# ACADEMIC REGULATIONS
# COURSE STRUCTURE
# AND
# DETAILED SYLLABUS

# ELECTRONICS & COMMUNICATION ENGINEERING

**For**

## B.Tech., FOUR YEAR DEGREE COURSE

(Applicable for the batches admitted from 2013-14)

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**
KAKINADA – 533003, ANDHRA PRADESH, INDIA.

# Academic Regulations (R13) for B. Tech. (Regular)

**Applicable for the students of B. Tech. (Regular) from the Academic Year 2013-14 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. A student shall be declared eligible for the award of the B. Tech Degree, if he pursues a course of study in not less than four and not more than eight academic years.
2. The candidate shall register for 180 credits and secure all the 180 credits.

2. **Courses of study**

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

| S.No. | Branch |
|---|---|
| **01** | Electronics and Communication Engineering |
| **02** | Electrical and Electronics Engineering |
| **03** | Civil Engineering |
| **04** | Mechanical Engineering |
| **05** | Computer Science and Engineering |
| **06** | Petro Chemical Engineering |
| **07** | Information Technology |
| **08** | Chemical Engineering |
| **09** | Electronics and Instrumentation Engineering |
| **10** | Bio-Medical Engineering |
| **11** | Aeronautical Engineering |
| **12** | Automobile Engineering |
| **13** | Bio Technology |
| **14** | Electronics and Computer Engineering |
| **15** | Mining Engineering |
| **16** | Petroleum Engineering |
| **17** | Metallurgical Engineering |
| **18** | Agricultural Engineering |

3. **Distribution and Weightage of Marks**

(i) The performance of a student in each semester shall be evaluated subject – wise with a maximum of 100 marks for theory subject and 75 marks for practical subject. The project work shall be evaluated for 200 marks.

(ii) For theory subjects the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End - Examinations.

(iii) For theory subjects, during the semester there shall be 2 tests. The weightage of Internal marks for 30 consists of Descriptive – 15, Assignment - 05 (Theory, Design, Analysis, Simulation, Algorithms, Drawing, etc. as the case may be) Objective -10 (Conducted at College level with 20 Multiple choice question with a weightage of ½ Mark each). The objective examination is for 20 minutes duration. The subjective examination is for 90 minutes duration conducted for 15 marks. Each subjective type test question paper shall contain **3 questions** and all questions need to be answered. The Objective examination conducted for 10 marks and subjective examination conducted for 15 marks are to be added to the assignment marks of 5 for finalizing internal marks for 30. The best of the two tests will be taken for internal marks. As the syllabus is framed for 6 units, the 1$^{st}$ mid examination (both Objective and Subjective) is conducted in 1-3 units and second test in 4-6 units of each subject in a semester.

(iv) The end semester examination is conducted covering the topics of all Units for 70 marks. Part – A contains a mandatory question (Brainstorming / Thought provoking / case study) for 22 marks. Part – B has 6 questions (One from each Unit). The student has to answer 3 out of 6 questions in Part – B and carries a weightage of 16 marks each.

(v) For practical subjects there shall be continuous evaluation during the semester for 25 internal marks and 50 end examination marks. The internal 25 marks shall be awarded as follows: day to day work - 10 marks, Record-5 marks and the remaining 10 marks to be awarded by conducting an internal laboratory test. The end examination shall be conducted by the teacher concerned and external examiner.

(vi) For the subject having design and / or drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing) and estimation, the distribution shall be 30 marks for internal evaluation ( 20 marks for day – to – day work, and 10 marks for internal tests) and 70 marks for end examination. There shall be two internal tests in a Semester and the better of the two shall be considered for the award of marks for internal tests.

(vii) For the seminar, the student shall collect the information on a specialized topic and prepare a technical report, showing his understanding over the topic, and submit to the department, which 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 seminar.

(viii) Out of a total of 200 marks for the project work, 60 marks shall be for Internal Evaluation and 140 marks for the End Semester Examination. The End Semester Examination (Viva – Voce) shall be conducted by the committee. The committee consists of an external examiner, Head of the Department and Supervisor of the Project. The evaluation of project work shall be conducted 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 and evaluated by an internal committee.

(ix) Laboratory marks and the internal marks awarded by the College are not final. The marks are subject to scrutiny and scaling by the University wherever felt desirable. The internal and laboratory marks awarded by the College will be referred to a Committee. The Committee shall arrive at a scaling factor and the marks will be scaled as per the scaling factor. The recommendations of the Committee are final and binding. The laboratory records and internal test papers shall be preserved in the respective departments as per the University norms and shall be produced to the Committees of the University as and when they ask for.

4. **Attendance Requirements**

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

6. A stipulated fee shall be payable towards condonation of shortage of attendance.
7. A student will be promoted to the next semester if he satisfies the (i)attendance requirement of the present semester and (ii) credits.
8. If any candidate fulfills the attendance requirement in the present semester, he shall not be eligible for readmission into the same class.

## 5. Minimum Academic Requirements

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no. 4.

5.1 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 internal marks and end semester examination marks.**

5.2 A student shall be promoted from first year to second year if he fulfills the minimum attendance requirement.

5.3 A student will be **promoted from II year to III year** if he fulfills the academic requirement **of 40% of the 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.**

5.4 A student shall be **promoted from III year to IV year** if he fulfils the academic requirements of **40% of the 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.**

5.5 A student shall register and put up minimum attendance in all 180 credits and earn all 180 credits. **Marks obtained in all the 180 credits shall be considered for the calculation of percentage of marks.**

## 6. Course pattern

1. The entire course of study is for four academic years, all the years are on semester pattern.
2. A student eligible to appear for the end semester examination in a subject, but absent from it or has failed in the end semester examination, may write the exam in that subject when conducted next.

3. When a student is detained for lack of credits / shortage of attendance, he may be re-admitted into the same semester / year in which he has been detained. However, the academic regulations under which he was first admitted shall continues to be applicable to him.

**7. 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:

| **Class Awarded** | **% of marks to be secured** | |
|---|---|---|
| First Class with Distinction | 70% and above | **From the aggregate marks secured from 180 Credits.** |
| 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 examination shall be shown separately in the memorandum of marks.

**8. Minimum Instruction Days**

The minimum instruction days for each semester shall be 90 working days.

9. There shall be no branch transfers after the completion of the admission process.

10. There shall be no transfer from one college/stream to another within the Constituent Colleges and Units of Jawaharlal Nehru Technological University Kakinada.

11. **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. His degree will be withheld in such cases.

12. **TRANSITORY REGULATIONS**

1. Discontinued or detained candidates are eligible for readmission as and when next offered.
2. In case of transferred students from other Universities, the credits shall be transferred to JNTUK as per the academic regulations and course structure of the JNTUK**.**

13. **General**

1. Wherever the words “he”, “him”, “his”, occur in the regulations, they include “she”, “her”, “hers”.
2. The academic regulation should be read as a whole for the purpose of any interpretation.
3. In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.
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.
5. The students seeking transfer to colleges affiliated to JNTUK from various other Universities/ Institutions have to pass the failed subjects which are equivalent to the subjects of JNTUK, and also pass the subjects of JNTUK on their own without the right to sessional marks which the candidates have not studied at the earlier Institution.

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# Academic Regulations (R13) for B. Tech. (Lateral entry Scheme)

Applicable for the students admitted into II year B. Tech. from the Academic Year 2014-15 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 A student shall be declared eligible for the award of the B. Tech Degree, if he pursues a course of study in not less than three academic years and not more than six academic years.

1.2 The candidate shall register for 132 credits and secure all the 132 credits.

2. The attendance regulations of B. Tech. (Regular) shall be applicable to B.Tech.

3. **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 if he fulfils the academic requirements of 40% of the 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.

4. **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 | |
|---|---|---|
| First Class with Distinction | 70% and above | **From the aggregate marks secured from 132 Credits from II year to IV year.** |
| 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.

5. 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 / Improper conduct | Punishment |
|---|---|---|
| | *If the candidate:* | |
| 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. 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 | 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 |

| | | |
|---|---|---|
| | 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 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. | semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them. |
| 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 examinations and project work of that semester/year examinations. |
| 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.

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# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

**KAKINADA-533003, Andhra Pradesh (India)**

**For Constituent Colleges and Affiliated Colleges of JNTUK**

# Ragging

## Prohibition of ragging in educational institutions Act 26 of 1997

### Salient Features

- Ragging within or outside any educational institution is prohibited.
- Ragging means doing an act which causes or is likely to cause Insult or Annoyance of Fear or Apprehension or Threat or Intimidation or outrage of modesty or Injury to a student

| | Imprisonment upto | | Fine Upto |
|---|---|---|---|
| Teasing, Embarrassing & Humiliation | 6 Months | + | Rs. 1,000/- |
| Assaulting or Using Criminal force or Criminal intimidation | 1 Year | + | Rs. 2,000/- |
| Wrongfully restraining or confining or causing hurt | 2 Years | + | Rs. 5,000/- |
| Causing grievous hurt, kidnapping or Abducts or rape or committing unnatural offence | 5 Years | + | Rs. 10,000/- |
| Causing death or abetting suicide | 10 Months | + | Rs. 50,000/- |

**In Case of Emergency CALL TOLL FREE No. : 1800 - 425 - 1288**

**LET US MAKE JNTUK A RAGGING FREE UNIVERSITY**

# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

**KAKINADA-533003, Andhra Pradesh (India)**
**For Constituent Colleges and Affiliated Colleges of JNTUK**

# Ragging

## ABSOLUTELY NOT TO RAGGING

1. **Ragging is prohibited as per Act 26 of A.P. Legislative Assembly, 1997.**
2. **Ragging entails heavy fines and/or imprisonment.**
3. **Ragging invokes suspension and dismissal from the College.**
4. **Outsiders are prohibited from entering the College and Hostel without permission.**
5. **Girl students must be in their hostel rooms by 7.00 p.m.**
6. **All the students must carry their Identity Cards and show them when demanded.**
7. **The Principal and the Wardens may visit the Hostels and inspect the rooms any time.**

**Jawaharlal Nehru Technological University Kakinada**
For Constituent Colleges and Affiliated Colleges of JNTUK

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# COURSE STRUCTURE

## I Year – I SEMESTER

| S. No. | Subject | T | P | Credits |
|---|---|---|---|---|
| 1 | English – I | 3 | -- | 3 |
| 2 | Mathematics - I | 3+1 | -- | 3 |
| 3 | Mathematics – II (Mathematical Methods) | 3+1 | -- | 3 |
| 4 | Engineering Physics | 3+1 | -- | 3 |
| 5 | Professional Ethics and Human Values | 3+1 | -- | 3 |
| 6 | Engineering Drawing | 1+3 | -- | 3 |
| 7 | English - Communication Skills Lab -1 | -- | 3 | 2 |
| 8 | Engineering Physics Laboratory | -- | 3 | 2 |
| 9 | Engineering Physics – Virtual Labs - Assignments | -- | 2 | -- |
| 10 | Engineering Workshop& IT Workshop | -- | 3 | 2 |
| **Total Credits** | | | | **24** |

## I Year – II SEMESTER

| S. No. | Subject | T | P | Credits |
|---|---|---|---|---|
| 1 | English – II | 3 | -- | 3 |
| 2 | Mathematics – III | 3+1 | -- | 3 |
| 3 | Engineering Chemistry | 3+1 | -- | 3 |
| 4 | Engineering Mechanics | 3+1 | -- | 3 |
| 5 | Computer Programming | 3+1 | -- | 3 |
| 6 | Network Analysis | 3+1 | -- | 3 |
| 7 | Engineering Chemistry Laboratory | -- | 3 | 2 |
| 8 | English - Communication Skills Lab -2 | -- | 3 | 2 |
| 9 | Computer Programming Lab | -- | 3 | 2 |
| **Total Credits** | | | | **24** |

**II Year – I SEMESTER**

| S. No. | Subject | T | P | Credits |
|---|---|---|---|---|
| 1 | Managerial Economics and Financial Analysis | 3+1 | -- | 3 |
| 2 | Electronic Devices and Circuits | 3+1 | -- | 3 |
| 3 | Data Structures | 3+1 | -- | 3 |
| 4 | Environmental Studies | 3 | -- | 3 |
| 5 | Signals & Systems | 3+1 | -- | 3 |
| 6 | Electrical Technology | 3+1 | -- | 3 |
| 7 | Electronic Devices and Circuits Lab | -- | 3 | 2 |
| 8 | Networks &Electrical Technology Lab | -- | 3 | 2 |
| **Total Credits** | | | | **22** |

**II Year – II SEMESTER**

| S. No. | Subject | T | P | Credits |
|---|---|---|---|---|
| 1 | Electronic Circuit Analysis | 3+1 | -- | 3 |
| 2 | Management Science | 3+1 | -- | 3 |
| 3 | Random Variables & Stochastic Processes | 3+1 | -- | 3 |
| 4 | Switching Theory & Logic Design | 3+1 | -- | 3 |
| 5 | EM Waves and Transmission Lines | 3+1 | -- | 3 |
| 6 | Analog Communications | 3+1 | -- | 3 |
| 7 | Electronic Circuit Analysis Lab | -- | 3 | 2 |
| 8 | Analog Communications Lab | -- | 3 | 2 |
| **Total Credits** | | | | **22** |

**III Year – I SEMESTER**

| S. No. | Subject | T | P | Credits |
|---|---|---|---|---|
| 1 | Pulse & Digital Circuits | 3+1 | - | 3 |
| 2 | Linear IC Applications | 3+1 | - | 3 |
| 3 | Control Systems | 3+1 | - | 3 |
| 4 | Digital System Design & Digital IC Applications | 3+1 | - | 3 |
| 5 | Antennas and Wave Propagation | 3+1 | - | 3 |
| 6 | Pulse & Digital Circuits Lab | | 3 | 2 |
| 7 | LIC Applications Lab | - | 3 | 2 |
| 8 | Digital System Design & DICA Lab | | 3 | 2 |
| 9 | IPR& Patents | 3 | | 2 |
| **Total Credits** | | | | **23** |

**III Year – II SEMESTER**

| S. No. | Subject | T | P | Credits |
|---|---|---|---|---|
| 1 | Microprocessors and Microcontrollers | 3+1 | - | 3 |
| 2 | Digital Signal Processing | 3+1 | - | 3 |
| 3 | Digital Communications | 3+1 | - | 3 |
| 4 | Microwave Engineering | 3+1 | - | 3 |
| 5 | **Open Elective** | 3+1 | - | 3 |
| 6 | Microprocessors and Microcontrollers Lab | - | 3 | 2 |
| 7 | Digital Communications Lab | - | 3 | 2 |
| 8 | Digital Signal Processing Lab | | 3 | 2 |
| 9 | Seminar | | 2 | 1 |
| **Total Credits** | | | | **22** |

**IV Year – I SEMESTER**

| S. No. | Subject | T | P | Credits |
|---|---|---|---|---|
| 1 | VLSI Design | 3+1 | - | 3 |
| 2 | Computer Networks | 3+1 | - | 3 |
| 3 | Digital Image Processing | 3+1 | - | 3 |
| 4 | Computer Architecture & Organization | 3+1 | - | 3 |
| 5 | **Elective – I**<br>1. Electronic Switching Systems<br>2. Analog IC Design<br>3. Object Oriented Programming & O S<br>4. Radar Systems<br>5. Advanced Computer Architecture | 3+1 | - | 3 |
| 6 | **Elective – II**<br>1. Optical Communication<br>2. Digital IC Design<br>3. Speech Processing<br>4. Artificial Neural Network & Fuzzy Logic<br>5. Network Security & Cryptography | 3+1 | - | 3 |
| 7 | V L S I Lab | - | 3 | 2 |
| 8 | Microwave Engineering Lab | - | 3 | 2 |
| **Total Credits** | | | | **22** |

**IV Year – II SEMESTER**

| S. No. | Subject | T | P | Credits |
|---|---|---|---|---|
| 1 | Cellular Mobile Communication | 3+1 | | 3 |
| 2 | Electronic Measurements and Instrumentation | 3+1 | | 3 |
| 3 | **Elective III**<br>1. Satellite Communication<br>2. Mixed signal Design<br>3. Embedded systems<br>4. RF Circuit Design<br>5. Cloud Computing | 3+1 | | 3 |
| 4 | **Elective IV**<br>1.Wireless Sensors and Networks<br>2.System on Chip<br>3.Low Power IC Design<br>4.Bio-Medical Instrumentation<br>5.EMI/EMC | 3+1 | | 3 |
| 5 | Project & Seminar | | | 9 |
| **Total Credits** | | | | **21** |

**Total course credits = 48+ 44 + 45 + 43 = 180**

**Open Electives:**

1. Bio Medical Engineering
2. Fuzzy & Neural Networks
3. Image Processing (not for ECE Students)
4. Principles of Signals, Systems and Communications (Not for ECE Students)
5. Electronic Instrumentation (Not for ECE Students)

## SYLLABUS

**I Year – I SEMESTER**

| T | P | C |
|---|---|---|
| 3+1 | 0 | 3 |

**ENGLISH –I**
**(Common to All Branches)**

**DETAILED TEXT-I English Essentials: Recommended Topics:**

1. **IN LONDON: M.K.GANDHI**

   **OBJECTIVE:** To apprise the learner how Gandhi spent a period of three years in London as a student.

   **OUTCOME**: The learner will understand how Gandhi grew in introspection and maturity.

2. **THE KNOWLEDGE SOCIETY- APJ KALAM**

   **OBJECTIVE**: To make the learners rediscover India as a land of Knowledge.

   **OUTCOME:** The learners will achieve a higher quality of life, strength and sovereignty of a developed nation.

3. **THE SCIENTIFIC POINT OF VIEW- J.B.S. HALDANE**

   **OBJECTIVE**: This essay discusses how scientific point of view seeks to arrive at the truth without being biased by emotion.

   **OUTCOME:** This develops in the student the scientific attitude to solve many problems which we find difficult to tackle.

4. **PRINCIPLES OF GOOD WRITING:**

   **OBJECTIVE**: To inform the learners how to write clearly and logically.

   **OUTCOME**: The learner will be able to think clearly and logically and write clearly and logically.

5. **MAN'S PERIL**

   **OBJECTIVE**: To inform the learner that all men are in peril.

   **OUTCOME:** The learner will understand that all men can come together and avert the peril.

6. **THE DYING SUN—SIR JAMES JEANS**

   **OBJECTIVE**: This excerpt from the book "The Mysterious Universe" presents the mysterious nature of the Universe and the stars which present numerous problems to the scientific mind. Sir James Jeans uses a poetic approach to discuss the scientific phenomena.

   **OUTCOME**: This provides the students to think about the scientific phenomena from a different angle and also exposes the readers to poetic expressions.

**7. LUCK—MARK TWAIN**

**OBJECTIVE:** This is a short story about a man's public image and his true nature. The theme of the story is that luck can be a factor of life, so that even if one is incompetent but lucky, one can still succeed.

**OUTCOME**: The story is humourous in that it contains a lot of irony. Thus this develops in the learner understand humourous texts and use of words for irony.

**Text Book** : 'English Essentials' by Ravindra Publications

**NON-DETAILED TEXT:**

**(From Modern Trailblazers of Orient Blackswan)**
**(Common single Text book for two semesters)**
**(Semester I (1 to 4 lessons)/ Semester II (5 to 8 lessons)**

**1. G.D.Naidu**

**OBJECTIVE:** To inspire the learners by G.D.Naidu's example of inventions and contributions.

**OUTCOME:** The learner will be in a position to emulate G.D.Naidu and take to practical applications.

**2. G.R.Gopinath**

**OBJECTIVE:** To inspire the learners by his example of inventions.

**OUTCOME:** Like G.R.Gopinath, the learners will be able to achieve much at a low cost and help the common man.

**3. Sudhamurthy**

**OBJECTIVE:** To inspire the learners by the unique interests and contributions of Sudha Murthy.

**OUTCOME:** The learner will take interest in multiple fields of knowledge and make life worthwhile through social service.

**4. Vijay Bhatkar**

**OBJECTIVE:** To inspire the learner by his work and studies in different fields of engineering and science.

**OUTCOME:** The learner will emulate him and produce memorable things.

**Text Book** : 'Trail Blazers' by Orient Black Swan Pvt. Ltd. Publishers

**I Year – I SEMESTER**

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## MATHEMATICS – I (DIFFERENTIAL EQUATIONS)
## (Common to All Branches)

**UNIT I: Differential equations of first order and first degree:**
Linear-Bernoulli-Exact-Reducible to exact.

Applications : Newton's Law of cooling-Law of natural growth and decay-orthogonal trajectories.

Subject Category

ABET Learning Objectives a d e

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

**UNIT II: Linear differential equations of higher order:**
Non-homogeneous equations of higher order with constant coefficients with RHS term of the type $e^{ax}$ , Sin ax, cos ax, polynomials in x, $e^{ax}$ V(x), xV(x).

Applications: LCR circuit, Simple Harmonic motion

Subject Category

ABET Learning Objectives a d e

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

**UNIT III Laplace transforms:**
Laplace transforms of standard functions-ShiftingTheorems, Transforms of derivatives and integrals – Unit step function –Dirac's delta function- Inverse Laplace transforms– Convolution theorem (with out proof).

Application: Solutions of ordinary differential equations using Laplace transforms.

Subject Category

ABET Learning Objectives a e

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

**UNIT IV Partial differentiation:**
Introduction- Total derivative-Chain rule-Generalized Mean Value theorem for single variable (without proof)-Taylors and Mc Laurent's series for two variables– Functional dependence- Jacobian.

Applications: Maxima and Minima of functions of two variables with constraints and without constraints.

Subject Category

ABET Learning Objectives a c e

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

**UNIT V First order Partial differential equations:**

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions –solutions of first order linear (Lagrange) equation and nonlinear (standard type) equations

Subject Category

ABET Learning Objectives a e

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

**UNIT VI Higher order Partial differential equations:**

Solutions of Linear Partial differential equations with constant coefficients-Method of separation of Variables

Applications : One- dimensional Wave, Heat equations - two-dimensional Laplace Equation.

Subject Category

ABET Learning Objectives a e

ABET internal assessments 1 2 6

JNTUK External Evaluation B E

**Books:**


1. **B.S.GREWAL,** Higher Engineering Mathematics, 42nd Edition, Khanna Publishers
2. **ERWIN KREYSZIG,** Advanced Engineering Mathematics, 9th Edition, Wiley-India
3. **GREENBERG,** Advanced Engineering Mathematics, 2nd edition, Pearson edn
4. **DEAN G. DUFFY,** Advanced engineering mathematics with MATLAB, CRC Press
5. **PETER O'NEIL,** advanced Engineering Mathematics, Cengage Learning.

| Subject Category | ABET Learning Objectives | ABET Internal Assessments | JNTUK External Evaluation | Remarks |
|---|---|---|---|---|
| Theory<br>Design<br>Analysis<br>Algorithms<br>Drawing<br>Others | a) Apply knowledge of math, science, & engineering<br>b) Design & conduct experiments, analyze & interpret data<br>c) Design a system/process to meet desired needs within economic, social, political, ethical, health/safety, manufacturability, & sustainability constraints<br>d) Function on multidisciplinary teams<br>e) Identify, formulate, & solve engineering problems<br>f) Understand professional & ethical responsibilities<br>g) Communicate effectively<br>h) Understand impact of engineering | 1. Objective tests<br>2. Essay questions tests<br>3. Peer tutoring based<br>4. Simulation based<br>5. Design oriented<br>6. Problem based<br>7. Experiential (project based) based<br>8. Lab work or field work based<br>9. Presentation based<br>10. Case Studies based<br>11. Role-play based<br>12. Portfolio based | A. Questions should have:<br>B. Definitions, Principle of operation or philosophy of concept.<br>C. Mathematical treatment, derivations, analysis, synthesis, numerical problems with inference.<br>D. Design oriented problems<br>E. Trouble shooting type of questions<br>F. Applications related questions<br>G. Brain storming questions | |

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| | solutions in global, economic, environmenta, & societal context<br>i) Recognize need for & be able to engage in lifelong learning<br>j) Know contemporary issues<br>k) Use techniques, skills, modern tools for engineering practices | | | |

**I Year – I SEMESTER**

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## MATHEMATICS – II
## (MATHEMATICAL METHODS)

(Common to All Branches)

**UNIT I Solution of Algebraic and Transcendental Equations:**

Introduction- Bisection Method – Method of False Position – Iteration Method – Newton-Raphson Method (One variable and Simultaneous Equestions)

Subject Category

ABET Learning Objectives a e k

ABET internal assessments 1 2 4 6

JNTUK External Evaluation A B E

**UNIT II Interpolation:**

Introduction- Errors in Polynomial Interpolation – Finite differences- Forward Differences- Backward differences –Central differences – Symbolic relations and separation of symbols-Differences of a polynomial-Newton's formulae for interpolation – Interpolation with unevenly spaced points - Lagrange's Interpolation formula

Subject Category

ABET Learning Objectives a e

ABET internal assessments 1 2 4 6

JNTUK External Evaluation A B E

**UNIT III Numerical solution of Ordinary Differential equations:**

Solution by Taylor's series-Picard's Method of successive Approximations-Euler's Method-Runge-Kutta Methods

Subject Category

ABET Learning Objectives a e

ABET internal assessments 1 2 4 6

JNTUK External Evaluation A B E

**UNIT IV Fourier Series:**

Introduction- Determination of Fourier coefficients – even and odd functions –change of interval– Half-range sine and cosine series
application: Amplitude, spectrum of a periodic function

Subject Category

ABET Learning Objectives a e d

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

**UNIT V Fourier Transforms:**

Fourier integral theorem (only statement) – Fourier sine and cosine integrals - sine and cosine transforms – properties – inverse transforms – Finite Fourier transforms

Subject Category

ABET Learning Objectives a d e k

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

**UNIT VI Z-transform:**

Introduction– properties – Damping rule – Shifting rule – Initial and final value theorems -Inverse z transform- -Convolution theorem – Solution of difference equation by Z -transforms.

Subject Category

ABET Learning Objectives a b e k

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

**BOOKS:**


1. **B.S. GREWAL,** Higher Engineering Mathematics, 42nd Edition, Khanna Publishers
2. **DEAN G. DUFFY,** Advanced Engineering Mathematics with MATLAB, CRC Press
3. **V.RAVINDRANATH and P. VIJAYALAXMI,** Mathematical Methods, Himalaya Publishing House
4. **ERWYN KREYSZIG,** Advanced Engineering Mathematics, 9th Edition, Wiley-India

| Subject Category | ABET Learning Objectives | ABET Internal Assessments | JNTUK External Evaluation | Remarks |
|---|---|---|---|---|
| Theory<br>Design<br>Analysis<br>Algorithms<br>Drawing<br>Others | a) Apply knowledge of math, science, & engineering<br>b) Design & conduct experiments, analyze & interpret data<br>c) Design a system/process to meet desired needs within economic, social, political, ethical, health/safety, manufacturability, & sustainability constraints<br>d) Function on multidisciplinary teams<br>e) Identify, formulate, & solve engineering problems<br>f) Understand professional & ethical responsibilities | 1. Objective tests<br>2. Essay questions tests<br>3. Peer tutoring based<br>4. Simulation based<br>5. Design oriented<br>6. Problem based<br>7. Experiential (project based) based<br>8. Lab work or field work based<br>9. Presentation based<br>10. Case Studies based<br>11. Role-play based<br>12. Portfolio based | A. Questions should have:<br>B. Definitions, Principle of operation or philosophy of concept.<br>C. Mathematical treatment, derivations, analysis, synthesis, numerical problems with inference.<br>D. Design oriented problems<br>E. Trouble shooting type of questions<br>F. Applications related questions<br>G. Brain storming questions | |

| | | | | |
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| | g) Communicate effectively<br>h) Understand impact of engineering solutions in global, economic, environmenta, & societal context<br>i) Recognize need for & be able to engage in lifelong learning<br>j) Know contemporary issues<br>k) Use techniques, skills, modern tools for engineering practices | | | |

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## ENGINEERING PHYSICS

### UNIT-I

### PHYSICAL OPTICS FOR INSTRUMENTS

"Objective Designing an instrument and enhancing the resolution for its operation would be effective as achieved through study of applicational aspects of physical Optics"

**INTERFACE :** Introduction – Interference in thin films by reflection – Newton's rings.

**DIFFRACTION :** Introduction – Fraunhofer diffraction - Fraunhofer diffraction at double slit (qualitative) – Diffraction grating – Grating spectrum – Resolving power of a grating – Rayleigh's criterion for resolving power.

**POLARIZATION :** Introduction – Types of Polarization – Double refraction – Quarter wave plate ad Half Wave plate.

### UNIT-II

### COHERENT OPTICS – COMMUNICATIONS AND STRUCTURE OF MATERIALS

Objectives while lasers are trusted Non-linear coherent sources established for the fitness of instrumentation, establishing a structure property relationship for materials requires allotment of an equivalent footing in convening the physics knowledge base.

**LASERS:** Introduction – coherent sources – Characteristics of lasers – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion – Three and Four level pumping schemes – Ruby laser – Helium Neon laser.

**FIBER OPTICS :** Introduction – Principle of Optical Fiber – Acceptance angle and acceptance cone – Numerical aperture.

**CRYSTALLOGRAPHY :** Introduction – Space lattice – Basis – Unit Cell – Lattice parameters – Bravais lattices – Crystal systems – Structures and packing fractions of SC,BCC and FCC

**X-RAY DIFFRACTION TECHNIQUES** : Directions and planes in crystals – Miller indices – Separation between successive [h k l] planes – Bragg's law.

**UNIT-III**

**MAGNETIC, ELECTRIC FIELD RESPONSE OF MATERIALS & SUPERCONDUCTIVITY**

**Objective:** Many of the Electrical or Electronic gadgets are designed basing on the response of naturally abundant and artificially made materials, while their response to E- or H- fields controls their performance.

**MAGNETIC PROPERTIES** : Magnetic permeability – Magnetization – Organ or magnetic moment – Classification of Magnetic materials – Dir, para, Ferro, anti ferro and ferri-magnetism – Hysteresis curve

**DIELECTRIC PROPERTIES** : Introduction – Dielectric constant – Electronic, ionic and orientational polarization – internal fields – Clausius – Mossotti equation – Dielectric loss, Breakdown and Strength.

**SUPERCONDUCTIVITY** : General properties – Meissner effect – Type I and Type II superconductors – BCS Theory Flux quantization London's equations – Penetration depth – DC and AC Josephson effects – SQUIDS.

**UNIT – IV**

**ACOUSTICS AND EM – FIELDS:**

**Objective:** The utility and nuances of ever pervading SHM and its consequences would be the first hand-on to as it clearly conveyed through the detailed studies of Acoustics of Buildings, while vectorial concepts of EM fields paves the student to gear – up for a deeper understanding.

**ACOUSTICS:** Sound absorption, absorption coefficient and its measurements, Reverberations time – Sabine's formula, Eyring's formula.

**ELECTRO-MAGNETIC FIELDS**: Gauss and stokes theorems (qualitative) – Fundamental laws of electromagnetism – Maxwell's Electromagnetic Equations (Calculus approach).

**UNIT – V**

**QUANTUM MECHANICS FOR ELECTRONIC TRANSPORT**

Objective: The discrepancy between classical estimates and laboratory observations of physical properties exhibited by materials would be lifted out through the understanding quantum picture of sub-atomic world dominated by electron and its presence.

**QUANTUM MECHANICS**: Introduction to matter waves – Schrodinger Time Independent and Time Dependent wave equations – Particle in a box.

**FREE ELECTRON THEORY**: Classical free electron theory – electrical conductivity – Mean free path – Relaxation time and drifty velocity – Quantum free electron theory – Fermi – Dirac (analytical) and its dependence

on temperature – Fermi energy – density of states – derivations for current density.

**BAND THEORY OF SOLIDS**: Bloch theorem (qualitative) – Kronig – Penney model – Origin of energy band formation in solids – Classification of materials into conductors, semi – conductors & insulators – Concepts of effective mass of electron - concept of hole.

**UNIT – VI**

**SEMICONDUCTOR PHYSICS:**

Objective: In the wake of ever increasing demand for the space and power the watch word "small is beautiful", understanding the physics of electronic transport as underlying mechanism for appliances would provide a knowledge base.

Introduction – Intrinsic semiconductor and carrier concentration – Equation for conductivity – Extrinsic semiconductor and carrier concentration – Drift and diffusion – Einstein's equation – Hall Effect – direct & indirect band gap semiconductors – Electronic transport Mechanism for LEDs, Photo conductors and solar cells.

**TEXT BOOKS**

1. Solid state Physics by A.J. Dekker (Mc Millan India Ltd.) .
2. A text book of Engineering Physics by M.N. Avadhanulu & P.G. Kshirasagar (S. Chand publications).
3. Engineering Physics b;y M.R. Srinivasan (New Age international publishers).

**REFERENCE BOOKS**

1. 'Introduction to solid state physics' by Charles Kittle (Willey India Pvt. Ltd).
2. 'Applied Physics' by T. Bhimasenkaram (BSP BH Publications )
3. 'Applied Physics' by M.Arumugam (Anuradha Agencies)
4. 'Engineering Physics' by Palanisamy (Scitech Publishers )
5. 'Engineering Physics' by D.K.Bhattacharya (Oxford University press).
6. 'Engineering Physics' by Mani Naidu S (Pearson Publications)
7. 'Engineering Physics' by Sanjay D Jain and Girish G Sahasrabudhe (University Press).
8. 'Engineering Physics' by B.K.Pandey & S. Chaturvedi (Cengage Learning).

**I Year – I SEMESTER**

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**Professional Ethics and Human Values**

**UNIT I : Human Values**:
Morals, Values and Ethics – Integrity – Work Ethics – Service Learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty –Courage – Value time – Co-operation – Commitment – Empathy – Self-confidence – Spirituality- Character.

**UNIT II : Engineering Ethics:**
The History of Ethics-Purposes for Engineering Ethics-Engineering Ethics-Consensus and Controversy –Professional and Professionalism –Professional Roles to be played by an Engineer –Self Interest, Customs and Religion-Uses of Ethical Theories-Professional Ethics-Types of Inquiry – Engineering and Ethics-Kohlberg's Theory – Gilligan's Argument –Heinz's Dilemma.

**UNIT III : Engineering as Social Experimentation:**
Comparison with Standard Experiments – Knowledge gained – Conscientiousness – Relevant Information – Learning from the Past – Engineers as Managers, Consultants, and Leaders – Accountability – Role of Codes – Codes and Experimental Nature of Engineering.

**UNIT IV : Engineers' Responsibility for Safety and Risk:**
Safety and Risk, Concept of Safety – Types of Risks – Voluntary v/s Involuntary Risk- Short term v/s Long term Consequences- Expected Probability- Reversible Effects- Threshold Levels for Risk- Delayed v/s Immediate Risk- Safety and the Engineer – Designing for Safety – Risk-Benefit Analysis-Accidents.

**UNIT V : Engineers' Responsibilities and Rights:**
Collegiality-Techniques for Achieving Collegiality –Two Senses of Loyalty-obligations of Loyalty-misguided Loyalty – professionalism and Loyalty-Professional Rights –Professional Responsibilities – confidential and proprietary information-Conflict of Interest-solving conflict problems – Self-interest, Customs and Religion- Ethical egoism-Collective bargaining-Confidentiality-Acceptance of Bribes/Gifts-when is a Gift and a Bribe-examples of Gifts v/s Bribes-problem solving-interests in other companies-Occupational Crimes-industrial espionage-price fixing-endangering lives-Whistle Blowing-types of whistle blowing-when should it be attempted-preventing whistle blowing.

**UNIT VI : Global Issues:**
Globalization- Cross-culture Issues-Environmental Ethics-Computer Ethics-computers as the instrument of Unethical behaviour-computers as the object of Unethical Acts-autonomous computers-computer codes of Ethics-Weapons Development-Ethics and Research-Analysing Ethical Problems in Research-Intellectual Property Rights.

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**Text Books:**


1. "Engineering Ethics and Human Values" by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd-2009.
2. "Professional Ethics and Morals" by Prof.A.R.Aryasri, Dharanikota Suyodhana-Maruthi Publications.
3. "Professional Ethics and Human Values" by A.Alavudeen, R.Kalil Rahman and M.Jayakumaran- Laxmi Publications.
4. "Professional Ethics and Human Values" by Prof. D.R. Kiran.
5. "Indian Culture, Values and Professional Ethics" by PSR Murthy-BS Publication.
6. "Ethics in Engineering" by Mike W. Martin and Roland Schinzinger – Tata McGraw-Hill – 2003.
7. "Engineering Ethics" by Harris, Pritchard and Rabins, CENGAGE Learning, India Edition, 2009.

**I Year – I SEMESTER**

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## ENGINEERING DRAWING

**Objective**: Engineering drawing being the principle method of communication for engineers, the objective to introduce the students, the techniques of constructing the various types of polygons, curves and scales. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc.

### UNIT I

Objective: The objective is to introduce the use and the application of drawing instruments and to make the students construct the polygons, curves and various types of scales. The student will be able to understand the need to enlarge or reduce the size of objects in representing them.

Polygons, Construction of regular polygons using given length of a side; Ellipse, arcs of circles and Oblong methods; Scales – Vernier and Diagonal scales.

### UNIT II

Objective: The objective is to introduce orthographic projections and to project the points and lines parallel to one plane and inclined to other.

Introduction to orthographic projections; projections of points; projections of straight lines parallel to both the planes; projections of straight lines – parallel to one plane and inclined to the other plane.

### UNIT III

Objective: The objective is to make the students draw the projections of the lines inclined to both the planes.

Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclinations and traces.

### UNIT IV

Objective: The objective is to make the students draw the projections of the plane inclined to both the planes.

Projections of planes: regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.

**UNIT V**

Objective: The objective is to make the students draw the projections of the various types of solids in different positions inclined to one of the planes.

Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.

**UNIT VI**

Objective: The objective is to represent the object in 3D view through isometric views. The student will be able to represent and convert the isometric view to orthographic view and vice versa.

Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

**TEXT BOOKS:**

1. Engineering Drawing by N.D. Butt, Chariot Publications
2. Engineering Drawing by K.L.Narayana & P. Kannaiah, Scitech Publishers.
3. Engineering Graphics by PI Varghese, McGrawHill Publishers

**REFERENCE BOOKS:**

1. Engineering Graphics for Degree by K.C. John, PHI Publishers
2. Engineering Drawing by Agarwal & Agarwal, Tata McGraw Hill Publishers.
3. Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, New Age.

**I Year – I SEMESTER**

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## ENGLISH – COMMUNICATION SKILLS LAB – I

**Suggested Lab Manuals:**

**OBJECTIVE:** To impart to the learner the skills of grammar as well as communication through listening, speaking, reading, and writing including soft, that is life skills.

### BASIC COMMUNICATION SKILLS

| | |
|---|---|
| UNIT 1 | A. Greeting and Introductions<br>B. Pure Vowels |
| UNIT 2 | A. Asking for information and Requests<br>B. Diphthongs |
| UNIT 3 | A. Invitations<br>B. Consonants |
| UNIT 4 | A. Commands and Instructions<br>B. Accent and Rhythm |
| UNIT 5 | A. Suggestions and Opinions<br>B. Intonation |

**Text Book:**

'Strengthen your Communication Skills' Part-A by Maruthi Publications

**Reference Books:**

1. INFOTECH English (Maruthi Publications)
2. Personality Development and Soft Skills (Oxford University Press, New Delhi).

**I Year – I SEMESTER**

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## ENGINEERING PHYSICS LAB

### List of Experiments

1. Determination of wavelength of a source-Diffraction Grating-Normal incidence
2. Newton's rings –Radius of Curvature of Plano_Convex Lens.
3. Determination of thickness of a thin object using parallel interference fringes.
4. Determination of Rigidity modulus of a material- Torsional Pendulum.
5. Determination of Acceleration due to Gravity and Radius of Gyration- Compound Pendulum.
6. Melde's experiment – Transverse and Longitudinal modes.
7. Verification of laws of stretched string – Sonometer.
8. Determination of velocity of sound – Volume resonator.
9. L C R Senes Resonance Circuit
10. Study of I/V Characteristics of Semiconductor diode
11. I/V characteristics of Zener diode
12. Thermistor characteristics – Temperature Coefficient
13. Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus.
14. Energy Band gap of a Semiconductor p.n junction.
15. Hall Effect for semiconductor.

**REFERENCE:**

1. Engineering Physics Lab Manual by Dr. Y. Aparna & Dr. K.Venkateswarao (V.G.S.Book links).
2. Physics practical manual, Lorven Publications.

