks and Cyber Security, Chwan-Hwa (John) Wu, J. David Irwin, CRC Press.
4. Computer Networks, L.L.Peterson and B.S.Davie, 4<sup>th</sup> edition, ELSEVIER.
5. Computer Networking: A Top-Down Approach Featuring the Internet, James F.Kurose,K.W.Ross,3<sup>rd</sup> Edition, Pearson Education.

**Outcome :**

- Students should be understand and explore the basics of Computer Networks and Various Protocols. He/She will be in a position to understand the World Wide Web concepts.
- Students will be in a position to administrate a network and flow of information further he/she can understand easily the concepts of network security, Mobile and ad hoc networks.

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**(A70439) EMBEDDED SYSTEMS**

**Objective:** To learn the method of designing a real time system.

**UNIT- I : 8051 FAMILY ARCHITECTURE**

8051 Microcontroller Architecture, Microcontroller 8051 Pins, 8051 Ports, Internal and External Memory, Counter and Timers, Serial Communication in 8051, Interrupts, Interrupts in 8051, External Interrupts.

**UNIT - II**

**Introduction to Real – Time Operating Systems :** Tasks and Task States, Tasks and Data, Semaphores, and Shared Data; Message Queues, Mailboxes and Pipes, Timer Functions, Events, Memory Management, Interrupt Routines in an RTOS Environment.

**UNIT - III**

**Basic Design Using a Real-Time Operating System :** Principles, Semaphores and Queues, HardReal-Time Scheduling Considerations, Saving Memory and Power, An example RTOS like uC-OS (Open Source); Embedded Software Development Tools: Host and Target machines, Linker/ Locators for Embedded

Software, Getting Embedded Software into the Target System; Debugging Techniques: Testing on Host Machine, Using Laboratory Tools, An Example System.

**UNIT – IV**

**ARM Processor Fundamentals:** Registers, Current Program Status Register, Pipeline, Exceptions, Interrupts, the Vector Table, Core Extensions, Architecture Revisions, ARM Processor Families.

**UNIT - V:**

**Introduction to the ARM Instruction Set:** Data Processing Instructions, Branch Instructions, Load-Store Instructions, Software Interrupt Instruction, Program Status Register Instructions, Loading Constants, ARMv5E Extensions, Conditional Execution.

**Introduction to the Thumb Instruction Set:** Thumb Register Usage, ARM-Thumb Interworking, Other Branch Instructions, Data Processing Instructions, Single and Multiple- Register Load-Store Instructions, Stack Instructions, Software Interrupt Instruction.

**TEXT BOOKS:**

1. Microcontrollers Architecture, Programming, Interfacing and System Design by Raj Kamal, 2e, Pearson.
2. ARM System Developer's Guide Design & Optimizing System Software by Sloss, Elsevier.

**REFERENCES :**

1. The 8051 Microcontroller & Embedded Systems using Assembly & C, by Kennet J Ayala and Dhananjay V. Gadre., Cengage Learning.
2. Embedded / Real Time Systems: Concepts, Design & Programming (Black Book) 2005 edition,by – KVKK Prasad.
3. Introduction to Embedded Systems – by Shibu K.V, MGH.

**Outcomes:**

Upon completion of this course, the student will be able to

- Understand the basics of an embedded system
- Design, implement and test an embedded system.

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**(A70517) LINUX PROGRAMMING****Objectives:**

- To understand and make effective use of Linux utilities and Shell scripting language (bash) to solve Problems.
- To implement in C some standard Linux utilities such as ls,mv,cp etc.using system calls.
- To develop the skills necessary for systems programming including file system programming, process and signal management, and interprocess communication.
- To develop the basic skills required to write network programs using Sockets.

**UNIT- I**

Linux Utilities-File handling utilities, Security by file permissions, Process utilities, Disk utilities, Networking commands, Filters, Text processing utilities and Backup utilities.

Sed-Scripts, Operation, Addresses, Commands, Applications, awk-Execution, Fields and Records, Scripts, Operation, Patterns, Actions, Associative Arrays, String and Mathematical functions, System commands in awk, Applications.

Shell programming with Bourne again shell(bash)- Introduction, shell responsibilities, pipes and Redirection, here documents, running a shell script, the shell as a programming language, shell meta characters, file name substitution, shell variables, command substitution, shell commands, the environment, quoting, test command, control structures, arithmetic in shell, shell script examples, interrupt processing, functions, debugging shell scripts.

**UNIT- II**

Files and Directories- File Concept, File types, File System Structure,file metadata-Inodes, kernel support for files, system calls for file I/O operations-open, creat, read, write, close, lseek, dup2,file status information-stat family, file and record locking- fcntl function, file permissions - chmod, fchmod,file ownership-chown,lchown, fchown, links-soft links and hard links – symlink, link, unlink.

Directories-Creating, removing and changing Directories-mkdir, rmdir, chdir, obtaining current working directory-getcwd, Directory contents, Scanning Directories-opendir, readdir, closedir, rewinddir functions.

**UNIT- III**

Process – Process concept, Layout of a C program image in main

memory, Process environment-environment list, environment variables, getenv, setenv, Kernel support for process, process identification, process control - process creation, replacing a process image, waiting for a process, process termination, zombie process, orphan process, system call interface for process management-fork, vfork, exit, wait, waitpid, exec family, Process Groups, Sessions and Controlling Terminal, Differences between threads and processes.

Signals – Introduction to signals, Signal generation and handling, Kernel support for signals, Signal function, unreliable signals, reliable signals, kill, raise, alarm, pause, abort, sleep functions.

#### **UNIT- IV**

Interprocess Communication - Introduction to IPC, IPC between processes on a single computer system, IPC between processes on different systems, pipes-creation, IPC between related processes using unnamed pipes, FIFOs-creation, IPC between unrelated processes using FIFOs(Named pipes), differences between unnamed and named pipes, popen and pclose library functions.

Message Queues- Kernel support for messages, APIs for message queues, client/server example.

Semaphores-Kernel support for semaphores, APIs for semaphores, file locking with semaphores.

#### **UNIT- V**

Shared Memory- Kernel support for shared memory, APIs for shared memory, shared memory example.

Sockets- Introduction to Berkeley Sockets, IPC over a network, Client-Server model, Socket address structures (Unix domain and Internet domain), Socket system calls for connection oriented protocol and connectionless protocol, example-client/server programs-Single Server-Client connection, Multiple simultaneous clients, Socket options-setsockopt and fcntl system calls, Comparison of IPC mechanisms.