**I Year – I SEMESTER**

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**Engineering Physics**
**Virtual Labs - Assignments**

**List of Experiments**

1. Hall Effect
2. Crystal Structure
3. Hysteresis
4. Brewster's angle
5. Magnetic Levitation / SQUID
6. Numerical Aperture of Optical fiber
7. Photoelectric Effect
8. Simple Harmonic Motion
9. Damped Harmonic Motion
10. LASER – Beam Divergence and Spot size

URL : WWW.vlab.co.in

**I Year – I SEMESTER**

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## ENGINEERING WORKSHOP & IT WORKSHOP

**ENGINEERING WORKSHOP:**

**Course Objective:** To impart hands-on practice on basic engineering trades and skills.

**Note:** At least two exercises to be done from each trade.

**Trade:**

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| **Carpentry** | 1. T-Lap Joint<br>2. Cross Lap Joint<br>3. Dovetail Joint<br>4. Mortise and Tennon Joint |
| **Fitting** | 1. Vee Fit<br>2. Square Fit<br>3. Half Round Fit<br>4. Dovetail Fit |
| **Black Smithy** | 1. Round rod to Square<br>2. S-Hook<br>3. Round Rod to Flat Ring<br>4. Round Rod to Square headed bolt |
| **House Wiring** | 1. Parallel / Series Connection of three bulbs<br>2. Stair Case wiring<br>3. Florescent Lamp Fitting<br>4. Measurement of Earth Resistance |
| **Tin Smithy** | 1. Taper Tray<br>2. Square Box without lid<br>3. Open Scoop<br>4. Funnel |

**IT WORKSHOP:**

**Objectives:** Enabling the student to understand basic hardware and software tools through practical exposure.

**PC Ha6rdware:**

Identification of basic peripherals, assembling a PC, installation of system software like MS Windows, device drivers. Troubleshooting Hardware and software _ some tips and tricks.

**Internet & World Wide Web:**
Different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet, web browsers, email, newsgroups and discussion forums .Awareness of cyber hygiene( protecting the personal computer from getting infected with the viruses), worms and other cyber attacks.

**Productivity tools** Crafting professional word documents; excel spread sheets, power point presentations and personal web sites using the Microsoft suite of office tools .

**(Note: Student should be thoroughly exposed to minimum of 12 Tasks)**

**PC Hardware**

**Task 1: Identification of the peripherals of a computer.**
To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions. Description of various I/O Devices

**Task 2 (Optional) :** A practice on disassembling the components of a PC and assembling them to back to working condition.

**Task 3:** Examples of Operating systems- DOS, MS Windows, Installation of MS windows on a PC.

**Task 4:** Introduction to Memory and Storage Devices , I/O Port, Device Drivers, Assemblers, Compilers, Interpreters , Linkers, Loaders.

**Task 5:**

**Hardware Troubleshooting (Demonstration):**

Identification of a problem and fixing a defective PC (improper assembly or defective peripherals).

**Software Troubleshooting (Demonstration):** Identification of a problem and fixing the PC for any software issues.

**Internet & Networking Infrastructure**

**Task 6**: Demonstrating Importance of Networking, Transmission Media, Networking Devices- Gateway, Routers, Hub, Bridge, NIC ,Bluetooth Technology, Wireless Technology, Modem, DSL, Dialup Connection.

**Orientation & Connectivity Boot Camp and web browsing:** Students are trained to configure the network settings to connect to the Internet. They are trained to demonstrate the same through web browsing (including all tool bar options) and email access.

**Task 7**: **Search Engines & Netiquette:**

Students are enabled to use search engines for simple search, academic search and any other context based search (Bing, Google etc). Students are

acquainted to the principles of micro-blogging, wiki, collaboration using social networks, participating in online technology forums

**Task 8: Cyber Hygiene (Demonstration):** Awareness of various threats on the internet. Importance of security patch updates and anti-virus solutions. Ethical Hacking, Firewalls, Multi-factor authentication techniques including Smartcard, Biometrics are also practiced.

**Word**

**Task 9 : MS Word Orientation:**

Accessing, overview of toolbars, saving files, Using help and resources, rulers, formatting, Drop Cap, Applying Text effects, Using Character Spacing, OLE in Word, using templates, Borders and Colors, Inserting Header and Footer, Using Date and Time option, security features in word, converting documents while saving.

**Task 10: 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, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs.

**Excel**

**Task 11:** Using spread sheet features of EXCEL including the macros, formulae, pivot tables, graphical representations.

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

**LOOKUP/VLOOKUP**

**Task 12: Performance Analysis** - Features to be covered:- Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting.

**Power Point**

**Task 13:** 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, Hyperlinks, Inserting –Images, Clip Art, Tables and Charts in Powerpoint.

**Task 14:** Focusing on the power and potential of Microsoft power point. 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, OLE in PPT.

**TEXT BOOK:**

**Faculty to consolidate the workshop manuals using the following references**

1. Computer Fundamentals, Anita Goel, Pearson
2. Scott Mueller's Upgrading and Repairing PCs, 18/e, Scott. Mueller, QUE, Pearson,2008
3. Information Technology Workshop,3e, G Praveen Babu, M V Narayana BS Publications.
4. Comdex Information Technology , Vikas Gupta, dreamtech.

**REFERENCE BOOK:**

1. Essential Computer and IT Fundamentals for Engineering and Science Students, Dr. N.B. Venkateswarlu.
2. PC Hardware trouble shooting made easy, TMH.

**I Year – II SEMESTER**

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## ENGLISH –II
## (Common to All Branches)

**DETAILED TEXT-II : Sure Outcomes**: English for Engineers and Technologists **Recommended Topics :**

1. **TECHNOLOGY WITH A HUMAN FACE**

   **OBJECTIVE:** To make the learner understand how modern life has been shaped by technology.

   **OUTCOME**: The proposed technology is people's technology. It serves the human person instead of making him the servant of machines.

2. **CLIMATE CHANGE AND HUMAN STRATEGY**

   **OBJECTIVE**: To make the learner understand how the unequal heating of earth's surface by the Sun, an atmospheric circulation pattern is developed and maintained.

   **OUTCOME**: The learner's understand that climate must be preserved.

3. **EMERGING TECHNOLOGIES**

   **OBJECTIVE**: To introduce the technologies of the $20^{th}$ century and $21^{st}$ centuries to the learners.

   **OUTCOME**: The learner will adopt the applications of modern technologies such as nanotechnology.

4. **WATER- THE ELIXIR OF LIFE**

   **OBJECTIVE**: To inform the learner of the various advantages and characteristics of water.

   **OUTCOME**: The learners will understand that water is the elixir of life.

5. **THE SECRET OF WORK**

   **OBJECTIVE:: ** In this lesson, Swami Vivekananda highlights the importance of work for any development.

   **OUTCOME**: The students will learn to work hard with devotion and dedication.

6. **WORK BRINGS SOLACE**

   **OBJECTIVE**: In this lesson Abdul Kalam highlights the advantage of work.

   **OUTCOME**: The students will understand the advantages of work. They will overcome their personal problems and address themselves to national and other problems.

**Text Book** : 'Sure Outcomes' by Orient Black Swan Pvt. Ltd. Publishers

**NON-DETAILED TEXT:**

**(From Modern Trailblazers of Orient Blackswan)**
**(Common single Text book for two semesters)**
**(Semester I (1 to 4 lessons) / Semester II (5 to 8 lessons)**

5. **J.C. Bose**
   **OBJECTIVE:** To apprise of J.C.Bose's original contributions.
   **OUTCOME:** The learner will be inspired by Bose's achievements so that he may start his own original work.
6. **Homi Jehangir Bhaba**
   **OBJECTIVE:** To show Bhabha as the originator of nuclear experiments in India.
   **OUTCOME:** The learner will be inspired by Bhabha's achievements so as to make his own experiments.
7. **Vikram Sarabhai**
   **OBJECTIVE:** To inform the learner of the pioneering experiments conducted by Sarabhai in nuclear energy and relevance of space programmes.
   **OUTCOME:** The learner will realize that development is impossible without scientific research.
8. **A Shadow- R.K.Narayan**
   **OBJECTIVE:** To expose the reader to the pleasure of the humorous story
   **OUTCOME:** The learner will be in a position to appreciate the art of writing a short story and try his hand at it.

**Text Book :** 'Trail Blazers' by Orient Black Swan Pvt. Ltd. Publishers

**I Year – II SEMESTER**

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| 3+1 | 0 | 3 |

**MATHEMATICS – III**
**(LINEAR ALGEBRA & VECTOR CALCULUS)**
**(Common to All Branches)**

**UNIT I Linear systems of equations:**

Rank-Echelon form, Normal form – Solution of Linear Systems – Direct Methods- Gauss Elimination - Gauss Jordon and Gauss Seidal Methods.

Application: Finding the current in a electrical circuit.

Subject Category

ABET Learning Objectives a e k

ABET internal assessments 1 2 6 4

JNTUK External Evaluation A B E

**UNIT II Eigen values - Eigen vectors and Quadratic forms:**

Eigen values - Eigen vectors– Properties – Cayley-Hamilton Theorem - Inverse and powers of a matrix by using Cayley-Hamilton theorem- Quadratic forms- Reduction of quadratic form to canonical form – Rank - Positive, negative definite - semi definite - index – signature.

Application: Free vibration of a two-mass system.

Subject Category

ABET Learning Objectives a d e k

ABET internal assessments 1 2 4 6

JNTUK External Evaluation A B E

**UNIT III Multiple integrals:**

Review concepts of Curve tracing ( Cartesian - Polar and Parametric curves).

Applications of Integration to Lengths, Volumes and Surface areas of revolution in Cartesian and Polar Coordinates.

Multiple integrals - double and triple integrals – change of variables – Change of order of Integration

Application: Moments of inertia

Subject Category

ABET Learning Objectives a e d

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

**UNIT IV Special functions:**
Beta and Gamma functions- Properties - Relation between Beta and Gamma functions- Evaluation of improper integrals.

Application: Evaluation of integrals

Subject Category

ABET Learning Objectives a e

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

**UNIT V Vector Differentiation:**
Gradient- Divergence- Curl - Laplacian and second order operators -Vector identities.

Application: Equation of continuity, potential surfaces

Subject Category

ABET Learning Objectives a e

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

**UNIT VI Vector Integration:**
Line integral – work done – Potential function – area- surface and volume integrals Vector integral theorems: Greens, Stokes and Gauss Divergence Theorems (Without proof) and related problems.

application: work done, Force

Subject Category

ABET Learning Objectives a e

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

**BOOKS:**

1. **GREENBERG,** Advanced Engineering Mathematics, 9th Edition, Wiley-India.
2. **B.V. RAMANA,** Higher Engineering Mathematics, Tata Mc Grawhill.
3. **ERWIN KREYSZIG,** Advanced Engineering Mathematics, 9th Edition, Wiley-India.
4. **PETER O'NEIL,** Advanced Engineering Mathematics, Cengage Learning.
5. **D.W. JORDAN AND T. SMITH,** Mathematical Techniques, Oxford University Press.

| Subject Category | ABET Learning Objectives | ABET Internal Assessments | JNTUK External Evaluation | Remarks |
|---|---|---|---|---|
| Theory<br>Design<br>Analysis<br>Algorithms<br>Drawing<br>Others | a) Apply knowledge of math, science, & engineering<br>b) Design & conduct experiments, analyze & interpret data<br>c) Design a system/process to meet desired needs within economic, social, political, ethical, health/safety, manufacturability, & sustainability constraints<br>d) Function on multidisciplinary teams<br>e) Identify, formulate, & solve engineering problems<br>f) Understand professional & ethical responsibilities<br>g) Communicate effectively<br>h) Understand impact of engineering solutions in global, | 1. Objective tests<br>2. Essay questions tests<br>3. Peer tutoring based<br>4. Simulation based<br>5. Design oriented<br>6. Problem based<br>7. Experiential (project based) based<br>8. Lab work or field work based<br>9. Presentation based<br>10. Case Studies based<br>11. Role-play based<br>12. Portfolio based | A. Questions should have:<br>B. Definitions, Principle of operation or philosophy of concept.<br>C. Mathematical treatment, derivations, analysis, synthesis, numerical problems with inference.<br>D. Design oriented problems<br>E. Trouble shooting type of questions<br>F. Applications related questions<br>G. Brain storming questions | |

| | | | | |
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| | economic, environmental, & societal context<br>i) Recognize need for & be able to engage in lifelong learning<br>j) Know contemporary issues<br>k) Use techniques, skills, modern tools for engineering practices | | | |

**I Year – II SEMESTER**

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## ENGINEERING CHEMISTRY

### UNIT-I: WATER TECHNOLOGY

Hard Water – Estimation of hardness by EDTA method – Potable water- Sterilization and Disinfection – Boiler feed water – Boiler troubles – Priming and foaming , scale formation, corrosion, caustic embrittlement, turbine deposits – Softening of water – Lime soda, Zeolite processes – Reverse osmosis – Electro Dialysis, Ion exchange process.

**Objectives :** For prospective engineers knowledge about water used in industries (boilers etc.) and for drinking purposes is useful; hence chemistry of hard water, boiler troubles and modern methods of softening hard water is introduced.

### UNIT-II : ELECTROCHEMISTRY

Concept of Ionic conductance – Ionic Mobilities – Applications of Kohlrausch law – Conductometric titrations – Galvanic cells – Electrode potentials – Nernst equation – Electrochemical series – Potentiometric titrations – Concentration cells – Ion selective electrode –Glass electrodes – Fluoride electrode; Batteries and Fuel cells.

Objectives : Knowledge of galvanic cells, electrode potentials, concentration cells is necessary for engineers to understand corrosion problem and its control ; also this knowledge helps in understanding modern bio-sensors, fuel cells and improve them.

### UNIT-III : CORROSION

Causes and effects of corrosion – theories of corrosion (dry, chemical and electrochemical corrosion) – Factors affecting corrosion – Corrosion control methods – Cathodic protection –Sacrificial Anodic, Impressed current methods – Surface coatings – Methods of application on metals (Hot dipping, Galvanizing, tinning, Cladding, Electroplating, Electroless plating) – Organic surface coatings – Paints – Their constituents and their functions.

**Objectives :** the problems associated with corrosion are well known and the engineers must be aware of these problems and also how to counter them

### UNIT-IV : HIGH POLYMERS

Types of Polymerization – Stereo regular Polymers – Physical and Mechanical properties of polymers – Plastics – Thermoplastics and thermo setting plastics – Compounding and Fabrication of plastics – Preparation and

properties of Polyethylene, PVC and Bakelite – Elastomers – Rubber and Vulcanization – Synthetic rubbers – Styrene butadiene rubber – Thiokol – applications.

**Objectives :** Plastics are materials used very widely as engineering materials. An understanding of properties particularly physical and mechanical properties of polymers / plastics / elastomers helps in selecting suitable materials for different purposes.

**UNIT-V : FUELS**

Coal – Proximate and ultimate analysis – Numerical problems based on analysis – Calorific vaule – HCV and LCV – Problems based on calorific values; petroleum – Refining – Cracking – Petrol – Diesel knocking; Gaseous fuels – Natural gas – LPG, CNG – Combustion – Problems on air requirements.

**Objectives :** A board understanding of the more important fuels employed on a large scale is necessary for all engineer to understand energy – related problems and solve them.

**UNIT-VI : CHEMISTRY OF ADVANCED MATERIALS**

Nanometerials (Preparation of carbon nanotubes and fullerenes – Properties of nanomaterials – Engineering applications) – Liquid crystals (Types – Application in LCD and Engineering Applications) – Fiber reinforced plastics – Biodegradable polymers – Conducting polymers – Solar cells (Solar heaters – Photo voltaic cells – Solar reflectors – Green house concepts – Green chemistry (Methods for green synthesis and Applications) – Cement – Hardening and setting – Deterioration of cement concrete.

**Objectives :** With the knowledge available now, future engineers should know at least some of the advanced materials that are becoming available. Hence some of them are introduced here.

**TEXT BOOKSS**

1. Jain and Jain (Latest Edition), Engineering Chemistry, Dhanpat Rai Publishing company Ltd.
2. N.Y.S.Murthy, V.Anuradha, KRamaRao “A Text Book of Engineering Chemistry”, Maruthi Publications.
3. C.Parameswara Murthy, C.V.Agarwal, Adhra Naidu (2006) Text Book of Engineering Chemistry, B.S. Publications.
4. B.Sivasankar (2010), Engineering Chemistry, Mc Graw-Hill companies.
5. Ch.Venkata Ramana Reddy and Ramadevi (2013), Engineering Chemistry, Cengage Learning.

**REFERENCES**

1. S.S. Dara (2013) Text Book of Engineering Chemistry, S.Chand Technical Series.
2. K.Sesha Maheswaramma and Mridula Chugh (2013), Engineering Chemistry, Pearson Publications.
3. R.Gopalan, D.Venkatappayya, Sulochana Nagarajan (2011), Text Book of Engineering Chemistry, Vikas Publications.
4. B.Viswanathan and M.Aulice Scibioh (2009), Fuel Cells, Principals and applications, University Press.

**I Year – II SEMESTER**

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## ENGINEERING MECHANICS

**Objectives:** The students completing this course are expected to understand the concepts of forces and its resolution in different planes ,resultant of force system, Forces acting on a body, their free body diagrams using graphical methods. They are required to understand the concepts of centre of gravity and moments of inertia and their application, Analysis of frames and trusses, different types of motion, friction and application of work - energy method.

**UNIT – I**

**Objectives: The students are to be exposed to the concepts of force and friction , direction and its application.**

Introduction to Engg. Mechanics – Basic Concepts.

**Systems of Forces :** Coplanar Concurrent Forces – Components in Space – Resultant – Moment of Force and its Application – Couples and Resultant of Force Systems. Introduction**,** limiting friction and impending motion, coulomb's laws of dry friction , coefficient of friction, cone of friction.

**UNIT II**

**Objectives: The students are to be exposed to application of free body diagrams. Solution to problems using graphical methods and law of triangle of forces.**

**Equilibrium of Systems of Forces :** Free Body Diagrams, Equations of Equilibrium of Coplanar Systems, Spatial Systems for concurrent forces. Lamis Theorm, Graphical method for the equilibrium of coplanar forces, Converse of the law of Triangle of forces, converse of the law of polygon of forces condition of equilibrium.

**UNIT – III**

**Objectives : The students are to be exposed to concepts of centre of gravity.**

**Centroid :** Centroids of simple figures (from basic principles ) – Centroids of Composite Figures.

**Centre of Gravity :** Centre of gravity of simple body (from basis principles), centre of gravity of composite bodies, pappus theorem.

**UNIT IV**

**Objective: The students are to be exposed to concepts of moment of inertia and polar moment of inertia including transfer methods and their applications.**

**Area moments of Inertia :** Definition – Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia. **Mass Moment of Inertia :** Moment

of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, mass moment of inertia of composite bodies.

**UNIT – V**

**Objectives : The students are to be exposed to motion in straight line and in curvilinear paths, its velocity and acceleration computation and methods of representing plane motion.**

**Kinematics :** Rectilinear and Curvelinear motions – Velocity and Acceleration – Motion of Rigid Body – Types and their Analysis in Planar Motion. **Kinetics :** Analysis as a Particle and Analysis as a Rigid Body in Translation – Central Force Motion – Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies.

**UNIT – VI**

**Objectives: The students are to be exposed to concepts of work, energy and particle motion**

**Work – Energy Method :** Equations for Translation, Work-Energy Applications to Particle Motion, Connected System-Fixed Axis Rotation and Plane Motion. Impulse momentum method.

**TEXT BOOKS:**

1. Engg. Mechanics - S.Timoshenko & D.H.Young., 4th Edn - , Mc Graw Hill publications.
2. Engineering Mechanics: Statics and Dynamics 3rd edition, Andrew Pytel and Jaan Kiusalaas; Cengage Learning publishers.

**REFERENCES:**

1. Engineering Mechanics statics and dynamics – R.C.Hibbeler, 11th Edn – Pearson Publ.
2. Engineering Mechanics, statics–J.L.Meriam, 6th Edn–Wiley India Pvt Ltd.
3. Engineering Mechanics , dynamics – J.L.Meriam, 6th Edn – Wiley India Pvt. Ltd.
4. Engineering Mechanics , statics and dynamics – I.H.Shames, – Pearson Publ.
5. Mechanics For Engineers , statics - F.P.Beer & E.R.Johnston – 5th Edn Mc Graw Hill Publ.
6. Mechanics For Engineers, dynamics - F.P. Beer & E.R. Johnston – 5th Edn Mc Graw Hill Publ.
7. Theory & Problems of engineering mechanics, statics & dynamics – E.W.Nelson, C.L.Best & W.G. McLean, 5th Edn – Schaum's outline series - Mc Graw Hill Publ.
8. Engineering Mechanics , Fedinand . L. Singer , Harper – Collins.
9. Engineering Mechanics statics and dynamics , A Nelson, Mc Graw Hill publications.
10. Engineering Mechanics, Tayal. Umesh Publ.

**I Year – II SEMESTER**

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## COMPUTER PROGRAMMING

**Objectives:** Formulating algorithmic solutions to problems and implementing algorithms in C.

**UNIT I:**

**Unit objective: Notion of Operation of a CPU, Notion of an algorithm and computational procedure, editing and executing programs in Linux**

**Introduction:** Computer systems, Hardware and Software Concepts**.**

**Problem Solving:** Algorithm / Pseudo code, flowchart, program development steps, computer languages: machine, symbolic and highlevel languages, Creating and Running Programs: Writing, Editing (vi/emacs editor), Compiling (gcc), Linking and Executing in under Linux.

**BASICS OF C:** Structure of a C program, identifiers, basic data types and sizes. Constants, Variables, Arthmetic , relational and logical operators, increment and decrement operators, conditional operator, assignment operator, expressions, type conversions, Conditional Expressions, precedence and order of evaluation, Sample Programs.

**UNIT II:**

**Unit objective: understanding branching, iteration and data representation using arrays**

**SELECTION – MAKING DECISION: TWO WAY SELECTION**: if-else, null else, nested if, examples, Multi-way selection: switch, else-if, examples**.**

**ITERATIVE:** loops- while, do-while and for statements , break, continue, initialization and updating, event and counter controlled loops, Looping applications: Summation, powers, smallest and largest.

**ARRAYS**: Arrays- concepts, declaration, definition, accessing elements, storing elements, Strings and String Manipulations, 1-D arrays, 2-D arrays and character arrays, string manipulations, Multidimensional arrays, array applications: Matrix operations, checking the symmetricity of a Matrix**.**

**STRINGS: concepts, c strings.**

**UNIT III:**

**Objective: Modular programming and recursive solution formulation**

**FUNCTIONS- MODULAR PROGRAMMING**: functions, basics, parameter passing, storage classes extern, auto, register, static, scope rules, block structure, user defined functions, standard library functions, recursive functions, Recursive solutions for fibonacci series, towers of Hanoi, header

files, C Preprocessor, example c programs, Passing 1-D arrays, 2-D arrays to functions.

**UNIT IV:**

**Objective: Understanding pointers and dynamic memory allocation**

**POINTERS:** pointers- concepts, initialization of pointer variables, pointers and function arguments, passing by address- dangling memory, address arithmetic, character pointers and functions, pointers to pointers, pointers and multi-dimensional arrays, dynamic memory management functions, command line arguments.

**UNIT V:**

**Objective: Understanding miscellaneous aspects of C**

**ENUMERATED, STRUCTURE AND UNION TYPES:** Derived types- structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit-fields, program applications

**BIT-WISE OPERATORS: logical, shift, rotation, masks.**

**UNIT VI:**

**Objective: Comprehension of file operations**

**FILE HANDLING**: Input and output- concept of a file, text files and binary files, Formatted I/O, File I/O operations, example programs

**Text Books:**

1. Problem Solving and Program Design in C, Hanly, Koffman, 7th ed, PERSON
2. Programming in C, Second Edition Pradip Dey and Manas Ghosh, OXFORD Higher Education .
3. Programming in C, A practical approach Ajay Mittal PEARSON
4. The C programming Language by Dennis Richie and Brian Kernighan
5. Programming in C, B. L. Juneja, Anith Seth, Cengage Learning.

**Reference Books and web links:**

1. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE.
2. Programming with C, Bichkar, Universities Press
3. Programming in C, Reema Thareja, OXFORD
4. C by Example, Noel Kalicharan, Cambridge

**I Year – II SEMESTER**

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## NETWORK ANALYSIS

**UNIT – I**

**Introduction to Electrical Circuits** : Network elements classification, Electric charge and current, Electric energy and potential, Resistance parameter – series and parallel combination, Inductance parameter – series and parallel combination, Capacitance parameter – series and parallel combination. Energy sources: Ideal, Non-ideal, Independent and dependent sources, Source transformation, Kirchoff's laws, Mesh analysis and Nodal analysis problem solving with resistances only including dependent sources also. (Text Books: 1,2,3, Reference Books: 3)

**A.C Fundamentals and Network Topology**: Definitions of terms associated with periodic functions: Time period, Angular velocity and frequency, RMS value, Average value, Form factor and peak factor- problem solving, Phase angle, Phasor representation, Addition and subtraction of phasors, mathematical representation of sinusoidal quantities, explanation with relevant theory, problem solving. Principal of Duality with examples.

**Network Topology:** Definitions of branch, node, tree, planar, non-planar graph, incidence matrix, basic tie set schedule, basic cut set schedule. (Text Books: 2,3, Reference Books: 3)

**UNIT – II**

**Steady State Analysis of A.C Circuits :** Response to sinusoidal excitation - pure resistance, pure inductance, pure capacitance, impedance concept, phase angle, series R-L, R-C, R-L-C circuits problem solving. Complex impedance and phasor notation for R-L, R-C, R-L-C problem solving using mesh and nodal analysis, Star-Delta conversion, problem solving. (Text Books: 1,2, Reference Books: 3)

**UNIT – III**

**Coupled Circuits :** Coupled Circuits: Self inductance, Mutual inductance, Coefficient of coupling, analysis of coupled circuits, Natural current, Dot rule of coupled circuits, Conductively coupled equivalent circuits- problem solving.

**Resonance:** Introduction, Definition of Q, Series resonance, Bandwidth of series resonance, Parallel resonance, Condition for maximum impedance, current in anti resonance, Bandwidth of parallel resonance, general case-resistance present in both branches, anti resonance at all frequencies. (Text Books:2,3, Reference Books: 3)

**UNIT – IV**

**Network Theorems:** Thevinin's, Norton's, Milliman's, Reciprocity, Compensation, Substitution, Superposition, Max Power Transfer, Tellegens-problem solving using dependent sources also. (Text Books: 1,2,3, Reference Books: 2)

**UNIT – V**

**Two-port networks** : Relationship of two port networks, Z-parameters, Y-parameters, Transmission line parameters, h-parameters, Inverse h-parameters, Inverse Transmission line parameters, Relationship between parameter sets, Parallel connection of two port networks, Cascading of two port networks, series connection of two port networks, problem solving including dependent sources also. (Text Books: 1,2, Reference Books: 1,3)

**UNIT – VI**

**Transients :** First order differential equations, Definition of time constants, R-L circuit, R-C circuit with DC excitation, Evaluating initial conditions procedure, second order differential equations, homogeneous, non-homogenous, problem solving using R-L-C elements with DC excitation and AC excitation, Response as related to s-plane rotation of roots. Solutions using Laplace transform method. (Text Books: 1,2,3, Reference Books: 1,3)

**TEXT BOOKS :**

1. Network Analysis – ME Van Valkenburg, Prentice Hall of India, 3rd Edition, 2000.
2. Network Analysis by K.Satya Prasad and S Sivanagaraju, Cengage Learning
3. Electric Circuit Analysis by Hayt and Kimmarle, TMH

**REFERENCES:**

1. Network lines and Fields by John. D. Ryder 2nd edition, Asia publishing house.
2. Basic Circuit Analysis by DR Cunninghan, Jaico Publishers.
3. Network Analysis and Filter Design by Chadha, Umesh Publications.

**I Year – II SEMESTER**

| T | P | C |
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## ENGINEERING CHEMISTRY LABORATORY

**List of Experiments**

1. Introduction to chemistry laboratory – Molarity, Normality, Primary, Secondary standard solutions, Volumetric titrations, Quantitative analysis, Quantitative analysis etc.,
2. Trial experiment – Estimation of HCI using standard $Na_2co_3$ solutions
3. Estimation of $KMnO_4$ using standard Oxalic acid solution.
4. Estimation of Ferric iron using standard $K_2Cr_2O_7$ solution.
5. Estimation of Copper using standard $K_2Cr_2O_7$ solution.
6. Estimation of Total Hardness water using standard EDTA solution.
7. Estimation of Copper using standard EDTA solution.
8. Estimation of Copper using Colorimeter
9. Estimation of pH of the given sample solution using pH meter.
10. Conductometric Titrations between strong acid and strong base
11. Conductometric Titrations between strong acid and Weak base
12. Potentiometric Titrations between strong acid and strong base
13. Potentiometric Titrations between strong acid and Weak base
14. Estimatinog of Zinc using standard potassium ferrocyanide solution
15. Estimation of Vitamin – C

**TEXT BOOKSS**

1. Dr. Jyotsna Cherukuis(2012)Laboratory Manual of Engineering Chemistry-II, VGS Techno Series
2. Chemistry Practical Manual, Lorven Publications
3. K. Mukkanti (2009) Practical Engineering Chemistry, B.S.Publication.

**I Year – II SEMESTER**

| T | P | C |
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## ENGLISH – COMMUNICATION SKILLS LAB – II

**Suggested Lab Manuals:**

**OBJECTIVE:** To impart to the learner the skills of grammar as well as communication through listening, speaking, reading, and writing including soft, that is life skills.

### ADVANCED COMMUNICATION SKILLS

| | |
|---|---|
| UNIT 6 | Body language |
| UNIT 7 | Dialogues |
| UNIT 8 | Interviews and Telephonic Interviews |
| UNIT 9 | Group Discussions |
| UNIT 10 | Presentation Skills |
| UNIT 11 | Debates |

**Text Book:**

'Strengthen your Communication Skills' Part-B by Maruthi Publications

**Reference Books:**

1. INFOTECH English (Maruthi Publications)
2. Personality Development and Soft Skills (Oxford University Press, New Delhi).

**I Year – II SEMESTER**

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## COMPUTER PROGRAMMING LAB

**Exercise l**

a) Write a C Program to calculate the area of triangle using the formula area = ( s (s-a) (s-b)(s-c))$^{1/2}$ where s= (a+b+c)/2

b) Write a C program to find the largest of three numbers using ternary operator.

c) Write a C Program to swap two numbers without using a temporary variable.

**Exercise 2**

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 find the roots of a quadratic equation.

c) Write a C program, which takes two integer operands and one operator form the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)

**Exercise 3**

a) Write a C program to find the sum of individual digits of a positive integer and find the reverse of the given number.

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 seqence.

c) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

**Exercise 4**

a) Write a C Program to print the multiplication table of a given number n up to a given value, where n is entered by the user.

b) Write a C Program to enter a decimal number, and calculate and display the binary equivalent of that number.

c) Write a C Program to check whether the given number is Armstrong number or not.

**Exercise 5**

a) Write a C program to interchange the largest and smallest numbers in the array.

b) Write a C program to implement a liner search.

c) Write a C program to implement binary search.

**Exercise 6**

a) Write a C program to implement sorting of an array of elements .

b) Write a C program to input two m x n matrices, check the compatibility and perform addition and multiplication of them.

**Exercise 7**

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

i. To insert a sub-string in to given main string from a given position.

ii. To delete n Characters from a given position in a given string.

iii. To replace a character of string either from beginning or ending or at a specified location.

**Exercise 8**

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

i) Reading a complex number

ii) Writing a complex number

iii) Addition of two complex numbers

iv) Multiplication of two complex numbers

**Exercise 9**

Write C Programs for the following string operations without using the built in functions

- to concatenate two strings
- to append a string to another string
- to compare two strings

**Exercise 10**

Write C Programs for the following string operations without using the built in functions

- to find t he length of a string
- to find whether a given string is palindrome or not

**Exercise 11**

a) Write a C functions to find both the largest and smallest number of an array of integers.

b) Write C programs illustrating call by value and call by reference cncepts.

**Exercise 12**

Write C programs that use both recursive and non-recursive functions for the following

i) To find the factorial of a given integer.

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

iii) To find Fibonacci sequence

**Exercise 13**

a) Write C Program to reverse a string using pointers

b) Write a C Program to compare two arrays using pointers

**Exercise 14**

a) Write a C program consisting of Pointer based function to exchange value of two integers using passing by address.

b) Write a C program to swap two numbers using pointers.

**Exercise 15**

Examples which explores the use of structures, union and other user defined variables.

**Exercise 16**

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

b) Write a C program to count the number of characters and number of lines in a file.

c) Write a C Program to merge two files into a third file. The names of the files must be entered using command line arguments.

**II Year – I SEMESTER**

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## MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

**Unit – I:**

**(*The Learning objective of this Unit is to understand the concept and nature of Managerial Economic s and its relationship with other disciplines, Concept of Demand and Demand forecasting)**

**Introduction to Managerial Economics and demand Analysis:**

Definition of Managerial Economics and Scope-Managerial Economics and its relation with other subjects-Concepts of Demand-Types-Determents-Law of Demand its Exception-Elasticity of Demand-Types and Measurement-Demand forecasting and its Methods.

(**The Learner is equipped with the knowledge of estimating the Demand for a product and the relationship between Price and Demand).

**Unit – II:**

**(*The Learning objective of this Unit is to understand the concept of Production function, Input Output relationship, different Cost Concepts and Concept of Cost-Volume-Profit Analysis)**

**Production and Cost Analyses:**

Production function-Isoquants and Isocosts-Law of Variable proportions-Cobb-Douglas Production function-Economics of Sale-Cost Concepts-Opportunity Cost-Fixed vs Variable Costs-Explicit Costs vs Implicit Costs-Out of Pocket Costs vs Imputed Costs-Cost Volume Profit analysis-Determination of Break-Even Point (Simple Problem).

(**One should understand the Cost Concepts for decision making and to estimate the least cost combination of inputs).

**Unit – III:**

**(*The Learning Objective of this Unit is t understand the Nature of Competition, Characteristics of Pricing in the different market structure and significance of various pricing methods).**

**Introduction to Markets, Theories of the Firm & Pricing Policies:**

Market Structures: Perfect Competition, Monopoly and Monopolistic and Oligopoly – Features – Price, Output Determination – Managerial Theories of firm: Maris and Williamson's models – Methods of Pricing: Limit Pricing,

Market Skimming Pricing, Internet Pricing: Flat Rate Pricing, Usage sensitive, Transaction based pricing, Priority Pricing.

(** One has to understand the nature of different markets and Price Output determination under various market conditions).

**Unit – IV:**

**(*The Learning objective of this Unit is to know the different forms of Business organization and their Merits and Demerits both public & private Enterprises and the concepts of Business Cycles)**

**Types of Business Organization and Business Cycles:**

Features and Evaluation of Sole Trader – Partnership – Joint Stock Company – State/Public Enterprises and their forms – Business Cycles – Meaning and Features – Phases of Business Cycle.

(**One should equipped with the knowledge of different Business Units)

**Unit – V:**

**(*The Learning objective of this Unit is to understand the different Accounting Systems preparation of Financial Statements and uses of different tools for performance evaluation)**

**Introduction to Accounting & Financing Analysis:**

Introduction to Double Entry Systems – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis – Preparation of Funds flow cash flow statements (Simple Problems).

(**The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis).

**Unit – VI:**

(*The Learning objective of this Unit is to understand the concept of Capital, Capitalization, Capital Budgeting and to know the techniques used to evaluate Capital Budgeting proposals by using different methods).

**Capital and Capital Budgeting:** Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Need for Capital Budgeting-Techniques of Capital Budgeting-Traditional and Modern Methods.

(**The Learner is able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making).

Note : *Learning Objective

** Learning Assessment

**TEXT BOOKS :**

1. Dr. N. Appa Rao, Dr. P. Vijay Kumar: 'Managerial Economics and Financial Analysis', Cengage Publications, New Delhi – 2011.

2. Dr. A. R. Aryasri – Managerial Economics and Financial Analysis, TMH 2011.
3. Prof. J.V.Prabhakara rao, Prof. P. Venkatarao. 'Managerial Economics and Financial Analysis', Ravindra Publication.

**REFERENCES :**

1. V. Maheswari : Managerial Economics, Sultan Chand.
2. Suma Damodaran : Managerial Economics, Oxford 2011.
3. Dr. B. Kuberudu and Dr. T. V. Ramana : Managerial Economics & Financial Analysis, Himalaya Publishing House 2011.
4. Vanitha Agarwal : Managerial Economics, Pearson Publications 2011.
5. Sanjay Dhameja : Financial Accounting for Managers, Pearson.
6. Maheswari : Financial Accounting, Vikas Publications.
7. S. A. Siddiqui & A. S. Siddiqui : Managerial Economics and Financial Analysis, New Age International Publishers, 2012.

**II Year – I SEMESTER**

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## ELECTRONIC DEVICES AND CIRCUITS

**UNIT-I**

**Semi Conductor Physics :** Insulators, Semi conductors and Metals classification using energy band diagrams, mobility and conductivity, electrons and holes in intrinsic semi conductors, extrinsic semi conductors, drift and diffusion, charge densities in semiconductors, Hall effect, continuity equation, law of junction, Fermi Dirac function, Fermi level in intrinsic and extrinsic Semiconductors.

**UNIT- II**

**Junction Diode Characteristics :** Open circuited p-n junction, Biased p-n junction, p-n junction diode, current components in PN junction Diode, diode equation, V-I Characteristics, temperature dependence on V-I characteristics, Diode resistance, Diode capacitance, energy band diagram of PN junction Diode.

**Special Semiconductor Devices**: Zener Diode, Breakdown mechanisms, Zener diode applications, LED, LCD, Photo diode, Varactor diode, Tunnel Diode, DIAC, TRIAC, SCR, UJT. Construction, operation and characteristics of all the diodes is required to be considered.

**UNIT- III**

**Rectifiers and Filters:** Basic Rectifier setup**,** half wave rectifier, full wave rectifier, bridge rectifier, derivations of characteristics of rectifiers, rectifier circuits-operation, input and output waveforms; Filters; Inductor filter, Capacitor filter, L- section filter, Π- section filter, Multiple L- section and Multiple Π section filter ,comparison of various filter circuits in terms of ripple factors.

**UNIT- IV**

**Transistor Characteristics:**

**BJT:** Junction transistor, transistor current components, transistor equation, transistor configurations, transistor as an amplifier, characteristics of transistor in Common Base, Common Emitter and Common Collector configurations, Ebers-Moll model of a transistor, punch through/ reach through, Photo transistor, typical transistor junction voltage values.

**FET:** FET types, construction, operation, characteristics, parameters, MOSFET-types, construction, operation, characteristics, comparison between JFET and MOSFET.

**UNIT- V**

**Transistor Biasing and Thermal Stabilization :** Need for biasing, operating point, load line analysis, BJT biasing- methods, basic stability, fixed bias, collector to base bias, self bias, Stabilization against variations in $V_{BE}$, Ic, and β, Stability factors, (S, $S'$, $S''$), Bias compensation, Thermal runaway, Thermal stability. FET Biasing- methods and stabilization.

**UNIT- VI**

**Small Signal Low Frequency Transistor Amplifier Models:**

**BJT:** Two port network, Transistor hybrid model, determination of h-parameters, conversion of h-parameters, generalized analysis of transistor amplifier model using h-parameters, Analysis of CB, CE and CC amplifiers using exact and approximate analysis, Comparison of transistor amplifiers.

**FET:** Generalized analysis of small signal model, Analysis of CG, CS and CD amplifiers, comparison of FET amplifiers.

**TEXT BOOKS:**

1. Electronic Devices and Circuits- J. Millman, C. Halkias, Tata Mc-Graw Hill, Second Edition.
2. Electronic Devices and Circuits-B.P.Singh, Rekha Singh,Pearson Publications,Second Edition.
3. Electronic Devices and Circuits-David A.Bell, Oxford University Press, Fifth Edition.

**REFERENCES:**

1. Electronic Devices and Circuits- K. Satya Prasad.
2. Electronic Devices and Circuits-Salivahanan, Kumar, Vallavaraj, Tata Mc-Graw Hill, Second Edition .
3. Electronic Devices and Circuit Theory-R.L. Boylestad and Louis Nashelsky, Pearson Publications,Tenth Edition.
4. Electronic Devices and Circuits -BV Rao, KBR Murty, K Raja Rajeswari, PCR Pantulu, Pearson, 2nd edition.
5. Integrated Electronics- Jacob Millman, C. Halkies, C.D. Parikh, Tata Mc-Graw Hill, 2009.

**II Year – I SEMESTER**

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## DATA STRUCTURES

**Objectives:** Comprehensive knowledge of data structures and ability to implement the same in software applications.

**UNIT I:**

**Objective: exposure to algorithmic complexities, recursive algorithms, searching and sorting techniques**

Preliminaries of algorithm, Algorithm analysis and complexity

**Data structure-** Definition, types of data structures

Recursion: Definition, Design Methodology and Implementation of recursive algorithms, Linear and binary recursion, recursive algorithms for factorial function, GCD computation, Fibonacci sequence, Towers of Hanoi, Tail recursion.