#### **TEXT BOOKS:**

1. Unix System Programming using C++, T.Chan, PHI.
2. Unix Concepts and Applications, 4th Edition, Sumitabha Das, TMH.
3. Unix Network Programming , W.R.Stevens, PHI.

#### **REFERENCE BOOKS:**

1. Beginning Linux Programming, 4<sup>th</sup> Edition, N.Matthew, R.Stones, Wrox, Wiley India Edition.
2. Unix for programmers and users, 3<sup>rd</sup> Edition, Graham Glass, King Ables, Pearson.

3. System Programming with C and Unix, A.Hoover, Pearson.
4. Unix System Programming, Communication, Concurrency and Threads, K.A.Robbins and S.Robbins, Pearson Education.
5. Unix shell Programming, S.G.Kochan and P.Wood,3<sup>rd</sup> edition, Pearson Education.
6. Shell Scripting, S.Parker, Wiley India Pvt. Ltd.
7. Advanced Programming in the Unix Environment,2<sup>nd</sup> edition, W.R.Stevens and S.A.Rago, Pearson Education.
8. Unix and Shell programming, B.A.Forouzan and R.F.Gilberg, Cengage Learning.
9. Linux System Programming, Robert Love, O'Reilly, SPD.
10. C Programming Language, Kernighan and Ritchie, PHI

**Outcomes:**

- Work confidently in Linux environment.
- Work with shell script to automate different tasks as Linux administration.

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**(A70434) CELLULAR AND MOBILE COMMUNICATIONS****(Elective - I)****Objectives:**

The course objectives are:

- To provide the student with an understanding of the Cellular concept, Frequency reuse, Hand-off strategies.
- To enable the student to analyze and understand wireless and mobile cellular communication systems over a stochastic fading channel
- To provide the student with an understanding of Co-channel and Non-Co-channel interferences
- To give the student an understanding of cell coverage for signal and traffic, diversity techniques and mobile antennas.
- To give the student an understanding of frequency management, Channel assignment and types of handoff.

**UNIT -I:****Introduction to Cellular Mobile Radio Systems:**

Limitations of Conventional Mobile Telephone Systems, Basic Cellular Mobile System, First, Second, Third and Fourth Generation Cellular Wireless Systems, Uniqueness of Mobile Radio Environment- Fading -Time Dispersion Parameters, Coherence Bandwidth, Doppler Spread and Coherence Time.

**Fundamentals of Cellular Radio System Design:**

Concept of Frequency Reuse, Co-Channel Interference, Co-Channel Interference Reduction Factor, Desired C/I From a Normal Case in a Omni Directional Antenna System, System Capacity, Trunking and Grade of Service, Improving Coverage and Capacity in Cellular Systems- Cell Splitting, Sectoring, Microcell Zone Concept.

**UNIT -II:****Co-Channel Interference:**

Measurement Of Real Time Co-Channel Interference, Design of Antenna System, Antenna Parameters and Their Effects, Diversity Techniques-Space Diversity, Polarization Diversity, Frequency Diversity, Time Diversity.

**Non-Co-Channel Interference:**

Adjacent Channel Interference, Near End Far End Interference, Cross Talk, Effects on Coverage and Interference by Power Decrease, Antenna Height Decrease, Effects of Cell Site Components.

**UNIT -III:****Cell Coverage for Signal and Traffic:**

Signal Reflections in Flat And Hilly Terrain, Effect of Human Made Structures, Phase Difference Between Direct and Reflected Paths, Constant Standard Deviation, Straight Line Path Loss Slope, General Formula for Mobile Propagation Over Water and Flat Open Area, Near and Long Distance Propagation, Path Loss From a Point to Point Prediction Model in Different Conditions, Merits of Lee Model.

**Cell Site and Mobile Antennas:**

Space Diversity Antennas, Umbrella Pattern Antennas, Minimum Separation of Cell Site Antennas, Mobile Antennas.

**UNIT -IV:****Frequency Management and Channel Assignment:**

Numbering And Grouping, Setup Access And Paging Channels, Channel Assignments to Cell Sites and Mobile Units, Channel Sharing and Borrowing, Sectorization, Overlaid Cells, Non Fixed Channel Assignment.

**UNIT -V:****Handoffs and Dropped Calls:**

Handoff Initiation, Types of Handoff, Delaying Handoff, Advantages of Handoff, Power Difference Handoff, Forced Handoff, Mobile Assisted and Soft Handoff, Intersystem Handoff, Introduction to Dropped Call Rates and their Evaluation.

**TEXT BOOKS:**

1. Mobile Cellular Telecommunications – W.C.Y. Lee, Mc Graw Hill, 2<sup>nd</sup> Edn., 1989.
2. Wireless Communications - Theodore. S. Rapport, Pearson Education, 2<sup>nd</sup> Edn., 2002.
3. Mobile Cellular Communication - Gottapu sashibhushana Rao, Pearson, 2012.

**REFERENCE BOOKS:**

1. Principles of Mobile Communications – Gordon L. Stuber, Springer International, 2<sup>nd</sup> Edn., 2001.
2. Modern Wireless Communications-Simon Haykin, Michael Moher, Pearson Education, 2005.
3. Wireless Communications Theory and Techniques, Asrar U. H. Sheikh, Springer, 2004.
4. Wireless Communications and Networking, Vijay Garg, Elsevier Publications, 2007.



5. Wireless Communications – Andrea Goldsmith, Cambridge University Press, 2005.

**Outcomes:**

By the end of the course, the student will be able to analyze and design wireless and mobile cellular systems.

The student will be able to understand impairments due to multipath fading channel.

The student will be able understand the fundamental techniques to overcome the different fading effects.

The student will be able to understand Co-channel and Non-Co-channel interferences

The student will be able to familiar with cell coverage for signal and traffic, diversity techniques and mobile antennas.

The student will have an understanding of frequency management, Channel assignment and types of handoff.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****IV Year B.Tech. ECM-I Sem****L T/P/D C****4 -/- 4****(A70526) ARTIFICIAL INTELLIGENCE****(Elective-I)****Objectives:**

- To learn the difference between optimal reasoning vs human like reasoning.
- To understand the notions of state space representation, exhaustive search, heuristic search along with the time and space complexities
- To learn different knowledge representation techniques.
- To understand the applications of AI: namely Game Playing, Theorem Proving, Expert Systems, Machine Learning and Natural Language Processing.

**UNIT-I**

Introduction, History, Intelligent Systems, Foundations of AI, Sub areas of AI, Applications.