List Searches using Linear Search, Binary Search, Fibonacci Search

**Sorting Techniques:** Basic concepts, Sorting by : insertion (Insertion sort), selection (heap sort), exchange (bubble sort, quick sort), distribution (radix sort ) and merging (merge sort ) Algorithms.

**UNIT II:**

**Objectives: Applying stack and queue techniques for logical operations**

**Stacks and Queues:** Basic Stack Operations, Representation of a Stack using Arrays, Stack Applications: Reversing list, Factorial Calculation, Infix to postfix Transformation, Evaluating Arithmetic Expressions.

**Queues:** Basic Queues Operations, Representation of a Queue using array, Implementation of Queue Operations using Stack, Applications of Queues-Round robin Algorithm, Circular Queues, Priority Queues.

**UNIT III:**

**Objectives: Exposure to list representation models in various types of applications**

**Linked Lists:** Introduction, single linked list, representation of a linked list in memory, Operations on a single linked list, Reversing a single linked list, applications of single linked list to represent polynomial expressions and sparse matrix manipulation, Advantages and disadvantages of single linked list, Circular linked list, Double linked list

**UNIT IV:**

**Objectives: Implementation of tree implementation in various forms**

**Trees:** Basic tree concepts, Binary Trees: Properties, Representation of Binary Trees using arrays and linked lists, operations on a Binary tree , Binary Tree Traversals (recursive), Creation of binary tree from in, pre and post order traversals

**UNIT-V:**

**Objectives: Advanced understanding of other variants of trees and their operations.**

**Advanced concepts of Trees:** Tree Travels using stack (non recursive), Threaded Binary Trees. Binary search tree, Basic concepts, BST operations: insertion, deletion, Balanced binary trees – need, basics and applications in computer science (No operations).

**UNIT VI:**

**Objectives: orientation on graphs, representation of graphs, graph traversals, spanning trees.**

**Graphs:** Basic concepts, Representations of Graphs: using Linked list and adjacency matrix, Graph algorithms.

Graph Traversals (BFS & DFS), applications: Dijkstra's shortest path, Transitive closure, Minimum Spanning Tree using Prim's Algorithm, warshall's Algorithm (**Algorithemic Concepts Only, No Programs required**).

**TEXT BOOKS:**

1. Data Structure with C, Seymour Lipschutz, TMH
2. Data Structures using C,Reema Thareja, Oxford
3. Data Structures, 2/e, Richard F, Gilberg , Forouzan, Cengage
4. Data structures and algorithm analysis in C, 2nd ed, mark allen weiss

**REFERENCE BOOKS:**

1. Data Structures and Algorithms, 2008,G.A.V.Pai, TMH
2. Classic Data Structures, 2/e, Debasis ,Samanta,PHI,2009
3. Fundamentals of Data Structure in C, 2/e, Horowitz,Sahni, Anderson Freed,University Prees.

**II Year – I SEMESTER**

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## ENVIRONMENTAL STUDIES

**Course Learning Objectives:**

The objectives of the course is to impart

1. Overall understanding of the natural resources
2. Basic understanding of the ecosystem and its diversity
3. Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities
4. An understanding of the environmental impact of developmental activities
5. Awareness on the social issues, environmental legislation and global treaties

**Course Outcomes:**

The student should have knowledge on

1. The natural resources and their importance for the sustenance of the life and recognise the need to conserve the natural resources
2. The concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web
3. The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
4. Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices
5. Social issues both rural and urban environment and the possible means to combat the challenges
6. The environmental legislations of India and the first global initiatives towards sustainable development.
7. About environmental assessment and the stages involved in EIA and the environmental audit

**Syllabus:**

**UNIT - I**

**Multidisciplinary nature of Environmental Studies:** Definition, Scope and Importance –Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming and climate change, acid rains,

ozone layer depletion, population growth and explosion, effects. Role of information Technology in Environment and human health.

**Ecosystems:** Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

**UNIT - II**

**Natural Resources:** Natural resources and associated problems

Forest resources – Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people.

Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems.

**Mineral resources:** Use and exploitation, environmental effects of extracting and using mineral resources.

**Food resources:** World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.

**Energy resources:** Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources.

**Land resources:** Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

**UNIT - III**

**Biodiversity and its conservation:** Definition: genetic, species and ecosystem diversity- classification - Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega-diversity nation - Hot-sports of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts. - Endangered and endemic species of India – Conservation of biodiversity: conservation of biodiversity.

**UNIT - IV**

**Environmental Pollution:** Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear

hazards. Role of an individual in prevention of pollution. - Pollution case studies.

**Solid Waste Management:** Sources, classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products.

**UNIT - V**

**Social Issues and the Environment:** Urban problems related to energy - Water conservation, rain water harvesting-Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions. Environmental Protection Act -Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act-Issues involved in enforcement of environmental legislation. -Public awareness.

**UNIT - VI**

**Environmental Management**: Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. Ecotourism.

The student should submit a report individually on any issues related to Environmental Studies course and make a power point presentation.

**Text Books:**

1. Environmental Studies by R. Rajagopalan, 2nd Edition, 2011, Oxford University Press.
2. A Textbook of Environmental Studies by Shaashi Chawla, TMH, New Delhi.
3. Environmental Studies by P.N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai.

**Reference:**

1. Text Book of Environmental Studies by Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.
2. Environmental Studies by K.V.S.G. Murali Krishna, VGS Publishers, Vijayawada.
3. Environmental Studies by Benny Joseph, Tata McGraw Hill Co, New Delhi.
4. Environmental Studies by Piyush Malaviya, Pratibha Singh, Anoop singh: Acme Learning, New Delhi.

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**II Year – I SEMESTER**

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## SIGNALS AND SYSTEMS

**UNIT I**

**SIGNAL ANALYSIS & FOURIER SERIES :** Analogy between vectors and signals, Orthogonal signal space, Signal approximation using orthogonal functions, Mean square error, Closed or complete set of orthogonal functions, Orthogonality in complex functions, Exponential and sinusoidal signals, Concepts of Impulse function, Unit step function, Signum function. Representation of Fourier series, Continuous time periodic signals, properties of Fourier series, Dirichlet's conditions, Trigonometric Fourier series and Exponential Fourier series, Complex Fourier spectrum.

**UNIT II**

**FOURIER TRANSFORMS & SAMPLING:** Deriving Fourier transform from Fourier series, Fourier transform of arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, properties of Fourier transforms, Fourier transforms involving impulse function and Signum function. Introduction to Hilbert Transform. Sampling theorem – Graphical and analytical proof for Band Limited Signals, impulse sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, effect of under sampling – Aliasing, Introduction to Band Pass sampling.

**UNIT III**

**SIGNAL TRANSMISSION THROUGH LINEAR SYSTEMS :** Linear system, impulse response, Response of a linear system, Linear time invariant (LTI) system, Linear time variant (LTV) system, Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Poly-Wiener criterion for physical realization, relationship between bandwidth and rise time.

**UNIT IV**

**CONVOLUTION AND CORRELATION OF SIGNALS :** Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Convolution property of Fourier transforms. Cross

correlation and auto correlation of functions, properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between auto correlation function and energy/power spectral density function. Relation between convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.

**UNIT V**

**LAPLACE TRANSFORMS :**Review of Laplace transforms, Partial fraction expansion, Inverse Laplace transform, Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Properties of L.T's, Relation between L.T's, and F.T. of a signal. Laplace transform of certain signals using waveform synthesis.

**UNIT VI**

**Z–TRANSFORMS :** Fundamental difference between continuous and discrete time signals, discrete time signal representation using complex exponential and sinusoidal components, Periodicity of discrete time using complex exponential signal, Concept of Z- Transform of a discrete sequence. Distinction between Laplace, Fourier and Z transforms. Region of convergence in Z-Transform, constraints on ROC for various classes of signals, Inverse Z-transform, properties of Z-transforms.

**TEXT BOOKS :**

1. Signals, Systems & Communications - B.P. Lathi, BS Publications, 2003.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2nd Edn.
3. Signals & Systems- Narayan Iyer and K Satya Prasad , Cenage Pub.

**REFERENCES :**

1. Signals & Systems - Simon Haykin and Van Veen,Wiley, 2nd Edition.
2. Signals and Systems – K R Rajeswari
3. Fundamentals of Signals and Systems- Michel J. Robert, MGH International Edition, 2008.
4. Signals and Systems

**II Year – I SEMESTER**

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## ELECTRICAL TECHNOLOGY

This course covers various topics related to principle of operation and performance of various electrical machines.

**Learning objectives:**

i. To learn the principle of electromechanical energy conversion of single excited and multi excited machines.

ii. To understand the principle of operation, constructional details and operational characteristics of DC generators.

iii. To understand the principle and characteristics of DC motors. To introduce starting and speed control methods of DC motors.

iv. To learn the principle of operation and constructional details of transformers. Develop the equivalent circuit and evaluate the performance of transformers.

v. To learn the principle of operation and constructional details of three phase induction motor. Study the torque – slip characteristics and starting methods of induction motor.

vi. To study the principle of operation of single phase induction motor, shaded pole motor, capacitor motor and AC servo motor.

**UNIT I**

**ELECTROMECHANICAL ENERGY CONVERSION :** Introduction to S.I units – Principles of electromechanical energy conversion – forces and torque in a magnetic field systems-energy balance – single excited machine – magnetic forces– co-energy – multi excited magnetic field system.

**UNIT II**

**DC GENERATORS :** Principle of operation and construction of DC generators - EMF equation – types of generators – magnetization and load characteristics of DC generators.

**UNIT III**

**DC MOTORS :** Principle of operation and construction of DC Motors – types of DC Motors – Characteristics of DC motors – basic starting methods

for DC shunt motor – losses and efficiency – Swinburne's test – speed control of DC shunt motor – flux and Armature voltage control methods.

**UNIT IV**

**TRANSFORMERS** : Principle of operation of single phase transformer – types – constructional features – phasor diagram on no-load and load – equivalent circuit, losses and efficiency of transformer - regulation of transformer – OC and SC tests – predetermination of efficiency and regulation.

**UNIT V**

**INDUCTION MACHINE** : Principle of operation and construction of three-phase induction motors –slip ring and squirrel cage motors – slip-torque characteristics – efficiency calculation – starting methods.

**UNIT VI**

**SPECIAL MACHINES** : Principle of operation and construction - single phase induction motor - shaded pole motors – capacitor motors and AC servomotor.

**Learning outcomes:**

1. Able to understand the principles of electro mechanical energy conversion.
2. Able to explain the operation of DC generator and analyze the characteristics of DC generator.
3. Able to explain the principle of operation of DC motor and analyze their characteristics. Acquire the skills to analyze the starting and speed control methods of DC motors.
4. Capability to develop equivalent circuit and evaluate performance of transformers.
5. Ability to analyze speed – torque characteristics of induction motor and understand starting methods of induction motor.
6. Capability to understand the operation of various special machines.

**TEXT BOOKS**:

1. Principles of Electrical Machines by V.K. Mehta & Rohit Mehta, S.Chand publications.
2. Theory & performance of Electrical Machines by J.B.Guptha, S.K.Kataria & Sons.

**REFERENCE BOOKS**:

1. Basic Electrical Engineering by M.S.Naidu and S.Kamakshiah,TMH Publications.
2. Fundamentals of Electrical Engineering by Rajendra Prasad, PHI Publications, 2nd edition.
3. Basic Electrical Engineering by Nagsarkar, Sukhija, Oxford Publications, 2nd edition.

**II Year – I SEMESTER**

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## ELECTRONIC DEVICES AND CIRCUITS LAB

**PART A: Electronic Workshop Practice**

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Coils, Gang Condensers, Relays, Bread Boards.
2. Identification, Specifications and Testing of active devices, Diodes, BJTs, JFETs, LEDs, LCDs, SCR, UJT.
3. Soldering Practice- Simple circuits using active and passive components.
4. Study and operation of Ammeters, Voltmeters, Transformers, Analog and Digital Multimeter, Function Generator, Regulated Power Supply and CRO.

**PART B: List of Experiments**
**(For Laboratory Examination-Minimum of Ten Experiments)**

1. P-N Junction Diode Characteristics
   Part A: Germanium Diode (Forward bias& Reverse bias)
   Part B: Silicon Diode (Forward Bias only)
2. Zener Diode Characteristics
   Part A: V-I Characteristics
   Part B: Zener Diode as Voltage Regulator
3. Rectifiers (without and with c-filter)
   Part A: Half-wave Rectifier
   Part B: Full-wave Rectifier
4. BJT Characteristics(CE Configuration)
   Part A: Input Characteristics
   Part B: Output Characteristics
5. FET Characteristics(CS Configuration)
   Part A: Drain Characteristics
   Part B: Transfer Characteristics

6. SCR Characteristics
7. UJT Characteristics
8. Transistor Biasing
9. CRO Operation and its Measurements
10. BJT-CE Amplifier
11. Emitter Follower-CC Amplifier
12. FET-CS Amplifier

**PART C: Equipment required for Laboratory**

1. Boxes
2. Ammeters (Analog or Digital)
3. Voltmeters (Analog or Digital)
4. Active & Passive Electronic Components
5. Regulated Power supplies
6. Analog/Digital Storage Oscilloscopes
7. Analog/Digital Function Generators
8. Digital Multimeters
9. Decade Résistance Boxes/Rheostats
10. Decade Capacitance

**II Year – I SEMESTER**

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## NETWORKS & ELECTRICAL TECHNOLOGY LAB

**PART – A**

**Any five experiments are to be conducted from each part**

1. Series and Parallel Resonance – Timing, Resonant frequency, Bandwidth and Q-factor determination for RLC network.
2. Time response of first order RC/RL network for periodic non-sinusoidal inputs – time constant and steady state error determination.
3. Two port network parameters – Z-Y Parameters, chain matrix and analytical verification.
4. Verification of Superposition and Reciprocity theorems.
5. Verification of maximum power transfer theorem. Verification on DC, verification on AC with Resistive and Reactive loads.
6. Experimental determination of Thevenin's and Norton's equivalent circuits and verification by direct test.

**PART – B**

1. Magnetization characteristics of D.C. Shunt generator. Determination of critical field resistance.
2. Swinburne's Test on DC shunt machine (Predetermination of efficiency of a given DC Shunt machine working as motor and generator).
3. Brake test on DC shunt motor. Determination of performance characteristics.
4. OC & SC tests on Single-phase transformer (Predetermination of efficiency and regulation at given power factors and determination of equivalent circuit).
5. Brake test on 3-phase Induction motor (performance characteristics).
6. Regulation of alternator by synchronous impedance method.

**II Year – II SEMESTER**

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## ELECTRONIC CIRCUIT ANALYSIS

**UNIT-I**

**Small Signal High Frequency Transistor Amplifier models:**

**BJT:** Transistor at high frequencies, Hybrid- π common emitter transistor model, Hybrid π conductances, Hybrid π capacitances, validity of hybrid π model, determination of high-frequency parameters in terms of low-frequency parameters , CE short circuit current gain, current gain with resistive load, cut-off frequencies, frequency response and gain bandwidth product.

**FET:** Analysis of common Source and common drain Amplifier circuits at high frequencies.

**UNIT-II**

**Multistage Amplifiers :** Classification of amplifiers, methods of coupling**, c**ascaded transistor amplifier and its analysis, analysis of two stage RC coupled amplifier, high input resistance transistor amplifier circuits and their analysis-Darlington pair amplifier, Cascode amplifier, Boot-strap emitter follower, Analysis of multi stage amplifiers using FET, Differential amplifier using BJT.

**UNIT -III**

**Feedback Amplifiers :** Feedback principle and concept, types of feedback, classification of amplifiers, feedback topologies, Characteristics of negative feedback amplifiers, Generalized analysis of feedback amplifiers, Performance comparison of feedback amplifiers, Method of analysis of feedback amplifiers.

**UNIT-IV**

**Oscillators:** Oscillator principle, condition for oscillations, types of oscillators, RC-phase shift and Wein bridge oscillators with BJT and FET and their analysis, Generalized analysis of LC Oscillators, Hartley and

Colpitt's oscillators with BJT and FET and their analysis, Crystal oscillators, Frequency and amplitude stability of oscillators.

**UNIT-V**

**Power Amplifiers:** Classification of amplifiers, Class A power Amplifiers and their analysis, Harmonic Distortions, Class B Push-pull amplifiers and their analysis, Complementary symmetry push pull amplifier, Class AB power amplifier, Class-C power amplifier, Thermal stability and Heat sinks, Advanced power amplifiers, Distortion in amplifiers.

**UNIT-VI**

**Tuned Amplifiers** : Introduction, Q-Factor, small signal tuned amplifier, capacitance single tuned amplifier, double tuned amplifiers, effect of cascading single tuned amplifiers on band width, effect of cascading double tuned amplifiers on band width, staggered tuned amplifiers, stability of tuned amplifiers, wideband amplifiers.

**TEXT BOOKS:**

1. Integrated Electronics- J. Millman and C.C. Halkias, Tata Mc Graw-Hill, 1972.
2. Electronic Circuit Analysis-B.V.Rao,K.R.Rajeswari, P.C.R.Pantulu,K.B.R.Murthy, Pearson Publications.
3. Electronic Devices and Circuits- Salivahanan, N.Suressh Kumar, A. Vallavaraj, TATA McGraw Hill, Second Edition

**REFERENCES:**

1. Microelectronic Circuits-Sedra A.S. and K.C. Smith, Oxford University Press, Sixth Edition.
2. Electronic Circuit Analysis and Design – Donald A. Neaman, Mc Graw Hill.
3. Electronic Circuits-I-Ravish R Singh-Peason Publications.
4. Electronic Devices and Circuits Theory – Robert L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall, Tenth Edition.
5. Electronic circuits Principles and Application - R.D.S.Samuel, B.Sujatha, Elesevier Publications.

**II Year – II SEMESTER**

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## MANAGEMENT SCIENCE

**UNIT – I:**

(*The Learning objective of this Unit is to understand the concept and nature of Management, Evolution of Management theories, Motivation and leadership Styles).

**Introduction to Management:** Concept – Nature and Importance of Management, Functions-Evaluation of Management, Motivation Theories – Leadership Styles – Decision Making Process-designing Organization Structure – Principles and types of Organization.

(**The learner is able to understand the concept and functions of Management, and Theeories of Motivation, Styles of Leardership)

**UNIT – II:**

(The Learning objective of this Unit is to Equip with the concepts of Operations, project management and inventory control).

**Operations and Project Management:** Work-Study-Statistical Quality Control Through Control Charts-Inventory Control-EOQ & ABC Analysis (Simple Problems) Project Management-PERT/CPM-Project Crashing (Simple Problem).

(**The learner is able to understand the main idea of Inspection and scrutinize the different methods of inspection, the concept of Inventory Management and Control and Inventory Pricing).

**UNIT – III:**

(* The Objective of this unit is to understand the main functional areas of organization i.e., Financial Management, Production Management, Marketing Management, Human Resource Management, and Product Life Cycles and Channels of Distribution).

**Functional Management:** Concept and Functions of Finance, HR, Production, Marketing Management and Services – Job Evolution and Merit Rating – Product Life Cycles – Channels of Distribution – Types/Methods of Production.

(**At the end of this chapter the learner is able to understand the different functional areas in an organization and their responsibilities – Product Life Cycle and Channels of Distribution.).

**UNIT – IV:**

(*The objective of this unit is to equip with the concept and practical issues relating to Strategic Management)

**Strategic Management:** Vision, Mission, Goals, Strategy – Corporate Planning Process – Environmental Scanning – SWOT analysis – Different Steps in Strategy Formulation, Implementation and Evaluation.

(**The learner is able to familiar with the meaning of Vision, Mission, Goals and Strategies of the Organization and to implement successfully).

**UNIT – V:**

(*The objective of this unit is to understand the need and importance of Business Ethics and Communication Skills in Contemporary situations).

**Business Ethics & Communications:** Ethics in Business and Management – Ethics in HRM, Finance & Marketing Management – Business Ethics & Law

(** The Learner is able to know the practical Issues of Business Ethics in various functional areas, to improve Report Writing skills and Understand the Communication Process).

**UNIT – VI:**

(*The Learning objective of this unit is to equip with the contemporary management practices, i.e., MIS, MRP, JIT and ERP etc.,)

**Contemporary Management Practices:** Basic concepts of MIS, MRP, Just-In-Time (JIT)System, Total Quality Management (TQM), Six Sigma and Capability Maturity Models (CMM) Levies, Supply Chain Management, Enterprise Resource Planning (ERP), Performance Management, Business Process Outsourcing (BPO), Business Process Re-Engineering and Bench Marking, Balance Score Card.

(**The Learner is able to Understand the various contemporary issues in Management Practices like TQM and BPO etc.,)

Note: *Learning Objective

** Learning Assessment

**TEXT BOOKS**

1. Kumar/Rao/Chhalill 'Introduction to Management Science' Cengage, Delhi, 2012.
2. Dr. A. R. Aryasri, Management Science' TMH 2011.

**REFERENCES**

1. Koontz & Weihrich: 'Essentials of Management' TMH 2011
2. Seth & Rastogi: Global Management Systems, Cengage Learning, Delhi, 2011.
3. Robbins: Organizational Behaviors, Pearson Publications, 2011
4. Kanishka Bedi: Production & Operational Management, Oxford Publications, 2011.
5. Manjunath: Management Science, Pearson Publications, 2013.
6. Biswajit Patnaik: Human Resource Management, PHI, 2011.
7. Hitt and Vijaya Kumar: Strategic Management, Cengage Learning.
8. Dr. PG. Ramanujam, BVR Naidu, PV Rama Sastry : Management Science Himalaya Publishing House, 2013.
9. Management Shapers, Universities Press.

**II Year – II SEMESTER**

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## RANDOM VARIABLES & STOCHASTIC PROCESSES

**UNIT I**

**THE RANDOM VARIABLE :** Introduction, Definition of a Random Variable, Conditions for a Function to be a Random Variable, Discrete, Continuous and Mixed Random Variables, Distribution and Density functions, Properties, Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh, Conditional Distribution, Conditional Density, Properties.

**UNIT II**

**OPERATION ON ONE RANDOM VARIABLE – EXPECTATIONS** : Introduction, Expected Value of a Random Variable, Function of a Random Variable, Moments about the Origin, Central Moments, Variance and Skew, Chebychev's Inequality, Characteristic Function, Moment Generating Function, Transformations of a Random Variable: Monotonic Transformations for a Continuous Random Variable, Nonmonotonic Transformations of Continuous Random Variable.

**UNIT III**

**MULTIPLE RANDOM VARIABLES** : Vector Random Variables, Joint Distribution Function, Properties of Joint Distribution, Marginal Distribution Functions, Conditional Distribution and Density, Statistical Independence, Sum of Two Random Variables, Sum of Several Random Variables, Central Limit Theorem: Unequal Distribution, Equal Distributions.

OPERATIONS ON MULTIPLE RANDOM VARIABLES: Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variables case, Properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

**UNIT IV**

**RANDOM PROCESSES – TEMPORAL CHARACTERISTICS:** The Random Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, Concept of Stationarity and Statistical Independence. First-Order Stationary Processes, Second- Order and Wide-Sense Stationarity, $N^{th}$-order and Strict-Sense Stationarity, Time Averages and Ergodicity, Autocorrelation Function and its Properties, Cross-Correlation Function and its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process.

**UNIT V**

**RANDOM PROCESSES – SPECTRAL CHARACTERISTICS:** The Power Spectrum: Properties, Relationship between Power Spectrum and Autocorrelation Function, The Cross-Power Density Spectrum, Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function.

**UNIT VI**

**LINEAR SYSTEMS WITH RANDOM INPUTS :** Random Signal Response of Linear Systems: System Response – Convolution, Mean and Mean-squared Value of System Response, Autocorrelation Function of Response, Cross-Correlation Functions of Input and Output, Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Density Spectra of Input and Output, Band pass, Band-Limited and Narrowband Processes, Properties, Modeling of Noise Sources: Resistive (Thermal) Noise Source, Arbitrary Noise Sources, Effective Noise Temperature, Average Noise Figure, Average Noise Figure of cascaded networks.

**TEXT BOOKS:**

1. Probability, Random Variables & Random Signal Principles, Peyton Z. Peebles, TMH, 4th Edition, 2001.
2. Probability, Random Variables and Stochastic Processes, Athanasios Papoulis and S.Unnikrisha, PHI, 4th Edition, 2002.

**REFERENCES:**

1. Probability Theory and Stochastic Processes – B. Prabhakara Rao, Oxford University Press.
2. Probability and Random Processes with Applications to Signal Processing, Henry Stark and John W. Woods, Pearson Education, 3rd Edition.
3. Probabilistic Methods of Signal & System Analysis, George R. Cooper, Clave D. Mc Gillem, Oxford, 3rd Edition, 1999.
4. Statistical Theory of Communication, S.P.Eugene Xavier, New Age Publications, 2003.
5. Signals, Systems & Communications, B.P. Lathi, B.S. Publications, 2003.
6. Probability and Random Processes, An Introduction for Applied Scientists and Engineers, Davenport W.B, McGraw-Hill, 1970.
7. Introduction to Random Processes with Applications to Signals and Systems, Gardener W.A, McGraw-Hill, 2nd Edition.
8. Schaum's Outline of Probability, Random Variables, and Random Processes.
9. An Introduction to Random Signals and Communication Theory, B.P. Lathi, International Textbook, 1968.

**II Year – II SEMESTER**

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## SWITCHING THEORY AND LOGIC DESIGN

**UNIT – I**

**REVIEW OF NUMBER SYSTEMS & CODES:**

i) Representation of numbers of different radix, conversation from one radix to another radix, r-1's compliments and r's compliments of signed members, problem solving.

ii) 4 bit codes, BCD, Excess-3, 2421, 84-2-1 $9^{'s}$ compliment code etc.,

iii) Logic operations and error detection & correction codes; Basic logic operations -NOT, OR, AND, Universal building blocks, EX-OR, EX-NOR - Gates, Standard SOP and POS, Forms, Gray code, error detection, error correction codes (parity checking, even parity, odd parity, Hamming code) NAND-NAND and NOR-NOR realizations.

**UNIT – II**

**MINIMIZATION TECHNIQUES:**

Boolean theorems, principle of complementation & duality, De-morgan theorems, minimization of logic functions using Boolean theorems, minimization of switching functions using K-Map up to 6 variables, tabular minimization, problem solving (code-converters using K-Map etc..).

**UNIT – III**

**COMBINATIONAL LOGIC CIRCUITS DESIGN :**

Design of Half adder, full adder, half subtractor, full subtractor, applications of full adders, 4-bit binary subtractor, adder-subtractor circuit, BCD adder circuit, Excess 3 adder circuit, look-a-head adder circuit, Design of decoder, demultiplexer, 7 segment decoder, higher order demultiplexing, encoder, multiplexer, higher order multiplexing, realization of Boolean functions using decoders and multiplexers, priority encoder, 4-bit digital comparator.

**UNIT – IV**

**INTRODUCTION OF PLD's :**

PROM, PAL, PLA-Basics structures, realization of Boolean function with PLDs, programming tables of PLDs, merits & demerits of PROM, PAL, PLA comparison, realization of Boolean functions using PROM, PAL, PLA, programming tables of PROM, PAL, PLA.

**UNIT – V**

**SEQUENTIAL CIRCUITS I:**

Classification of sequential circuits (synchronous and asynchronous); basic flip-flops, truth tables and excitation tables (nand RS latch, nor RS latch, RS flip-flop, JK flip-flop, T flip-flop, D flip-flop with reset and clear terminals). Conversion from one flip-flop to flip-flop. Design of ripple counters, design of synchronous counters, Johnson counter, ring counter. Design of registers - Buffer register, control buffer register, shift register, bi-directional shift register, universal shift register.

**UNIT – VI**

**SEQUENTIAL CIRCUITS II :**

Finite state machine; Analysis of clocked sequential circuits, state diagrams, state tables, reduction of state tables and state assignment, design procedures. Realization of circuits using various flip-flops. Meelay to Moore conversion and vice-versa.

**TEXT BOOKS:**

1. Switching Theory and Logic Design by Hill and Peterson Mc-Graw Hill TMH edition.
2. Switching Theory and Logic Design by A. Anand Kumar
3. Digital Design by Mano PHI.

**REFERENCE BOOKS:**

1. Modern Digital Electronics by RP Jain, TMH.
2. Fundamentals of Logic Design by Charles H. Roth Jr, Jaico Publishers.
3. Micro electronics by Milliman MH edition.

**II Year – II SEMESTER**

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## EM WAVES AND TRANSMISSION LINES

**UNIT I**

**Electrostatics:** Coulomb's Law, Electric Field Intensity Electric Flux Density, Gauss Law and Applications, Electric Potential, Maxwell's Two Equations for Electrostatic Fields, Energy Density, Illustrative Problems. Convection and Conduction Currents, Dielectric Constant, Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations; Capacitance – Parallel Plate, Coaxial, Spherical Capacitors, Illustrative Problems.

**Magneto Statics :** Biot-Savart Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magnetostatic Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere's Force Law, Inductances and Magnetic Energy. Illustrative Problems.

**UNIT II**

**Maxwell's Equations (Time Varying Fields):** Faraday's Law and Transformer emf, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Final Forms and Word Statements. Conditions at a Boundary Surface : Dielectric-Dielectric and Dielectric-Conductor Interfaces. Illustrative Problems.

**UNIT III**

**EM Wave Characteristics - I:** Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definition, All Relations Between E & H. Sinusoidal Variations. Wave Propagation in Lossless and Conducting Media. Conductors & Dielectrics – Characterization, Wave Propagation in Good Conductors and Good Dielectrics. Polarization. Illustrative Problems.

**UNIT IV**

**EM Wave Characteristics – II:** Reflection and Refraction of Plane Waves – Normal and Oblique Incidences, for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection,

Surface Impedance. Poynting Vector and Poynting Theorem – Applications, Power Loss in a Plane Conductor. Illustrative Problems.

**UNIT VI**

**Transmission Lines - I** : Types, Parameters, Transmission Line Equations, Primary & Secondary Constants, Expressions for Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line Concepts, Losslessness/Low Loss Characterization, Distortion – Condition for Distortionlessness and Minimum Attenuation, Loading - Types of Loading. Illustrative Problems.

**UNIT VI**

**Transmission Lines – II :** Input Impedance Relations, SC and OC Lines, Reflection Coefficient, VSWR. UHF Lines as Circuit Elements; $\lambda/4$, $\lambda/2$, $\lambda/8$ Lines – Impedance Transformations. Smith Chart – Configuration and Applications, Single and Double Stub Matching. Illustrative Problems.

**TEXT BOOKS :**

1. Elements of Electromagnetic – Matthew N.O. Sadiku, Oxford Univ. Press, 3rd ed., 2001.
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2nd Edition, 2000.

**REFERENCES :**

1. Electromagnetic Fields and Wave Theory –GSN Raju, Pearson Education 2006
2. Engineering Electromagnetics – Nathan Ida, Springer (India) Pvt. Ltd., New Delhi, 2nd ed., 2005.
3. Engineering Electromagnetics – William H. Hayt Jr. and John A. Buck, TMH, 7th ed., 2006.
4. Transmission Lines and Networks – Umesh Sinha, Satya Prakashan (Tech. India Publications), New Delhi, 2001.

**II Year – II SEMESTER**

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## ANALOG COMMUNICATIONS

**UNIT I**

**AMPLITUDE MODULATION :** Introduction to communication system, Need for modulation, Frequency Division Multiplexing , Amplitude Modulation, Definition, Time domain and frequency domain description, single tone modulation, power relations in AM waves, Generation of AM waves, square law Modulator, Switching modulator, Detection of AM Waves; Square law detector, Envelope detector.

**UNIT II**

**DSB & SSB MODULATION :** Double side band suppressed carrier modulators, time domain and frequency domain description, Generation of DSBSC Waves, Balanced Modulators, Ring Modulator, Coherent detection of DSB-SC Modulated waves, COSTAS Loop. Frequency domain description, Frequency discrimination method for generation of AM SSB Modulated Wave, Time domain description, Phase discrimination method for generating AM SSB Modulated waves. Demodulation of SSB Waves, Vestigial side band modulation: Frequency description, Generation of VSB Modulated wave, Time domain description, Envelope detection of a VSB Wave pulse Carrier, Comparison of AM Techniques, Applications of different AM Systems.

**UNIT III**

**ANGLE MODULATION** : Basic concepts, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave - Generation of FM Waves, Direct FM, Detection of FM Waves: Balanced Frequency discriminator, Zero crossing detector, Phase locked loop, Comparison of FM & AM.

**UNIT IV**

**NOISE :** Noise in Analog communication System, Noise in DSB & SSB

System, Noise in AM System, Noise in Angle Modulation System, Threshold effect in Angle Modulation System, Pre-emphasis & de-emphasis.

**UNIT V**

**TRANSMITTERS & RECEIVERS: Radio Transmitter** - Classification of Transmitter, AM Transmitter, Effect of feedback on performance of AM Transmitter, FM Transmitter – Variable reactance type and phase modulated FM Transmitter, frequency stability in FM Transmitter. **Radio Receiver** - Receiver Types - Tuned radio frequency receiver, Superhetrodyne receiver, RF section and Characteristics - Frequency changing and tracking, Intermediate frequency, AGC, FM Receiver, Comparison with AM Receiver, Amplitude limiting.

**UNIT VI**

**PULSE MODULATION :** Time Division Multiplexing, Types of Pulse modulation, PAM (Single polarity, double polarity) PWM: Generation & demodulation of PWM, PPM, Generation and demodulation of PPM, TDM Vs FDM.

**TEXT BOOKS:**

1. Principles of Communication Systems – H Taub & D. Schilling, Gautam Sahe, TMH, 2007 3rd Edition.
2. Communication Systems – B.P. Lathi, BS Publication, 2006.

**REFERENCES:**

1. Principles of Communication Systems - Simon Haykin, John Wiley, 2nd Ed.
2. Electronics & Communication System – George Kennedy and Bernard Davis, TMH 2004.
3. Communication Systems– R.P. Singh, SP Sapre, Second Edition TMH, 2007.
4. Fundamentals of Communication Systems - John G. Proakis, Masond, Salehi PEA, 2006.

**II Year – II SEMESTER**

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## ELECTRONIC CIRCUIT ANALYSIS LAB

**Note :** The students are required to design the electronic circuit and they have to perform the simulation using Multisim/ Pspice/Equivalent Licensed simulation software tool. Further they are required to verify the result using necessary hardware in the hardware laboratory**.**

**PART A: List of Experiments :( Minimum of Ten Experiments has to be performed)**

1. Determination of $f_T$ of a given transistor.
2. Voltage-Series Feedback Amplifier
3. Current-Shunt Feedback Amplifier
4. RC Phase Shift/Wien Bridge Oscillator
5. Hartley/Colpitt's Oscillator
6. Two Stage RC Coupled Amplifier
7. Darlington Pair Amplifier
8. Bootstrapped Emitter Follower
9. Class A Series-fed Power Amplifier
10. Transformer-coupled Class A Power Amplifier
11. Class B Push-Pull Power Amplifier
12. Complementary Symmetry Class B Push-Pull Power Amplifier
13. Single Tuned Voltage Amplifier
14. Double Tuned Voltage Amplifier

**PART B: Equipment required for Laboratory**

**Software:**

**i.** Multisim/ Pspice/Equivalent Licensed simulation software tool

**ii.** Computer Systems with required specifications

**Hardware:**

1. Regulated Power supplies
2. Analog/Digital Storage Oscilloscopes
3. Analog/Digital Function Generators
4. Digital Multimeters
5. Decade Résistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital)
8. Voltmeters (Analog or Digital)

Active & Passive Electronic Components

**II Year – II SEMESTER**

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## ANALOG COMMUNICATIONS LAB

List of Experiments (Twelve experiments to be done) - (a. Hardware, b. MATLAB Simulink, c. MATLAB Communication tool box)

A. Amplitude Modulation - Mod. & Demod.
B. AM - DSB SC - Mod. & Demod.
C. Spectrum Analysis of Modulated signal using Spectrum Analyser
D. Diode Detector
E. Pre-emphasis & De-emphasis
F. Frequency Modulation - Mod. & Demod.
G. AGC Circuits
H. Sampling Theorem
I. Pulse Amplitude Modulation - Mod. & Demod.
J. PWM , PPM - Mod. & Demod.
K. PLL

**Equipments & Software required:**

**Software :**

i.) Computer Systems with latest specifications
ii) Connected in Lan (Optional)
iii) Operating system (Windows XP)
iv) Simulations software (Simulink & MATLAB)

**Equipment:**

1. RPS - 0 – 30 V
2. CRO - 0 – 20 M Hz.
3. Function Generators - 0 – 1 M Hz
4. Components
5. Multimeters
6. Spectrum Analyser

**III Year – I SEMESTER**

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## PULSE AND DIGITAL CIRCUITS

**OBJECTIVES**

The student will be made

- To understand the concept of wave shaping circuits, Switching Characteristics of diode and transistor.
- To analyze different types of Multi vibrators and their design procedures.
- To Introduce to Time-base Generators and Principles of Synchronization and Frequency division.
- To Understand Sampling Gates and to Design NAND and NOR gates using various logic families.

**UNIT I**

**LINEAR WAVE SHAPING:** High pass, low pass RC circuits, their response for sinusoidal, step, pulse, square and ramp inputs. RC network as differentiator and integrator, attenuators, its applications in CRO probe, RL and RLC circuits and their response for step input, Ringing circuit.

**UNIT II**

**NON-LINEAR WAVE SHAPING :** Diode clippers, Transistor clippers, clipping at two independent levels, Transfer characteristics of clippers, Emitter coupled clipper, Comparators, applications of voltage comparators, clamping operation, clamping circuits using diode with different inputs, Clamping circuit theorem, practical clamping circuits, effect of diode characteristics on clamping voltage, Transfer characteristics of clampers.

**UNIT III**

**SWITCHING CHARACTERISTICS OF DEVICES :** Diode as a switch, piecewise linear diode characteristics, Transistor as a switch, Break down voltage consideration of transistor, saturation parameters of Transistor and their variation with temperature, Design of transistor switch, transistor-switching times.

**Digital Logic gate circuits:** Realization of Logic Gates using DTL, TTL, ECL and CMOS logic circuits, Comparison of logic families.

**UNIT IV**

**MULTIVIBRATORS :**

**Bistable Multi Vibrator:** Analysis and Design of Fixed Bias, Self Bias Bistable Multi Vibrator, Collector catching Diodes, Commutating Capacitors,

Methods of Triggering using RC network & Diode, Emitter Coupled Bistable Multi Vibrator (Schmitt trigger).

**Monostable Multi Vibrator:** Analysis and Design of Collector Coupled Monostable Multi Vibrator, Triggering method of a Monostable Multi Vibrator, Application of Monostable Multi Vibrator as a Voltage to Time Converter.

**Astable Multi Vibrator:** Analysis and Design of Collector Coupled Astable Multi vibrator , Application of Astable Multi Vibrator as a Voltage to Frequency Converter. All circuits are transistor version.

**UNIT V**

**VOLTAGE TIME BASE GENERATORS :** General features of a time base signal, methods of generating time base waveform, Miller and Bootstrap time base generators – basic principles, Transistor miller time base generator, Transistor Bootstrap time base generator.

**UNIT VI**

**SYNCHRONIZATION AND FREQUENCY DIVISION & SAMPLING GATES :** Principles of Synchronization, Frequency division in sweep circuit, Astable relaxation circuits, Monostable relaxation circuits, Synchronization of a sweep circuit with symmetrical signals.

Basic operating principles of sampling gates, Unidirectional and Bi-directional sampling gates, Reduction of pedestal in gate circuits, Applications of sampling gates.

**TEXT BOOKS :**

1. Pulse, Digital and Switching Waveforms - J. Millman and H. Taub, McGraw-Hill, 1991.
2. Solid State Pulse circuits - David A. Bell, PHI, 4th Edn., 2002 .

**REFERENCES :**

1. Pulse and Digital Circuits – A. Anand Kumar, PHI, 2005.
2. Wave Generation and Shaping - L. Strauss.
3. Pulse, Digital Circuits and Computer Fundamentals - R.Venkataraman.

**OUTCOMES**

After going through this course the student will be able to

- Design linear and non-linear wave shaping circuits.
- Apply the fundamental concepts of wave shaping for various switching and signal generating circuits.
- Design different multivibrators and time base generators.

**III Year – I SEMESTER**

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## LINEAR IC APPLICATIONS

**OBJECTIVES**

The student will

- Study characteristics, realize circuits, design for signal analysis using Op-amp ICs.
- Study the linear and non-linear applications of operational amplifiers.
- Study IC 555 timer, PLL and VCO with their applications.
- Study and understand different types of ADCs and DACs
- Acquire skills required for designing and testing integrated circuits

**UNIT I**

**INTEGRATED CIRCUITS:** Differential Amplifier- DC and AC analysis of Dual input Balanced output Configuration, Properties of other differential amplifier configuration (Dual Input Unbalanced Output, Single Ended Input – Balanced/ Unbalanced Output), DC Coupling and Cascade Differential Amplifier Stages, Level translator.

**UNIT II**

Characteristics of OP-Amps, Integrated circuits-Types, Classification, Package Types and Temperature ranges, Power supplies, Op-amp Block Diagram, ideal and practical Op-amp Specifications, DC and AC characteristics, 741 op-amp & its features, FET input. Op-Amps, Op-Amp parameters & Measurement, Input & Out put Off set voltages & currents, slew rates, CMRR, PSRR, drift, Frequency Compensation technique.

**UNIT III**

**LINEAR and NON-LINEAR APPLICATIONS OF OP- AMPS:** Inverting and Non-inverting amplifier, Integrator and differentiator, Difference amplifier, Instrumentation amplifier, AC amplifier, V to I, I to V converters, Buffers. Non- Linear function generation, Comparators, Multivibrators, Triangular and Square wave generators, Log and Anti log Amplifiers, Precision rectifiers.

**UNIT IV**

**ACTIVE FILTERS, ANALOG MULTIPLIERS AND MODULATORS:** Introduction, Butter worth filters – 1st order, 2nd order LPF, HPF filters. Band pass, Band reject and All pass filters.

Four Quadrant multiplier, balanced modulator, IC1496,Applications of analog switches and Multiplexers, Sample & Hold amplifiers.

**UNIT V**

**TIMERS & PHASE LOCKED LOOPS**: Introduction to 555 timer, functional diagram, Monostable and Astable operations and applications, Schmitt Trigger. PLL - introduction, block schematic, principles and description of individual blocks, 565 PLL, Applications of PLL – frequency multiplication, frequency translation, AM, FM & FSK demodulators. Applications of VCO (566).

**UNIT VI**

**DIGITAL TO ANALOG AND ANALOG TO DIGITAL CONVERTERS :** Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and IC 1408 DAC, Different types of ADCs – parallel Comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC.DAC and ADC Specifications, Specifications AD 574 (12 bit ADC).

**TEXT BOOKS :**

1. Linear Integrated Circuits – D. Roy Chowdhury, New Age International (p) Ltd, 2nd Edition,2003.
2. Op-Amps & Linear ICs - Ramakanth A. Gayakwad, PHI,1987.

**REFERENCES :**

1. Design with Operational Amplifiers & Analog Integrated Circuits - Sergio Franco, McGraw Hill, 1988.
2. OP AMPS and Linear Integrated Circuits concepts and Applications, James M Fiore, Cenage Learning India Ltd.
3. Operational Amplifiers & Linear Integrated Circuits–R.F.Coughlin & Fredrick Driscoll, PHI, 6th Edition.
4. Operational Amplifiers – C.G. Clayton, Butterworth & Company Publ.Ltd./ Elsevier, 1971.
5. Operational Amplifiers & Linear ICs – David A Bell, Oxford Uni. Press, 3rd Edition.

**OUTCOMES**

After going through this course the student will be able to

- Design circuits using operational amplifiers for various applications.
- Analyze and design amplifiers and active filters using Op-amp.
- Acquire skills required for designing and testing integrated circuits
- Understand the gain-bandwidth concept and frequency response of the three basic amplifiers. Understand thoroughly the operational amplifiers with linear integrated circuits.
- Design combinational logic circuits for different applications.

**III Year – I SEMESTER**

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## CONTROL SYSTEMS

**OBJECTIVES**

The student will

- Learn the fundamental concepts of Control systems and mathematical modelling of the system.
- Study the concepts of time response and frequency response of the system.
- Understand the basics of stability analysis of the system.

**UNIT I**

**INTRODUCTION**

Concepts of Control Systems- Open Loop and closed loop control systems and their differences- Different examples of control systems- Classification of control systems, Feed-Back Characteristics, Effects of feedback. Mathematical models – Differential equations, Impulse Response and transfer functions - Translational and Rotational mechanical systems

**UNIT II**

**TRANSFER FUNCTION REPRESENTATION**

Transfer Function of DC Servo motor - AC Servo motor- Synchro transmitter and Receiver, Block diagram representation of systems considering electrical systems as examples -Block diagram algebra – Representation by Signal flow graph - Reduction using mason's gain formula.

**UNIT III**

**TIME RESPONSE ANALYSIS**

Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems.

**UNIT IV**

**STABILITY ANALYSIS IN S-DOMAIN**

The concept of stability – Routh's stability criterion – qualitative stability and

conditional stability – limitations of Routh's stability.

**Root Locus Technique:**
The root locus concept - construction of root loci-effects of adding poles and zeros to G(s)H(s) on the root loci.

**UNIT V**
**FREQUENCY RESPONSE ANALYSIS**

Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots.

**STABILITY ANALYSIS IN FREQUENCY DOMAIN:**
Polar Plots, Nyquist Plots Stability Analysis.

**UNIT VI**
**CLASSICAL CONTROL DESIGN TECHNIQUES**

Compensation techniques – Lag, Lead, Lead-Lag Controllers design in frequency Domain, PID Controllers. State Space Analysis of Continuous Systems Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and it's Properties – Concepts of Controllability and Observability.

**TEXT BOOKS:**

1. Automatic Control Systems 8th edition– by B. C. Kuo 2003– John wiley and son's.,
2. Control Systems Engineering – by I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers, 2nd edition.

**REFERENCE BOOKS:**

1. Modern Control Engineering – by Katsuhiko Ogata – Prentice Hall of India Pvt. Ltd., 3rd edition, 1998.
2. Control Systems by N.K.Sinha, New Age International (P) Limited Publishers, 3rd Edition, 1998.

**OUTCOMES**

After going through this course the student will be able to

- Represent the mathematical model of a system.
- Determine the response of different order systems for various step inputs.
- Analyse the stability of the system.

**III Year – I SEMESTER**

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## DIGITAL SYSTEM DESIGN & DIGITAL IC APPLICATIONS

**OBJECTIVES**

The student will be introduced to

- The electrical behavior of CMOS both in static and dynamic conditions and before that study the diode/transistor-transistor logic and Emitter coupled logic.
- In this course, students can study Integrated circuits for all digital operational designs like adder, subtractor, multipliers, multiplexers, registers, counters, flip flops, encoders, decoders and memory elements like RAM and ROM.
- Design and to develop the internal circuits for different digital operations and simulate them using hardware languages using integrated circuits.
- Understand the concepts of SSI Latches and Flip-Flops and Design of Counters using Digital ICs, modeling of sequential logic integrated circuits using VHDL.

**Unit-I:**

**Digital Design Using HDL**: Design flow, program structure, History of VHDL, VHDL requirements, Levels of Abstraction, Elements of VHDL, Concurrent and Sequential Statements, Packages, Libraries and Bindings, Objects and Classes, Subprograms, Comparison of VHDL and Verilog HDL.

**Unit-II:**

**VHDL Modelling** : Simulation, Logic Synthesis, Inside a logic Synthesizer, Constraints, Technology Libraries, VHDL and Logic Synthesis, Functional Gate-Level verification, Place and Route, Post Layout Timing Simulation, Static Timing, Major Netlist formats for design representation, VHDL Synthesis-Programming Approach.

**Unit-III:**

**Programmable Logic Devices (PLDs) & Memories:** Programmable Read Only Memory, Programmable Logic Array, Programmable Array Logic Devices, ROM: Internal structure, 2D-Decoding, Commercial ROM types, timing and applications,. Static RAM: Internal structure, SRAM timing, standard, synchronous SRAMS, Dynamic RAM: Internal structure, timing, synchronous DRAMs. Design considerations of PLDs with relevant Digital ICs.

**Unit-IV:**

**Digital Logic Families and Interfacing**: Introduction to logic families, CMOS logic, CMOS steady state and dynamic electrical behavior, CMOS

logic families.bipolar logic, transistor-transistor logic, TTL families, CMOS/TTL interfacing, low voltage CMOS logic and interfacing, Emitter coupled logic.

**Unit-V:**

**Combinational Logic Design**: Adders & Subtractors, Ripple Adder, Look Ahead Carry Generator, Binary Parallel Adder, Binary Adder-Subtractor, ALU, Decoders, encoders, three state devices, multiplexers and demultiplexers, Code Converters, parity circuits, comparators, multipliers, Barrel Shifter, Simple Floating-Point Encoder, Cascading Comparators, Dual Priority Encoder, Design considerations with relevant Digital ICs, modeling of Circuits by using VHDL.

**Unit-VI:**

**Sequential Logic Design:** SSI Latches and Flip-Flops, Counters, Design of Counters using Digital ICs, Ring Counter, Johnson Counter, Modulus N Synchronous Counters, MSI Registers, Shift Registers, Modes of Operation of Shift Registers, Universal Shift Registers, MSI Shift Registers, Design considerations with relevant Digital ICs, modeling of circuits by using VHDL.

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**TEXT BOOKS:**

1. Digital Design Principles & Practices – John F.Wakerly, PHI/ Pearson Education Asia, 3rd Edition, 2005.
2. Designing with TTL Integrated Circuits: Robert L. / John R. Morris & Miller.

**REFERENCES:**

1. "Fundamentals of Digital logic design with VHDL". Stephen Brown & Zvonko Vranesic, Tata McGraw Hill, 2nd edition.
2. VHDL Primer – J. Bhasker, Pearson Education/ PHI, 3rd Edition.

**OUTCOMES:**

After going through this course the student will be able to

- Understand the concepts of different logics and implementations using Integrated circuits.
- Design and analyze any Digital design in real time applications.
- Extend the digital operations to any width by connecting the ICs and can also design, simulate their results using hardware description language.
- Understand the concepts of MSI Registers and Modes of Operation of Shift Registers, Universal Shift Registers.

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**III Year – I SEMESTER**

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## ANTENNAS AND WAVE PROPAGATION

**OBJECTIVES**

The student will be able to

- understand the applications of the electromagnetic waves in free space.
- introduce the working principles of various types of antennas
- discuss the major applications of antennas with an emphasis on how antennas are employed to meet electronic system requirements.
- understand the concepts of radio wave propagation in the atmosphere.

**UNIT I**

**ANTENNA FUNDAMENTALS:** Introduction, Radiation Mechanism – single wire, 2 wire, dipoles, Current Distribution on a thin wire antenna. Antenna Parameters - Radiation Patterns, Patterns in Principal Planes, Main Lobe and Side Lobes, Beamwidths, Polarization, Beam Area, Radiation Intensity, Beam Efficiency, Directivity, Gain and Resolution, Antenna Apertures, Aperture Efficiency, Effective Height, illustrated Problems.

**UNIT II**

**THIN LINEAR WIRE ANTENNAS:** Retarded Potentials, Radiation from Small Electric Dipole, Quarter wave Monopole and Half wave Dipole – Current Distributions, Evaluation of Field Components, Power Radiated, Radiation Resistance, Beamwidths, Directivity, Effective Area and Effective Height. Natural current distributions, fields and patterns of Thin Linear Center-fed Antennas of different lengths, Radiation Resistance at a point which is not current maximum. Antenna Theorems – Applicability and Proofs for equivalence of directional characteristics, Loop Antennas: Small Loops - Field Components, Comparison of far fields of small loop and short dipole, Concept of short magnetic dipole, D and $R_r$ relations for small loops.

**UNIT III**

**ANTENNA ARRAYS :** 2 element arrays – different cases, Principle of Pattern Multiplication, N element Uniform Linear Arrays – Broadside, End-fire Arrays, EFA with Increased Directivity, Derivation of their characteristics and comparison; Concept of Scanning Arrays. Directivity

Relations (no derivations). Related Problems. Binomial Arrays, Effects of Uniform and Non-uniform Amplitude Distributions, Design Relations. Arrays with Parasitic Elements, Yagi-Uda Arrays, Folded Dipoles and their characteristics.

**UNIT IV**

**NON-RESONANT RADIATORS :** Introduction, Traveling wave radiators – basic concepts, Long wire antennas – field strength calculations and patterns, Microstrip Antennas-Introduction, Features, Advantages and Limitations, Rectangular Patch Antennas –Geometry and Parameters, Impact of different parameters on characteristics. Broadband Antennas: Helical Antennas – Significance, Geometry, basic properties; Design considerations for monofilar helical antennas in Axial Mode and Normal Modes (Qualitative Treatment).

**UNIT V**

**VHF, UHF AND MICROWAVE ANTENNAS :** Reflector Antennas : Flat Sheet and Corner Reflectors. Paraboloidal Reflectors – Geometry, characteristics, types of feeds, F/D Ratio, Spill Over, Back Lobes, Aperture Blocking, Off-set Feeds, Cassegrain Feeds.

Horn Antennas – Types, Optimum Horns, Design Characteristics of Pyramidal Horns; Lens Antennas – Geometry, Features, Dielectric Lenses and Zoning, Applications, Antenna Measurements – Patterns Required, Set Up, Distance Criterion, Directivity and Gain Measurements (Comparison, Absolute and 3-Antenna Methods).

**UNIT VI**

**WAVE PROPAGATION :** Concepts of Propagation – frequency ranges and types of propagations. Ground Wave Propagation–Characteristics, Parameters, Wave Tilt, Flat and Spherical Earth Considerations. Sky Wave Propagation – Formation of Ionospheric Layers and their Characteristics, Mechanism of Reflection and Refraction, Critical Frequency, MUF and Skip Distance – Calculations for flat and spherical earth cases, Optimum Frequency, LUHF, Virtual Height, Ionospheric Abnormalities, Ionospheric Absorption.

Fundamental Equation for Free-Space Propagation, Basic Transmission Loss Calculations. Space Wave Propagation – Mechanism, LOS and Radio Horizon. Tropospheric Wave Propagation – Radius of Curvature of path, Effective Earth's Radius, Effect of Earth's Curvature, Field Strength Calculations, M-curves and Duct Propagation, Tropospheric Scattering.

**TEXT BOOKS**

1. Antennas for All Applications – John D. Kraus and Ronald J. Marhefka, 3rd Edition, TMH, 2003.
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2nd Edition, 2000.

**REFERENCES**

1. Antenna Theory - C.A. Balanis, John Wiley and Sons, 2nd Edition, 2001.
2. Antennas and Wave Propagation – K.D. Prasad, Satya Prakashan, Tech India Publications, New Delhi, 2001.
3. Transmission and Propagation – E.V.D. Glazier and H.R.L. Lamont, The Services Text Book of Radio, vol. 5, Standard Publishers Distributors, Delhi.
4. Electronic and Radio Engineering – F.E. Terman, McGraw-Hill, 4th Edition, 1955.
5. Antennas – John D. Kraus, McGraw-Hill, 2nd Edition, 1988.

**OUTCOMES**

After going through this course the student will be able to

- Identify basic antenna parameters.
- Design and analyze wire antennas, loop antennas, reflector antennas, lens antennas, horn antennas and microstrip antennas
- Quantify the fields radiated by various types of antennas
- Design and analyze antenna arrays
- Analyze antenna measurements to assess antenna's performance
- Identify the characteristics of radio wave propagation

**III Year – I SEMESTER**

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## Pulse & Digital Circuits Lab

1. Linear wave shaping.
2. Non Linear wave shaping – Clippers.
3. Non Linear wave shaping – Clampers.
4. Transistor as a switch.
5. Study of Logic Gates & Some applications.
6. Study of Flip-Flops & some applications.
7. Sampling Gates.
8. Astable Multivibrator.
9. Monostable Multivibrator.
10. Bistable Multivibrator.
11. Schmitt Trigger.
12. UJT Relaxation Oscillator.
13. Bootstrap sweep circuit.

**EQUIPMENT REQUIRED FOR LABORATORY:**

1. RPS - 0 – 30 V
2. CRO - 0 – 20 M Hz.
3. Function Generators - 0 – 1 M Hz
4. Components
5. Multi Meters

**III Year – I SEMESTER**

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## LIC APPLICATIONS LAB

**Minimum Twelve Experiments to be conducted :**

1. Study of ICs – IC 741, IC 555, IC 565, IC 566, IC 1496 – functioning, parameters and Specifications.
2. OP AMP Applications – Adder, Subtractor, Comparator Circuits.
3. Integrator and Differentiator Circuits using IC 741.
4. Active Filter Applications – LPF, HPF (first order)
5. Active Filter Applications – BPF, Band Reject (Wideband) and Notch Filters.
6. IC 741 Oscillator Circuits – Phase Shift and Wien Bridge Oscillators.
7. Function Generator using OP AMPs.
8. IC 555 Timer – Monostable Operation Circuit.
9. IC 555 Timer – Astable Operation Circuit.
10. Schmitt Trigger Circuits – using IC 741 and IC 555.
11. IC 565 – PLL Applications.
12. IC 566 – VCO Applications.
13. Voltage Regulator using IC 723.
14. Three Terminal Voltage Regulators – 7805, 7809, 7912.
15. 4 bit DAC using OP AMP.

**EQUIPMENT REQUIRED FOR LABORATORIES:**

1. RPS
2. CRO
3. Function Generator
4. Multi Meters
5. IC Trainer Kits (Optional)
6. Bread Boards
7. Components:- IC741, IC555, IC565, IC1496, IC723, 7805, 7809, 7912 and other essential components.
8. Analog IC Tester

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**III Year – I SEMESTER**

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## Digital System Design & DICA Laboratory

The students are required to design and draw the internal structure of the following Digital Integrated Circuits and to develop VHDL source code, perform simulation using relevant simulator and analyze the obtained simulation results using necessary synthesizer. Further, it is required to verify the logic with necessary hardware.

**List of Experiments:**

1. Realization of Logic Gates
2. 3 to 8 Decoder- 74138
3. 8*1 Multiplexer-74151 and 2*1 De-multiplexer-74155
4. 4-Bit Comparator-7485.
5. D Flip-Flop- 7474
6. Decade Counter- 7490
7. 4 Bit Counter-7493
8. Shift Register-7495
9. Universal shift register-74194/195
10. Ram (16*4)-74189 (read and write operations)
11. ALU

**Equipment Required:**

1. Xilinix ISE software-latest version
2. Personal computer with necessary pheripherals
3. Hardware kits- Various FPGA families.

**III Year – I SEMESTER**

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## INTELLECTUAL PROPERTY RIGHTS AND PATENTS

### Unit I

Introduction to Intellectual Property Law – Evolutionary past – Intellectual Property Law Basics - Types of Intellectual Property - Innovations and Inventions of Trade related Intellectual Property Rights – Agencies Responsible for Intellectual Property Registration – Infringement - Regulatory – Over use or Misuse of Intellectual Property Rights - Compliance and Liability Issues.

### Unit II

Introduction to Copyrights – Principles of Copyright – Subject Matters of Copyright – Rights Afforded by Copyright Law –Copyright Ownership – Transfer and Duration – Right to Prepare Derivative Works –Rights of Distribution – Rights of performers **–** Copyright Formalities and Registration – Limitations – Infringement of Copyright – International Copyright Law- Semiconductor Chip Protection Act.

### Unit III

Introduction to Patent Law – Rights and Limitations – Rights under Patent Law – Patent Requirements – Ownership and Transfer – Patent Application Process and Granting of Patent – Patent Infringement and Litigation – International Patent Law – Double Patenting – Patent Searching – Patent Cooperation Treaty – New developments in Patent Law- Invention Developers and Promoters.

### Unit IV

Introduction to Trade Mark – Trade Mark Registration Process – Post registration procedures – Trade Mark maintenance – Transfer of rights – Inter parties Proceedings – Infringement – Dilution of Ownership of Trade Mark – Likelihood of confusion – Trade Mark claims – Trade Marks Litigation – International Trade Mark Law

### Unit V

Introduction to Trade Secrets – Maintaining Trade Secret – Physical Security – Employee Access Limitation – Employee Confidentiality Agreement –

Trade Secret Law – Unfair Competition – Trade Secret Litigation – Breach of Contract – Applying State Law.

**Unit VI**

Introduction to Cyber Law – Information Technology Act - Cyber Crime and E-commerce – Data Security – Confidentiality – Privacy - International aspects of Computer and Online Crime.

**REFERENCE BOOKS:**

1. Deborah E.Bouchoux: “Intellectual Property”. Cengage learning , New Delhi
2. Kompal Bansal & Parishit Bansal "Fundamentals of IPR for Engineers", BS Publications (Press)
3. Cyber Law. Texts & Cases, South-Western’s Special Topics Collections
4. Prabhuddha Ganguli: ‘ Intellectual Property Rights” Tata Mc-Graw – Hill, New Delhi
5. Richard Stim: "Intellectual Property", Cengage Learning, New Delhi.
6. R. Radha Krishnan, S. Balasubramanian: "Intellectual Property Rights",Excel Books. New Delhi.
7. M. Ashok Kumar and Mohd.Iqbal Ali: “Intellectual Property Right” Serials Pub.

**III Year – II SEMESTER**

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## MICRO PROCESSORS AND MICRO CONTROLLERS

**OBJECTIVES :** The student will

- learn concepts of microprocessor, different addressing modes and programming of 8086.
- understand interfacing of 8086, with memory and other peripherals.
- learn concept of DMA, USART RS-232 and PIC controller.
- study the features of advanced processors and Pentium processors.
- study the features of 8051 Microcontroller, its instruction set and also other controllers.

### UNIT-I: 8086/8088 MICROPROCESSORS

Register organization of 8086, Architecture, signal description of 8086, physical memory organization, general bus operation, I/O addressing capability, special purpose activities, Minimum mode, maximum mode of 8086 system and timings, the processor 8088, machine language instruction formats, addressing mode of 8086, instruction set off 8086,assembler directives and operators.

### UNIT-II: PROGRAMMING WITH 8086 MICROPROCESSOR

Machine level programs, programming with an assembler, Assembly language programs, introduction to stack, stack structure of 8086/8088, interrupts and interrupt service routines, interrupt cycle of 8086, non-mask able interrupt and mask able interrupts, interrupt programming.

### UNIT-III: BASIC AND SPECIAL PURPOSE PROGRAMMABLE PERIPHERALS AND THEIR INTERFACING WITH 8086/88

Semiconductor memory interfacing, dynamic RAM interfacing, interfacing i/o ports, PIO 8255 modes of operation of 8255,interfacing to D/A and A/D converters, stepper motor interfacing, control of high power devices using 8255.Programmable interrupt controller 8259A, the keyboard /display controller8279, programmable communication interface 8251 USART, DMA Controller 8257.

### UNIT-IV: ADVANCED MICRO PROCESSORS

Salient features of 0386DX, architecture and signal description of 80386, register organization of 80386 and addressing modes, data types of 80386,

real address mode of 80386, protected mode of 80386, segmentation and Paging, virtual 8086 mode and enhanced mode. Instruction set of 80386.The coprocessor 80387.

**UNIT-V: 8051 MICROCONTROLLER**

Introduction to microcontrollers, 8051Microcontrollers, 8051pin description, connections, I/O ports and memory organization, MCS51addressing modes and instructions, assembly language programming tools.

**UNIT-VI: PIC MICROCONTROLLERS AND ARM 32-BIT MICROCONTROLLER**

Overview and features, PIC16Cx/7X instructions, interrupts in PIC 16C61/71, PIC 16F8XX Flash controllers, I/O ports and timers. Introduction to 16/32 Bit processors, ARM architecture and organization, ARM / Thumb programming model, ARM / Thumb instruction set.

**TEXT BOOKS:**

1. A.K.Ray, K.M.Bhurchandi ,"Advanced Microprocessors and Peripherals", Tata McGraw Hill Publications, 2000.
2. N.Sentil Kumar, M.Saravanan, S.Jeevananthan, "Microprocessors and Microcontrollers", Oxford University Press, 2010.

**REFERENCES:**

1. Ajay V Deshmukh, "Microcontrollers", TATA McGraw Hill publications, 2012.
2. Krishna Kant, "Microprocessors and Microcontrollers", PHI Publications, 2010.

**OUTCOMES**

After going through this course the student will be able to

- develop programs for different addressing modes.
- perform 8086 interfacing with different peripherals and implement programs.
- describe the key features of serial and parallel communication and able to
- Design a microcontroller for simple applications.

**III Year – II SEMESTER**

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## DIGITAL SIGNAL PROCESSING

**OBJECTIVES**

The student will be able to

- Define and use Discrete Fourier Transforms (DFTs)
- Use Z - transforms and discrete time Fourier transforms to analyze a digital system.
- Understand simple finite impulse response filters
- Learn the design procedures used for filter bank
- Learn to program a DSP processor to filter signals

**UNIT I**

**INTRODUCTION:** Introduction to Digital Signal Processing: Discrete time signals & sequences, linear shift invariant systems, stability, and causality. Linear constant coefficient difference equations. Frequency domain representation of discrete time signals and systems.

**UNIT II**

**DISCRETE FOURIER SERIES & FOURIER TRANSFORMS:** Properties of discrete Fourier series, DFS representation of periodic sequences, Discrete Fourier transforms: Properties of DFT, linear convolution of sequences using DFT,Computation of DFT, Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency FFT Algorithms, Inverse FFT.

**UNIT III**

**REALIZATION OF DIGITAL FILTERS:** Review of Z-transforms, Applications of Z – transforms, solution of difference equations - digital filters, Block diagram representation of linear constant-coefficient difference equations, Basic structures of IIR systems, Transposed forms, Basic structures of FIR systems, System function,

**UNIT IV**

**IIR & FIR DIGITAL FILTERS:** Analog filter approximations – Butter worth and Chebyshev, Design of IIR Digital filters from analog filters, Design Examples: Analog-Digital transformations Characteristics of FIR Digital Filters, frequency response. Design of FIR Digital Filters using Window Techniques, Frequency Sampling technique, Comparison of IIR & FIR filters.

**UNIT V**

**MULTIRATE DIGITAL SIGNAL PROCESSING:** Decimation, interpolation, sampling rate conversion, Implementation of sampling rate conversion.

**UNIT VI**

**INTRODUCTION TO DSP PROCESSORS:** Introduction to programmable DSPs: Multiplier and Multiplier Accumulator (MAC), Modified Bus Structures and Memory Access schemes in DSPs Multiple access memory ,multiport memory, VLSI architecture, Pipelining, Special addressing modes, On-Chip Peripherals. Architecture of TMS 320C5X-Introduction, Bus Structure, Central Arithmetic Logic Unit, Auxiliary Register, Index Register, Block Move Address Register, Parallel Logic Unit, Memory mapped registers, program controller, Some flags in the status registers, On- chip registers, On-chip peripherals.

**TEXT BOOKS:**

1. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, Dimitris G.Manolakis,Pearson Education / PHI, 2007.
2. Discrete Time Signal Processing – A.V.Oppenheim and R.W. Schaffer, PHI.
3. Digital Signal Processors – Architecture, Programming and Applications,, B.Venkataramani, M.Bhaskar, TATA McGraw Hill, 2002.
4. Digital Signal Processing – K Raja Rajeswari, I.K. International Publishing House.

**Reference Books:**

1. Digital Signal Processing: Andreas Antoniou, TATA McGraw Hill , 2006
2. Digital Signal Processing: MH Hayes, Schaum's Outlines, TATA Mc-Graw Hill, 2007.
3. DSP Primer - C. Britton Rorabaugh, Tata McGraw Hill, 2005.
4. Fundamentals of Digital Signal Processing using Matlab – Robert J. Schilling, Sandra

L. Harris,Thomson, 2007.

5. Digital Signal Processing – Alan V. Oppenheim, Ronald W. Schafer, PHI Ed., 2006

**OUTCOMES**

After going through this course the student will be able to

- Estimate the spectra of signals that are to be processed by a discrete time filter, and to verify the performance of a variety of modern and classical spectrum estimation techniques.
- Design and simulate a digital filter
- Design new digital signal processing systems.
- Design and realize FIR, IIR filters
- Program a DSP processor to filter signals

**III Year – II SEMESTER**

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## DIGITAL COMMUNICATIONS

**OBJECTIVES**

The student will be able to

- understand pulse digital modulation systems such as PCM,DPCM and DM.
- understand various digital modulation techniques and able to analyze various systems for their performance in terms of probability of error.
- study the concept of entropy and need for source coding.
- study Block codes, cyclic codes and convolution codes.

**UNIT I**

**PULSE DIGITAL MODULATION:** Elements of digital communication systems, advantages of digital communication systems, Elements of PCM: Sampling, Quantization & Coding, Quantization error, Companding in PCM systems. Differential PCM systems (DPCM). Delta modulation, its draw backs, adaptive delta modulation, comparison of PCM and DM systems, noise in PCM and DM systems.

**UNIT II**

**DIGITAL MODULATION TECHNIQUES:** Introduction, ASK, FSK, PSK, DPSK, DEPSK, QPSK, M-ary PSK, ASK, FSK, similarity of BFSK and BPSK.

**UNIT III**

**DATA TRANSMISSION :** Base band signal receiver, probability of error, the optimum filter, matched filter, probability of error using matched filter, coherent reception, non-coherent detection of FSK, calculation of error probability of ASK, BPSK, BFSK,QPSK.

**UNIT IV**

**INFORMATION THEORY:** Discrete messages, concept of amount of information and its properties. Average information, Entropy and its properties. Information rate, Mutual information and its properties.

**UNIT V**

**SOURCE CODING:** Introductions, Advantages, Shannon's theorem, Shanon-Fano coding, Huffman coding, efficiency calculations, channel capacity of discrete and analog Channels, capacity of a Gaussian channel, bandwidth –S/N trade off.

**UNIT VI**

**LINEAR BLOCK CODES:** Introduction, Matrix description of Linear Block codes, Error detection and error correction capabilities of Linear block codes, Hamming codes, Binary cyclic codes, Algebraic structure, encoding, syndrome calculation, BCH Codes.

**CONVOLUTION CODES:** Introduction, encoding of convolution codes, time domain approach, transform domain approach. Graphical approach: state, tree and trellis diagram decoding using Viterbi algorithm.

**TEXT BOOKS:**

1. Digital communications - Simon Haykin, John Wiley, 2005
2. Principles of Communication Systems – H. Taub and D. Schilling, TMH, 2003

**REFERENCES:**

1. Digital and Analog Communication Systems - Sam Shanmugam, John Wiley, 2005.
2. Digital Communications – John Proakis, TMH, 1983. Communication Systems Analog & Digital – Singh & Sapre, TMH, 2004.
3. Modern Analog and Digital Communication – B.P.Lathi, Oxford reprint, 3rd edition, 2004.

**OUTCOMES**

After going through this course the student will be able to

- analyze the performance of a Digital Communication System for probability of error and are able to design a digital communication system.
- analyze various source coding techniques
- Compute and analyze Block codes, cyclic codes and convolution codes.
- Design a coded communication system.

**III Year – II SEMESTER**

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## MICROWAVE ENGINEERING

**OBJECTIVES**

The student will

- Understand fundamental electrical characteristics of waveguides and transmission lines through electromagnetic field analysis.
- Understand the basic properties of Polarization and Ferrite materials composition in the case of waveguide components.
- Understand the multiport junction concept for splitting the microwave energy in a desired direction.
- Understand the function, design, and integration of the major microwave components like oscillator, modulator, power amplifier, filter, and mixer in building a Microwave test bench setup for measurements.

**UNIT I**

**MICROWAVE TRANSMISSION LINES:** Introduction, Microwave Spectrum and Bands, Applications of Microwaves. Rectangular Waveguides – TE/TM mode analysis, Expressions for Fields, Characteristic Equation and Cut-off Frequencies, Filter Characteristics, Dominant and Degenerate Modes, Sketches of TE and TM mode fields in the cross-section, Mode Characteristics – Phase and Group Velocities, Wavelengths and Impedance Relations; Power Transmission and Power Losses in Rectangular Guide, Impossibility of TEM mode. Related Problems.

**UNIT II**

**CIRCULAR WAVEGUIDES**: Introduction, Nature of Fields, Characteristic Equation, Dominant and Degenerate Modes. Microstrip Lines– Introduction, Zo Relations, Effective Dielectric Constant, Losses, Q factor.

Cavity Resonators– Introduction, Rectangular and Cylindrical Cavities, Dominant Modes and Resonant Frequencies, Q factor and Coupling Coefficients, Excitation techniques- waveguides and cavities, Related Problems.

**UNIT III**

**WAVEGUIDE COMPONENTS AND APPLICATIONS - I :**Coupling Mechanisms – Probe, Loop, Aperture types. Waveguide Discontinuities –

Waveguide irises, Tuning Screws and Posts, Matched Loads. Waveguide Attenuators – Resistive Card, Rotary Vane types; Waveguide Phase Shifters – Dielectric, Rotary Vane types. Scattering Matrix– Significance, Formulation and Properties. S-Matrix Calculations for – 2 port Junction, E-plane and H-plane Tees, Magic Tee, Hybrid Ring; Directional Couplers – 2Hole, Bethe Hole types, Ferrite Components– Faraday Rotation, S-Matrix Calculations for Gyrator, Isolator, Circulator, Related Problems.

**UNIT - IV**

**MICROWAVE TUBES :**Limitations and Losses of conventional tubes at microwave frequencies.

Microwave tubes – O type and M type classifications. O-type tubes : 2 Cavity Klystrons – Structure, Reentrant Cavities, Velocity Modulation Process and Applegate Diagram, Bunching Process and Small Signal Theory – Expressions for o/p Power and Efficiency. Reflex Klystrons – Structure, Applegate Diagram and Principle of working, Mathematical Theory of Bunching, Power Output, Efficiency, Electronic Admittance; Oscillating Modes and o/p Characteristics, Electronic and Mechanical Tuning, Related Problems.

**UNIT V**

**HELIX TWTS:** Significance, Types and Characteristics of Slow Wave Structures; Structure of TWT and
Suppression of Oscillations, Nature of the four Propagation Constants.

**M-type Tubes**

Introduction, Cross-field effects, Magnetrons – Different Types, 8-Cavity Cylindrical Travelling Wave.

Magnetron – Hull Cut-off and Hartree Conditions, Modes of Resonance and PI-Mode Operation, Separation of PI-Mode, o/p characteristics.

**UNIT VI**

**MICROWAVE SOLID STATE DEVICES:** Introduction, Classification, Applications. TEDs – Introduction, Gunn Diode – Principle, RWH Theory, Characteristics, Basic Modes of Operation, Oscillation Modes. Avalanche Transit Time Devices – Introduction, IMPATT and TRAPATT Diodes – Principle of Operation and Characteristics.

**MICROWAVE MEASUREMENTS:** Description of Microwave Bench – Different Blocks and their Features, Precautions; Microwave Power Measurement – Bolometer Method. Measurement of Attenuation, Frequency, VSWR, Cavity Q. Impedance Measurements.

**TEXT BOOKS :**

1. Microwave Devices and Circuits – Samuel Y. Liao, PHI, 3rd Edition,1994.
2. Microwave Principles – Herbert J. Reich, J.G. Skalnik, P.F. Ordung and H.L. Krauss, CBS Publishers and Distributors, New Delhi, 2004.

**REFERENCES :**

1. Foundations for Microwave Engineering – R.E. Collin, IEEE Press, John Wiley, 2nd Edition, 2002.
2. Microwave Circuits and Passive Devices – M.L. Sisodia and G.S.Raghuvanshi, Wiley Eastern Ltd., New Age International Publishers Ltd., 1995.
3. Microwave Engineering Passive Circuits – Peter A. Rizzi, PHI, 1999.
4. Microwave Engineering – G S N Raju , I K International
5. Microwave and Radar Engineering – G Sasibhushana Rao Pearson
6. Electronic and Radio Engineering – F.E. Terman, McGraw-Hill, 4th ed., 1955.

**OUTCOMES** : After going through this course the student will

- Gain knowledge of transmissionlines and waveguide structures and how they are used as elements in impedance matching and filter circuits.
- Apply analysis methods to determine circuit properties of passive or active microwave devices.
- Gain knowledge and understanding of microwave analysis methods.
- Distinguish between M-type and O-type tubes
- Analyze and measure various microwave parameters using a Microwave test bench

**III Year – II SEMESTER**

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**Open Elective**

**Open Electives:**

1. Bio Medical Engineering
2. Fuzzy & Neural Networks
3. Image Processing (not for ECE Students)
4. Principles of Signals, Systems and Communications (Not for ECE Students)
5. Electronic Instrumentation (Not for ECE Students)

**Note: ECE Students can also Choose the OPEN ELECTIVES Offered by any Other Department.**

## BIO-MEDICAL ENGINEERING
## (OPEN ELECTIVE)

**UNIT-I:**

**INTRODUCTION TO BIOMEDICAL INSTRUMENTATION:** Age of Biomedical Engineering, Development of Biomedical Instrumentation, Man Instrumentation System, Components of the Man-Instrument System, Physiological System of the Body, Problems Encountered in Measuring a Living System, Sources of Bioelectric Potentials, Muscle, Bioelectric Potentials, Sources of Bioelectric Potentials, Resting and Action Potentials, Propagation of Action Potential, Bioelectric Potentials-ECG, EEG and EMG, Envoked Responses.

**UNIT-II:**

**ELECTRODES AND TRANSDUCERS:** Introduction, Electrode Theory, Biopotential Electrodes, Examples of Electrodes, Basic Transducer Principles, Biochemical Transducers, The Transducer and Transduction Principles, Active Transducers, Passive Transducers, Transducers for Biomedical Applications, Pulse Sensors, Respiration Sensor, Transducers with Digital Output.

**UNIT-III:**

**CARDIOVASCULAR SYSTEM AND MEASUREMENTS:** The Heart and Cardiovascular System, Electro Cardiography, Blood Pressure Measurement, Measurement of Blood Flow and Cardiac Output, Measurement of Heart Sound, Plethysmography.

**MEASUREMENTS IN THE RESPIRATORY SYSTEM:** The Physiology of The Respiratory System, Tests and Instrumentation for The Mechanics of Breathing, Respiratory Therapy Equipment.

**UNIT-IV:**

**PATIENT CARE AND MONITORING:** Elements of Intensive-Care Monitoring, Patient Monitoring Displays, Diagnosis, Calibration and Repair ability of Patient-Monitoring Equipment, Other Instrumentation for Monitoring Patients, Organization of the Hospital for Patient-Care Monitoring, Pacemakers, Defibrillators, Radio Frequency Applications of Therapeutic use.

**THERAPEUTIC AND PROSTHETIC DEVICES:** Audiometers and Hearing Aids.

Myoelectric Arm, Laparoscope, Ophthalmology Instruments, Anatomy of Vision,.

Electrophysiological Tests, Ophthalmoscope, Tonometer for Eye Pressure Measurement.

Diathermy, Clinical Laboratory Instruments, Biomaterials, Stimulators.

**UNIT-V:**

**DIAGNOSTIC TECHNIQUES AND BIO-TELEMETRY:** Principles of Ultrasonic Measurement, Ultrasonic Imaging, Ultrasonic Applications of Therapeutic Uses, Ultrasonic Diagnosis, X-Ray and Radio-Isotope Instrumentations, CAT Scan, Emission Computerized Tomography, MRI, Introduction to Biotelemetry, Physiological Parameters Adaptable to Biotelemetry, The Components of Biotelemetry System, Implantable Units, Telemetry for ECG Measurements during Exercise, Telemetry for Emergency Patient Monitoring.

**UNIT-VI:**

**MONITORS, RECORDERS AND SHOCK HAZARDS:** Biopotential Amplifiers, Monitors, Recorders, Shock Hazards and Prevention,

Physiological Effects and Electrical Current, Shock Hazards from Electrical Equipment, Methods of Accident Prevention, Isolated Power Distribution System.

**Text Books:**

1. "Bio-Medical Electronics and Instrumentation", Onkar N. Pandey, Rakesh Kumar, Katson Books.
2. "Bio-Medical Instrumentation", Cromewell , Wiebell, Pfeiffer

**References:**

1. "Introduction to Bio-Medical Equipment Technology", 4th Edition, Joseph J. Carr, John M. Brown, Pearson Publications.
2. "Hand Book of Bio-Medical Instrumentation", Khandapur. McGrawHill

Image Processing

**(OPEN ELECTIVE)**

**Unit: 1**

**Introduction to Image Processing:**

Overview of Image Processing, Nature of Image Processing, Image Processing Computer Graphics, Signal Processing, Machine Vision, video Processing, Optics, Statistics, Digital Image Representation, Types of Images, Digital Image Processing Operations, Fundamental steps in Image Processing, Image Processing Applications.

Digital Imaging System

**Digital Imaging System:**

Physical Aspects of Imaging Acquisition, Biological Aspects of Image Acquisition, Properties of Human Visual System, Review of Digital Camera, Sampling and Quantization, Image Quality – *Optical Resolution, Image Display Device and Device Resolution,* Digital Halftone Process – *Random Dithering, Ordered Dithering, Non-Periodic Dithering,* Image Storage and File Formats – Need for File Format

Types of File Formats – *GIF, JPEG, PNG, DICOM, SVG Structure of TIFF File Format.*

**Unit: 2**

**Digital Image Processing Operations:** Basic Relationship and Distance Metrics, Classification of Image Processing Operations, Arithmetic and Logical Operations, Geometric Operations, Image Interpolation Techniques, Set Operations, Statistical Operations, Convolution and Correlation Operations, Data Structures and Image Processing Applications Development – Relational Structures, Hierarchical Data Structures, Pyramids, Quadtrees, Application Development.