Problem Solving - State-Space Search and Control Strategies: Introduction, General Problem Solving, Characteristics of Problem, Exhaustive Searches, Heuristic Search Techniques, Iterative-Deepening A\*, Constraint Satisfaction. Game Playing, Bounded Look-ahead Strategy and use of Evaluation Functions, Alpha-Beta Pruning

**UNIT-II**

Logic Concepts and Logic Programming: Introduction, Propositional Calculus, Propositional Logic, Natural Deduction System, Axiomatic System, Semantic Tableau System in Propositional Logic, Resolution Refutation in Propositional Logic, Predicate Logic, Logic Programming.

Knowledge Representation: Introduction, Approaches to Knowledge Representation, Knowledge Representation using Semantic Network, Extended Semantic Networks for KR, Knowledge Representation using Frames.

**UNIT-III**

Expert System and Applications: Introduction, Phases in Building Expert Systems, Expert System Architecture, Expert Systems Vs Traditional Systems, Truth Maintenance Systems, Application of Expert Systems, List of Shells and Tools.

Uncertainty Measure - Probability Theory: Introduction, Probability Theory, Bayesian Belief Networks, Certainty Factor Theory, Dempster-Shafer Theory.

**UNIT-IV**

Machine-Learning Paradigms: Introduction. Machine Learning Systems. Supervised and Unsupervised Learning. Inductive Learning. Learning Decision Trees (Text Book 2), Deductive Learning. Clustering, Support Vector Machines.

Artificial Neural Networks: Introduction, Artificial Neural Networks, Single-Layer Feed-Forward Networks, Multi-Layer Feed-Forward Networks, Radial-Basis Function Networks, Design Issues of Artificial Neural Networks, Recurrent Networks.

**UNIT-V**

Advanced Knowledge Representation Techniques: Case Grammars, Semantic Web

Natural Language Processing: Introduction, Sentence Analysis Phases, Grammars and Parsers, Types of Parsers, Semantic Analysis, Universal Networking Knowledge.

**TEXT BOOKS:**

1. Saroj Kaushik. Artificial Intelligence. Cengage Learning. 2011
2. Russell, Norvig: Artificial intelligence, A Modern Approach, Pearson Education, Second Edition. 2004

**REFERENCE BOOK:**

1. Rich, Knight, Nair: Artificial intelligence, Tata McGraw Hill, Third Edition 2009.

**Outcomes:**

- Possess the ability to formulate an efficient problem space for a problem expressed in English.
- Possess the ability to select a search algorithm for a problem and characterize its time and space complexities.
- Possess the skill for representing knowledge using the appropriate technique.
- Possess the ability to apply AI techniques to solve problems of Game Playing, Expert Systems, Machine Learning and Natural Language Processing.

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**(A70529) COMPUTER GRAPHICS****(Elective-I)****Objectives:**

- To make students understand about fundamentals of Graphics to enable them to design animated scenes for virtual object creations.
- To make the student present the content graphically.

**UNIT- I**

**Introduction:** Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices

**Output primitives:** Points and lines, line drawing algorithms, mid-point circle and ellipse algorithms. Filled area primitives: Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms.

**UNIT- II**

**2-D Geometrical transforms:** Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems.

**2-D Viewing:** The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm.

**UNIT- III**

**3-D Object representation:** Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-spline curves, Bezier and B-spline surfaces, sweep representations, octrees BSP Trees,

**3-D Geometric transformations:** Translation, rotation, scaling, reflection and shear transformations, composite transformations, 3-D viewing: Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping.

**UNIT- IV**

**Visible surface detection methods:** Classification, back-face detection, depth-buffer, scan-line, depth sorting, BSP-tree methods, area sub-division and octree methods

**Illumination Models and Surface rendering Methods:** Basic illumination

models, polygon rendering methods

#### **UNIT- V**

**Computer animation:** Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications

#### **TEXT BOOKS:**

1. "Computer Graphics C version", Donald Hearn and M. Pauline Baker, Pearson education.
2. "Computer Graphics Second edition", Zhigand xiang, Roy Plastock, Schaum's outlines, Tata Mc Graw hill edition.

#### **REFERENCE BOOKS:**

1. "Computer Graphics Principles & practice", second edition in C, Foley, VanDam, Feiner and Hughes, Pearson Education.
2. "Procedural elements for Computer Graphics", David F Rogers, Tata Mc Graw hill, 2nd edition.
3. "Principles of Interactive Computer Graphics", Neuman and Sproul, TMH.
4. "Principles of Computer Graphics", Shalini, Govil-Pai, Springer.
5. "Computer Graphics", Steven Harrington, TMH
6. Computer Graphics, F.S.Hill, S.M.Kelley, PHI.
7. Computer Graphics, P.Shirley, Steve Marschner&Others,Cengage Learning.
8. Computer Graphics & Animation, M.C.Trivedi, Jaico Publishing House.
9. An Integrated Introduction to Computer Graphics and Geometric Modelling, R.Goldman, CRC Press, Taylor&Francis Group.
10. Computer Graphics, Rajesh K.Maurya, Wiley India.

#### **Outcomes:**

- Students can animate scenes entertainment.
- Will be able work in computer aided design for content presentation..
- Better analogy data with pictorial representation.

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**(A70436) DIGITAL IMAGE PROCESSING****(Elective-II)****Objectives:**

The objectives of the course are to:

- Provide the student with the fundamentals of digital image processing.
- Give the students a taste of the applications of the theories taught in the subject. This will be achieved through the project and some selected lab sessions.
- Introduce the students to some advanced topics in digital image processing.
- Give the students a useful skill base that would allow them to carry out further study should they be interested and to work in the field.

**UNIT -I:****Digital Image Fundamentals & Image Transforms:** Digital Image Fundamentals, Sampling and Quantization, Relationship between Pixels,**Image Transforms:** 2-D FFT, Properties, Walsh Transform, Hadamard Transform, Discrete Cosine Transform, Haar Transform, Slant Transform, Hotelling Transform.**UNIT -II:****Image Enhancement (Spatial Domain):** Introduction, Image Enhancement in Spatial Domain, Enhancement Through Point Operation, Types of Point Operation, Histogram Manipulation, Linear and Non – Linear Gray Level Transformation, Local or Neighborhood Operation, Median Filter, Spatial Domain High-Pass Filtering.**Image Enhancement (Frequency Domain):** Filtering in Frequency Domain, Obtaining Frequency Domain Filters from Spatial Filters, Generating Filters Directly in the Frequency Domain, Low Pass (Smoothing) and High Pass (Sharpening) Filters in Frequency Domain.**UNIT -III:****Image Restoration:** Degradation Model, Algebraic Approach to Restoration, Inverse Filtering, Least Mean Square Filters, Constrained Least Squares Restoration, Interactive Restoration.