**Digital Image Transforms:** Need for Image Transforms, Spatial Frequencies in Image Processing, Introduction to Fourier Transform, Discrete Fourier Transform, Fast Fourier Transform and its algorithm, Properties of Fourier transform – *Sampling Theorem, Parseval's Theorem,* Discrete Cosine Transform, Discrete Sine Transform, Walsh Transform, Hadamard Transform, Haar Transform, Slant Transform, SVD and KL Transforms *or Hotelling Transform.*

**Unit: 3**

**Image Enhancement:** Image Quality and Need for Image Enhancement, Image Quality Metrics, Image Enhancement Point Operations Linear and

Non-linear Functions, Piecewise Linear Functions, Histogram-based Techniques, Spatial Filtering Concepts, Image Smoothing Spatial Filters and its design, Image Sharpening Spatial Filters Frequency Domain Filtering

**Image Restoration:** Image Degradation (Restoration) Model, Categories of Image Degradations, Noise Modeling, Blur and Distortions, Image Restoration in the Presence of Noise Only, Mean Filters, Order-statistics Filters, Image Restoration Techniques, Constrained and Unconstrained Methods, Geometrical Transforms for Image Restoration.

**Unit: 4**

**Image Compression:**

Image Compression Model**,** Compression Algorithm and its types – *Entropy Coding, Predictive Coding, Transform Coding, Layered Coding,* Types of Redundancy – *Coding Redundancy, Inter-pixel Redundancy, Psychovisual Redundancy, Chromatic Redundancy.*

Lossless Compression Algorithms, Run-length Coding, Huffman Coding , Shannon–Fano Coding, Bit-plane Coding, Arithmetic Coding, Lossless Predictive Coding, Lossy Compression Algorithms, Block Transform Coding, Image and Video Compression standards, JPEG, Video Compression – MPEG.

**Unit: 5**

**Image Segmentation:**

Introduction – Classification of Image Segmentation Algorithms, Detection of Discontinuities, Edge Detection – Staged in Edge Detection – Types of Edge Detectors, First-order Edge Detection Operators – Second-order Derivative Filters, Edge Operator Performance, Edge Linking Algorithms, Principle of Thresholding - Effect of Noise over Threshold Process and Peakiness Test - Parametric Methods, Non-parametric Methods, Principle of Region- growing –Dynamic Segmentation approaches , Validation of Segmentation Algorithms.

**Unit: 6**

**Colour Image Processing:**

Introduction – Colour Fundamentals, Devices for Colour Imaging, Colour Image Storage and Processing – Colour Models – RGB Colour Model, HIS Colour Model, HSV Colour Model, HLS Colour Model, TV Colour Model–

YUV Model, YIQ Model, Y $C_b$ $C_r$ Colour Model, Printing Colour Models- CMK and CMYK Models.

Colour Quantization – Popularity Algorithm, Median-cut Algorithm, Octree-based Algorithm, Pseudo Colour Image Processing.

Full Colour Processing – Colour Transformation – Image Filters for Colour Images – Noise in Colour Images, Colour Image Segmentation– Thresholding, K-means Clustering Technique, RGB Colour Space Segmentation, Colour Features.

**Text Books:**

1. S.Sridhar, “Digital Image Processing” Oxford Publishers, 2011
2. S.Jayaraman, S.Esakkirajan, T.Veerakumar, “Digital Image Processing” Mc Graw Hill Publishers, 2009

**Reference Books:**

1. Rafael C.Gonzalez and Richard E. Woods, “Digital Image Processing” Pearson Education, 2011.
2. B.Chanda and D. Dutta Majumder, “Digital Image Processing and Analysis” Prentice Hall of India, 2011/2012 (Print).
3. Anil K. Jain, “Fundamentals of Digital Image Processing,” Prentice Hall of India, 2012.
4. Milan Sonka, Hlavac & Boyle “Digital Image Processing and Computer Vision,” Cengage Learning Publishers, 2010 (Reprinted).

## Principles of Signals, Systems and Communications
## (OPEN ELECTIVE)

**Unit – I**

**Signal Analysis:** Introduction, Fourier Series - Trigonometric Fourier Series, Complex Exponential Fourier Series; Complex Fourier Spectrum – Time Domain and Frequency Domain Representation of a Signal; Fourier Transform - Analysis of a Non Periodic Function over entire interval; Fourier Transform Involving Impulse Function; Properties of Fourier Transform and Significance- Convolution Integral, Fourier Transform of Periodic Functions.

**Unit – II**

**Linear Systems:** Introduction; System Function – Representation of a function f(t) and its response r(t), Definition of System Function; Distortionless Transmission – Band width of a system, Rise Time and System Band Width; Energy Signals and Power Signals, Energy and Power Spectral Densities; Correlation – Cross and Auto Correlation and their properties.

**Unit – III**

**Amplitude Modulation:** Introduction to Communication System, Need for Modulation, Types of Amplitude Modulations, AM-SC- DSB-SC & SSB-SC, AM- DSB, SSB & VSB, Power and BW requirements, Generation of AM, DSB-SC, SSB-SC; Demodulation of AM-: Diode detectors.

**Unit – IV**

**Angle Modulation:** Frequency & Phase Modulations, Advantages of FM over AM, Bandwidth consideration, Narrow band and Wide band FM, Comparison of FM & PM, FM Modulators – Direct Method and Indirect or Armstrong method of generations; FM Demodulators- Slope Detection, Balanced Slope, Foster Seeley and Ratio Detectors.

**Unit – V**

**Pulse Modulations:** Sampling Theorem – Nyquist Interval, Aliasing, Signal recovery from its sampled version; Flat Top and Natural Sampling, PAM-PAM Modulation and Demodulation, PWM and PPM, Time Division

Multiplexing, Frequency Division Multiplexing and Comparison between TDM and FDM.

**Unit – VI**

**Pulse Code Modulations:** Digital Representation of Analog Signal- Quantization of Signals, Quantization Error, Pulse Code Modulation- PCM System, Line Codes and their properties, Delta Modulation, Adaptive DM and comparisons.

**Digital Modulation:** ASK, FSK, PSK and DPSK, QPSK demodulation, Coherent and Non-coherent Reception, Comparison of Binary and Quaternary Modulation Schemes, M-ary modulation techniques.

**TEXT BOOKS:**

1. Communication Systems Analog and Digital – R.P. Singh and SD Sapre, TMH, 2nd Edition, 2008
2. Principles of Communication Systems- H. Taub and D. Schilling, TMH, 2003.

**REFERENCE BOOKS:**

1. Modern Digital and Analog Communication Systems – B.P. Lathi, Oxford 3rd Edition.
2. Communication Systems – Simon Haykin, John Wiley, 3rd Edition
3. Digital and Analog Communication Systems – K Sam Shanmugam, WSE, 2006.
4. Electronic & Communication Systems – Kennedy and Davis, TMH, 4th Edition, 2004.

**III Year – II SEMESTER**

| T | P | C |
|---|---|---|
| 0 | 3 | 2 |

## MICROPROCESSORS AND MICROCONTROLLERS LAB

The students are required to develop the necessary Algorithm, Flowchart and Assembly Language Program Source Code for executing the following functions using MASM/TASM software and to verify the results with necessary Hardware Kits.

### PART-I: MICROPROCESSOR 8086

1. Introduction to MASM/TASM.
2. Arithmetic operation- Multi byte Addition and Subtraction, Multiplication and Division- Signed and unsigned Arithmetic operation, ASCII- Arithmetic operation.
3. Logic operations-Shift and rotate- Converting packed BCD to unpacked BCD, BCD to ASCII conversion.
4. By using string operation and Instruction prefix: Move Block, Reverse string, Sorting, Inserting, Deleting, Length of the string, String comparison.
5. DOS/BIOS programming : Reading keyboard (Buffered with and without echo) - Display characters, Strings.

### PART-II: INTERFACING WITH MICROPROCESSOR

1. 8259 – Interrupt Controller-Generate an interrupt using 8259 timer.
2. 8279 – Keyboard Display- Write a program to display a string of characters.
3. 8255 – PPI-Write ALP to generate sinusoidal wave using PPI.
4. 8251 – USART-Write a program in ALP to establish Communication between two processors.

### PART-III: MICROCONTROLLER 8051

1. Reading and Writing on a parallel port.
2. Timer in different modes.
3. Serial communication implementation.

**PART-IV: INTERFACING WITH MICROCONTROLLER**

Write C programs to interface 8051 chip to Interfacing modules to Develop single chip solutions.

1. Simple Calculator using 6 digit seven segment display and Hex Keyboard interface to 8051.
2. Alphanumeric LCD panel and Hex keypad input interface to 8051.
3. External ADC and Temperature control interface to 8051.
4. Generate different waveforms Sine, Square, Triangular, and Rampetc. using DAC interface to 8051; change the frequency and Amplitude.

**EQUIPMENT REQUIRED FOR LABORATORY**

1. MASM/TASM software 2. 8086 Microprocessor Kits
1. 8051 Micro Controller kits
2. Interfaces/peripheral subsystems

   i) 8259 PIC

   ii) 8279-KB/Display

   iii) 8255 PPI

   iv) 8251 USART
5. A/D and D/AC Interface

**III Year – II SEMESTER**

| T | P | C |
|---|---|---|
| 0 | 3 | 2 |

## DIGITAL COMMUNICATIONS LAB

1. Time division multiplexing.
2. Pulse code modulation.
3. Differential pulse code modulation.
4. Delta modulation.
5. Frequency shift keying.
6. Phase shift keying .
7. Differential phase shift keying.
8. Companding
9. Source Encoder and Decoder
10. Linear Block Code-Encoder and Decoder
11. Binary Cyclic Code - Encoder and Decoder
12. Convolution Code - Encoder and Decoder

**Equipment required for Laboratories:**

1. RPS - 0 – 30 V
2. CRO - 0 – 20 M Hz.
3. Function Generators - 0 – 1 M Hz
4. RF Generators - 0 – 1000 M Hz./0 – 100 M Hz.
5. Multimeters
6. Lab Experimental kits for Digital Communication
7. Components
8. Radio Receiver/TV Receiver Demo kits or Trainees.

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**III Year – II SEMESTER**

| T | P | C |
|---|---|---|
| 0 | 3 | 2 |

## DIGITAL SIGNAL PROCESSING LAB

**LIST OF EXPERIMENTS:**

1. To study the architecture of DSP chips – TMS 320C 5X/6X Instructions.
2. To verify linear convolution.
3. To verify the circular convolution.
4. To design FIR filter (LP/HP) using windowing technique
   a) Using rectangular window
   b) Using triangular window
   c) Using Kaiser window
5. To Implement IIR filter (LP/HP) on DSP Processors
6. N-point FFT algorithm.
7. MATLAB program to generate sum of sinusoidal signals.
8. MATLAB program to find frequency response of analog LP/HP filters.
9. To compute power density spectrum of a sequence.
10. To find the FFT of given 1-D signal and plot.

**III Year – II SEMESTER**

| T | P | C |
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## Seminar

**IV Year – I SEMESTER**

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|---|---|---|
| 3+1 | 0 | 3 |

## VLSI DESIGN

**OBJECTIVES**

The student will be introduced to

- Use mathematical methods and circuit analysis models in analysis of CMOS digital electronics circuits, including logic components and their interconnects.
- Learn the various fabrication steps of IC and come across basic electrical properties of MOSFET.
- Apply CMOS technology-specific layout rules in the placement and routing of transistors and interconnect and to verify the functionality, timing, power and parasitic effects.
- The concepts and techniques of modern integrated circuit design and testing (CMOS VLSI).
- Design static CMOS combinational and sequential logic at the transistor level, including mask layout.

**Unit-I:**

**Introduction :** Introduction to IC Technology, MOS and related VLSI Technology, Basic MOS Transistors, Enhancement and Depletion modes of transistor action, IC production process, MOS and CMOS Fabrication processes, BiCMOS Technology, Comparison between CMOS and Bipolar technologies.

**Basic Electrical Properties Of MOS and Bi-CMOS Circuits:** $I_{ds}$ versus $V_{ds}$ Relationships, Aspects of MOS transistor Threshold Voltage, MOS transistor Trans, Output Conductance and Figure of Merit. The Pass transistor, NMOS Inverter, Pull-up to Pull-down Ratio for NMOS inverter driven by another NMOS inverter. Alternative forms of pull-up, The CMOS Inverter, MOS transistor circuit model, Bi-CMOS Inverter, Latch-up in CMOS circuits and BiCMOS Latch-up Susceptibility.

**Unit-II:**

**MOS and Bi-CMOS Circuit Design Processes:** MOS Layers, Stick Diagrams, Design Rules and Layout, General observations on the Design

rules, 2µm Double Metal, Double Poly, CMOS/BiCMOS rules, 1.2µm Double Metal, Double Poly CMOS rules, Layout Diagrams of NAND and NOR gates and CMOS inverter, Symbolic Diagrams-Translation to Mask Form.

**Unit-III:**

**Basic Circuit Concepts:** Sheet Resistance, Sheet Resistance concept applied to MOS transistors and Inverters, Area Capacitance of Layers, Standard unit of capacitance, The Delay Unit, Inverter Delays, Propagation Delays, Wiring Capacitances, Fan-in and fan-out characteristics, Choice of layers, Transistor switches, Realization of gates using NMOS, PMOS and CMOS technologies.

**Scaling Of MOS Circuits:** Scaling models, Scaling factors for device parameters, Limits due to sub threshold currents, current density limits on logic levels and supply voltage due to noise.

**Unit-IV:**

**Subsystem Design:** Architectural issues, switch logic, Gate logic, examples of structured design, clocked sequential circuits, system considerations, general considerations of subsystem design processes, an illustration of design processes.

**Unit-V:**

**VlSI Design Issues:** VLSI Design issues and design trends, design process, design for testability, technology options, power calculations, package selection, clock mechanisms, mixed signal design, ASIC design flow, FPGA design flow, introduction to SoC design.

**Unit-VI:**

**FPGA Design:** Basic FPGA architecture, , FPGA configuration, configuration modes, FPGA design process- FPGA design flow, FPGA families, FPGA design examples-stack, queue and shift register implementation using VHDL, step-by-step approach of FPGA design process on Xilinx environment.

**Text Books:**

1. Essentials of VLSI Circuits and Systems By Kamran Eshraghian, Douglas and A. Pucknell and Sholeh Eshraghian, Prentice-Hall of India Private Limited,2005 Edition.
2. VLSI Design-Black Book By Dr. K.V.K.K. Prasad, Kattula Shyamala, Kogent Learning Solutions Inc.2012 Edition.

**References:**

1. VLSI Design By A.Albert Raj & T.Latha,PHI Learning Private Limited,2010.
2. VLSI Design-A.Shanthi and A.Kavita, New Age International Private Limited, 2006 First Edition.

**OUTCOMES**

After going through this course the student will be able to

- Apply the Concept of design rules during the layout of a circuit.
- Model and simulate digital VLSI systems using hardware design language.
- Synthesize digital VLSI systems from register-transfer or higher level descriptions
- Understand current trends in semiconductor technology, and how it impacts scaling and performance.

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**IV Year – I SEMESTER**

| T | P | C |
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| 3+1 | 0 | 3 |

## COMPUTER NETWORKS

**Objectives**

The aim of this course is to introduce key concepts and principles of computer networks. The course will use a top-down approach to study the Internet and its protocol stack. Architecture, protocol, application-examples will include email, web and media-streaming. We will cover communications services (e.g., TCP/IP) required to support such network applications. The implementation and deployment of communications services in practical networks: including wired and wireless LAN environments, will be followed by a discussion of issues of network-security and network-management. Internet's architecture and protocols will be used as the primary examples to illustrate the fundamental principles of computer networking.

**UNIT I**
**INTRODUCTION**

OSI, TCP/IP and other networks models, Examples of Networks: Novell Networks, Arpanet, Internet, Network Topologies WAN, LAN, MAN.

**UNIT II**
**PHYSICAL LAYER**

Transmission media copper, twisted pair wireless, switching and encoding asynchronous communications; Narrow band, broad band ISDN and ATM.

**UNIT III**
**DATA LINK LAYER**

Design issues, framing, error detection and correction, CRC, Elementary Protocol-stop and wait, Sliding Window. Medium Access Sub Layer: ALOHA, MAC addresses, Carrier sense multiple access, IEEE 802.X Standard Ethernet, wireless LANS, Bridges.

**UNIT IV**
**NETWORK LAYER**

Virtual circuit and Datagram subnets-Routing algorithm shortest path routing, Flooding, Hierarchical routing, Broad cast, Multi cast, distance vector routing. **DYNAMIC ROUTING:** Broadcast routing. Rotary for mobility, Congestion, Control Algorithms – General Principles of Congestion prevention policies. Internetworking: The Network layer in the internet and in the ATM Networks.

**UNIT V**
**TRANSPORT LAYER**
Transport Services, Connection management, TCP and UDP protocols; ATM AAL Layer Protocol.

**UNIT VI**
**APPLICATION LAYER**

Network Security, Domain name system, SNMP, Electronic Mail; the World WEB, Multi Media.

**TEXT BOOKS**

1. Computer Networks — Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI.
2. Data Communications and Networking – Behrouz A. Forouzan.Third Edition TMH.

**REFERENCES**

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition,Pearson Education.
2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson.

***Outcomes:***
The student will be able to

Analyze a communication system by separating out the different functions provided by the network; and some example networks.

Understand various network topologies required for communication

Understand that there are fundamental limits to any communications system;

Understand the general principles behind addressing, routing, reliable transmission and other stateful protocols as well as specific examples of each;
Have an informed view of both the internal workings of the Internet and of a number of common Internet applications and protocols.

**IV Year – I SEMESTER**

| T | P | C |
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| 3+1 | 0 | 3 |

## DIGITAL IMAGE PROCESSING

**OBJECTIVES**

The student will

- Learn the fundamental concepts and applications of Digital Image Processing.
- Learn the concepts of and how to perform Intensity transformations and spatial filtering.
- Understand the relationship between Filtering in spatial and frequency domains,
- Understand the concepts of and how to perform Image restoration and reconstruction.
- Understand the concepts of different color models and Color image processing.
- Learn the concepts of Wavelets and multi-resolution processing, Image compression and Watermarking, Morphological image processing, Image segmentation, Representation and description.

**UNIT-1**

**Introduction:** Origins of digital image processing, uses digital image processing, fundamental steps in digital image processing, components of an image processing system, digital image fundamentals, Elements of visual perception, light and electromagnetic spectrum, imaging sensing and acquisition, image sampling and quantization. Some basic relationships between pixels, an introduction to the mathematical tools used in digital image processing.

**Image Transforms:** Need for image transforms, Spatial Frequencies in image processing, introduction to Fourier transform, discrete Fourier transform, fast Fourier transform and its algorithm, properties of Fourier transform. Discrete sine transforms. Walsh Transform. Hadamard transform, Haar Transform. Slant transforms, SVD and KL Transforms or Hotelling Transform

**UNIT-2**

**Intensity Transformations and Spatial Filtering:** Background, Some basic intensity transformation functions, histogram processing, fundamentals of

spatial filtering, smoothing spatial filters, sharpening spatial filters, Combining spatial enhancement methods, using fuzzy techniques for intensity transformations and spatial filtering.

**Filtering in the frequency domain:** Preliminary concepts, Sampling and the Fourier transform of sampled functions, the discrete Fourier transform (DFT) of one variable, Extension to functions of two variables, some properties of the 2-D Discrete Fourier transform. The Basic of filtering in the frequency domain, image smoothing using frequency domain filters, Selective filtering, Implementation.

**UNIT-3**

**Image restoration and Reconstruction:** A model of the image degradation / Restoration process, Noise models, restoration in the presence of noise only-Spatial Filtering, Periodic Noise Reduction by frequency domain filtering, Linear, Position –Invariant Degradations, Estimation the degradation function, Inverse filtering, Minimum mean square error(Wiener) filtering ,constrained least squares filtering ,geometric mean filtering ,image reconstruction from projections.

**Unit-4**

**Color image processing:** color fundamentals, color models, pseudo color image processing, basic of full color image processing, color transformations, smoothing and sharpening. Image segmentation based on color, noise in color images, color image compression.

**Unit-5**

**Wavelets and Multi-resolution Processing:** image pyramids, sub band coding & Haar transforms multi resolution expressions, wavelet transforms in one dimensions. The fast wavelets transform, wavelet transforms in two dimensions, wavelet packets.

**Image compression:** Fundamentals, various compression methods-coding techniques, digital image water marking.

**Unit-6**

**Morphological image processing:** preliminaries Erosion and dilation, opening and closing, the Hit-or-miss transformation, some Basic Morphological algorithms, grey –scale morphology

**Image segmentation:** Fundamentals, point, line, edge detection thresholding, region –based segmentation, segmentation using Morphological watersheds, the use of motion in segmentation**.**

**TEXT BOOKS :**

1. R. C. Gonzalez and R. E. Woods, Digital Image Processing, 3rd edition, Prentice Hall, 2008.
2. R. C. Gonzalez, R. E. Woods and Steven L. Eddins , Digital Image Processing Using MATLAB , 2rd edition, Prentice Hall, 2009.
3. Anil K.Jain, "Fundamentals of Digital Image Processing", Prentice Hall of India, 9th Edition, Indian Reprint, 2002.
4. Jayaraman, S. Esakkirajan, and T. Veerakumar, Digital Image Processing, Tata McGraw-Hill Education, 2011.

**OUTCOMES**

After going through this course the student will be able to

- Perform different transforms on image useful for image processing applications
- Perform spatial and frequency domain filtering on image and can implement all smoothing and sharpening operations on images
- Perform image restoration operations/techniques on images
- Operate effectively on color images and different color conversions on images and can code images to achieve good compression
- Do wavelet based image processing and image compression using wavelets
- Perform all morphological operations on images and can be able to do image segmentation also.
- Develop simple algorithms for image processing and use the various techniques involved in Bio Medical applications, etc.

**IV Year – I SEMESTER**

| T | P | C |
|---|---|---|
| 3+1 | 0 | 3 |

## COMPUTER ARCHITECTURE AND ORGANIZATION

**Objectives**

The student will

- Understand the fundamentals of different instruction set architectures and their relationship to the CPU design.
- Understand the principles and the implementation of computer arithmetic and ALU.
- Understand the memory system, I/O organization
- Understand the operation of modern CPUs including interfacing, pipelining, memory systems and busses.
- Understand the principles of operation of multiprocessor systems.

**UNIT-I**

**BASIC STRUCTURE OF COMPUTERS:** Computer Types, Functional units, Basic operational concepts, Bus structures, Software, Performance, multiprocessors and multi computers. Data types, Complements, Data Representation. Fixed Point Representation. Floating – Point Representation. Error Detection codes.

**COMPUTER ARITHMETIC:** Addition and subtraction, multiplication Algorithms, Division Algorithms, Floating point Arithmetic operations. Decimal Arithmetic unit, Decimal Arithmetic operations.

**UNIT-II**

**REGISTER TRANSFER LANGUAGE AND MICRO-OPERATIONS:** Register Transfer language. Register Transfer, Bus and memory transfer, Arithmetic Micro-operations, logic micro operations, shift micro-operations, Arithmetic logic shift unit. Instruction codes. Computer Registers Computer instructions –Instruction cycle. Memory Reference Instructions. Input Onput and Interrupt. **CENTRAL PROCESSING UNIT** - Stack organization. Instruction formats. Addressing modes. DATA Transfer and manipulation. Program control. Reduced Instruction set computer

**UNIT-III**

**MICRO PROGRAMMED CONTROL:** Control memory, Address sequencing, micro program example, Design of control unit-Hard wired control. Micro programmed control

**UNIT-IV**

**THE MEMORY SYSTEM:** Memory Hierarchy, Main memory, Auxiliary memory, Associative memory, Cache memory, Virtual memory, Memory management hardware

**UNIT-V**

**INPUT-OUTPUT ORGANIZATION :** Peripheral Devices, Input-Output Interface, Asynchronous data transfer Modes of Transfer, Priority Interrupt, Direct memory Access, Input –Output Processor (IOP), Serial communication;

**UNIT-VI**

**PIPELINE AND VECTOR PROCESSING:** Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline Vector Processing, Array Processors. **Multi processors:** Characteristics of Multiprocessors, Interconnection Structures, Interprocessor Arbitration. Interprocessor Communication and Synchronization, Cache Coherence.

**TEXT BOOKS:**

1. Computer System Architecture – M.Moris Mano, IIIrd Edition, PHI / Pearson, 2006.
2. Computer Organization – Car Hamacher, ZvonksVranesic, SafwatZaky, V Edition, McGraw Hill, 2002.

**REFERENCES:**

1. Computer Organization and Architecture – William Stallings Seventh Edition, PHI/Pearson, 2006.
2. Computer Architecture and Organization – John P. Hayes, Mc Graw Hill International editions, 1998.

**Objectives :**

- Understand the fundamentals of different instruction set architectures and their relationship to the CPU design.
- Understand the principles and the implementation of computer arithmetic and ALU.
- Understand the memory system, I/O organization
- Understand the operation of modern CPUs including interfacing, pipelining, memory systems and busses.
- Understand the principles of operation of multiprocessor systems.
- Demonstrate the relationship between the software and the hardware and focuses on the foundational concepts that are the basis for current computer design.

**IV Year – I SEMESTER**

| T | P | C |
|---|---|---|
| 3+1 | 0 | 3 |

**Elective I**

# ELECTRONIC SWITCHING SYSTEMS

**Objectives :**

The student will

- Understand the means of measuring traffic.
- Understand the implication of the traffic level on system design.

**UNIT -I:**

**Introduction:** Evolution of Telecommunications, Simple Telephone Communication, Basics of Switching System, Manual Switching System, Major Telecommunication Networks.

**Crossbar Switching:** Principles of Common Control, Touch Tone Dial Telephone, Principles of Crossbar Switching, Crossbar Switch Configurations, Cross point Technology, Crossbar Exchange Organization.

**UNIT -II:**

**Electronic Space Division Switching:** Stored Program Control, Centralized SPC, Distributed SPC, Software Architecture, Application Software, Enhanced Services, Two-Stage Networks, Three-Stage Networks, n- 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, n- Stage Combination Switching.

**UNIT -III:**

**Telephone Networks:** Subscriber Loop System, Switching Hierarchy and Routing, Transmission Plan, Transmission Systems, Numbering Plan, Charging Plan, Signaling Techniques, In-channel Signaling, Common Channel Signaling, Cellular Mobile Telephony.

**Signaling:** Customer Line Signaling, Audio- Frequency Junctions and Trunk Circuits, FDM Carrier Systems, PCM Signaling, Inter- Register Signaling, Common- Channel Signaling Principles, CCITT Signaling System no.6, CCITT Signaling System no.7, Digital Customer Line Signaling.

**UNIT -IV:**

**Packet Switching:** Statistical Multiplexing, Local- Area and Wide- Area Networks, Large-scale Networks, Broadband Networks.

**Telecommunications Traffic:** The Unit of Traffic, Congestion, Traffic Measurement, A Mathematical Model, Lost-call Systems, Queuing Systems.

**UNIT -V:**

**Switching Networks:** Single- Stage Networks, Grading, Link Systems, Grades of service of link systems, Application of Graph Theory to link Systems, Use of Expansion, Call Packing,
Rearrange-able Networks, Strict- Sense non-blocking Networks, Sectionalized Switching Networks

**UNIT -VI:**

**Integrated Services Digital Network:** Motivation for ISDN, New Services, Network and Protocol Architecture, Transmission Channels, User- Network Interfaces, Signaling, Numbering and Addressing, Service Characterization, Interworking, ISDN Standards, Expert Systems in ISDN, Broadband ISDN, Voice Data Integration.

**TEXT BOOKS:**

1. Telecommunication Switching Systems and Networks- Thiagarajan Viswanathan, 2000, PHI.
2. Telecommunications Switching, Traffic and Networks- J. E. Flood, 2006, Pearson Education.

**REFERENCES:**

1. Digital Telephony- J. Bellamy, 2nd Edition, 2001, John Wiley.
2. Data Communications and Networks- Achyut S. Godbole, 2004, TMH.
3. Principles of Communication Ststems- H. Taub & D. Schilling, 2nd Edition, 2003, TMH.
4. Data Communication & Networking- B. A. Forouzan, 3rd Edition, 2004, TMH.
5. Telecommunication System Engineering – Roger L. Freeman, 4th Ed., Wiley-Inter Science, John Wiley & Sons, 2004.

**Outcomes**

The student will be able to

- Evaluate the time and space parameters of a switched signal
- Establish the digital signal path in time and space, between two terminals
- Evaluate the inherent facilities within the system to test some of the SLIC, CODEC and digital switch functions.
- Investigate the traffic capacity of the system.
- Evaluate methods of collecting traffic data.
- Evaluate the method of interconnecting two separate digital switches.

# ANALOG IC DESIGN

**( Elective I )**

**OBJECTIVES**

The student will be introduced to

- The student will be able to understand the behavior of MOS Devices and Small-Signal & Large-Signal Modeling of MOS Transistor and Analog Sub-Circuits.
- In this course, students can study CMOS Amplifiers like Differential Amplifiers, Cascode Amplifiers, Output Amplifiers, and Operational Amplifiers.
- Another main object of this course is to motivate the graduate students to design and to develop the Analog CMOS Circuits for different Analog operations.
- The concepts of Open-Loop Comparators and Different Types of Oscillators like Ring Oscillator, LC Oscillator etc.

**UNIT -I:**

**MOS Devices and Modeling:** The MOS Transistor, Passive Components-Capacitor & Resistor, Integrated circuit Layout, CMOS Device Modeling - Simple MOS Large-Signal Model, Other Model Parameters, Small-Signal Model for the MOS Transistor, Computer Simulation Models, Sub-threshold MOS Model.

**UNIT -II:**

**Analog CMOS Sub-Circuits:** MOS Switch, MOS Diode, MOS Active Resistor, Current Sinks and Sources, Current Mirrors-Current mirror with Beta Helper, Degeneration, Cascode current Mirror and Wilson Current Mirror, Current and Voltage References, Band gap Reference.

**UNIT -III:**

**CMOS Amplifiers:** Inverters, Differential Amplifiers, Cascode Amplifiers, Current Amplifiers, Output Amplifiers, High Gain Amplifiers Architectures.

**UNIT -IV:**

**CMOS Operational Amplifiers:** Design of CMOS Op Amps, Compensation of Op Amps, Design of Two-Stage Op Amps, Power- Supply Rejection Ratio of Two-Stage Op Amps, Cascode Op Amps, Measurement Techniques of OP Amp.

**UNIT -V:**

**Comparators:** Characterization of Comparator, Two-Stage, Open-Loop Comparators, Other Open-Loop Comparators, Improving the Performance of Open-Loop Comparators, Discrete-Time Comparators.

**UNIT -VI:**

**Oscillators & Phase-Locked Loops:** General Considerations, Ring Oscillators, LC Oscillators, Voltage Controlled Oscillators.

Simple PLL, Charge Pump PLLs, Non-Ideal Effects in PLLs, Delay Locked Loops, Applications.

**Text Books**:

1. Design of Analog CMOS Integrated Circuits- Behzad Razavi, TMH Edition.
2. CMOS Analog Circuit Design - Philip E. Allen and Douglas R. Holberg, Oxford University Press, International Second Edition/Indian Edition, 2010.

**References**:

1. Analysis and Design of Analog Integrated Circuits- Paul R. Gray, Paul J. Hurst, S. Lewis and R. G. Meyer, Wiley India, Fifth Edition, 2010.
2. Analog Integrated Circuit Design- David A.Johns, Ken Martin, Wiley Student Edn, 2013.

**OUTCOMES**

After going through this course the student will be able to

- Understand the concepts of MOS Devices and Modeling.
- Design and analyze any Analog Circuits in real time applications.
- Extend the Analog Circuit Design to Different Applications in Real Time.
- Understand of Open-Loop Comparators and Different Types of Oscillators.

# OBJECT ORIENTED PROGRAMMING & OPERATING SYSTEM

**(Elective I )**

**Course Objectives:**

By the end of the course student will

- Describe the general architecture of computers
- Describe object oriented concepts
- Describe, contrast and compare differing structures for operating Systems
- Understand and analyze theory and implementation of: processes, resource control (concurrency etc.), physical and virtual memory, scheduling, I/O and files

**UNIT-I:**

**Introduction to OOP**

Introduction, Need of Object Oriented Programming, Principles of Object Oriented Languages, Procedural languages Vs OOP, Applications of OOP.

**UNIT-II:**

**Computer System and Operating System Overview:** Overview of computer operating systems, operating systems functions, protection and security, distributed systems, special purpose systems, operating systems structures and systems calls, operating systems generation.

**UNIT-III:**

**Process Management** – Process concept- process scheduling, operations, Inter process communication. Multi Thread programming models. Process scheduling criteria and algorithms, and their evaluation.

**UNIT-IV:**

**Memory Management:** Swapping, contiguous memory allocation, paging, structure of the page table, segmentation.

**UNIT-V:**

**Virtual Memory Management:**

virtual memory, demand paging, page-Replacement, algorithms, Allocation of Frames, Thrashing.

**UNIT-VI:**

**File system Interface-** the concept of a file, Access Methods, Directory structure, File system mounting, file sharing, protection.

**TEXT BOOKS:**

1. The Complete Reference Java, 8ed, Herbert Schildt, TMH.
2. Operating System Concepts- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley.
3. Operating Systems' – Internal and Design Principles Stallings, Sixth Edition–2005, Pearson education.

**REFERENCES:**

1. http://nptel.iitm.ac.in/courses/Webcourse-contents/IISc-BANG/Operating%20Systems/New_index1.html.
2. Operating systems- A Concept based Approach-D.M.Dhamdhere, 2nd Edition, TMH.
3. Operating System A Design Approach-Crowley, TMH.
4. Modern Operating Systems, Andrew S Tanenbaum 3rd edition PHI.

**Course Outcomes:**

By the end of the course student will be able to

- describe the general architecture of computers
- describe object oriented concepts
- describe, contrast and compare differing structures for operating Systems.
- understand and analyze theory and implementation of: processes, resource control (concurrency etc.), physical and virtual memory, scheduling, I/O and files.

# RADAR SYSTEMS

**(Elective-I)**

**OBJECTIVES**

The student will be introduced to

- the knowledge of different Antennas systems and communication equipment required for the operation of RADAR.
- different parameters of Transmitter and Receiver of RADAR
- the concept of Doppler Effect to measure parameters of RADAR.
- different types of RADARS and applications based on the type of Transmitters, Receivers, and their functions.

**Pre requisites: Antennas and wave propagation; Electromagnetics and Communications**

**UNIT – I**

Introduction: Nature of Radar. Maximum Unambiguous Range. Radar Waveforms, Simple form of Radar Equation, Radar Block Diagram and Operation, Radar Frequencies and Applications. Related Problems. Radar Equation: Prediction of Range Performance, Minimum Detectable Signal, Receiver Noise and SNR, Integration of Radar Pulses, Radar Cross Section of Targets (simple targets-sphere, cone-sphere). Transmitter power.

**UNIT – II**

PRF and Range Ambiguities, System Losses (Qualitative treatment). Related Problems. CW and Frequency Modulated Radar: Doppler effect, CW Radar – Block Diagram, Isolation between Transmitter and Receiver, Non-zero IF Receiver, Receiver Bandwidth Requirement, Applications of CW radar. FM-CW Radar, Range and Doppler Measurement, Block Diagram and Characteristics (Approaching/ Receding Targets), FM-CW altimeter, Measurement Errors, Multiple Frequency CW Radar.

**UNIT – III**

MTI and Pulse Doppler Radar: Introduction, Principle, MTIR Radar with-Power Amplifier Transmitter and Power Oscillator Transmitter, Delay Line Cancellers – Filter Characteristics, Blind Speeds, Double Cancellation staggered PRFs. Range Gated Doppler Filters. MTI Radar Parameters, Limitations to MTI Performance. Non-coherent MTI, MTI versus Pulse Doppler Radar. Tracking Rader : Tracking with Rader, Sequential Lobing, Conical Scan, Mono-pulse Tracking.

**UNIT – IV**

Rader Amplitude Comparison Mono-pulse (one – and two –coordinates), Phase Comparison Mono-pulse. Target Reflection Characteristics and Angular Accuracy. Tracking in Range Acquisition and Scanning Patterns. Comparison of Trackers. Radar Antennas – Antenna Parameters, Reflector Antennas, Lens Antennas, Lens Antennas Cosecant- Squared Antenna Pattern, Radomes.

**UNIT- V**

Electronically Steered Phased Array Antennas, Phase Shifters, Frequency – scan Arrays, Radiation for Phased Array, Architecture for Phased Arrays. Detection of Radar Signals in Noise: Introduction, Matched Filter Receiver – Response Characteristics and Derivation, Correlation detection, Detection criteria, Detector Characteristics, Automatic Detection, Constant False Alarm Rate Receiver

**UNIT – VI**

Radar Receivers – Noise Figure and Noise Temperature. Displays – types. Duplexer – Branch type and Balanced type, Circulators as Duplexers. Introduction to Phased Array Antennas- Basic Concepts, Radiation Pattern. Beam Steering and Beam Width changes, Series versus Parallel Feeds. Applications, Advantages and Limitations.

**TEXT BOOKS:**

1. Introduction to Radar Systems – Merrill I. Skolnik, SECOND EDITION, McGraw – Hill, 1981.
2. Radar Engineering and fundamentals of Navigational Aids-G.S.N.Raju, I.K International, 2008.

**REFERENCES:**

1. Introduction to Radar Systems – Merrill I. Skolnik, THIRD EDITION, Tata McGraw – Hill, 2001.
2. Radar: Principles, Technologies, Applications- Byron Edde, Pearson Education.

**OUTCOMES**

After going through this course the student will be able to

- Acquire the knowledge to apply and to design required parameters for a RADAR system.
- Apply the techniques learned, to choose suitable RADAR from the available, for the required application.

# ADVANCED COMPUTER ARCHITECTURE

**( Elective I )**

**UNIT -I:**

**Fundamentals of Computer Design:**

Fundamentals of Computer design, Changing faces of computing and task of computer designer, Technology trends, Cost price and their trends, Measuring and reporting performance, Quantitative principles of computer design, Amdahl's law.

Instruction set principles and examples- Introduction, Classifying instruction set- MEmory addressing- type and size of operands, Operations in the instruction set.

**UNIT –II:**

**Pipelines:**

Introduction, Basic RISC instruction set, Simple implementation of RISC instruction set, Classic five stage pipe lined RISC processor, Basic performance issues in pipelining, Pipeline hazards, Reducing pipeline branch penalties.

**Memory Hierarchy Design:**

Introduction, Review of ABC of cache, Cache performance, Reducing cache miss penalty, Virtual memory.

**UNIT -III:**

**Instruction Level Parallelism the Hardware Approach:**

Instruction-Level parallelism, Dynamic scheduling, Dynamic scheduling using Tomasulo's approach, Branch prediction, high performance instruction delivery- hardware based speculation.

**UNIT-IV**

**ILP Software Approach**

Basic compiler level techniques, Static branch prediction, VLIW approach, Exploiting ILP, Parallelism at compile time, Cross cutting issues -Hardware verses Software.

**UNIT –V:**

**Multi Processors and Thread Level Parallelism:**

Multi Processors and Thread level Parallelism- Introduction, Characteristics of application domain, Systematic shared memory architecture, Distributed shared – memory architecture, Synchronization.

**UNIT –VI:**

**Inter Connection and Networks:**

Introduction, Interconnection network media, Practical issues in interconnecting networks, Examples of inter connection, Cluster, Designing of clusters.

**Intel Architecture:** Intel IA-64 ILP in embedded and mobile markets Fallacies and pit falls.

**TEXT BOOKS:**

1. John L. Hennessy, David A. Patterson - Computer Architecture: A Quantitative Approach, 3rd Edition, An Imprint of Elsevier.

**REFERENCES:**

1. John P. Shen and Miikko H. Lipasti - Modern Processor Design : Fundamentals of Super Scalar Processors
2. Computer Architecture and Parallel Processing - Kai Hwang, Faye A.Brigs., MC Graw Hill.
3. Advanced Computer Architecture - A Design Space Approach - Dezso Sima, Terence Fountain, Peter Kacsuk , Pearson Ed.

**IV Year – I SEMESTER**

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**Elective II**

# OPTICAL COMMUNICATIONS

**OBJECTIVES**

The student will be introduced to

- the functionality of each of the components that comprise a fiber-optic communication system
- the properties of optical fiber that affect the performance of a communication link and types of fiber materials with their properties and the losses occur in fibers.
- the principles of single and multi-mode optical fibers and their characteristics
- working of semiconductor lasers, and differentiate between direct modulation and external electro-optic modulation.
- Analyze the operation of LEDs, laser diodes, and PIN photo detectors (spectral properties, bandwidth, and circuits) and apply in optical systems.
- Analyze and design optical communication and fiber optic sensor systems.
- the models of analog and digital receivers.