**UNIT -IV:**

**Image Segmentation:** Detection of Discontinuities, Edge Linking And Boundary Detection, Thresholding, Region Oriented Segmentation.

**Morphological Image Processing:** Dilation and Erosion: Dilation, Structuring Element Decomposition, Erosion, Combining Dilation and Erosion, Opening and Closing, The Hit or Miss Transformation.

**UNIT -V:**

**Image Compression:** Redundancies and their Removal Methods, Fidelity Criteria, Image Compression Models, Huffman and Arithmetic Coding, Error Free Compression, Lossy Compression, Lossy and Lossless Predictive Coding, Transform Based Compression, JPEG 2000 Standards.

**TEXT BOOKS:**

1. Digital Image Processing - Rafael C. Gonzalez, Richard E. Woods, 3<sup>rd</sup> Edition, Pearson, 2008
2. Digital Image Processing- S Jayaraman, S Esakkirajan, T Veerakumar- TMH, 2010.

**REFERENCE BOOKS:**

1. Digital Image Processing and Analysis-Human and Computer Vision Application with using CVIP Tools - Scotte Umbaugh, 2<sup>nd</sup> Ed, CRC Press, 2011
2. Digital Image Processing using MATLAB – Rafael C. Gonzalez, Richard E Woods and Steven L. Eddings, 2<sup>nd</sup> Edition, TMH, 2010.
3. Fundamentals of Digital Image Processing – A.K.Jain , PHI, 1989
4. Digital Image Processing and Computer Vision – Somka, Hlavac, Boyle- Cengage Learning (Indian edition) 2008.
5. Introductory Computer Vision Imaging Techniques and Solutions- Adrian low, 2008, 2<sup>nd</sup> Edition
6. Introduction to Image Processing & Analysis – John C. Russ, J. Christian Russ, CRC Press, 2010.
7. Digital Image Processing with MATLAB & Labview – Vipula Singh, Elsevier.

**Outcomes:**

Upon successfully completing the course, the student should:

- Have an appreciation of the fundamentals of Digital image processing including the topics of filtering, transforms and morphology, and image analysis and compression.

- Be able to implement basic image processing algorithms in MATLAB.
- Have the skill base necessary to further explore advanced topics of Digital Image Processing.
- Be in a position to make a positive professional contribution in the field of Digital Image Processing.
- At the end of the course the student should have a clear impression of the breadth and practical scope of digital image processing and have arrived at a level of understanding that is the foundation for most of the work currently underway in this field.



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**(A70519) CLOUD COMPUTING****(Elective-II)****Objectives:**

- To explain the evolving computer model called cloud computing.
- To introduce the various levels of services that can be achieved by cloud.
- To describe the security aspects in cloud.

**UNIT- I****Systems Modeling, Clustering and Virtualization**

Distributed System Models and Enabling Technologies, Computer Clusters for Scalable Parallel Computing, Virtual Machines and Virtualization of Clusters and Data centers.

**UNIT- II****Foundations**

Introduction to Cloud Computing, Migrating into a Cloud, Enriching the 'Integration as a Service' Paradigm for the Cloud Era, The Enterprise Cloud Computing Paradigm.

**UNIT- III****Infrastructure as a Service (IAAS) & Platform and Software as a Service (PAAS / SAAS)**

Virtual machines provisioning and Migration services, On the Management of Virtual machines for Cloud Infrastructures, Enhancing Cloud Computing Environments using a cluster as a Service, Secure Distributed Data Storage in Cloud Computing.

Aneka, Comet Cloud, T-Systems', Workflow Engine for Clouds, Understanding Scientific Applications for Cloud Environments.

**UNIT- IV****Monitoring, Management and Applications**

An Architecture for Federated Cloud Computing, SLA Management in Cloud Computing, Performance Prediction for HPC on Clouds, Best Practices in Architecting Cloud Applications in the AWS cloud, Building Content Delivery networks using Clouds, Resource Cloud Mashups.

**UNIT- V****Governance and Case Studies**

Organizational Readiness and Change management in the Cloud age, Data Security in the Cloud, Legal Issues in Cloud computing, Achieving Production Readiness for Cloud Services.

**TEXT BOOKS:**

1. Cloud Computing: Principles and Paradigms by Rajkumar Buyya, James Broberg and Andrzej M. Goscinski, Wiley, 2011.
2. Distributed and Cloud Computing, Kai Hwang, Geoffery C.Fox, Jack J.Dongarra, Elsevier, 2012.

**REFERENCE BOOKS:**

1. Cloud Computing : A Practical Approach, Anthony T.Velte, Toby J.Velte, Robert Elsenpeter, Tata McGraw Hill, rp2011.
2. Enterprise Cloud Computing, Gautam Shroff, Cambridge University Press, 2010.
3. Cloud Computing: Implementation, Management and Security, John W. Rittinghouse, James F.Ransome, CRC Press, rp2012.
4. Cloud Application Architectures: Building Applications and Infrastructure in the Cloud, George Reese, O'Reilly, SPD, rp2011.
5. Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, Tim Mather, Subra Kumaraswamy, Shahed Latif, O'Reilly, SPD, rp2011.

**Outcomes:**

- Ability to understand the virtualization and cloud computing concepts.

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**(A70520) DATA WAREHOUSING AND DATA MINING****(Elective-II)****Objectives:**

Study data warehouse principles and its working learn data mining concepts understand association rules mining. Discuss classification algorithms learn how data is grouped using clustering techniques.

**UNIT-I**

**Data warehouse:** Introduction to Data warehouse, Difference between operational database systems and data warehouses, Data warehouse Characteristics, Data warehouse Architecture and its Components, Extraction-Transformation-Loading, Logical(Multi-Dimensional), Data Modeling, Schema Design, Star and Snow-Flake Schema, Fact Consultation, Fact Table, Fully Addictive, Semi-Addictive, Non Addictive Measures; Fact-Less-Facts, Dimension Table Characteristics; OLAP Cube, OLAP Operations, OLAP Server Architecture-ROLAP, MOLAP and HOLAP.

**UNIT-II**

**Introduction to Data Mining:** Introduction, What is Data Mining, Definition, KDD, Challenges, Data Mining Tasks, Data Preprocessing, Data Cleaning, Missing data, Dimensionality Reduction, Feature Subset Selection, Discretization and Binaryzation, Data Transformation; Measures of Similarity and Dissimilarity- Basics.

**UNIT-III**

**Association Rules:** Problem Definition, Frequent Item Set Generation, The APRIORI Principle, Support and Confidence Measures, Association Rule Generation; APRIORI Algorithm, The Partition Algorithms, FP-Growth Algorithms, Compact Representation of Frequent Item Set- Maximal Frequent Item Set, Closed Frequent Item Set.

**UNIT-IV**

**Classification:** Problem Definition, General Approaches to solving a classification problem , Evaluation of Classifiers , Classification techniques, Decision Trees-Decision tree Construction , Methods for Expressing attribute test conditions, Measures for Selecting the Best Split, Algorithm for Decision tree Induction ; Naive-Bayes Classifier, Bayesian Belief Networks; K- Nearest neighbor classification-Algorithm and Characteristics.

**UNIT-V**

**Clustering:** Problem Definition, Clustering Overview, Evaluation of Clustering

Algorithms, Partitioning Clustering-K-Means Algorithm, K-Means Additional issues, PAM Algorithm; Hierarchical Clustering-Agglomerative Methods and divisive methods, Basic Agglomerative Hierarchical Clustering Algorithm, Specific techniques, Key Issues in Hierarchical Clustering, Strengths and Weakness; Outlier Detection.

**TEXT BOOKS:**

- 1) Data Mining- Concepts and Techniques- Jiawei Han, Micheline Kander, Morgan Kaufmann Publishers Elsevier 2 Edition, 2006.
- 2) Introduction to Data Mining, Pang-Ning Tan, Vipin Kumar, Michael Steinbach, Pearson Education

**REFERENCE BOOKS:**

- 1) Data Mining Techniques, Arun K Pujari, 3<sup>rd</sup> Edition, Universities Press.
- 2) Data Warehousing Fundamentals, Pualraj Ponnaiah, Wiley Student Edition.
- 3) The Data Warehouse Life Cycle Toolkit – Ralph Kimball, Wiley Student Edition.
- 4) Data Mining, Vikaram Pudi, P Radha Krishna, Oxford University Press.

**Outcomes:**

- Student should be able to understand why the data warehouse in addition to database systems.
- Ability to perform the preprocessing of data and apply mining techniques on it.
- Ability to identify the association rules, classification and clusters in large data sets.
- Ability to solve real world problems in business and scientific information using data mining

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****IV Year B.Tech. ECM-I Sem****L T/P/D C****- -/3/- 2****(A70594) COMPUTER NETWORKS LAB****Objective:**

- To Understand the functionalities of various layers of OSI model
- To understand the operating System functionalities

**List of Programs:**

1. Implement the data link layer framing methods such as character, character stuffing and bit stuffing.
2. Implement on a data set of characters the three CRC polynomials – CRC 12, CRC 16 and CRC CCIP.
3. Implement Dijkstra 's algorithm to compute the Shortest path thru a graph.
4. Take an example subnet graph with weights indicating delay between nodes. Now obtain Routing table at each node using distance vector routing algorithm
5. Take an example subnet of hosts . Obtain broadcast tree for it.
6. Take a 64 bit playing text and encrypt the same using DES algorithm.
7. Write a program to break the above DES coding
8. Using RSA algorithm Encrypt a text data and Decrypt the same.

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**(A70596) LINUX PROGRAMMING LAB****Objectives:**

- To write shell scripts to solve problems.
- To implement some standard Linux utilities such as ls,cp etc using system calls.
- To develop network-based applications using C.

**List of sample problems:****Note: Use Bash for Shell scripts.**

1. Write a shell script that accepts a file name, starting and ending line numbers as arguments and displays all the lines between the given line numbers.
2. Write a shell script that deletes all lines containing a specified word in one or more files supplied as arguments to it.
3. Write a shell script that displays a list of all the files in the current directory to which the user has read, write and execute permissions.
4. Write a shell script that receives any number of file names as arguments checks if every argument supplied is a file or a directory and reports accordingly. Whenever the argument is a file, the number of lines on it is also reported.
5. Write a shell script that accepts a list of file names as its arguments, counts and reports the occurrence of each word that is present in the first argument file on other argument files.
6. Write a shell script to list all of the directory files in a directory.
7. Write a shell script to find factorial of a given integer.
8. Write an awk script to count the number of lines in a file that do not contain vowels.
9. Write an awk script to find the number of characters, words and lines in a file.
10. Write a C program that makes a copy of a file using standard I/O and system calls.
11. Implement in C the following Linux commands using System calls  
a). cat b) mv
12. Write a C program to list files in a directory.
13. Write a C program to emulate the Unix ls -l command.

14. Write a C program to list for every file in a directory, its inode number and file name.
15. Write a C program that redirects standard output to a file.Ex: ls > f1.
16. Write a C program to create a child process and allow the parent to display "parent" and the child to display "child" on the screen.
17. Write a C program to create a Zombie process.
18. Write a C program that illustrates how an orphan is created.
19. Write a C program that illustrates how to execute two commands concurrently with a command pipe. Ex:- ls -l | sort.
20. Write C programs that illustrate communication between two unrelated processes using named pipe(FIFO File).
21. Write a C program in which a parent writes a message to a pipe and the child reads the message.
22. Write a C program (sender.c) to create a message queue with read and write permissions to write 3 messages to it with different priority numbers.
23. Write a C program (receiver.c) that receives the messages (from the above message queue as specified in (22)) and displays them.
24. Write a C program that illustrates suspending and resuming processes using signals.
25. Write Client and Server programs in C for connection oriented communication between Server and Client processes using Unix Domain sockets to perform the following:  
Client process sends a message to the Server Process.The Server receives the message,reverses it and sends it back to the Client.The Client will then display the message to the standard output device.
26. Write Client and Server programs in C for connection oriented communication between Server and Client processes using Internet Domain sockets to perform the following:  
Client process sends a message to the Server Process.The Server receives the message,reverses it and sends it back to the Client.The Client will then display the message to the standard output device.
27. Write C programs to perform the following:  
One process creates a shared memory segment and writes a message("Hello") into it. Another process opens the shared memory segment and reads the message(ie. "Hello").It will then display the message("Hello") to standard output device.

**TEXT BOOKS:**

1. Beginning Linux Programming, 4<sup>th</sup> Edition, N.Matthew, R.Stones,Wrox, Wiley India Edition.
2. Advanced Unix Programming, N.B.Venkateswarulu, BS Publications.
3. Unix and Shell Programming, M.G. Venkatesh Murthy, Pearson Education.
4. Unix Shells by Example, 4th Edition, Ellie Quigley, Pearson Education.
5. Sed and Awk, O.Dougherty&A.Robbins,2<sup>nd</sup> edition, SPD.