**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, V-number, Mode coupling, Step Index fibers, Graded Index fibers, Single mode fibers- Cut off wavelength, Mode Field Diameter, Effective Refractive Index, Related problems.

**UNIT II**

Fiber materials:- Glass, Halide, Active glass, Chalgenide glass, Plastic optical fibers. 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 in Graded index fiber, Related problems.

**UNIT III**

Optical fiber Connectors-Connector types, Single mode fiber connectors, Connector return loss, Fiber Splicing- Splicing techniques, Splicing single mode fibers, Fiber alignment and joint loss- Multimode fiber joints, single mode fiber joints.

**UNIT IV**

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, Optical detectors-Physical principles of PIN and APD, Detector response time, Temperature effect on Avalanche gain, Comparison of Photo detectors, Related problems.

**UNIT V**

Source to fiber power launching - Output patterns, Power coupling, Power launching, Equilibrium Numerical Aperture, Laser diode to fiber coupling, Optical receiver operation- Fundamental receiver operation, Digital signal transmission, error sources, Receiver configuration, Digital receiver performance, Probability of Error, Quantum limit, Analog receivers.

**UNIT VI**

Optical system design - Point-to- point links- Component choice and considerations, Link power budget, Rise time budget with examples, Line coding in Optical links, WDM, Necessity, Principles, Measurement of Attenuation and Dispersion, Eye pattern.

**TEXT BOOKS :**

1. Optical Fiber Communications – Gerd Keiser, Mc Graw-Hill International edition, 3rd Edition, 2000.
2. Optical Fiber Communications – John M. Senior, PHI, 2nd Edition, 2002.

**RERFERENCES :**

1. Fiber Optic Communications – D.K. Mynbaev , S.C. Gupta and Lowell L. Scheiner, Pearson Education,2005.
2. Text Book on Optical Fiber Communication and its Applications – S.C.Gupta, PHI, 2005.

3. Fiber Optic Communication Systems – Govind P. Agarwal , John Wiley, 3rd Ediition, 2004.
4. Fiber Optic Communications – Joseph C. Palais, 4th Edition, Pearson Education, 2004.

**OUTCOMES**

After going through this course the student will be able to

- Choose necessary components required in modern optical communications systems .
- Design and build optical fiber experiments in the laboratory, and learn how to calculate electromagnetic modes in waveguides, the amount of light lost going through an optical system, dispersion of optical fibers.
- Use different types of photo detectors and optical test equipment to analyze optical fiber and light wave systems.
- Choose the optical cables for better communication with minimum losses
- Design, build, and demonstrate optical fiber experiments in the laboratory.

# DIGITAL IC DESIGN

**( Elective II )**

**OBJECTIVES**

- The student will be able to understand the MOS Design.
- In this course, students can study Combinational MOS Logic Circuits and Sequential MOS Logic Circuits.
- Another main object of this course is to motivate the graduate students to design and to develop the Digital Integreated Circuits for different Applications.
- The concepts of Semiconductor Memories, Flash Memory, RAM array organization.

**UNIT-I:**

**MOS Design:** Pseudo NMOS Logic – Inverter, Inverter threshold voltage, Output high voltage, Output Low voltage, Gain at gate threshold voltage, Transient response, Rise time, Fall time, Pseudo NMOS logic gates, Transistor equivalency, CMOS Inverter logic.

**UNIT-II:**

**Combinational MOS Logic Circuits**: MOS logic circuits with NMOS loads, Primitive CMOS logic gates – NOR & NAND gate, Complex Logic circuits design – Realizing Boolean expressions using NMOS gates and CMOS gates, AOI and OIA gates, CMOS full adder, CMOS transmission gates, Designing with Transmission gates.

**UNIT-III:**

**Sequential MOS Logic Circuits:** Behaviour of bistable elements, SR Latch, Clocked latch and flip flop circuits, CMOS D latch and edge triggered flip-flop.

**UNIT-IV:**

**Dynamic Logic Circuits:** Basic principle, Voltage Bootstrapping, Synchronous dynamic pass transistor circuits, Dynamic CMOS transmission gate logic, High performance Dynamic CMOS circuits.

**UNIT-V:**

**Interconnect:** Capacitive Parasitics, Resistive Parasitics, Inductive Parasitics, Advanced Interconncet Techniques.

**UNIT-VI:**

**Semiconductor Memories:** Memory Types, RAM array organization, DRAM – Types, Operation, Leakage currents in DRAM cell and refresh operation, SRAM operation Leakage currents in SRAM cells, Flash Memory-NOR flash and NAND flash.

**Text Books:**

1. Digital Integrated Circuits – A Design Perspective, Jan M. Rabaey, Anantha Chandrakasan, Borivoje Nikolic, 2nd Ed., PHI.

2. Digital Integrated Circuit Design – Ken Martin, Oxford University Press, 2011.

**References:**

1. CMOS Digital Integrated Circuits Analysis and Design – Sung-Mo Kang, Yusuf Leblebici, TMH, 3rd Ed., 2011.
2. CMOS VLSI Design – Neil H.E Weste, David harris, Ayan Banerjee 3rd Edition, Pearson

**OUTCOMES**

After going through this course the student will be able to

- Understand the concepts of MOS Design.
- Design and analysis of Combinational and Sequential MOS Circuits.
- Extend the Digital IC Design to Different Applications.
- Understand the Concepts of Semiconductor Memories, Flash Memory, RAM array organization.

# SPEECH PROCESSING

## (ELECTIVE – II)

**UNIT –I:**

**Fundamentals of Digital Speech Processing**:

Anatomy & Physiology of Speech Organs, The process of Speech Production, Acoustic Phonetics, Articulatory Phonetics, The Acoustic Theory of Speech Production- Uniform lossless tube model, effect of losses in vocal tract, effect of radiation at lips, Digital models for speech signals.

**UNIT –II:**

**Time Domain Models for Speech Processing:**

Introduction- Window considerations, Short time energy and average magnitude Short time average zero crossing rate, Speech Vs Silence discrimination using energy and zero crossing, Pitch period estimation using a parallel processing approach, The short time autocorrelation function, The short time average magnitude difference function, Pitch period estimation using the autocorrelation function.

**UNIT –III:**

**Linear Predictive Coding (LPC) Analysis:**

Basic principles of Linear Predictive Analysis: The Autocorrelation Method, The Covariance Method, Solution of LPC Equations: Cholesky Decomposition Solution for Covariance Method, Durbin's Recursive Solution for the Autocorrelation Equations, Comparison between the Methods of Solution of the LPC Analysis Equations, Applications of LPC Parameters: Pitch Detection using LPC Parameters, Formant Analysis using LPC Parameters.

**UNIT –IV:**

**Homomorphic Speech Processing:**

Introduction, Homomorphic Systems for Convolution: Properties of the Complex Cepstrum, Computational Considerations, The Complex Cepstrum of Speech, Pitch Detection, Formant Estimation, The Homomorphic Vocoder.

**UNIT-V**

**Speech Enhancement:**

Nature of interfering sounds, Speech enhancement techniques: Single

Microphone Approach : spectral subtraction, Enhancement by re-synthesis, Comb filter, Wiener filter, Multi microphone Approach.

**UNIT-VI:**

**Automatic Speech & Speaker Recognition:**

Basic pattern recognition approaches, Parametric representation of speech, Evaluating the similarity of speech patterns, Isolated digit Recognition System, Continuous digit Recognition System.

**Hidden Markov Model (HMM) for Speech:**

Hidden Markov Model (HMM) for speech recognition, Viterbi algorithm, Training and testing using HMMS,

**Speaker Recognition:**

Recognition techniques, Features that distinguish speakers, Speaker Recognition Systems: Speaker Verification System, Speaker Identification System.

**TEXT BOOKS:**

1. Digital Processing of Speech Signals - L.R. Rabiner and S. W. Schafer. Pearson Education.
2. Speech Communications: Human & Machine - Douglas O'Shaughnessy, 2nd Ed., Wiley India, 2000.
3. Digital Processing of Speech Signals. L.R Rabinar and R W Jhaung, 1978, Pearson Education.

**REFERENCE BOOKS:**

1. Discrete Time Speech Signal Processing: Principles and Practice - Thomas F. Quateri, 1st Ed., PE.
2. Speech & Audio Signal Processing- Ben Gold & Nelson Morgan, 1st Ed., Wiley.

# Artificial Neural Networks and Fuzzy Logic

**(Elective II )**

## 1. Introduction to Neural Networks

Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Hodgkin-Huxley Neuron Model, Integrate-and-Fire Neuron Model, Spiking Neuron Model, Characteristics of ANN, McCulloch-Pitts Model, Potential Applications of ANN.

### Essentials of Artificial Neural Networks

Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN-Connectivity, Neural Dynamics (Activation and Synaptic), Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules, Types of Application.

## 2. Feed Forward Neural Networks

Introduction, Perceptron Models: Discrete, Continuous and Multi-Category, Training

Algorithms: Discrete and Continuous Perceptron Networks, Perceptron Convergence

theorem, Limitations of the Perceptron Model, Applications.

Multilayer Feed Forward Neural Networks

Credit Assignment Problem, Generalized Delta Rule, Derivation of Back-propagation (BP)

Training, Summary of Back-propagation Algorithm, Kolmogorov Theorem, Learning

Difficulties and Improvements.

## 3. Associative Memories

Paradigms of Associative Memory, Pattern Mathematics, Hebbian Learning, General Concepts of Associative Memory Associative Matrix, Association Rules, Hamming Distance, The Linear Associator, Matrix Memories, Content Addressable Memory, Bidirectional Associative Memory (BAM) Architecture, BAM Training Algorithms: Storage and Recall Algorithm,

BAM Energy Function, Proof of BAM Stability Theorem. Architecture of Hopfield Network: Discrete and Continuous versions, Storage and Recall Algorithm, Stability Analysis, Capacity of the Hopfield Network.

4. **Self-Organizing Maps (SOM) and Adaptive Resonance Theory (ART)**

Introduction, Competitive Learning, Vector Quantization, Self-Organized Learning Networks, Kohonen Networks, Training Algorithms, Linear Vector Quantization, Stability- Plasticity Dilemma, Feed forward competition, Feedback Competition, Instar, Outstar, ART1, ART2, Applications.

**5. Classical & Fuzzy Sets**

Introduction to classical sets – properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, Properties, fuzzy relations, cardinalities, membership functions.

**6. Fuzzy Logic System Components**

Fuzzification, Membership Value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods.

**Applications :**

Neural network applications: Process identification, Fraction Approximation, Control and Process Monitoring, Fault diagnosis and Load forecasting.

Fuzzy logic applications: Fuzzy logic control and Fuzzy classification.

**Text Books:**

1. Neural Netwroks, Fuzy logic , Gnenetic algorithms: synthesis and applications by Rajasekharan and Rai- PHI Publication.
2. Introduction to Artificial Neural Systems- Jacek M.Zurada, Jaico Publishing House, 1997.

**Reference Books:**

1. Neural and Fuzzy Systems: Foundation, Architectures and Applications, - N. Yadaiah and S. Bapi Raju, Pearson Education
2. Neural Netwroks – James A Freeman and Davis Skapura, Pearson, 2002
3. Neural Netwroks – Simon Hykins, Pearson Education.
4. Neural Engineering by C. Eliasmith and CH. Anderson, PHI.

   Neural Netwroks and Fuzzy Logic System by Brok Kosko, PHI Publications.

## NETWORK SECURITY & CRYPTOGRAPHY
## (Elective-II)

**Course objectives:**

The main objective of this course is to teach students to understand and how to address various software security problems in a secure and controlled environment. During this course the students will gain knowledge (both theoretical and practical) in various kinds of software security problems, and techniques that could be used to protect the software from security threats. The students will also learn to understand the "modus operandi" of adversaries; which could be used for increasing software dependability.

**Course outcomes:**

1. be able to individually reason about software security problems and protection techniques on both an abstract and a more technically advanced level.
2. be able to individually explain how software exploitation techniques, used by adversaries, function and how to protect against them.

**Syllabus:**

**UNIT I : Classical Encryption Techniques**

**Objectives:** *The Objectives of this unit is to present an overview of the main concepts of cryptography, understand the threats & attacks, understand ethical hacking.*

**Introduction:** Security attacks, services & mechanisms, Symmetric Cipher Model, Substitution Techniques, Transportation Techniques, Cyber threats and their defense (Phishing Defensive measures, web based attacks, SQL injection & Defense techniques) TEXT BOOK 2), Buffer overflow & format string vulnerabilities, TCP session hijacking (ARP attacks, route table modification) UDP hijacking (man-in-the-middle attacks) (TEXT BOOK3).

**UNIT II: Block Ciphers & Symmetric Key Cryptography**

**Objectives:** The Objectives of this unit is to understand the difference between stream ciphers & block ciphers, present an overview of the Feistel Cipher and explain the encryption and decryption, present an overview of DES, Triple DES, Blowfish, IDEA.

Traditional Block Cipher Structure, DES, Block Cipher Design Principles,

AES-Structure, Transformation functions, Key Expansion, Blowfish, CAST-128, IDEA, Block Cipher Modes of Operations.

**UNIT III: Number Theory & Asymmetric Key Cryptography**
**Objectives:** *Presents the basic principles of public key cryptography, Distinct uses of public key cryptosystems.*

**Number Theory:** Prime and Relatively Prime Numbers, Modular Arithmetic, Fermat's and Euler's Theorems, The Chinese Remainder theorem, Discrete logarithms.

**Public Key Cryptography**: Principles, public key cryptography algorithms, RSA Algorithms, Diffie Hellman Key Exchange, Elgamal encryption & decryption, Elliptic Curve Cryptography.

**UNIT IV : Cryptographic Hash Functions & Digital Signatures**

**Objectives:** *Present overview of the basic structure of cryptographic functions, Message Authentication Codes, Understand the operation of SHA-512, HMAC, Digital Signature*

Application of Cryptographic hash Functions, Requirements & Security, Secure Hash Algorithm, Message Authentication Functions, Requirements & Security, HMAC & CMAC. Digital Signatures, NIST Digital Signature Algorithm. Key management & distribution.

**UNIT V: User Authentication, Transport Layer Security & Email Security**

**Objectives:** Present an overview of techniques for remote user authentication, Kerberos, Summarize Web Security threats and Web traffic security approaches, overview of SSL & TLS. Present an overview of electronic mail security.

**User Authentication:** Remote user authentication principles, Kerberos
**Transport Level Security:** Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Shell(SSH)
**Electronic Mail Security:** Pretty Good Privacy (PGP) and S/MIME.

**UNIT VI: IP Security & Intrusion Detection Systems**
**Objectives:** Provide an overview of IP Security, concept of security association, Intrusion Detection Techniques

**IP Security:** IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

**Intrusion detection**: Overview, Approaches for IDS/IPS, Signature based IDS, Host based IDS/IPS. (TEXT BOOK 2)

**TEXT BOOKS:**

1. Cryptography & Network Security: Principles and Practices, William Stallings, PEA, Sixth edition.
2. Introduction to Computer Networks & Cyber Security, Chwan Hwa Wu, J.David Irwin, CRC press.
3. Hack Proofing your Network, Russell, Kaminsky, Forest Puppy, Wiley Dreamtech.

**REFERENCE BOOKS:**

1. Everyday Cryptography, Fundamental Principles & Applications, Keith Martin, Oxford.
2. Network Security & Cryptography, Bernard Menezes, Cengage, 2010.

**IV Year – I SEMESTER**

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## VLSI Laboratory

The students are required to design the schematic diagrams using CMOS logic and to draw the layout diagrams to perform the following experiments using CMOS 130nm Technology with necessary EDA tools (Mentor Graphics/Tanner).

**List of Experiments:**

1. Design and implementation of an inverter
2. Design and implementation of universal gates
3. Design and implementation of full adder
4. Design and implementation of full subtractor
5. Design and implementation of RS-latch
6. Design and implementation of D-latch
7. Design and implementation asynchronous counter
8. Design and Implementation of static RAM cell
9. Design and Implementation of differential amplifier
10. Design and Implementation of ring oscillator

**Equipment Required:**

1. Mentor Graphics/Tanner software-latest version
2. Personal computer with necessary peripherals.

**IV Year – I SEMESTER**

| T | P | C |
|---|---|---|
| 0 | 3 | 2 |

## MICROWAVE ENGINEERING LAB

**Minimum Twelve Experiments to be conducted:**

**Part – A (Any 7 Experiments) :**

1. Reflex Klystron Characteristics.
2. Gunn Diode Characteristics.
3. Attenuation Measurement.
4. Directional Coupler Characteristics.
5. VSWR Measurement.
6. Impedance and Frequency Measurement.
7. Waveguide parameters measurement.
8. Scattering parameters of Circulator.
9. Scattering parameters of Magic Tee.

**Part – B (Any 5 Experiments ) :**

10. Characterization of LED.
11. Characterization of Laser Diode.
12. Intensity modulation of Laser output through an optical fiber.
13. Measurement of Data rate for Digital Optical link.
14. Measurement of NA.
15. Measurement of losses for Analog Optical link.

**Equipment required for Laboratories:**

1. Regulated Klystron Power Supply
2. VSWR Meter -
3. Micro Ammeter - 0 – 500 μA
4. Multi meter
5. CRO
6. GUNN Power Supply, Pin Modulator
7. Reflex Klystron

8. Crystal Diodes
9. Micro wave components (Attenuation)
10. Frequency Meter
11. Slotted line carriage
12. Probe detector
13. wave guide shorts
14. Pyramidal Horn Antennas
15. Directional Coupler
16. E, H, Magic Tees
17. Circulators, Isolator
18. Matched Loads
19. Fiber Optic Analog Trainer based LED
20. Fiber Optic Analog Trainer based laser
21. Fiber Optic Digital Trainer
22. Fiber cables - (Plastic, Glass)

**IV Year – II SEMESTER**

| T | P | C |
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## CELLULAR AND MOBILE COMMUNICATIONS

**UNIT I**

**CELLULAR MOBILE RADIO SYSTEMS:** Introduction to Cellular Mobile System, Performance criteria, uniqueness of mobile radio environment, operation of cellular systems, Hexagonal shaped cells, Analog and Digital Cellular systems.

**ELEMENTS OF CELLULAR RADIO SYSTEM DESIGN :** General description of the problem, concept of frequency channels, Co-channel Interference Reduction Factor, desired C/I from a normal case in a Omni directional Antenna system, Cell splitting, consideration of the components of Cellular system.

**UNIT II**

**INTERFERENCE :** Introduction to Co-Channel Interference, real time Co-Channel interference, Co-Channel measurement, design of Antenna system, Antenna parameters and their effects, diversity receiver, non-cochannel interference-different types. **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 antenna height gain, form of a point to point model.

**UNIT III**

**CELL SITE AND MOBILE ANTENNAS :** Sum and difference patterns and their synthesis, omni directional antennas, directional antennas for interference reduction, space diversity antennas, umbrella pattern antennas, minimum separation of cell site antennas, high gain 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**

Handoff, dropped calls and cell splitting, types of handoff, handoff invitation, delaying handoff, forced handoff, mobile assigned handoff. Intersystem handoff, cell splitting, micro cells, vehicle locating methods, dropped call rates and their evaluation.

**UNIT VI**

**DIGITAL CELLULAR NETWORKS :** GSM architecture, GSM channels, multiplex access scheme, TDMA, CDMA.

**TEXTBOOKS :**

1. Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2rd Edn., 2006.
2. Principles of Mobile Communications – Gordon L. Stuber, Springer International 2nd Edition, 2007.

**REFERENCES :**

**1.** Wireless Communications - Theodore. S. Rapport, Pearson education, 2nd Edn., 2002.
**2.** Wireless and Mobile Communications – Lee McGraw Hills, 3rd Edition, 2006.
3. Mobile Cellular Communication – G Sasibhushana Rao Pearson
**3.** Wireless Communication and Networking – Jon W. Mark and Weihua Zhqung, PHI, 2005.
**4.** Wireless Communication Technology – R. Blake, Thompson Asia Pvt. Ltd., 2004.

**IV Year – II SEMESTER**

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## ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

### UNIT I

Performance characteristics of instruments, Static characteristics, Accuracy, Resolution, Precision, Expected value, Error, Sensitivity. Errors in Measurement, Dynamic Characteristics-speed of response, Fidelity, Lag and Dynamic error. DC Voltmeters- Multi-range, Range extension/Solid state and differential voltmeters, AC voltmeters- multi range, range extension, shunt. Thermocouple type RF ammeter, Ohmmeters series type, shunt type, Multi-meter for Voltage, Current and resistance measurements.

### UNIT II

Signal Generator- fixed and variable, AF oscillators, Standard and AF sine and square wave signal generators, Function Generators, Square pulse, Random noise, sweep, Arbitrary waveform. Wave Analyzers, Harmonic Distortion Analyzers, Spectrum Analyzers, Digital Fourier Analyzers.

### UNIT III

Oscilloscopes CRT features, vertical amplifiers, horizontal deflection system, sweep, trigger pulse, delay line, sync selector circuits, simple CRO, triggered sweep CRO, Dual beam CRO, . Dual trace oscilloscope, sampling oscilloscope, storage oscilloscope, digital readout oscilloscope, digital storage oscilloscope, Lissajous method of frequency measurement, standard specifications of CRO, probes for CRO- Active & Passive, attenuator type.

### UNIT IV

AC Bridges Measurement of inductance- Maxwell's bridge, Anderson bridge. Measurement of capacitance -Schearing Bridge. Wheat stone bridge. Wien Bridge, Errors and precautions in using bridges. Q-meter.

### UNIT V

Transducers- active & passive transducers : Resistance, Capacitance, inductance; Strain gauges, LVDT, Piezo Electric transducers, Resistance Thermometers, Thermocouples, Thermistors, Sensistors.

**UNIT VI**

Measurement of physical parameters force, pressure, velocity, humidity, moisture, speed, proximity and displacement. Data acquisition systems.

**TEXTBOOKS :**

1. Electronic instrumentation, second edition - H.S.Kalsi, Tata McGraw Hill, 2004.
2. Modern Electronic Instrumentation and Measurement Techniques – A.D. Helfrick and W.D. Cooper, PHI, 5th Edition, 2002.

**REFERENCES :**

1. Electronic Instrumentation & Measurements - David A. Bell, PHI, 2nd Edition, 2003.
2. Electronic Test Instruments, Analog and Digital Measurements - Robert A.Witte, Pearson Education, 2nd Ed., 2004.
3. Electronic Measurements & Instrumentations by K. Lal Kishore, Pearson Education - 2005.

**OUTCOMES**

The student will be able to

- Select the instrument to be used based on the requirements.
- Understand and analyze different signal generators and analyzers.
- Understand the design of oscilloscopes for different applications.
- Design different transducers for measurement of different parameters.

**IV Year – II SEMESTER**

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**ELECTIVE – III**

# SATELLITE COMMUNICATIONS

**UNIT I**

**INTRODUCTION :** Origin of Satellite Communications, Historical Background, Basic Concepts of Satellite Communications, Frequency allocations for Satellite Services, Applications, Future Trends of Satellite Communications.

**UNIT II**

**ORBITAL MECHANICS AND LAUNCHERS:** Orbital Mechanics, Look Angle determination, Orbital perturbations, Orbit determination, launches and launch vehicles, Orbital effects in communication systems performance.

**UNIT III**

**SATELLITE SUBSYSTEMS :** Attitude and orbit control system, telemetry, tracking, Command and monitoring, power systems, communication subsystems, Satellite antenna Equipment reliability and Space qualification.

**UNIT IV**

**SATELLITE LINK DESIGN :** Basic transmission theory, system noise temperature and G/T ratio, Design of down links, up link design, Design of satellite links for specified C/N, System design example.

**MULTIPLE ACCESS:** Frequency division multiple access (FDMA) Intermodulation, Calculation of C/N. Time division Multiple Access (TDMA) Frame structure, Examples. Satellite Switched TDMA Onboard processing, DAMA, Code Division Multiple access (CDMA),Spread spectrum transmission and reception.

**UNIT V**

**EARTH STATION TECHNOLOGY :** Introduction, Transmitters, Receivers, Antennas, Tracking systems, Terrestrial interface, Primary power test methods.

**LOW EARTH ORBIT AND GEO-STATIONARY SATELLITE SYSTEMS:** Orbit consideration, coverage and frequency considerations,

Delay & Throughput considerations, System considerations, Operational NGSO constellation Designs

**UNIT VI**

**SATELLITE NAVIGATION & THE GLOBAL POSITIONING SYSTEM [1] :** Radio and Satellite Navigation, GPS Position Location principles, GPS Receivers and codes, Satellite signal acquisition, GPS Navigation Message, GPS signal levels, GPS receiver operation, GPS C/A code accuracy, Differential GPS.

**TEXT BOOKS:**

1. Satellite Communications – Timothy Pratt, Charles Bostian and Jeremy Allnutt, WSE, Wiley Publications, 2nd Edition, 2003.
2. Satellite Communications Engineering – Wilbur L. Pritchard, Robert A Nelson and Henri G.Suyderhoud, 2nd Edition, Pearson Publications, 2003.

**REFERENCES :**

1. Satellite Communications : Design Principles – M. Richharia, BS Publications, 2nd Edition, 2003.
2. Satellite Communication - D.C Agarwal, Khanna Publications, 5th Ed.
3. Fundamentals of Satellite Communications – K.N. Raja Rao, PHI, 2004
4. Satellite Communications – Dennis Roddy, McGraw Hill, 2nd Edition, 1996.

# MIXED SIGNAL DESIGN

## (ELECTIVE – III)

**OBJECTIVES**

The student will be introduced to

- Understand the Switched capacitors Circuits and Operation and Analysis, PLLS.
- In this course, students can study Data Converter Fundamentals, Nyquist Rate A/D Converters.
- Another main object of this course is to motivate the graduate students to study and to analyze the Oversampling Converters and Continuous-Time Filters.
- The concepts of Continuous-Time Filters**,** CMOS Transconductors Using Triode and Active Transistors and MOSFET-C Filters.

**UNIT-I:**

**Switched Capacitor Circuits:** Introduction to Switched Capacitor circuits-basic building blocks, Operation and Analysis, Non-ideal effects in switched capacitor circuits, Switched capacitor integrators first order filters, Switch sharing, biquad filters.

**UNIT-II:**

**Phased Lock Loop (PLL):** Basic PLL topology, Dynamics of simple PLL, Charge pump PLLs-Lock acquisition, Phase/Frequency detector and charge pump, Basic charge pump PLL, Non-ideal effects in PLLs-PFD/CP non-idealities, Jitter in PLLs, Delay locked loops, applications.

**UNIT-III:**

**Data Converter Fundamentals:** DC and dynamic specifications, Quantization noise, Nyquist rate D/A converters- Decoder based converters, Binary-Scaled converters, Thermometer-code converters, Hybrid converters

**UNIT-IV:**

**Nyquist Rate A/D Converters:** Successive approximation converters, Flash converter, Two-step A/D converters, Interpolating A/D converters, Folding A/D converters, Pipelined A/D converters, Time-interleaved converters.

**UNIT-V:**

**Oversampling Converters:** Noise shaping modulators, Decimating filters and interpolating filters, Higher order modulators, Delta sigma modulators with multi-bit quantizers, Delta sigma D/A

**UNIT-VI:**

**Continuous-Time Filters:** Introduction to Gm-C Filters, Bipolar Transconductors, CMOS transconductors Using Triode and Active Transistors, BiCMOS Tran conductors, MOSFET-C Filters.

**Text Books:**

1. Design of Analog CMOS Integrated Circuits- Behzad Razavi, TMH Edition, 2002
2. Analog Integrated Circuit Design- David A. Johns,Ken Martin, Wiley Student Edition, 2013

**Reference Books:**

1. CMOS Mixed-Signal Circuit Design - R. Jacob Baker, Wiley Interscience, 2009.
2. CMOS Analog Circuit Design –Philip E. Allen and Douglas R. Holberg, Oxford University Press, International Second Edition/Indian Edition, 2010.

**OUTCOMES**

After going through this course the student will be able to

- Understand the concepts of Switched Capacitor circuits.
- Design and analysis of Nyquist Rate A/D Converters.
- Extend the Mixed Signal Design to Different Applications.
- Concepts of Oversampling Converters and Continuous-Time Filters.

# EMBEDDED SYSTEMS

**(ELECTIVE – III)**

**OBJECTIVES**

After going through this course the student will be able to

- Understand the building blocks of typical embedded system and different memory technology and memory types.
- Learn the characteristics of an embedded system, quality attributes of embedded systems, application specific and domain specific embedded system,
- Learn about communication devices and basics about VLSI and integrated circuit design and learn concept of firmware design approaches, ISR concept. Interrupt sources, interrupt servicing mechanism, multiple interrupts,
- Understand the concepts of c versus embedded c and compiler versus cross-compiler.
- Learn about the integrated development environment, software utility tool. Also learn about quality assurance and testing of the design, testing on host machine, simulators.

**Unit-I:**

**Introduction:** Embedded System-Definition, History, Classification, application areas and purpose of embedded systems, The typical embedded system-Core of the embedded system, Memory, Sensors and Actuators, Communication Interface, Embedded firmware, PCB and passive components. Characteristics, Quality attributes of an Embedded systems, Application-specific and Domain-Specific examples of an embedded system.

**Unit-II:**

**Embedded Hardware Design:** Analog and digital electronic components, I/O types and examples, Serial communication devices, Parallel device ports, Wireless devices, Timer and counting devices, Watchdog timer, Real time clock.

**Unit-III:**

**Embedded Firmware Design:** Embedded Firmware design approaches, Embedded Firmware development languages, ISR concept, Interrupt sources, Interrupt servicing mechanism, Multiple interrupts, DMA, Device driver programming, Concepts of C versus Embedded C and Compiler versus Cross-compiler.

**Unit-IV:**

**Real Time Operating System:** Operating system basics, Types of operating systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Threads, Processes and Scheduling, Task Scheduling, Communication, Synchronization, Device Drivers, How to choose an RTOS.

**Hardware Software Co-Design:** Fundamental Issues in Hardware Software Co-Design, Computational models in embedded design, Hardware software Trade-offs, Integration of Hardware and Firmware, ICE.

**Unit-V:**

**Embedded System Development:** The integrated development environment, Types of files generated on cross-compilation, Deassembler/Decompiler, Simulators, Emulators and Debugging, Target hardware debugging, Boundary Scan, Embedded Software development process and tools.

**Unit-VI:**

**Embedded System Implementation And Testing:** The main software utility tool, CAD and the hardware, Translation tools-Pre-processors, Interpreters, Compilers and Linkers, Debugging tools, Quality assurance and testing of the design, Testing on host machine, Simulators, Laboratory Tools.

**Text Books:**

1. Embedded Systems Architecture By Tammy Noergaard, Elsevier Publications, 2005
2. Embedded System Design, Frank Vahid, Tony Givargis, John Wiley Publications.

**References:**

1. Embedded Systems, Raj Kamal-Tata McGraw Hill Education Private Limited, Second Edition, 2008
2. Embedding system building blocks By Labrosse, CMP publishers.

**OUTCOMES**

After going through this course the student will be able to

- Know basics of embedded system, classification, memories, different communication interface and what embedded firmware is and its role in embedded system, different system components.
- Distinguish all communication devices in embedded system, other peripheral device.
- Distinguish concepts of C versus embedded C and compiler versus cross-compiler.
- Choose an operating system, and learn how to choose an RTOS

# RF CIRCUIT DESIGN

## (ELECTIVE – III)

**UNIT -I:**

**Introduction to RF Electronics:**

The Electromagnetic Spectrum, units and Physical Constants, Microwave bands – RF behavior of Passive components: Tuned resonant circuits, Vectors, Inductors and Capacitors - Voltage and Current in capacitor circuits – Tuned RF / IF Transformers.

**UNIT -II:**

**Transmission Line Analysis:** Examples of transmission lines- Transmission line equations and Biasing- Micro Strip Transmission Lines- Special Termination Conditions- sourced and Loaded Transmission Lines. **Single And Multiport Networks:** The Smith Chart, Interconnectivity networks, Network properties and Applications, Scattering Parameters.

**UNIT -III:**

**Matching and Biasing Networks:**

Impedance matching using discrete components – Micro strip line matching networks, Amplifier classes of Operation and Biasing networks.

**UNIT-IV**

**RF Passive & Active Components:** Filter Basics – Lumped filter design – Distributed Filter Design – Diplexer Filters- Crystal and Saw filters- Active Filters - Tunable filters – Power Combiners / Dividers – Directional Couplers – Hybrid Couplers – Isolators. RF Diodes – BJTs- FETs- HEMTs and Models.

**UNIT -V:**

**RF Transistor Amplifier Design:** Characteristics of Amplifiers - Amplifier Circuit Configurations, Amplifier Matching Basics, Distortion and noise products, Stability Considerations, Small Signal amplifier design, Power amplifier design, MMIC amplifiers, Broadband High Power multistage amplifiers, Low noise amplifiers, VGA Amplifiers.

**UNIT -VI:**

**Oscillators:** Oscillator basics, Low phase noise oscillator design, High frequency Oscillator configuration, LC Oscillators, VCOs, Crystal Oscillators, PLL Synthesizer, and Direct Digital Synthesizer. **RF Mixers:**

Basic characteristics of a mixer - Active mixers- Image Reject and Harmonic mixers, Frequency domain considerations.

**TEXT BOOKS:**

1. RF Circuit design: Theory and applications by Reinhold Ludwing, Pavel Bretchko. Pearson Education Asia Publication, New Delhi 2001.
2. Radio Frequency and Microwave Communication Circuits – Analysis and Design – Devendra K. Misra, Wiley Student Edition, John Wiley & Sons

**REFERENCE BOOKS:**

1. Radio frequency and Microwave Electronics - Mathew M.Radmangh, 2001, PE Asia Publ.
2. RF Circuit Design – Christopher Bowick, Cheryl Aljuni and John Biyler, Elsevier Science, 2008.
3. Secrets of RF Design - Joseph Carr., 3rd Edition, Tab Electronics.
4. Complete Wireless Design - Cotter W. Sawyer, 2nd Edition, Mc-Graw Hill.
5. Practical RF Circuit Design for Modem Wireless Systems Vol.2 -Less Besser and Rowan Gilmore.

# Cloud Computing
## (ELECTIVE – III)

**Course Objectives:** The student will learn about the cloud environment, building software systems and components that scale to millions of users in modern internet, cloud concepts capabilities across the various cloud service models including Iaas, Paas, Saas, and developing cloud based software applications on top of cloud platforms.

**Course Outcomes:**

1. Understanding the key dimensions of the challenge of Cloud Computing.
2. Assessment of the economics , financial, and technological implications for selecting cloud computing for own organization.
3. Assessing the financial, technological, and organizational capacity of employer's for actively initiating and installing cloud-based applications.
4. Assessment of own organizations' needs for capacity building and training in cloud computing-related IT areas.

**Syllabus:**

**UNIT I: Systems modeling, Clustering and virtualization:**

Scalable Computing over the Internet, Technologies for Network based systems, System models for Distributed and Cloud Computing, Software environments for distributed systems and clouds, Performance, Security And Energy Efficiency.

**UNIT II: Virtual Machines and Virtualization of Clusters and Data Centers:**

Implementation Levels of Virtualization, Virtualization Structures/ Tools and mechanisms, Virtualization of CPU, Memory and I/O Devices, Virtual Clusters and Resource Management, Virtualization for Data Center Automation.

**UNIT III: Cloud Platform Architecture:**

Cloud Computing and service Models, Architectural Design of Compute and Storage Clouds, Public Cloud Platforms, Inter Cloud Resource Management, Cloud Security and Trust Management. Service Oriented Architecture, Message Oriented Middleware.

**UNIT IV: Cloud Programming and Software Environments:**

Features of Cloud and Grid Platforms, Parallel & Distributed Programming Paradigms, Programming Support of Google App Engine, Programming on Amazon AWS and Microsoft Azure, Emerging Cloud Software Environments.

**UNIT V: Cloud Resource Management and Scheduling:**

Policies and Mechanisms for Resource Management Applications of Control Theory to Task Scheduling on a Cloud, Stability of a Two Level Resource Allocation Architecture, Feedback Control Based on Dynamic Thresholds. Coordination of Specialized Autonomic Performance Managers, Resource Bundling, Scheduling Algorithms for Computing Clouds, Fair Queuing, Start Time Fair Queuing, Borrowed Virtual Time, Cloud Scheduling Subject to Deadlines, Scheduling Map Reduce Applications Subject to Deadlines.

**UNIT VI:**

**Storage Systems:** Evolution of storage technology, storage models, file systems and database, distributed file systems, general parallel file systems. Google file system., Apache Hadoop, Big Table, Megastore, Amazon Simple Storage Service (S3) .

**TEXT BOOKS:**

1. Distributed and Cloud Computing, Kai Hwang, Geoffry C. Fox, Jack J. Dongarra MK Elsevier.
2. Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier.
3. Cloud Computing, A Hands on approach, Arshadeep Bahga, Vijay Madisetti, University Press.

**REFERNCE BOOK:**

1. Cloud Computing, A Practical Approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter, TMH.
2. Mastering Cloud Computing, Foundations and Application Programming, Raj Kumar Buyya, Christen vecctiola, S Tammarai selvi, TMH.

**IV Year – II SEMESTER**

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**ELECTIVE - IV**

# WIRELESS SENSORS AND NETWORKS

**UNIT I**

**OVERVIEW OF WIRELESS SENSOR NETWORKS:**

Key definitions of sensor networks, Advantages of sensor Networks, Unique constraints an challenges, Driving Applications, Enabling Technologies for Wireless Sensor Networks.

**ARCHITECTURES**:

Single-Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes, Operating Systems and Execution Environments, Network Architecture -Sensor Network Scenarios, Optimization Goals and Figures of Merit, Gateway Concepts.

**UNIT II**

**NETWORKING Technologies**:

Physical Layer and Transceiver Design Considerations, Personal area networks (PANs), hidden node and exposed node problem, Topologies of PANs, MANETs, WANETs.

**UNIT-III**

**MAC Protocols for Wireless Sensor Networks**:

Issues in Designing a MAC protocol for Ad Hoc Wireless Networks, Design goals of a MAC Protocol for Ad Hoc Wireless Networks, Classifications of MAC Protocols, Contention - Based Protocols, Contention - Based Protocols with reservation Mechanisms, Contention – Based MAC Protocols with Scheduling Mechanisms, MAC Protocols that use Directional Antennas, Other MAC Protocols.

**UNIT-IV**

**ROUTING PROTOCOLS**:

Introduction, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classification of Routing Protocols, Table –Driven Routing Protocols, On – Demand Routing Protocols, Hybrid Routing Protocols, Routing Protocols with Efficient Flooding Mechanisms, Hierarchical Routing Protocols, Power – Aware Routing Protocols, Proactive Routing.

**UNIT-V**

**TRANSPORT LAYER AND SECURITY PROTOCOLS**:

Introduction, Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks, Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer Solutions, TCP Over Ad Hoc Wireless Networks, Other Transport Layer Protocol for Ad Hoc Wireless Networks.

**UNIT- VI**

**SECURITY IN WSNs**:

Security in Ad Hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Key Management, Secure Routing in Ad Hoc Wireless Networks.

**SENSOR NETWORK PLATFORMS AND TOOLS**:

Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node-level software platforms, Node-level Simulators, State-centric programming.

**APPLICATIONS of WSN:**

**S** Ultra wide band radio communication, Wireless fidelity systems. Future directions, Home automation, smart metering Applications.

**TEXT BOOKS:**

1. Ad Hoc Wireless Networks: Architectures and Protocols - C. Siva Ram Murthy and B.S.Manoj, 2004, PHI
2. Wireless Ad- hoc and Sensor Networks: Protocols, Performance and Control – Jagannathan Sarangapani, CRC Press
3. Holger Karl & Andreas Willig, “Protocols And Architectures for Wireless Sensor Networks", John Wiley, 2005.

**REFERENCES:**

1. . Kazem Sohraby, Daniel Minoli, & Taieb Znati, “Wireless Sensor Networks- Technology, Protocols, and Applications”, John Wiley, 2007.
2. Feng Zhao & Leonidas J. Guibas, “Wireless Sensor Networks- An Information Processing Approach", Elsevier, 2007.
3. Ad- Hoc Mobile Wireless Networks: Protocols & Systems, C.K. Toh ,1 ed. Pearson Education.
4. Wireless Sensor Networks - C. S. Raghavendra, Krishna M. Sivalingam, 2004, Springer.
5. Wireless Sensor Networks – S Anandamurugan , Lakshmi Publications

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# SYSTEM ON CHIP

## (ELECTIVE - IV)

**OBJECTIVES**

After going through this course the student will be able to

- Understand the System Architecture and Processor Architecture, approach for a SOC Design.
- Learn the, Basic concepts in Processor Micro Architecture, and Learn Different Types of Processors like VLIW Processors, Superscalar Processors etc.
- Learn about SOC external memory, Scratchpads and Cache memory and Multilevel Caches.
- Learn the SOC Design approach, Design and evaluation, Applications Like Image compression etc…

**UNIT-I:**

**Introduction to the System Approach:** System Architecture, Components of the system, Hardware & Software, Processor Architectures, Memory and Addressing. System level interconnection, an approach for SOC Design, System Architecture and Complexity.