**Outcomes:**

- Ability to understand the Linux environment
- Ability to perform the file management and multiple tasks using shell scripts in Linux environment



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**(A80545) INFORMATION SYSTEMS****(Elective-III)****UNIT I:**

**Introduction:** Definition, Objectives, Functional Overview, Relationship to DBMS, Digital Libraries and Data Warehouses, Information Retrieval System Capabilities - Search, Browse, Miscellaneous.

**UNIT II:**

**Cataloging and Indexing:** Objectives, Indexing Process, Automatic Indexing, Information Extraction, Data Structures: Introduction, Stemming Algorithms, Inverted File Structures, N-Gram Data Structure, PAT Data Structure, Signature File Structure, Hypertext Data Structure - Automatic Indexing: Classes of Automatic Indexing, Statistical Indexing, Natural Language, Concept Indexing, Hypertext Linkages.

**UNIT III:**

**Document and Term Clustering:** Introduction, Thesaurus Generation, Item Clustering, Hierarchy of Clusters - User Search Techniques: Search Statements and Binding, Similarity Measures and Ranking, Relevance Feedback, Selective

**UNIT IV:**

Dissemination of Information Search, Weighted Searches of Boolean Systems, Searching the Internet and Hypertext - Information Visualization: Introduction, Cognition and Perception, Information Visualization Technologies.

**UNIT V:**

**Text Search Algorithms:** Introduction, Software Text Search Algorithms, Hardware Text Search Systems, Information System Evaluation: Introduction, Measures used in System Evaluation, Measurement Example – TREC Results.

**TEXT BOOKS:**

1. Information Storage and Retrieval Systems: Theory and Implementation by Kowalski, Gerald, Mark T Maybury, Springer.
2. Modern Information Retrieval by Ricardo Baeza-Yates, Pearson Education, 2007.
3. Information Retrieval: Algorithms and Heuristics by David A Grossman and Ophir Frieder, 2nd Edition, Springer, 2004.

**REFERENCES:**

1. Information Retrieval Data Structures and Algorithms by William B Frakes, Ricardo Baeza-Yates, Pearson Education, 1992.
2. Information Storage & Retrieval by Robert Korfhage – John Wiley & Sons.
3. Introduction to Information Retrieval by Christopher D. Manning and Prabhakar Raghavan, Cambridge University Press, 2008.

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**(A80453) TELECOMMUNICATION SWITCHING SYSTEMS****(Elective-III)****Objectives:**

- To learn Switching, Signaling and traffic in the context of telecommunication network.
- To expose through the evolution of switching systems from manual and electromechanical systems to stored-program-controlled digital systems.
- To study signaling, packet switching.

**UNIT -I:**

**Switching Systems:** Evolution of Telecommunications; Basics of a Switching System; Functions of a Switching System; Crossbar Switching-Principle of Crossbar Switching; Crossbar Switch Configurations; Cross-Point Technology; Crossbar Exchange Organization; A General Trunking; Electronic Switching; Digital Switching Systems.

**UNIT -II:**

**Telecommunications Traffic:** Introduction; The Unit of Traffic; Congestion; Traffic Measurement; A Mathematical Model; Lost-Call Systems-Theory; Traffic Performance; Loss Systems in Tandem; Use of Traffic Tables; Queuing Systems-The Second Erlang Distribution; Probability of Delay; Finite Queue Capacity; Some Other Useful Results; Systems with a Single Server; Queues in Tandem; Delay Tables; Applications of Delay Formulae.

**UNIT -III:**

**Switching Networks:** Single Stage Networks; Gradings-Principle; Two Stage Networks; Three Stage Networks; Four Stage Networks

**Time Division Switching:** Basic Time Division Space Switching; Basic Time Division Time Switching; Time Multiplexed Space Switching; Time Multiplexed Time Switching; Combination Switching; Three Stage Combination Switching.

**Control of Switching Systems:** Call Processing Functions-Sequence of Operations; Signal Exchanges; State Transition Diagrams; Common Control; Reliability; Availability and Security; Stored Program Control.

**UNIT -IV:**

**Signaling:** Introduction; Customer Line Signaling; Audio Frequency Junctions and Trunk Circuits; FDM Carrier Systems-Outband Signaling; Inband (VF) Signaling; PCM Signaling; Inter Register Signaling; Common Channel

Signaling Principles-General Signaling Networks; CCITT Signaling System Number 6; CCITT Signaling System Number 7; The High Level Data Link Control Protocol; Signal Units; The Signaling Information Field.

**UNIT -V:**

**Packet Switching:** Introduction; Statistical Multiplexing; Local Area And Wide Area Networks-Bus Networks; Ring Networks; Comparison of Bus and Ring Networks; Optical Fiber Networks; Large Scale Networks-General; Datagrams and Virtual Circuits; Routing; Flow Control; Standards; Frame Relay; Broadband Networks-General; The Asynchronous Transfer Mode; ATM Switches.

**TEXT BOOKS:**

1. J. E Flood, "Telecommunications Switching and Traffic Networks," Pearson Education, 2006.
2. Tyagarajan Viswanathan, "Telecommunications Switching Systems and Networks," Prentice Hall of India Pvt. Ltd., 2006.

**REFERENCE BOOKS:**

1. John C Bellamy, "Digital Telephony," John Wiley International Student Edition, 3<sup>rd</sup> Edition, 2000.
2. Behrouz A. Forouzan, "Data Communications and Networking," TMH, 2<sup>nd</sup> Edition, 2002.
3. Tomasi, "Introduction to Data Communication and Networking," Pearson Education, 1<sup>st</sup> Edition, 2007.

**Outcomes:**

On completion of this course, it is expected that the student will be able to:

- Analyze and evaluate fundamental telecommunication traffic models.
- Understand basic modern signaling system.
- Solve traditional interconnection switching system design problems.
- Understand the concept of packet switching.