**UNIT-II:**

**Processors :** Introduction , Processor Selection for SOC, Basic concepts in Processor Architecture, Micro Architecture, Basic elements in Instruction handling. Buffers: minimizing Pipeline Delays, Branches, More Robust Processors, Vector Processors and Vector Instructions extensions, VLIW Processors, Superscalar Processors.

**UNIT-III:**

**Memory Design for SOC:** Overview of SOC external memory, Internal Memory, Size, Scratchpads and Cache memory, Cache Organization, Cache data, Write Policies, Strategies for line replacement at miss time, Types of Cache, Split – I, and D – Caches, Multilevel Caches, Virtual to real translation , SOC Memory System, Models of Simple Processor – memory interaction.

**UNIT-IV:**

**Interconnect Customization and Configuration:** Inter Connect Architectures, Bus: Basic Architectures, SOC Standard Buses, Analytic Bus Models, Using the Bus model, Effects of Bus transactions and contention time. SOC Customization: An overview, Customizing Instruction Processor

**UNIT-V:**

**Interconnect Configuration:** Reconfiguration Technologies, Mapping design onto Reconfigurable devices, Instance- Specific design, Customizable Soft Processor, Reconfiguration - overhead analysis and trade-off analysis on reconfigurable Parallelism.

**UNIT-VI:**

**Application Studies / Case Studies:** SOC Design approach, AES algorithms, Design and evaluation, Image compression – JPEG compression.

**Text Books:**

1. Computer System Design System-on-Chip - Michael J. Flynn and Wayne Luk, Wiely India Pvt. Ltd.
2. Design of System on a Chip: Devices and Components – Ricardo Reis, 1st Ed., 2004, Springer

**Reference Books:**

1. ARM System on Chip Architecture – Steve Furber –2nd Ed., 2000, Addison Wesley Professional.
2. System on Chip Verification – Methodologies and Techniques – Prakash Rashinkar, Peter Paterson and Leena Singh L, 2001, Kluwer Academic Publishers.

**OUTCOMES**

After going through this course the student will be able to

- Know basics of System Architecture and Processor Architecture.
- Know different Types of Processors Like VLIW Processors, Superscalar Processors etc. and Basic concepts in Processor Micro Architecture.
- Distinguish Cache memory and Multilevel Caches, SOC external memory.
- Know the Concept of Inter Connect Architectures, SOC Standard Buses and Reconfiguration Technologies.

# LOW POWER VLSI DESIGN
## (ELECTIVE - IV)

**OBJECTIVES**

- The student will be able to understand the Fundamentals of Low Power VLSI Design.
- In this course, students can study low-Power Design Approaches, Power estimation and analysis.
- Another main object of this course is to motivate the graduate students to study and to analyze the Low-Voltage Low-Power Adders, Multipliers.
- The concepts of Low-Voltage Low-Power Memories and Future Trend and Development of DRAM.

**UNIT-I:**

**Fundamentals of Low Power VLSI Design:** Need for Low Power Circuit Design, Sources of Power Dissipation – Switching Power Dissipation, Short Circuit Power Dissipation, Leakage Power Dissipation, Glitching Power Dissipation, Short Channel Effects –Drain Induced Barrier Lowering and Punch Through, Surface Scattering, Velocity Saturation, Impact Ionization, Hot Electron Effect.

**UNIT-II:**

**Low-Power Design Approaches:**

**Low-Power Design through Voltage Scaling:** VTCMOS circuits, MTCMOS circuits, Architectural Level Approach –Pipelining and Parallel Processing Approaches.

**Switched Capacitance Minimization Approaches:** System Level Measures, Circuit Level Measures, Mask level Measures.

**UNIT-III:**

**Power estimation and analysis:** SPICE circuit simulators, gate level logic simulation, capacitive power estimation, static state power and gate level capacitance estimation.

**UNIT-IV:**

**Low-Voltage Low-Power Adders:** Introduction, Standard Adder Cells, CMOS Adder's Architectures – Ripple Carry Adders, Carry Look-Ahead Adders, Carry Select Adders, Carry Save Adders, Low-Voltage Low-Power

Design Techniques –Trends of Technology and Power Supply Voltage, Low-Voltage Low-Power Logic Styles.

**UNIT-V:**

**Low-Voltage Low-Power Multipliers** Introduction, Overview of Multiplication, Types of Multiplier Architectures, Braun Multiplier, Baugh-Wooley Multiplier, Booth Multiplier, Introduction to Wallace Tree Multiplier.

**UNIT-VI:**

**Low-Voltage Low-Power Memories:** Basics of ROM, Low-Power ROM Technology, Future Trend and Development of ROMs, Basics of SRAM, Memory Cell, Precharge and Equalization Circuit, Low-Power SRAM Technologies, Basics of DRAM, Self-Refresh Circuit, Future Trend and Development of DRAM.

**Text Books:**

1. Low-Voltage, Low-Power VLSI Subsystems – Kiat-Seng Yeo, Kaushik Roy, TMH Professional Engineering.

**Reference Books:**

1. Low Power CMOS VLSI Circuit Design – Kaushik Roy, Sharat C. Prasad, John Wiley & Sons, 2000.
2. Practical Low Power Digital VLSI Design – Gary K. Yeap, Kluwer Academic Press, 2002.

**OUTCOMES**

After going through this course the student will be able to

- Understand the concepts of Low-Power Design Approaches.
- Design and analysis of Low-Voltage Low-Power Circuits.
- Extend the Low Power Design to Different Applications.
- Understand of Low-Voltage Low-Power Memories and Basics of DRAM.

# BIO-MEDICAL INSTRUMENTATION

## (ELECTIVE - IV)

**UNIT-I**

**Sources of Bioelectric potentials and Electrodes:** Resisting and Action Potentials, Propagation of Action Potentials, The Bioelectric Potentials. Electrodes: Electrode theory, Bio Potential Electrodes, Biochemical Transducers, introduction to bio-medical signals.

**UNIT-II**

**The Cardiovascular System:** The Heart and Cardiovascular System, The Heart, Blood Pressure, Characteristics of Blood Flow, Heart Sounds, Cardio Vascular Measurements, Electrocardiography, Measurement of Blood Pressure, Measurement of Blood Flow and Cardiac output, Plethysmography, Measurement of Heart Sounds, Event detection, PQRS & T-Waves in ECG, the first & second Heart beats, ECG rhythm analysis, the di-crotic notch in the carotid pulse detection of events and waves, analysis of exercise ECG, analysis of event related potentials, correlation analysis of EEG channels, correlation of muscular contraction.

**UNIT- III**

**Patient Care & Monitory and Measurements in Respiratory System:** The elements of Intensive Care Monitory, Diagnosis, Calibration and reparability of Patient Monitoring equipment, other instrumentation for monitoring patients, pace makers, defibrillators, the physiology of respiratory system, tests and instrumentation for mechanics of breathing, respiratory theory equipment, analysis of respiration.

**UNIT-IV**

Bio telemetry and Instrumentation for the clinical laboratory Introduction to bio telemetry, Physiological parameters adaptable to bio telemetry, the components of bio telemetry system, implantable units, applications of telemetry in patient care – The blood, tests on blood cells, chemical test, automation of chemical tests.

**UNIT-V**

**X-ray and radioisotope instrumentation and electrical safety of medical equipment:** Generation of Ionizing radiation, instrumentation for diagnostic X-rays, special techniques, instrumentation for the medical use of

radioisotopes, radiation therapy - Physiological effects of electrical current, shock Hazards from electrical equipment, Methods of accident prevention.

**UNIT-VI**

Modern Imaging Systems: Tomography, Magnetic resonance Imaging System, Ultrasonic Imaging System, Medical Thermography.

**TEXT BOOK:**

1. Biomedical Instrumentation and Measurements – C. Cromwell, F.J. Weibell, E.A.Pfeiffer – Pearson education.
2. Biomedical signal analysis – Rangaraj, M. Rangayya – Wiley Inter science – John willey & Sons Inc.

**Reference:**

1. Hand Book of Bio-Medical Instrumentation – R.S. Khandpur, (TMH)
2. Introduction to Bio-Medical Engineering – Domach, (Pearson)
3. Introduction to Bio-Medical Equipment Technology – Cart, (Pearson)

# EMI / EMC

**Pre requisites: EMTL and AWP Courses.**

**Objectives:**

- Student shall be able to understand the root causes for Electromagnetic Noise (EMI), its sources.
- Shall be able to understand the effects of EMI and the required precautions to be taken/to be discussed with his peer group.
- Shall be able to understand the different measurement techniques of EMI (for conducted and normal) and their influences in detail.
- Shall be able to understand different compatibility techniques (EMC) to reduce/suppress EMI.
- Shall be able to understand different standards being followed across the world in the fields of EMI/EMC.

**UNIT-I**:**Natural and Nuclear sources of EMI / EMC** : Introduction, Electromagnetic environment, History, Concepts, Practical experiences and concerns, frequency spectrum conservations. An overview of EMI / EMC, Natural and Nuclear sources of EMI.

**UNIT-II: EMI from apparatus, circuits and open area test sites** : Electromagnetic emissions, noise from relays and switches, non-linearities in circuits, passive inter modulation, cross talk in transmission lines, transients in power supply lines, electromagnetic interference (EMI). Open area test sites and measurements.

**UNIT-III: Radiated and conducted interference measurements**: Anechoic chamber, TEM cell, GH TEM Cell, characterization of conduction currents / voltages, conducted EM noise on power lines, conducted EMI from equipment, Immunity to conducted EMI detectors and measurements.

**UNIT-IV:ESD, Grounding, shielding, bonding and EMI filters** : Principles and types of grounding, shielding and bonding, characterization of filters, power lines filter design. ESD, Electrical fast transients / bursts, electrical surges.

**UNIT-V: Cables, connectors, components**: Introduction, EMI suppression cables, EMC connectors, EMC gaskets, Isolation transformers, opto-isolators, Transient and Surge Suppression Devices.

**UNIT-VI: EMC standards- National / International** .: Introduction, Standards for EMI and EMC, MIL-Standards, IEEE/ANSI standards, CISPR/IEC standards, FCC regulations, Euro norms, British Standards, EMI/EMC standards in JAPAN, Conclusions.

**Text Books :**

1. Engineering Electromagnetic Compatibility by **Dr. V.P. Kodali, IEEE Publication**, Printed in India by ***S. Chand & Co. Ltd., New Delhi, 2000***.
2. Electromagnetic Interference and Compatibility **IMPACT series, IIT – Delhi, Modules 1 – 9**.

**References** :

**1.** Introduction to Electromagnetic Compatibility, NY, **John Wiley, 1992, by C.R. Pal.**

***Outcomes-***

At the end of this Course

- Students shall be able to distinguish effects of EMI and counter measures by EMC-techniques.
- Students shall apply the knowledge gained in selecting proper gadget/device/appliance/system, as per EMC- norms specified by regulating authorities.
- Students shall choose career in the fields of EMI/EMC as an Engineer/Researcher/Entrepreneur in India/abroad.

**IV Year – II SEMESTER**

| T | P | C |
|---|---|---|
| 0 | 0 | 9 |

**Project & Seminar**

# ACADEMIC REGULATIONS
# COURSE STRUCTURE
# AND
# DETAILED SYLLABUS

**COMPUTER SCIENCE AND ENGINEERING**

**For**

COMPUTER SCIENCE AND ENGINEERING FOUR DEGREE COURSE

*(Applicable for batches admitted from 2013-2014)*

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA**

**KAKINADA - 533 003, Andhra Pradesh, India**

# COURSE STRUCTURE

**I Year – I SEMESTER**

| S. No. | Subject | T | P | Credits |
|---|---|---|---|---|
| 1 | English – I | 3+1 | -- | 3 |
| 2 | Mathematics - I | 3+1 | -- | 3 |
| 3 | Engineering Chemistry | 3+1 | -- | 3 |
| 4 | Engineering Mechanics | 3+1 | -- | 3 |
| 5 | Computer Programming | 3+1 | -- | 3 |
| 6 | Environmental Studies | 3+1 | -- | 3 |
| 7 | Engineering Chemistry Laboratory | -- | 3 | 2 |
| 8 | English - Communication Skills Lab - I | -- | 3 | 2 |
| 9 | C Programming Lab | -- | 3 | 2 |
| **Total Credits** | | | | **24** |

**I Year – II SEMESTER**

| S. No. | Subject | T | P | Credits |
|---|---|---|---|---|
| 1 | English – II | 3+1 | -- | 3 |
| 2 | Mathematics – II (Mathematical Methods) | 3+1 | -- | 3 |
| 3 | Mathematics – III | 3+1 | -- | 3 |
| 4 | Engineering Physics | 3+1 | -- | 3 |
| 5 | Professional Ethics and Human Values | 3+1 | -- | 3 |
| 6 | Engineering Drawing | 3+1 | -- | 3 |
| 7 | English - Communication Skills Lab - II | -- | 3 | 2 |
| 8 | Engineering Physics Lab | -- | 3 | 2 |
| 9 | Engineering Physics – Virtual Labs - Assignments | -- | 2 | -- |
| 10 | Engg.Workshop & IT Workshop | -- | 3 | 2 |
| **Total Credits** | | | | **24** |

**II Year – I SEMESTER**

| S. No. | Subject | T | P | Credits |
|---|---|---|---|---|
| 1 | Managerial Economics and Financial Analysis | 4 | -- | 3 |
| 2 | Object Oriented Programming through C++ | 4 | -- | 3 |
| 3 | Mathematical Foundations of Computer Science | 4 | -- | 3 |
| 4 | Digital Logic Design | 4 | -- | 3 |
| 5 | Data Structures | 4 | -- | 3 |
| 6 | Object Oriented Programming Lab | -- | 3 | 2 |
| 7 | Data Structures Lab | -- | 3 | 2 |
| 8 | Digital Logic Design Lab | -- | 3 | 2 |
| 9 | Seminar | -- | -- | 1 |
| **Total Credits** | | | | **22** |

**II Year – II SEMESTER**

| S. No. | Subject | T | P | Credits |
|---|---|---|---|---|
| 1 | Probability and statistics | 4 | -- | 3 |
| 2 | Java Programming | 4 | -- | 3 |
| 3 | Advanced Data Structures | 4 | -- | 3 |
| 4 | Computer Organization | 4 | -- | 3 |
| 5 | Formal Languages and Automata Theory | 4 | -- | 3 |
| 6 | Advanced Data Structures Lab | -- | 3 | 2 |
| 7 | Java Programming Lab | -- | 3 | 2 |
| 8 | Free Open Source Software(FOSS) Lab | -- | 3 | 2 |
| **Total Credits** | | | | **21** |

**III Year – I SEMESTER**

| S. No. | Subject | T | P | Credits |
|---|---|---|---|---|
| 1 | Compiler Design | 4 | - | 3 |
| 2 | Data Communication | 4 | - | 3 |
| 3 | Principles of Programming Languages | 4 | - | 3 |
| 4 | Database Management Systems | 4 | - | 3 |
| 5 | Operating Systems | 4 | - | 3 |
| 6 | Compiler Design Lab | - | 3 | 2 |
| 7 | Operating System Lab | - | 3 | 2 |
| 8 | Database Management Systems Lab | | 3 | 2 |
| 9 | Linux Programming Lab | - | 3 | 2 |
| 10 | IPR and Patents- 1 | 2 | - | - |
| 11 | Seminar | -- | -- | 1 |
| **Total Credits** | | | | **24** |

**III Year – II SEMESTER**

| S. No. | Subject | T | P | Credits |
|---|---|---|---|---|
| 1 | Computer Networks | 4 | - | 3 |
| 2 | Data Ware housing and Mining | 4 | - | 3 |
| 3 | Design and Analysis of Algorithms | 4 | - | 3 |
| 4 | Software Engineering | 4 | - | 3 |
| 5 | Web Technologies | 4 | - | 3 |
| 6 | Computer Networks Lab | - | 3 | 2 |
| 7 | Software Engineering Lab | - | 3 | 2 |
| 8 | Web Technologies Lab | - | 3 | 2 |
| 9 | IPR and Patents- II | 2 | -- | -- |
| **Total Credits** | | | | **21** |

**IV Year – I SEMESTER**

| S. No. | Subject | T | P | Credits |
|---|---|---|---|---|
| 1 | Cryptography and Network Security | 4 | - | 3 |
| 2 | UML & Design Patterns | 4 | - | 3 |
| 3 | Mobile Computing | 4 | - | 3 |
| 4 | **Elective –I** | 4 | - | 3 |
| 5 | **Elective – II** | 4 | - | 3 |
| 6 | UML & Design Patterns Lab | - | 3 | 2 |
| 7 | Mobile Application Development Lab | - | 3 | 2 |

| | | | | |
|---|---|---|---|---|
| 8 | Software Testing Lab | - | 3 | 2 |
| 9 | Hadoop & BigData Lab | - | 3 | 2 |
| **Total Credits** | | | | **23** |

**IV Year – II SEMESTER**

| S. No. | Subject | T | P | Credits |
|---|---|---|---|---|
| 1 | **Elective – III** | 4 | - | 3 |
| 2 | **Elective – IV** | 4 | - | 3 |
| 3 | Distributed Systems | 4 | - | 3 |
| 4 | Management Science | 4 | - | 3 |
| 5 | Project | - | - | 9 |
| **Total Credits** | | | | **21** |

Elective – I:
i) Software Testing Methodologies
ii) Simulation Modeling
iii) Information Retrieval Systems
iv) Artificial Intelligence
v) Multimedia Computing
vi) High Performance Computing

Elective – II:
i. Digital Forensics
ii. Hadoop and Big Data
iii. Software Project Management
iv. Machine Learning
v. Advanced Databases

Elective – III:
i) Human Computer Interaction
ii) Advanced Operating Systems
iii) Mobile Adhoc & Sensor Networks
iv) Pattern Recognition
v) Digital Image Processing
vi) Micro processers and Multi Core Systems

Elective-IV:
i) Embedded and Real Time Systems
ii) Neural Networks & Soft Computing
iii) Social Networks and the Semantic Web
iv)Cloud Computing

# SYLLABUS

**I Year – I SEMESTER**

| T | P | C |
|---|---|---|
| 3+1 | 0 | 3 |

**ENGLISH –I**
**(Common to All Branches)**

**DETAILED TEXT-I English Essentials: Recommended Topics:**

1. **IN LONDON: M.K.GANDHI**
   **OBJECTIVE:** To apprise the learner how Gandhi spent a period of three years in London as a student.
   **OUTCOME**: The learner will understand how Gandhi grew in introspection and maturity.
2. **THE KNOWLEDGE SOCIETY- APJ KALAM**
   **OBJECTIVE**: To make the learners rediscover India as a land of Knowledge.
   **OUTCOME:** The learners will achieve a higher quality of life, strength and sovereignty of a developed nation.
3. **THE SCIENTIFIC POINT OF VIEW- J.B.S. HALDANE**
   **OBJECTIVE**: This essay discusses how scientific point of view seeks to arrive at the truth without being biased by emotion.
   **OUTCOME:** This develops in the student the scientific attitude to solve many problems which we find difficult to tackle.
4. **PRINCIPLES OF GOOD WRITING:**
   **OBJECTIVE**: To inform the learners how to write clearly and logically.
   **OUTCOME**: The learner will be able to think clearly and logically and write clearly and logically.
5. **MAN'S PERIL**
   **OBJECTIVE**: To inform the learner that all men are in peril.
   **OUTCOME:** The learner will understand that all men can come together and avert the peril.
6. **THE DYING SUN—SIR JAMES JEANS**
   **OBJECTIVE**: This excerpt from the book "The Mysterious Universe" presents the mysterious nature of the Universe and the stars which present numerous problems to the scientific mind. Sir James Jeans uses a poetic approach to discuss the scientific phenomena.
   **OUTCOME**: This provides the students to think about the scientific phenomena from a different angle and also exposes the readers to poetic expressions.
7. **LUCK—MARK TWAIN**
   **OBJECTIVE:** This is a short story about a man's public image and his true nature. The theme of the story is that luck can be a factor of life, so that even if one is incompetent but lucky, one can still succeed.
   **OUTCOME**: The story is humourous in that it contains a lot of irony. Thus this develops in the learner understand humourous texts and use of words for irony.

**Text Book:** 'English Essentials' by Ravindra Publications

**NON-DETAILED TEXT:**

**(From Modern Trailblazers of Orient Blackswan)**
**(Common single Text book for two semesters)**
**(Semester I (1 to 4 lessons)/ Semester II (5 to 8 lessons)**

1. **G.D.Naidu**
   **OBJECTIVE:** To inspire the learners by G.D.Naidu's example of inventions and contributions.
   **OUTCOME:** The learner will be in a position to emulate G.D.Naidu and take to practical applications.
2. **G.R.Gopinath**
   **OBJECTIVE:** To inspire the learners by his example of inventions.
   **OUTCOME:** Like G.R.Gopinath, the learners will be able to achieve much at a low cost and help the common man.
3. **Sudhamurthy**
   **OBJECTIVE:** To inspire the learners by the unique interests and contributions of Sudha Murthy.
   **OUTCOME:** The learner will take interest in multiple fields of knowledge and make life worthwhile through social service.
4. **Vijay Bhatkar**
   **OBJECTIVE:** To inspire the learner by his work and studies in different fields of engineering and science.
   **OUTCOME:** The learner will emulate him and produce memorable things.

**Text Book:** 'Trail Blazers' by Orient Black Swan Pvt. Ltd. Publishers

**I Year – I SEMESTER**

| T | P | C |
|---|---|---|
| 3+1 | 0 | 3 |

# MATHEMATICS – I (DIFFERENTIAL EQUATIONS)
## (Common to All Branches)

**UNIT I: Differential equations of first order and first degree:**
Linear-Bernoulli-Exact-Reducible to exact.
Applications: Newton's Law of cooling-Law of natural growth and decay-orthogonal trajectories.
Subject Category
ABET Learning Objectives a d e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

**UNIT II: Linear differential equations of higher order:**
Non-homogeneous equations of higher order with constant coefficients with RHS term of the type $e^{ax}$ , Sin ax, cos ax, polynomials in x, $e^{ax}$ V(x), xV(x).
Applications: LCR circuit, Simple Harmonic motion
Subject Category
ABET Learning Objectives a d e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

**UNIT III Laplace transforms:**
Laplace transforms of standard functions-ShiftingTheorems, Transforms of derivatives and integrals – Unit step function –Dirac's delta function- Inverse Laplace transforms– Convolution theorem (with out proof).
Application: Solutions of ordinary differential equations using Laplace transforms.
Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

**UNIT IV Partial differentiation:**
Introduction- Total derivative-Chain rule-Generalized Mean Value theorem for single variable (without proof)-Taylors and Mc Laurent's series for two variables– Functional dependence- Jacobian.
Applications: Maxima and Minima of functions of two variables with constraints and without constraints.
Subject Category
ABET Learning Objectives a c e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

**UNIT V First order Partial differential equations:**
Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions –solutions of first order linear (Lagrange) equation and nonlinear (standard type) equations
Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

**UNIT VI Higher order Partial differential equations:**
Solutions of Linear Partial differential equations with constant coefficients- Method of separation of Variables
Applications: One- dimensional Wave, Heat equations - two-dimensional Laplace Equation.
Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 6
JNTUK External Evaluation B E

**Books:**


1. **B.S.GREWAL,** Higher Engineering Mathematics, 42nd Edition, Khanna Publishers
2. **ERWIN KREYSZIG,** Advanced Engineering Mathematics, 9th Edition, Wiley-India
3. **GREENBERG,** Advanced Engineering Mathematics, 2nd edition, Pearson edn
4. **DEAN G. DUFFY,** Advanced engineering mathematics with MATLAB, CRC Press
5. **PETER O'NEIL,** advanced Engineering Mathematics, Cengage Learning.


| Subject Category | ABET Learning Objectives | ABET Internal Assessments | JNTUK External Evaluation | Remarks |
|---|---|---|---|---|
| Theory<br>Design<br>Analysis<br>Algorithms<br>Drawing<br>Others | a) Apply knowledge of math, science, & engineering<br>b) Design & conduct experiments, analyze & interpret data<br>c) Design a system/process to meet desired needs within economic, social, political, ethical, health/safety, manufacturability, & sustainability constraints<br>d) Function on multidisciplinary teams<br>e) Identify, formulate, & solve engineering problems<br>f) Understand professional & ethical responsibilities<br>g) Communicate effectively<br>h) Understand impact of engineering solutions in global, economic, environmental, & societal context<br>i) Recognize need for & be able to engage in lifelong learning<br>j) Know contemporary issues<br>k) Use techniques, skills, modern tools for engineering practices | 1. Objective tests<br>2. Essay questions tests<br>3. Peer tutoring based<br>4. Simulation based<br>5. Design oriented<br>6. Problem based<br>7. Experiential (project based) based<br>8. Lab work or field work based<br>9. Presentation based<br>10. Case Studies based<br>11. Role-play based<br>12. Portfolio based | A. Questions should have:<br>B. Definitions, Principle of operation or philosophy of concept.<br>C. Mathematical treatment, derivations, analysis, synthesis, numerical problems with inference.<br>D. Design oriented problems<br>E. Trouble shooting type of questions<br>F. Applications related questions<br>G. Brain storming questions | |

**I Year – I SEMESTER**

| T | P | C |
|---|---|---|
| 3+1 | 0 | 3 |

# ENGINEERING CHEMISTRY

## UNIT-I: WATER TECHNOLOGY

Hard Water – Estimation of hardness by EDTA method – Potable water- Sterilization and Disinfection – Boiler feed water – Boiler troubles – Priming and foaming , scale formation, corrosion, caustic embrittlement, turbine deposits – Softening of water – Lime soda, Zeolite processes – Reverse osmosis – Electro Dialysis, Ion exchange process

**Objectives :** For prospective engineers knowledge about water used in industries (boilers etc.) and for drinking purposes is useful; hence chemistry of hard water, boiler troubles and modern methods of softening hard water is introduced.

## UNIT-II : ELECTROCHEMISTRY

Concept of Ionic conductance – Ionic Mobilities – Applications of Kohlrausch law – Conductometric titrations – Galvanic cells – Electrode potentials – Nernst equation – Electrochemical series – Potentiometric titrations – Concentration cells – Ion selective electrode –Glass electrodes – Fluoride electrode; Batteries and Fuel cells

Objectives : Knowledge of galvanic cells, electrode potentials, concentration cells is necessary for engineers to understand corrosion problem and its control ; also this knowledge helps in understanding modern bio-sensors, fuel cells and improve them.

## UNIT-III : CORROSION

Causes and effects of corrosion – theories of corrosion (dry, chemical and electrochemical corrosion) – Factors affecting corrosion – Corrosion control methods – Cathodic protection –Sacrificial Anodic, Impressed current methods – Surface coatings – Methods of application on metals (Hot dipping, Galvanizing, tinning , Cladding, Electroplating, Electroless plating) – Organic surface coatings – Paints – Their constituents and their functions.

**Objectives :** the problems associated with corrosion are well known and the engineers must be aware of these problems and also how to counter them

## UNIT-IV : HIGH POLYMERS

Types of Polymerization – Stereo regular Polymers – Physical and Mechanical properties of polymers – Plastics – Thermoplastics and thermo setting plastics – Compounding and Fabrication of plastics – Preparation and properties of Polyethylene, PVC and Bakelite – Elastomers – Rubber and Vulcanization – Synthetic rubbers – Styrene butadiene rubber – Thiokol – applications.

**Objectives :** Plastics are materials used very widely as engineering materials. An understanding of properties particularly physical and mechanical properties of polymers / plastics / elastomers helps in selecting suitable materials for different purposes.

## UNIT-V : FUELS

Coal – Proximate and ultimate analysis – Numerical problems based on analysis – Calorific vaule – HCV and LCV – Problems based on calorific values; petroleum – Refining – Cracking – Petrol – Diesel knocking; Gaseous fuels – Natural gas – LPG, CNG – Combustion – Problems on air requirements.

**Objectives :** A board understanding of the more important fuels employed on a large scale is necessary for all engineer to understand energy – related problems and solve them.

## UNIT-VI : CHEMISTRY OF ADVANCED MATERIALS

Nanometerials (Preparation of carbon nanotubes and fullerenes – Properties of nanomaterials – Engineering applications) – Liquid crystals (Types – Application in LCD and Engineering Applications) – Fiber reinforced plastics – Biodegradable polymers – Conducting polymers – Solar cells (Solar heaters – Photo voltaic cells – Solar reflectors – Green house concepts – Green chemistry (Methods for green synthesis and Applications) – Cement – Hardening and setting – Deterioration of cement concrete

**Objectives :** With the knowledge available now, future engineers should know at least some of the advanced materials that are becoming available. Hence some of them are introduced here.

**TEXT BOOKSS**


1. Jain and Jain (Latest Edition), Engineering Chemistry, Dhanpat Rai Publishing company Ltd,
2. N.Y.S.Murthy, V.Anuradha, KRamaRao "A Text Book of Engineering Chemistry", Maruthi Publications
3. C.Parameswara Murthy, C.V.Agarwal, Adhra Naidu (2006) Text Book of Engineering Chemistry, B.S.Publications
4. B.Sivasankar (2010), Engineering Chemistry, McGraw-Hill companies.
5. Ch.Venkata Ramana Reddy and Ramadevi (2013) , Engineering Chemistry, Cengage Learning


**REFERENCES**


1. S.S. Dara (2013) Text Book of Engineering Chemistry, S.Chand Technical Series
2. K.Sesha Maheswaramma and Mridula Chugh (2013), Engineering Chemistry, Pearson Publications.
3. R.Gopalan, D.Venkatappayya, Sulochana Nagarajan (2011), Text Book of Engineering Chemistry, Vikas Publications.
4. B.Viswanathan and M.Aulice Scibioh (2009), Fuel Cells, Principals and applications, University Press.

**I Year – I SEMESTER**

| T | P | C |
|---|---|---|
| 3+1 | 0 | 3 |

# ENGINEERING MECHANICS

**Objectives:** The students completing this course are expected to understand the concepts of forces and its resolution in different planes ,resultant of force system, Forces acting on a body, their free body diagrams using graphical methods. They are required to understand the concepts of centre of gravity and moments of inertia and their application, Analysis of frames and trusses, different types of motion, friction and application of work - energy method.

**UNIT – I**

**Objectives: The students are to be exposed to the concepts of force and friction , direction and its application.**

Introduction to Engg. Mechanics – Basic Concepts.

**Systems of Forces :** Coplanar Concurrent Forces – Components in Space – Resultant – Moment of Force and its Application – Couples and Resultant of Force Systems. Introduction **,** limiting friction and impending motion, coulomb's laws of dry friction , coefficient of friction, cone of friction

**UNIT II**

**Objectives: The students are to be exposed to application of free body diagrams. Solution to problems using graphical methods and law of triangle of forces.**

**Equilibrium of Systems of Forces :** Free Body Diagrams, Equations of Equilibrium of Coplanar Systems, Spatial Systems for concurrent forces. Lamis Theorm, Graphical method for the equilibrium of coplanar forces, Converse of the law of Triangle of forces, converse of the law of polygon of forces condition of equilibrium.

**UNIT – III**

**Objectives : The students are to be exposed to concepts of centre of gravity.**

**Centroid :** Centroids of simple figures (from basic principles ) – Centroids of Composite Figures

**Centre of Gravity :** Centre of gravity of simple body (from basis principles), centre of gravity of composite bodies, pappus theorem.

**UNIT IV**

**Objective: The students are to be exposed to concepts of moment of inertia and polar moment of inertia including transfer methods and their applications.**

**Area moments of Inertia :** Definition – Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia. **Mass Moment of Inertia :** Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, mass moment of inertia of composite bodies.

**UNIT – V**

**Objectives : The students are to be exposed to motion in straight line and in curvilinear paths, its velocity and acceleration computation and methods of representing plane motion.**

**Kinematics :** Rectilinear and Curvelinear motions – Velocity and Acceleration – Motion of Rigid Body – Types and their Analysis in Planar Motion. **Kinetics :** Analysis as a Particle and Analysis as a Rigid Body in Translation – Central Force Motion – Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies.

**...**

**UNIT – VI**

**Objectives: The students are to be exposed to concepts of work, energy and particle motion**

**Work – Energy Method :** Equations for Translation, Work-Energy Applications to Particle Motion, Connected System-Fixed Axis Rotation and Plane Motion. Impulse momentum method.

**TEXT BOOKS:**


1. Engg. Mechanics - S.Timoshenko & D.H.Young., 4th Edn - , Mc Graw Hill publications.
2. Engineering Mechanics: Statics and Dynamics 3rd edition, Andrew Pytel and Jaan Kiusalaas; Cengage Learning publishers.


**REFERENCES:**


1. Engineering Mechanics statics and dynamics – R.C.Hibbeler, 11th Edn – Pearson Publ.
2. Engineering Mechanics , statics – J.L.Meriam, 6th Edn – Wiley India Pvt Ltd.

3. Engineering Mechanics , dynamics – J.L.Meriam, 6th Edn – Wiley India Pvt Ltd.
4. Engineering Mechanics , statics and dynamics – I.H.Shames, – Pearson Publ.
5. Mechanics For Engineers , statics - F.P.Beer & E.R.Johnston – 5th Edn Mc Graw Hill Publ.
6. Mechanics For Engineers, dynamics - F.P.Beer & E.R.Johnston – 5th Edn Mc Graw Hill Publ.
7. Theory & Problems of engineering mechanics, statics & dynamics – E.W.Nelson, C.L.Best & W.G. McLean, 5th Edn – Schaum's outline series - Mc Graw Hill Publ.
8. Engineering Mechanics , Fedinand . L. Singer , Harper – Collins.
9. Engineering Mechanics statics and dynamics , A Nelson, Mc Graw Hill publications
10. Engineering Mechanics, Tayal. Umesh Publ.

**I Year – I SEMESTER**

| T | P | C |
|---|---|---|
| 3+1 | 0 | 3 |

## COMPUTER PROGRAMMING

**Objectives:** Formulating algorithmic solutions to problems and implementing algorithms in C

**UNIT I:**
**Unit objective: Notion of Operation of a CPU, Notion of an algorithm and computational procedure, editing and executing programs in Linux**
**Introduction:** Computer systems, Hardware and Software Concepts**,**
**Problem Solving:** Algorithm / Pseudo code, flowchart, program development steps, computer languages: machine, symbolic and highlevel languages, Creating and Running Programs: Writing, Editing(vi/emacs editor), Compiling( gcc), Linking and Executing in under Linux.
**BASICS OF C:** Structure of a C program, identifiers, basic data types and sizes. Constants, Variables, Arthmetic , relational and logical operators, increment and decrement operators, conditional operator, assignment operator, expressions, type conversions, Conditional Expressions, precedence and order of evaluation, Sample Programs.

**UNIT II:**
**Unit objective: understanding branching, iteration and data representation using arrays**
**SELECTION – MAKING DECISION: TWO WAY SELECTION**: if-else, null else, nested if, examples, Multi-way selection: switch, else-if, examples**.**
**ITERATIVE:** loops- while, do-while and for statements , break, continue, initialization and updating, event and counter controlled loops, Looping applications: Summation, powers, smallest and largest.
**ARRAYS**: Arrays- concepts, declaration, definition, accessing elements, storing elements, Strings and String Manipulations, 1-D arrays, 2-D arrays and character arrays, string manipulations, Multidimensional arrays, array applications: Matrix operations, checking the symmetricity of a Matrix**.**
**STRINGS: concepts, c strings.**

**UNIT III:**
**Objective: Modular programming and recursive solution formulation**
**FUNCTIONS- MODULAR PROGRAMMING**: functions, basics, parameter passing, storage classes extern, auto, register, static, scope rules, block structure, user defined functions, standard library functions, recursive functions, Recursive solutions for fibonacci series, towers of Hanoi, header files, C Preprocessor, example c programs, Passing 1-D arrays, 2-D arrays to functions.

**UNIT IV:**
**Objective: Understanding pointers and dynamic memory allocation**
**POINTERS:** pointers- concepts, initialization of pointer variables, pointers and function arguments, passing by address- dangling memory, address arithmetic, character pointers and functions, pointers to pointers, pointers and multi-dimensional arrays, dynamic memory management functions, command line arguments

**UNIT V:**
**Objective: Understanding miscellaneous aspects of C**
**ENUMERATED, STRUCTURE AND UNION TYPES:** Derived types- structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit-fields, program applications
**BIT-WISE OPERATORS: logical, shift, rotation, masks.**

**UNIT VI:**
**Objective: Comprehension of file operations**
**FILE HANDLING**: Input and output- concept of a file, text files and binary files, Formatted I/O, File I/O operations, example programs

**Text Books:**

1. Problem Solving and Program Design in C, Hanly, Koffman, 7th ed, PERSON
2. Programming in C, Second Edition Pradip Dey and Manas Ghosh, OXFORD Higher Education
3. Programming in C, A practical approach Ajay Mittal PEARSON
4. The C programming Language by Dennis Richie and Brian Kernighan
5. Programming in C, B. L. Juneja, Anith Seth, Cengage Learning.

**Reference Books and web links:**

1. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE
2. Programming with C, Bichkar, Universities Press
3. Programming in C, Reema Thareja, OXFORD
4. C by Example, Noel Kalicharan, Cambridge

**I Year – I SEMESTER**

| T | P | C |
|---|---|---|
| 3+1 | 0 | 3 |

# ENVIRONMENTAL STUDIES

**Course Learning Objectives:**

The objectives of the course is to impart

1. Overall understanding of the natural resources
2. Basic understanding of the ecosystem and its diversity
3. Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities
4. An understanding of the environmental impact of developmental activities
5. Awareness on the social issues, environmental legislation and global treaties

**Course Outcomes:**

The student should have knowledge on

1. The natural resources and their importance for the sustenance of the life and recognise the need to conserve the natural resources
2. The concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web
3. The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
4. Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices
5. Social issues both rural and urban environment and the possible means to combat the challenges
6. The environmental legislations of India and the first global initiatives towards sustainable development.
7. About environmental assessment and the stages involved in EIA and the environmental audit

**Syllabus:**

**UNIT - I**

**Multidisciplinary nature of Environmental Studies:** Definition, Scope and Importance –Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming and climate change, acid rains, ozone layer depletion, population growth and explosion, effects. Role of information Technology in Environment and human health.

**Ecosystems:** Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

**UNIT - II**

**Natural Resources:** Natural resources and associated problems

Forest resources – Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people

Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources

Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity

Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources.

Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

**UNIT - III**

**Biodiversity and its conservation:** Definition: genetic, species and ecosystem diversity- classification - Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega-diversity nation - Hot-sports of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts. - Endangered and endemic species of India – Conservation of biodiversity: conservation of biodiversity.

**UNIT - IV**

**Environmental Pollution:** Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies.

**Solid Waste Management:** Sources, classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products.

**UNIT - V**

**Social Issues and the Environment:** Urban problems related to energy -Water conservation, rain water harvesting-Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions. Environmental Protection Act -Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act-Issues involved in enforcement of environmental legislation. -Public awareness.

**UNIT - VI**

**Environmental Management**: Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. Ecotourism

The student should submit a report individually on any issues related to Environmental Studies course and make a power point presentation.

**Text Books:**


1. Environmental Studies by R. Rajagopalan, 2nd Edition, 2011, Oxford University Press.
2. A Textbook of Environmental Studies by Shaashi Chawla, TMH, New Delhi
3. Environmental Studies by P.N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai


**Reference:**


1. Text Book of Environmental Studies by Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.
2. Environmental Studies by K.V.S.G. Murali Krishna, VGS Publishers, Vijayawada
3. Environmental Studies by Benny Joseph, Tata McGraw Hill Co, New Delhi
4. Environmental Studies by Piyush Malaviya, Pratibha Singh, Anoop singh: Acme Learning, New Delhi

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**I Year – I SEMESTER**

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## ENGINEERING CHEMISTRY LABORATORY

### List of Experiments

1. Introduction to chemistry laboratory – Molarity, Normality, Primary, Secondary standard solutions, Volumetric titrations, Quantitative analysis, Quantitative analysis etc.,
2. Trial experiment – Estimation of HCI using standard $Na_2co_3$ solutions
3. Estimation of $KMnO_4$ using standard Oxalic acid solution.
4. Estimation of Ferric iron using standard $K_2Cr_2O_7$ solution.
5. Estimation of Copper using standard $K_2Cr_2O_7$ solution.
6. Estimation of Total Hardness water using standard EDTA solution.
7. Estimation of Copper using standard EDTA solution.
8. Estimation of Copper using Colorimeter
9. Estimation of pH of the given sample solution using pH meter.
10. Conductometric Titrations between strong acid and strong base
11. Conductometric Titrations between strong acid and Weak base
12. Potentiometric Titrations between strong acid and strong base
13. Potentiometric Titrations between strong acid and Weak base
14. Estimatinog of Zinc using standard potassium ferrocyanide solution
15. Estimation of Vitamin – C

### TEXT BOOKS


1. Dr.Jyotsna Cherukuis(2012)Laboratory Manual of Engineering Chemistry-II, VGS Techno Series
2. Chemistry Practical Manual, Lorven Publications
3. K. Mukkanti (2009) Practical Engineering Chemistry, B.S.Publication

**I Year – I SEMESTER**

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## ENGLISH – COMMUNICATION SKILLS LAB – I

**Suggested Lab Manuals:**

**OBJECTIVE:** To impart to the learner the skills of grammar as well as communication through listening, speaking, reading, and writing including soft, that is life skills.