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**(A80543) DATABASE SECURITY****(Elective-IV)****Objectives:**

- To learn the security of databases
- To learn the design techniques of database security
- To learn the secure software design

**UNIT- I**

**Introduction:** Introduction to Databases Security Problems in Databases Security Controls Conclusions

**Security Models -1:** Introduction Access Matrix Model Take-Grant Model Acten Model PN Model Hartson and Hsiao's Model Fernandez's Model Bussolati and Martella's Model for Distributed databases

**UNIT- II**

**Security Models -2:** Bell and LaPadula's Model Biba's Model Dion's Model Sea View Model Jajodia and Sandhu's Model The Lattice Model for the Flow Control conclusion

**Security Mechanisms :** Introduction User Identification/Authentication Memory Protection Resource Protection Control Flow Mechanisms Isolation Security Functionalities in Some Operating Systems Trusted Computer System Evaluation Criteria

**UNIT- III**

**Security Software Design :** Introduction A Methodological Approach to Security Software Design Secure Operating System Design Secure DBMS Design Security Packages Database Security Design

**Statistical Database Protection & Intrusion Detection Systems:** Introduction Statistics Concepts and Definitions Types of Attacks Inference Controls evaluation Criteria for Control Comparison .Introduction IDES System RETISS System ASES System Discovery

**UNIT- IV**

**Models For The Protection Of New Generation Database Systems -1:** Introduction A Model for the Protection of Frame Based Systems A Model for the Protection of Object-Oriented Systems SORION Model for the Protection of Object-Oriented Databases

**UNIT- V**

**Models For The Protection Of New Generation Database Systems -2:** A

Model for the Protection of New Generation Database Systems: the Orion Model Jajodia and Kogan's Model A Model for the Protection of Active Databases Conclusions

**TEXT BOOKS:**

1. Database Security by Castano *Pearson Edition (1/e)*
2. Database Security and Auditing: Protecting Data Integrity and Accessibility, 1st Edition, Hassan Afyouni, THOMSON Edition.

**REFERENCE BOOK:**

1. Database security by alfred basta, melissa zgola, CENGAGE learning.

**Outcomes:**

- Ability to carry out a risk analysis for large database.
- Ability to set up, and maintain the accounts with privileges and roles.

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**(A80444) OPTICAL COMMUNICATIONS****(Elective-IV)****Objectives:**

The objectives of the course are:

- To realize the significance of optical fibre communications.
- To understand the construction and characteristics of optical fibre cable.
- To develop the knowledge of optical signal sources and power launching.
- To identify and understand the operation of various optical detectors.
- To understand the design of optical systems and WDM.

**UNIT -I:**

**Overview of Optical Fiber Communication:** - Historical development, The general system, Advantages of Optical Fiber Communications, Optical Fiber Wave Guides- Introduction, Ray Theory Transmission, Total Internal Reflection, Acceptance Angle, Numerical Aperture, Skew Rays, Cylindrical Fibers- Modes, Vnumber, Mode Coupling, Step Index Fibers, Graded Index Fibers.

**Single Mode Fibers-** Cut Off Wavelength, Mode Field Diameter, Effective Refractive Index, Fiber Materials Glass, Halide, Active Glass, Chalcogenide Glass, Plastic Optical Fibers.

**UNIT -II:**

**Signal Distortion in Optical Fibers:** Attenuation, Absorption, Scattering and Bending Losses, Core and Cladding Losses, Information Capacity Determination, Group Delay, Types of Dispersion - Material Dispersion, Wave-Guide Dispersion, Polarization Mode Dispersion, Intermodal Dispersion, Pulse Broadening, Optical Fiber Connectors- Connector Types, Single Mode Fiber Connectors, Connector Return Loss.

**UNIT -III:**

**Fiber Splicing:** Splicing Techniques, Splicing Single Mode Fibers, Fiber Alignment and Joint Loss- Multimode Fiber Joints, Single Mode Fiber Joints, Optical Sources- LEDs, Structures, Materials, Quantum Efficiency, Power, Modulation, Power Bandwidth Product, Injection Laser Diodes- Modes, Threshold Conditions, External Quantum Efficiency, Laser Diode Rate Equations, Resonant Frequencies, Reliability of LED & ILD.

**Source to Fiber Power Launching:** - Output Patterns, Power Coupling, Power Launching, Equilibrium Numerical Aperture, Laser Diode to Fiber Coupling.

**UNIT -IV:**

**Optical Detectors:** Physical Principles of PIN and APD, Detector Response Time, Temperature Effect on Avalanche Gain, Comparison of Photo Detectors, Optical Receiver Operation- Fundamental Receiver Operation, Digital Signal Transmission, Error Sources, Receiver Configuration, Digital Receiver Performance, Probability of Error, Quantum Limit, Analog Receivers.

**UNIT -V:**

**Optical System Design:** Considerations, Component Choice, Multiplexing, Point-to- Point Links, System Considerations, Link Power Budget with Examples, Overall Fiber Dispersion in Multi-Mode and Single Mode Fibers, Rise Time Budget with Examples.

Transmission Distance, Line Coding in Optical Links, WDM, Necessity, Principles, Types of WDM, Measurement of Attenuation and Dispersion, Eye Pattern.

**TEXT BOOKS:**

1. Optical Fiber Communications – Gerd Keiser, TMH, 4<sup>th</sup> Edition, 2008.
2. Optical Fiber Communications – John M. Senior, Pearson Education, 3<sup>rd</sup> Edition, 2009.

**REFERENCE BOOKS:**

1. Fiber Optic Communications – D.K. Mynbaev , S.C. Gupta and Lowell L. Scheiner, Pearson Education, 2005.
2. Text Book on Optical Fibre Communication and its Applications – S.C.Gupta, PHI, 2005.
3. Fiber Optic Communication Systems – Govind P. Agarwal , John Wiley, 3rd Edition, 2004.
4. Introduction to Fiber Optics by Donald J. Sterling Jr. – Cengage learning, 2004.
5. Optical Communication Systems – John Goward, 2<sup>nd</sup> Edition, PHI, 2001.

**Outcomes:**

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

- Understand and analyze the constructional parameters of optical fibres.
- Be able to design an optical system.
- Estimate the losses due to attenuation, absorption, scattering and bending.
- Compare various optical detectors and choose suitable one for different applications.



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**(A80455) WIRELESS SENSOR NETWORKS****(Elective-IV)****Unit I**

**Introduction:** Unique constraints and challenges, advantages of Sensor Networks, Sensor Network Applications, Collaborative Processing, Overview and applications of Wireless Sensor Networks, Basic Wireless Sensor Technology-Sensor Node Technology, Sensor Taxonomy, WN operating Environment, WN trends. Radio Propagation primer.

**Unit II**

**MAC protocols for Wireless Sensor Networks:** Introduction, Background, Fundamentals of MAC protocols, MAC protocols for WSNs, Sensor-MAC case study, IEEE 802.15.4 LR-WPANs standard case study.

**Unit III**

**Routing protocols for Wireless Sensor Networks:** Introduction, background, Data dissemination and gathering, routing challenges and design issues, routing strategies in wireless sensor networks.

**Networking Sensors:** Key assumptions, Medium Access Control, General Issues, Geographic, Energy-Aware Routing, Attribute-based Routing.

**Unit IV**

**Transport Control protocols for Wireless Sensor Networks:** Traditional Transport control protocols, Transport protocol design issues, Examples of existing transport control protocols, performance of transport control protocols.

**Performance and Traffic Management:** Introduction, background, WSN Design Issues, Performance Modeling of WSNs, Case Study-Simple computation of the system life span.

**Unit V**

**Network Management for Wireless Sensor Networks:** Introduction, Network management requirements, traditional network management models, network management design issues, MANNA, Naming and Localization.

**Operating Systems for Wireless Sensor Networks:** Introduction, operating system design issues, Examples of operating systems-TinyOS, Mate, MagnetOS, MANTIS, OSPM, EYES OS, SenOS, EMERALDS, PicOS.

**TEXT BOOKS:**

1. Wireless Sensor Networks- Technology, protocols and applications, Kazem Sohraby, Daniel Minoli and Taieb Znati, Wiley Student Edition.
2. Wireless Sensor Networks-An Information processing approach, Feng Zhao, Leonidas Guibas, Morgan Kaufmann publications, 2004.

**REFERENCE BOOKS:**

1. Adhoc Mobile Wireless Networks-Principles, Protocols and Applications, Subir kumar Sarkar, T G Basavaraju and C Puttamadappa, Auerbach Publications, Taylor & Francis group.
2. Adhoc Wireless Networks-Architectures and Protocols, C. Siva Ram Murthy and B.S. Manoj, Pearson Education.

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**(A80549) REAL TIME OPERATING SYSTEMS****(Elective-IV)****UNIT-I:**

**Introduction:** Introduction to UNIX, Overview of Commands, File I/O, (Open, Create, Close, Lseek, Read, Write), Process Control ( Fork, Vfork, Exit, Wait, Waitpid, Exec), Signals, Interprocess Communication, ( pipes, FIFOs, Message Queues, Semaphores, Shared Memory)

**UNIT-II:**

**Real Time Systems:** Typical Real Time Applications, Hard Vs Soft Real-Time Systems, A Reference Model of Real Time Systems: Processors and Resources, Temporal Parameters of Real Time Work Load, Periodic Task Model Precedence Constraints and Data Dependency Functional Parameters, Resource Parameters of Jobs and Parameters of Resources.

**UNIT-III:**

**Scheduling:** Commonly Used Approaches to Real Time Scheduling Clock Driven, Weighted Round Robin, Priority Driven, Dynamic Vs State Systems, Effective Release Time and Dead Lines, Offline Vs Online Scheduling.

**UNIT-IV:**

**Real Time Operating Systems & Programming Tools:** Operating Systems Services, I/O Subsystems, RTOS, Interrupt Routine in RTOS Environment. Micro C/OS-II- Need of a Well Tested & Debugged RTOS, Use of  $\mu$ COS-II.

**UNIT-V:**

**VX Works & Case Studies:** Memory Managements Task State Transition Diagram, Pre-Emptive Priority, Scheduling Context Switches- Semaphore-Binary Mutex, Counting Watch Dugs, I/O System

Case Studies of Programming with RTOS- Case Study of Automatic Chocolate Vending M/C Using  $\mu$ COS RTOS, Case Study of Sending Application Layer Byte Streams on a TCP/IP Network.

**TEXT BOOKS:**

1. Embedded Systems- Architecture, Programming and Design by Rajkamal, TMH.
2. Real Time Systems- Jane W. S. Liu- Pearson Education

3. Real Time Systems- C. M.V. Krishna, KANG G. Shin- TMH

**REFERENCES:**

1. Advanced UNIX Programming, Richard Stevens
2. VX Works Programmers Guide

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**(A80449) NETWORK SECURITY****(Elective-IV)****Objectives:**

The main objectives are:

- To acquire an understanding of network security and its changing character.
- To understand how network security is conceptualized and carried out.
- To examine conventional encryption and cryptography techniques.
- To articulate informed opinion about issues related to network IP security.
- To identify and investigate web security requirements.
- To appreciate the concepts of SNMP and design principles of firewall.

**UNIT –I:**

**Security Attacks:** (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.

**UNIT –II:**

**Conventional Encryption:** Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC.

**UNIT –III:**

**Public Key Cryptography:** principles, public key cryptography algorithms, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service.

**Email Privacy:** Pretty Good Privacy (PGP) and S/MIME.

**UNIT –IV:**

**IP Security:** Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

**Web Security Requirements:** Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET).

**UNIT –V:**

**Basic Concepts of SNMP:** SNMPv1 Community facility and SNMPv3, Intruders, Viruses and related threats.

**Firewall:** Design principles, Trusted Systems, Intrusion Detection Systems.

**TEXT BOOKS:**

1. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education.
2. Hack Proofing your network by Ryan Russell, Dan Kaminsky, Rain Forest Puppy, Joe Grand, David Ahmad, Hal Flynn Ido Dubrawsky, Steve W.Manzuik and Ryan Permech, wiley Dreamtech

**REFERENCE BOOKS:**

1. Fundamentals of Network Security by Eric Maiwald (Dreamtech press)
2. Network Security - Private Communication in a Public World by Charlie Kaufman, Radia Perlman and Mike Speciner, Pearson/PHI.
3. Cryptography and network Security, Third Edition, Stallings, PHI/ Pearson
4. Principles of Information Security, Whitman, Thomson.
5. Network Security: The complete reference, Robert Bragg, Mark Rhodes, TMH
6. Introduction to Cryptography, Buchmann, Springer.
7. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning.
8. Information Systems Security,Godbole,Wiley Student Edition.
9. Cryptography and network Security, B.A.Forouzan, D.Mukhopadhyay, 2nd Edition, TMH.

**Outcomes:**

Upon completion of the course, the student will be able to:

- Acquire an understanding of network security and its changing character.
- Understand conventional encryption and cryptography techniques.
- Analyze issues related to network IP security.
- Identify and investigate web security requirements.
- Know the concepts of SNMP and design principles of firewall.

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**(A80087) INDUSTRY ORIENTED MINI PROJECT**

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**(A80089) SEMINAR**

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**(A80088) WORK PROJECT**

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**(A80090) COMPREHENSIVE VIVA**