### BASIC COMMUNICATION SKILLS

| | |
|---|---|
| UNIT 1 | A. Greeting and Introductions |
| | B. Pure Vowels |
| UNIT 2 | A. Asking for information and Requests |
| | B. Diphthongs |
| UNIT 3 | A. Invitations |
| | B. Consonants |
| UNIT 4 | A. Commands and Instructions |
| | B. Accent and Rhythm |
| UNIT 5 | A. Suggestions and Opinions |
| | B. Intonation |

**Text Book:**

'Strengthen your Communication Skills' Part-A by Maruthi Publications

**Reference Books:**

1. INFOTECH English (Maruthi Publications)
2. Personality Development and Soft Skills ( Oxford University Press, New Delhi)

**I Year – I SEMESTER** **T P C**
**0 3 2**

# C PROGRAMMING LAB

**Exercise l**

a) Write a C Program to calculate the area of triangle using the formula
area = ( s (s-a) (s-b)(s-c))$^{1/2}$ where s= (a+b+c)/2

b) Write a C program to find the largest of three numbers using ternary operator.

c) Write a C Program to swap two numbers without using a temporary variable.

**Exercise 2**

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 find the roots of a quadratic equation.

c) Write a C program, which takes two integer operands and one operator form the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)

**Exercise 3**

**a)** Write a C program to find the sum of individual digits of a positive integer and find the reverse of the given number.

**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.

**Exercise 4**

a) Write a C Program to print the multiplication table of a given number n up to a given value, where n is entered by the user.

b) Write a C Program to enter a decimal number, and calculate and display the binary equivalent of that number.

c) Write a C Program to check whether the given number is Armstrong number or not.

**Exercise 5**

a) Write a C program to interchange the largest and smallest numbers in the array.

b) Write a C program to implement a liner search.

c) Write a C program to implement binary search

**Exercise 6**

**a)** Write a C program to implement sorting of an array of elements .

b) Write a C program to input two m x n matrices, check the compatibility and perform addition and multiplication of them

**Exercise 7**

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

i. To insert a sub-string in to given main string from a given position.
ii. To delete n Characters from a given position in a given string.
iii. To replace a character of string either from beginning or ending or at a specified location

**Exercise 8**

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

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

**Exercise 9**

Write C Programs for the following string operations without using the built in functions

- to concatenate two strings
- to append a string to another string
- to compare two strings

**Exercise 10**

Write C Programs for the following string operations without using the built in functions

- to find t he length of a string

- to find whether a given string is palindrome or not

**Exercise 11**

**a)** Write a C functions to find both the largest and smallest number of an array of integers.

b) Write C programs illustrating call by value and call by reference cncepts.

**Exercise 12**

Write C programs that use both recursive and non-recursive functions for the following

i) To find the factorial of a given integer.

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

iii) To find Fibonacci sequence

**Exercise 13**

a) Write C Program to reverse a string using pointers

b) Write a C Program to compare two arrays using pointers

**Exercise 14**

a) Write a C program consisting of Pointer based function to exchange value of two integers using passing by address.

b) Write a C program to swap two numbers using pointers

**Exercise 15**

Examples which explores the use of structures, union and other user defined variables

**Exercise 16**

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

**b)** Write a C program to count the number of characters and number of lines in a file.

c) Write a C Program to merge two files into a third file. The names of the files must be entered using command line arguments.

**I Year – II SEMESTER**

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# ENGLISH –II
## (Common to All Branches)

**DETAILED TEXT-II : Sure Outcomes**: English for Engineers and Technologists **Recommended Topics :**

1. **TECHNOLOGY WITH A HUMAN FACE**
   **OBJECTIVE:** To make the learner understand how modern life has been shaped by technology.
   **OUTCOME**: The proposed technology is people's technology. It serves the human person instead of making him the servant of machines.
2. **CLIMATE CHANGE AND HUMAN STRATEGY**
   **OBJECTIVE**: To make the learner understand how the unequal heating of earth's surface by the Sun, an atmospheric circulation pattern is developed and maintained.
   **OUTCOME**: The learner's understand that climate must be preserved.
3. **EMERGING TECHNOLOGIES**
   **OBJECTIVE**: To introduce the technologies of the 20th century and 21st centuries to the learners.
   **OUTCOME**: The learner will adopt the applications of modern technologies such as nanotechnology.
4. **WATER- THE ELIXIR OF LIFE**
   **OBJECTIVE**: To inform the learner of the various advantages and characteristics of water.
   **OUTCOME**: The learners will understand that water is the elixir of life.
5. **THE SECRET OF WORK**
   **OBJECTIVE:** In this lesson, Swami Vivekananda highlights the importance of work for any development.
   **OUTCOME**: The students will learn to work hard with devotion and dedication.
6. **WORK BRINGS SOLACE**
   **OBJECTIVE**: In this lesson Abdul Kalam highlights the advantage of work.
   **OUTCOME**: The students will understand the advantages of work. They will overcome their personal problems and address themselves to national and other problems.

**Text Book** : 'Sure Outcomes' by Orient Black Swan Pvt. Ltd. Publishers

**NON-DETAILED TEXT:**

**(From Modern Trailblazers of Orient Blackswan)**
**(Common single Text book for two semesters)**
**(Semester I (1 to 4 lessons)/ Semester II (5 to 8 lessons)**

5. **J.C. Bose**
   **OBJECTIVE:** To apprise of J.C.Bose's original contributions.
   **OUTCOME:** The learner will be inspired by Bose's achievements so that he may start his own original work.
6. **Homi Jehangir Bhaba**
   **OBJECTIVE:** To show Bhabha as the originator of nuclear experiments in India.
   **OUTCOME:** The learner will be inspired by Bhabha's achievements so as to make his own experiments.
7. **Vikram Sarabhai**
   **OBJECTIVE:** To inform the learner of the pioneering experiments conducted by Sarabhai in nuclear energy and relevance of space programmes.
   **OUTCOME:** The learner will realize that development is impossible without scientific research.
8. **A Shadow- R.K.Narayan**
   **OBJECTIVE:** To expose the reader to the pleasure of the humorous story
   **OUTCOME:** The learner will be in a position to appreciate the art of writing a short story and try his hand at it.

**Text Book :** 'Trail Blazers' by Orient Black Swan Pvt. Ltd. Publishers

I Year – II SEMESTER

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# MATHEMATICS – II
# (MATHEMATICAL METHODS)

(Common to All Branches)

**UNIT I Solution of Algebraic and Transcendental Equations:**

Introduction- Bisection Method – Method of False Position – Iteration Method – Newton-Raphson Method (One variable and Simultaneous Equestions)

Subject Category
ABET Learning Objectives a e k
ABET internal assessments 1 2 4 6
JNTUK External Evaluation A B E

**UNIT II Interpolation:**

Introduction- Errors in Polynomial Interpolation – Finite differences- Forward Differences- Backward differences –Central differences – Symbolic relations and separation of symbols-Differences of a polynomial-Newton's formulae for interpolation – Interpolation with unevenly spaced points - Lagrange's Interpolation formula

Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 4 6
JNTUK External Evaluation A B E

**UNIT III Numerical solution of Ordinary Differential equations:**

Solution by Taylor's series-Picard's Method of successive Approximations-Euler's Method-Runge-Kutta Methods

Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 4 6
JNTUK External Evaluation A B E

**UNIT IV Fourier Series:**

Introduction- Determination of Fourier coefficients – even and odd functions –change of interval– Half-range sine and cosine series

application: Amplitude, spectrum of a periodic function

Subject Category
ABET Learning Objectives a e d
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

**UNIT V Fourier Transforms:**

Fourier integral theorem (only statement) – Fourier sine and cosine integrals - sine and cosine transforms – properties – inverse transforms – Finite Fourier transforms

Subject Category
ABET Learning Objectives a d e k
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

**UNIT VI Z-transform:**

Introduction– properties – Damping rule – Shifting rule – Initial and final value theorems -Inverse z transform- -Convolution theorem – Solution of difference equation by Z -transforms.

Subject Category
ABET Learning Objectives a b e k
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

**BOOKS:**


1. **B.S. GREWAL,** Higher Engineering Mathematics, 42nd Edition, Khanna Publishers
2. **DEAN G. DUFFY,** Advanced Engineering Mathematics with MATLAB, CRC Press
3. **V.RAVINDRANATH and P. VIJAYALAXMI,** Mathematical Methods, Himalaya Publishing House
4. **ERWYN KREYSZIG,** Advanced Engineering Mathematics, 9th Edition, Wiley-India


| Subject Category | ABET Learning Objectives | ABET Internal Assessments | JNTUK External Evaluation | Remarks |
|---|---|---|---|---|
| Theory<br>Design<br>Analysis<br>Algorithms<br>Drawing<br>Others | a) Apply knowledge of math, science, & engineering<br>b) Design & conduct experiments, analyze & interpret data<br>c) Design a system/process to meet desired needs within economic, social, political, ethical, health/safety, manufacturability, & sustainability constraints<br>d) Function on multidisciplinary teams<br>e) Identify, formulate, & solve engineering problems<br>f) Understand professional & ethical responsibilities<br>g) Communicate effectively<br>h) Understand impact of engineering solutions in global, economic, environmental, & societal context<br>i) Recognize need for & be able to engage in lifelong learning<br>j) Know contemporary issues<br>k) Use techniques, skills, modern tools for engineering practices | 1. Objective tests<br>2. Essay questions tests<br>3. Peer tutoring based<br>4. Simulation based<br>5. Design oriented<br>6. Problem based<br>7. Experiential (project based) based<br>8. Lab work or field work based<br>9. Presentation based<br>10. Case Studies based<br>11. Role-play based<br>12. Portfolio based | A. Questions should have:<br>B. Definitions, Principle of operation or philosophy of concept.<br>C. Mathematical treatment, derivations, analysis, synthesis, numerical problems with inference.<br>D. Design oriented problems<br>E. Trouble shooting type of questions<br>F. Applications related questions<br>G. Brain storming questions | |

**I Year – II SEMESTER**

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# MATHEMATICS – III
## (LINEAR ALGEBRA & VECTOR CALCULUS)
## (Common to All Branches)

**UNIT I Linear systems of equations:**

Rank-Echelon form, Normal form – Solution of Linear Systems – Direct Methods- Gauss Elimination - Gauss Jordon and Gauss Seidal Methods.

Application: Finding the current in a electrical circuit.

Subject Category
ABET Learning Objectives a e k
ABET internal assessments 1 2 6 4
JNTUK External Evaluation A B E

**UNIT II Eigen values - Eigen vectors and Quadratic forms:**

Eigen values - Eigen vectors– Properties – Cayley-Hamilton Theorem - Inverse and powers of a matrix by using Cayley-Hamilton theorem- Quadratic forms- Reduction of quadratic form to canonical form – Rank - Positive, negative definite - semi definite - index – signature.

Application: Free vibration of a two-mass system.

Subject Category
ABET Learning Objectives a d e k
ABET internal assessments 1 2 4 6
JNTUK External Evaluation A B E

**UNIT III Multiple integrals:**

Review concepts of Curve tracing ( Cartesian - Polar and Parametric curves)-

Applications of Integration to Lengths, Volumes and Surface areas of revolution in Cartesian and Polar Coordinates.

Multiple integrals - double and triple integrals – change of variables – Change of order of Integration

Application: Moments of inertia

Subject Category
ABET Learning Objectives a e d
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

**UNIT IV Special functions:**

Beta and Gamma functions- Properties - Relation between Beta and Gamma functions- Evaluation of improper integrals

Application: Evaluation of integrals

Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

**UNIT V Vector Differentiation:**

Gradient- Divergence- Curl - Laplacian and second order operators -Vector identities

Application: Equation of continuity, potential surfaces

Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

**UNIT VI Vector Integration:**

Line integral – work done – Potential function – area- surface and volume integrals Vector integral theorems: Greens, Stokes and Gauss Divergence Theorems (Without proof) and related problems.

application: work done, Force

Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

**BOOKS:**


1. **GREENBERG,** Advanced Engineering Mathematics, 9th Edition, Wiley-India
2. **B.V. RAMANA,** Higher Engineering Mathematics, Tata McGrawhill
3. **ERWIN KREYSZIG,** Advanced Engineering Mathematics, 9th Edition, Wiley-India
4. **PETER O'NEIL,** Advanced Engineering Mathematics, Cengage Learning
5. **D.W. JORDAN AND T. SMITH,** Mathematical Techniques, Oxford University Press


| Subject Category | ABET Learning Objectives | ABET Internal Assessments | JNTUK External Evaluation | Remarks |
|---|---|---|---|---|
| Theory<br>Design<br>Analysis<br>Algorithms<br>Drawing<br>Others | a) Apply knowledge of math, science, & engineering<br>b) Design & conduct experiments, analyze & interpret data<br>c) Design a system/process to meet desired needs within economic, social, political, ethical, health/safety, manufacturability, & sustainability constraints<br>d) Function on multidisciplinary teams<br>e) Identify, formulate, & solve engineering problems<br>f) Understand professional & ethical responsibilities<br>g) Communicate effectively<br>h) Understand impact of engineering solutions in global, economic, environmental, & societal context<br>i) Recognize need for & be able to engage in lifelong learning<br>j) Know contemporary issues<br>k) Use techniques, skills, modern tools for engineering practices | 1. Objective tests<br>2. Essay questions tests<br>3. Peer tutoring based<br>4. Simulation based<br>5. Design oriented<br>6. Problem based<br>7. Experiential (project based) based<br>8. Lab work or field work based<br>9. Presentation based<br>10. Case Studies based<br>11. Role-play based<br>12. Portfolio based | A. Questions should have:<br>B. Definitions, Principle of operation or philosophy of concept.<br>C. Mathematical treatment, derivations, analysis, synthesis, numerical problems with inference.<br>D. Design oriented problems<br>E. Trouble shooting type of questions<br>F. Applications related questions<br>G. Brain storming questions | |

**I Year – II SEMESTER**

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# ENGINEERING PHYSICS

## UNIT-I
## PHYSICAL OPTICS FOR INSTRUMENTS

"Objective Designing an instrument and enhancing the resolution for its operation would be effective as achieved through study of applicational aspects of physical Optics"

**INTERFACE :** Introduction – Interference in thin films by reflection – Newton's rings.

**DIFFRACTION :** Introduction – Fraunhofer diffraction - Fraunhofer diffraction at double slit (qualitative) – Diffraction grating – Grating spectrum – Resolving power of a grating – Rayleigh's criterion for resolving power.

**POLARIZATION :** Introduction – Types of Polarization – Double refraction – Quarter wave plate ad Half Wave plate.

## UNIT-II
## COHERENT OPTICS – COMMUNICATIONS AND STRUCTURE OF MATERIALS

Objectives while lasers are trusted Non-linear coherent sources established for the fitness of instrumentation, establishing a structure property relationship for materials requires allotment of an equivalent footing in convening the physics knowledge base.

**LASERS:** Introduction – coherent sources – Characteristics of lasers – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion – Three and Four level pumping schemes – Ruby laser – Helium Neon laser.

**FIBER OPTICS :** Introduction – Principle of Optical Fiber – Acceptance angle and acceptance cone – Numerical aperture.

**CRYSTALLOGRAPHY :** Introduction – Space lattice – Basis – Unit Cell – Lattice parameters – Bravais lattices – Crystal systems – Structures and packing fractions of SC,BCC and FCC

**X-RAY DIFFRACTION TECHNIQUES** : Directions and planes in crystals – Miller indices – Separation between successive [h k l] planes – Bragg's law.

## UNIT-III
## MAGNETIC, ELECTRIC FIELD RESPONSE OF MATERIALS & SUPERCONDUCTIVITY

"Objective many of the Electrical or Electronic gadgets are designed basing on the response of naturally abundant and artificially made materials, while their response to E- or H- fields controls their performance.

**MAGNETIC PROPERTIES** : Magnetic permeability – Magnetization – Organ or magnetic moment – Classification of Magnetic materials – Dir, para, Ferro, anti ferro and ferri-magnetism – Hysteresis curve

**DIELECTRIC PROPERTIES** : Introduction – Dielectric constant – Electronic, ionic and orientational polarization – internal fields – Clausius – Mossotti equation – Dielectric loss, Breakdown and Strength.

**SUPERCONDUCTIVITY** : General properties – Meissner effect – Type I and Type II superconductors – BCS Theory Flux quantization London's equations – Penetration depth – DC and AC Josephson effects – SQUIDS.

## UNIT – IV
## ACOUSTICS AND EM – FIELDS:

**Objective:** The utility and nuances of ever pervading SHM and its consequences would be the first hand-on to as it clearly conveyed through the detailed studies of Acoustics of Buildings, while vectorial concepts of EM fields paves the student to gear – up for a deeper understanding.

**ACOUSTICS:** Sound absorption, absorption coefficient and its measurements, Reverberations time – Sabine's formula, Eyring's formula.

**ELECTRO-MAGNETIC FIELDS**: Gauss and stokes theorems (qualitative) – Fundamental laws of electromagnetism – Maxwell's Electromagnetic Equations (Calculus approach).

## UNIT – V
## QUANTUM MECHANICS FOR ELECTRONIC TRANSPORT

Objective: The discrepancy between classical estimates and laboratory observations of physical properties exhibited by materials would be lifted out through the understanding quantum picture of sub-atomic world dominated by electron and its presence.

**QUANTUM MECHANICS**: Introduction to matter waves – Schrodinger Time Independent and Time Dependent wave equations – Particle in a box.

**FREE ELECTRON THEORY**: Classical free electron theory – electrical conductivity – Mean free path – Relaxation time and drifty velocity – Quantum free electron theory – Fermi – Dirac (analytical) and its dependence on temperature – Fermi energy – density of states – derivations for current density.

**BAND THEORY OF SOLIDS**: Bloch theorem (qualitative) – Kronig – Penney model – Origin of energy band formation in solids – Classification of materials into conductors, semi – conductors & insulators – Concepts of effective mass of electron - concept of hole.

**UNIT – VI**

**SEMICONDUCTOR PHYSICS:**

Objective: In the wake of ever increasing demand for the space and power the watch word "small is beautiful", understanding the physics of electronic transport as underlying mechanism for appliances would provide a knowledge base.

Introduction – Intrinsic semiconductor and carrier concentration – Equation for conductivity – Extrinsic semiconductor and carrier concentration – Drift and diffusion – Einstein's equation – Hall Effect – direct & indirect band gap semiconductors – Electronic transport Mechanism for LEDs, Photo conductors and solar cells.

**TEXT BOOKS**


1. Solid state Physics by A.J. Dekker (Mc Millan India Ltd)
2. A text book of Engineering Physics by M.N. Avadhanulu & P.G. Kshirasagar (S. Chand publications)
3. Engineering Physics b;y M.R. Srinivasan (New Age international publishers )


**REFERENCE BOOKS**


1. 'Introduction to solid state physics' by Charles Kittle (Willey India Pvt.Ltd)
2. 'Applied Physics' by T. Bhimasenkaram (BSP BH Publications )
3. 'Applied Physics' by M.Arumugam (Anuradha Agencies)
4. 'Engineering Physics' by Palanisamy ( Scitech Publishers )
5. 'Engineering Physics' by D.K.Bhattacharya ( Oxford University press)
6. 'Engineering Physics' by Mani Naidu S (Pearson Publications)
7. 'Engineering Physics' by Sanjay D Jain and Girish G Sahasrabudhe (University Press)
8. 'Engineering Physics' by B.K.Pandey & S. Chaturvedi ( Cengage Learning )

**I Year – II SEMESTER**

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# Professional Ethics and Human Values

**UNIT I : Human Values**:

Morals, Values and Ethics – Integrity – Work Ethics – Service Learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty –Courage – Value time – Co-operation – Commitment – Empathy – Self-confidence – Spirituality- Character.

**UNIT II : Engineering Ethics:**

The History of Ethics-Purposes for Engineering Ethics-Engineering Ethics-Consensus and Controversy –Professional and Professionalism –Professional Roles to be played by an Engineer –Self Interest, Customs and Religion-Uses of Ethical Theories-Professional Ethics-Types of Inquiry – Engineering and Ethics-Kohlberg's Theory – Gilligan's Argument –Heinz's Dilemma.

**UNIT III : Engineering as Social Experimentation:**

Comparison with Standard Experiments – Knowledge gained – Conscientiousness – Relevant Information – Learning from the Past – Engineers as Managers, Consultants, and Leaders – Accountability – Role of Codes – Codes and Experimental Nature of Engineering.

**UNIT IV : Engineers' Responsibility for Safety and Risk:**

Safety and Risk, Concept of Safety – Types of Risks – Voluntary v/s Involuntary Risk- Short term v/s Long term Consequences- Expected Probability- Reversible Effects- Threshold Levels for Risk- Delayed v/s Immediate Risk- Safety and the Engineer – Designing for Safety – Risk-Benefit Analysis-Accidents.

**UNIT V : Engineers' Responsibilities and Rights:**

Collegiality-Techniques for Achieving Collegiality –Two Senses of Loyalty-obligations of Loyalty-misguided Loyalty – professionalism and Loyalty- Professional Rights –Professional Responsibilities – confidential and proprietary information-Conflict of Interest-solving conflict problems – Self-interest, Customs and Religion- Ethical egoism-Collective bargaining-Confidentiality-Acceptance of Bribes/Gifts-when is a Gift and a Bribe-examples of Gifts v/s Bribes-problem solving-interests in other companies-Occupational Crimes-industrial espionage-price fixing-endangering lives- Whistle Blowing-types of whistle blowing-when should it be attempted-preventing whistle blowing.

**UNIT VI : Global Issues:**

Globalization- Cross-culture Issues-Environmental Ethics-Computer Ethics-computers as the instrument of Unethical behaviour-computers as the object of Unethical Acts-autonomous computers-computer codes of Ethics-Weapons Development-Ethics and Research-Analysing Ethical Problems in Research-Intellectual Property Rights.

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**Text Books:**


1. "Engineering Ethics and Human Values" by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd-2009
2. "Professional Ethics and Morals" by Prof.A.R.Aryasri, Dharanikota Suyodhana-Maruthi Publications
3. "Professional Ethics and Human Values" by A.Alavudeen, R.Kalil Rahman and M.Jayakumaran-Laxmi Publications
4. "Professional Ethics and Human Values" by Prof.D.R.Kiran-
5. "Indian Culture, Values and Professional Ethics" by PSR Murthy-BS Publication
6. "Ethics in Engineering" by Mike W. Martin and Roland Schinzinger – Tata McGraw-Hill – 2003.
7. "Engineering Ethics" by Harris, Pritchard and Rabins, CENGAGE Learning, India Edition, 2009.

**I Year – II SEMESTER**

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# ENGINEERING DRAWING

**Objective**: Engineering drawing being the principle method of communication for engineers, the objective to introduce the students, the techniques of constructing the various types of polygons, curves and scales. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc.

## UNIT I

Objective: The objective is to introduce the use and the application of drawing instruments and to make the students construct the polygons, curves and various types of scales. The student will be able to understand the need to enlarge or reduce the size of objects in representing them.

Polygons, Construction of regular polygons using given length of a side; Ellipse, arcs of circles and Oblong methods; Scales – Vernier and Diagonal scales.

## UNIT II

Objective: The objective is to introduce orthographic projections and to project the points and lines parallel to one plane and inclined to other.

Introduction to orthographic projections; projections of points; projections of straight lines parallel to both the planes; projections of straight lines – parallel to one plane and inclined to the other plane.

## UNIT III

Objective: The objective is to make the students draw the projections of the lines inclined to both the planes.

Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclinations and traces.

## UNIT IV

Objective: The objective is to make the students draw the projections of the plane inclined to both the planes.

Projections of planes: regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.

## UNIT V

Objective: The objective is to make the students draw the projections of the various types of solids in different positions inclined to one of the planes.

Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.

## UNIT VI

Objective: The objective is to represent the object in 3D view through isometric views. The student will be able to represent and convert the isometric view to orthographic view and vice versa.

Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

## TEXT BOOKS:


1. Engineering Drawing by N.D. Butt, Chariot Publications
2. Engineering Drawing by K.L.Narayana & P. Kannaiah, Scitech Publishers.
3. Engineering Graphics by PI Varghese, McGrawHill Publishers


## REFERENCE BOOKS:


1. Engineering Graphics for Degree by K.C. John, PHI Publishers
2. Engineering Drawing by Agarwal & Agarwal, Tata McGraw Hill Publishers
3. Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, New Age

**I Year – II SEMESTER**

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## ENGLISH – COMMUNICATION SKILLS LAB – II

**Suggested Lab Manuals:**

**OBJECTIVE:** To impart to the learner the skills of grammar as well as communication through listening, speaking, reading, and writing including soft, that is life skills.

### ADVANCED COMMUNICATION SKILLS

| | |
|---|---|
| UNIT 6 | Body language |
| UNIT 7 | Dialogues |
| UNIT 8 | Interviews and Telephonic Interviews |
| UNIT 9 | Group Discussions |
| UNIT 10 | Presentation Skills |
| UNIT 11 | Debates |

**Text Book:**

'Strengthen your Communication Skills' Part-B by Maruthi Publications

**Reference Books:**

1. INFOTECH English (Maruthi Publications)
2. Personality Development and Soft Skills ( Oxford University Press, New Delhi)

**I Year – II SEMESTER**

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# ENGINEERING PHYSICS LAB

**List of Experiments**

1. Determination of wavelength of a source-Diffraction Grating-Normal incidence
2. Newton's rings –Radius of Curvature of Plano_Convex Lens.
3. Determination of thickness of a thin object using parallel interference fringes.
4. Determination of Rigidity modulus of a material- Torsional Pendulum.
5. Determination of Acceleration due to Gravity and Radius of Gyration- Compound Pendulum.
6. Melde's experiment – Transverse and Longitudinal modes.
7. Verification of laws of stretched string – Sonometer.
8. Determination of velocity of sound – Volume resonator.
9. L C R Senes Resonance Circuit
10. Study of I/V Characteristics of Semiconductor diode
11. I/V characteristics of Zener diode
12. Thermistor characteristics – Temperature Coefficient
13. Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus.
14. Energy Band gap of a Semiconductor p.n junction.
15. Hall Effect for semiconductor.

**REFERENCE:**


1. Engineering Physics Lab Manual by Dr.Y. Aparna & Dr.K.Venkateswarao (V.G.S.Book links)
2. Physics practical manual, Lorven Publications.

**I Year – II SEMESTER**

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# Engineering Physics
# Virtual Labs - Assignments

**List of Experiments**

1. Hall Effect
2. Crystal Structure
3. Hysteresis
4. Brewster's angle
5. Magnetic Levitation / SQUID
6. Numerical Aperture of Optical fiber
7. Photoelectric Effect
8. Simple Harmonic Motion
9. Damped Harmonic Motion
10. LASER – Beam Divergence and Spot size

URL : WWW.vlab.co.in

**I Year – II SEMESTER** **T P C**
**0 3 2**

# ENGINEERING WORKSHOP & IT WORKSHOP

## ENGINEERING WORKSHOP:

**Course Objective:** To impart hands-on practice on basic engineering trades and skills.
Note: At least two exercises to be done from each trade.

**Trade:**

| | |
|---|---|
| **Carpentry** | 1. T-Lap Joint |
| | 2. Cross Lap Joint |
| | 3. Dovetail Joint |
| | 4. Mortise and Tennon Joint |
| **Fitting** | 1. Vee Fit |
| | 2. Square Fit |
| | 3. Half Round Fit |
| | 4. Dovetail Fit |
| **Black Smithy** | 1. Round rod to Square |
| | 2. S-Hook |
| | 3. Round Rod to Flat Ring |
| | 4. Round Rod to Square headed bolt |
| **House Wiring** | 1. Parallel / Series Connection of three bulbs |
| | 2. Stair Case wiring |
| | 3. Florescent Lamp Fitting |
| | 4. Measurement of Earth Resistance |
| **Tin Smithy** | 1. Taper Tray |
| | 2. Square Box without lid |
| | 3. Open Scoop |
| | 4. Funnel |

## IT WORKSHOP:

**Objectives:** Enabling the student to understand basic hardware and software tools through practical exposure

**PC Hardware:**
Identification of basic peripherals, assembling a PC, installation of system software like MS Windows, device drivers. Troubleshooting Hardware and software _ some tips and tricks.

**Internet & World Wide Web:**
Different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet, web browsers, email, newsgroups and discussion forums .Awareness of cyber hygiene( protecting the personal computer from getting infected with the viruses), worms and other cyber attacks .

**Productivity tools** Crafting professional word documents; excel spread sheets, power point presentations and personal web sites using the Microsoft suite of office tools

**(Note: Student should be thoroughly exposed to minimum of 12 Tasks)**

**PC Hardware**

**Task 1: Identification of the peripherals of a computer.**
To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions. Description of various I/O Devices

**Task 2(Optional) :** A practice on disassembling the components of a PC and assembling them to back to working condition.

**Task 3:** Examples of Operating systems- DOS, MS Windows, Installation of MS windows on a PC.

**Task 4:** Introduction to Memory and Storage Devices , I/O Port, Device Drivers, Assemblers, Compilers, Interpreters , Linkers, Loaders.

**Task 5:**

**Hardware Troubleshooting (Demonstration):**
Identification of a problem and fixing a defective PC(improper assembly or defective peripherals).
**Software Troubleshooting (Demonstration):**. Identification of a problem and fixing the PC for any software issues

**Internet & Networking Infrastructure**

**Task 6**: Demonstrating Importance of Networking, Transmission Media, Networking Devices- Gateway, Routers, Hub, Bridge, NIC ,Bluetooth Technology, Wireless Technology, Modem, DSL, Dialup Connection.
**Orientation & Connectivity Boot Camp and web browsing:** Students are trained to configure the network settings to connect to the Internet. They are trained to demonstrate the same through web browsing (including all tool bar options) and email access.
**Task 7**: **Search Engines & Netiquette:**
Students are enabled to use search engines for simple search, academic search and any other context based search (Bing, Google etc). Students are acquainted to the principles of micro-blogging, wiki, collaboration using social networks, participating in online technology forums
**Task 8: Cyber Hygiene (Demonstration):** Awareness of various threats on the internet. Importance of security patch updates and anti-virus solutions. Ethical Hacking, Firewalls, Multi-factor authentication techniques including Smartcard, Biometrics are also practiced

**Word**

**Task 9 : MS Word Orientation:**
Accessing, overview of toolbars, saving files, Using help and resources, rulers, formatting ,Drop Cap , Applying Text effects, Using Character Spacing, OLE in Word, using templates, Borders and Colors, Inserting Header and Footer, Using Date and Time option, security features in word, converting documents while saving
**Task 10: 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, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs.

**Excel**

**Task 11:** Using spread sheet features of EXCEL including the macros, formulae, pivot tables, graphical representations
**Creating a Scheduler -** Features to be covered:- Gridlines, Format Cells, Summation, auto fill, Formatting Text

**LOOKUP/VLOOKUP**

**Task 12: Performance Analysis** - Features to be covered:- Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

**Power Point**

**Task 13:** 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, Hyperlinks, Inserting –Images, Clip Art, Tables and Charts in Powerpoint.

**Task 14:** Focusing on the power and potential of Microsoft power point. 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, OLE in PPT.

**TEXT BOOK:**

**Faculty to consolidate the workshop manuals using the following references**

1. Computer Fundamentals, Anita Goel, Pearson
2. Scott Mueller's Upgrading and Repairing PCs, 18/e, Scott. Mueller, QUE, Pearson,2008
3. Information Technology Workshop,3e, G Praveen Babu, M V Narayana BS Publications.
4. Comdex Information Technology , Vikas Gupta, dreamtech.

**REFERENCE BOOK:**

1. Essential Computer and IT Fundamentals for Engineering and Science Students, Dr. N.B. Venkateswarlu

**II Year – I SEMESTER** | **T** | **P** | **C**
**3+1** | **0** | **3**

# MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

**Unit – I: (*The Learning objective of this Unit is to understand the concept and nature of Managerial Economic s and its relationship with other disciplines, Concept of Demand and Demand forecasting)**
**Introduction to Managerial Economics and demand Analysis:**
Definition of Managerial Economics and Scope-Managerial Economics and its relation with other subjects-Concepts of Demand-Types-Determents-Law of Demand its Exception-Elasticity of Demand-Types and Measurement-Demand forecasting and its Methods.
(**The Learner is equipped with the knowledge of estimating the Demand for a product and the relationship between Price and Demand)

**Unit – II: (*The Learning objective of this Unit is to understand the concept of Production function, Input Output relationship, different Cost Concepts and Concept of Cost-Volume-Profit Analysis)**
**Production and Cost Analyses:**
Production function-Isoquants and Isocosts-Law of Variable proportions-Cobb-Douglas Production function-Economics of Sale-Cost Concepts-Opportunity Cost-Fixed vs Variable Costs-Explicit Costs vs Implicit Costs-Out of Pocket Costs vs Imputed Costs-Cost Volume Profit analysis-Determination of Break-Even Point (Simple Problem)
(**One should understand the Cost Concepts for decision making and to estimate the least cost combination of inputs).

**Unit – III: (*The Learning Objective of this Unit is t understand the Nature of Competition, Characteristics of Pricing in the different market structure and significance of various pricing methods)**
**Introduction to Markets, Theories of the Firm & Pricing Policies:**
Market Structures: Perfect Competition, Monopoly and Monopolistic and Oligopoly – Features – Price, Output Determination – Managerial Theories of firm: Maris and Williamson's models – Methods of Pricing: Limit Pricing, Market Skimming Pricing, Internet Pricing: Flat Rate Pricing, Usage sensitive, Transaction based pricing, Priority Pricing.
(** One has to understand the nature of different markets and Price Output determination under various market conditions)

**Unit – IV: (*The Learning objective of this Unit is to know the different forms of Business organization and their Merits and Demerits both public & private Enterprises and the concepts of Business Cycles)**
**Types of Business Organization and Business Cycles:**
Features and Evaluation of Sole Trader – Partnership – Joint Stock Company – State/Public Enterprises and their forms – Business Cycles – Meaning and Features – Phases of Business Cycle.
(**One should equipped with the knowledge of different Business Units)

**Unit – V: (*The Learning objective of this Unit is to understand the different Accounting Systems preparation of Financial Statements and uses of different tools for performance evaluation)**
**Introduction to Accounting & Financing Analysis:**
Introduction to Double Entry Systems – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis – Preparation of Funds flow cash flow statements (Simple Problems)
(**The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis)

**Unit – VI:** (*The Learning objective of this Unit is to understand the concept of Capital, Capitalization, Capital Budgeting and to know the techniques used to evaluate Capital Budgeting proposals by using different methods)
**Capital and Capital Budgeting:** Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Need for Capital Budgeting-Techniques of Capital Budgeting-Traditional and Modern Methods.

(**The Learner is able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making)

Note: *Learning Objective

** Learning Assessment

**TEXT BOOKS**

1. Dr. N. Appa Rao, Dr. P. Vijay Kumar: 'Managerial Economics and Financial Analysis', Cengage Publications, New Delhi – 2011
2. Dr. A. R. Aryasri – Managerial Economics and Financial Analysis, TMH 2011
3. Prof. J.V.Prabhakara rao, Prof. P. Venkatarao. 'Managerial Economics and Financial Analysis', Ravindra Publication.

**REFERENCES:**

1. V. Maheswari: Managerial Economics, Sultan Chand.
2. Suma Damodaran: Managerial Economics, Oxford 2011.
3. Dr. B. Kuberudu and Dr. T. V. Ramana: Managerial Economics & Financial Analysis, Himalaya Publishing House 2011.
4. Vanitha Agarwal: Managerial Economics, Pearson Publications 2011.
5. Sanjay Dhameja: Financial Accounting for Managers, Pearson.
6. Maheswari: Financial Accounting, Vikas Publications.
7. S. A. Siddiqui & A. S. Siddiqui: Managerial Economics and Financial Analysis, New Age International Publishers, 2012

**II Year – I SEMESTER** | **T** | **P** | **C**
| **3+1** | **0** | **3**

## OBJECT-ORIENTED PROGRAMMING THROUGH C++

**Objectives: Expertise in object oriented principles and their implementation in C++**

**UNIT I :**

**Objectives: Exposure to basics of object oriented mode, C++ programming and I/O in C++**

**INTRODUCTION:** Differences Between C And C++, The Object Oriented Technology , Disadvantage of Conventional Programming, Concepts of Object Oriented Programming, Advantages of OOP Structure of A C++ Program, Header Files And Libraries

**INPUT AND OUTPUT IN C++ :**

Introduction, Streams In C++ And Stream Classes, Pre-Defined Streams, Stream Classes, Formatted And Unformatted Data,Unformatted Console I/O Operations, Member Functions Of Istream Class, Formatted Console I/O Operations, Bit Fields, Flags Without Bit Field, Manipulators, User Defined Manipulators

**UNIT II :**

**Objectives: Focus on Basic concept in C++ programming, Operators, control structures , functions, overloading, recursion**

Tokens In C++, Variable Declaration And Initialization, Data Types, Operators In C And C++, Scope Access Operator, Namespace, Memory Management Operators, Comma Operator, Revision Of Decision Statements, Control Loop Statements

**FUNCTIONS IN C++ :** Introduction, Structure Of Function, Passing Arguments, Lvalues And Rvalues, Retrun By Reference, Returning More Values By Reference, Default Arguments, Const Arguments, Inputting Default Arguments, Inline Functions, Function Overloading, Principles Of Function Overloading, Recursion

**UNIT III** :

**Objectives: Acquaintance with classes, objects and member functions**

**CLASSES AND OBJECTS :** Introduction, Classes In C++, Declaring Objects, Access Specifiers And Their Scope, Member Functions, Outside Member Function As Inline, Data Hiding or Encapsulation, Classes, Objects and Memory, Static Member Variables, Static Member Functions Static Object, Array Of Objects, Objects As Function Arguments, Friend Functions, The Const Member Functions, The Volatile Member Function, Recursive Member Function, Local Classes, Empty, Static And Const Classes, Member Function and Non- Member Function, Overloading Member Functions, Nested Class

**UNIT IV :**

**Objectives: Focus on constructors , destructors, variants in them, operator overloading, type conversions**

**CONSTRUCTORS AND DESTRUCTORS :** Introduction, Characteristic Of Constructors & Destructors, Applications With Constructors, Parameterized Constructor, Overloading Constructors (Multiple Constructors), Array Of Objects Using Constructors, Constructors With Default Arguments, Copy Constructors, The Const Objects, Destructors, Calling Constructors And Destructors, Qualifier And Nested Classes, Anonymous Objects, Private Constructors And Destructors, Dynamic Initialization Using Constructors, Dynamic Operators and Constructors, Recursive Constructor, Constructor and Destructor With Static Members, Local Vs. Global Object

**OPERATOR OVERLOADING AND TYPE CONVERSION :** Introduction, Overloading Unary Operators, Constraint on Increment And Decrement Operators, Overloading Binary Operators, Overloading With Friend Function, Overloading Assignment Operator (=), Type Conversion, Rules For Overloading Operators, One Argument Constructor And Operator Function, Overloading Stream Operators

**UNIT V :**

**Objective: Concentration on inheritance, types of inheritance, polymorphism, virtual functions**

**INHERITANCE :** Introduction, Reusability, Access Specifiers And Simple Inheritance, Protected Data With Private Inheritance, Types Of Inheritances(Single Inheritance, Multilevel Inheritance, Multiple Inheritance, Hierarchical Inheritance, Hybrid Inheritance, Multipath Inheritance), Virtual Base Classes, Constructors, Destructors, And Inheritance, Object As A Class Member, Abstract Classes, Qualifier Classes And Inheritance, Constructor In Derived Class, Pointers And Inheritance, Overloading Member Function, Advantages Of Inheritance, Disadvantages Of Inheritance.

**BINDING, POLYMORPHISM AND VIRTUAL FUNCTIONS:** Introduction, Binding In C++, Static (Early) Binding, Dynamic (Late) Binding, Pointer To Base And Derived Class Objects, Virtual Functions, Rules For Virtual Functions, Array Of Pointers, Pure Virtual Functions, Abstract Classes, Working Of Virtual Functions, Virtual Functions In Derived Classes, Object Slicing, Constructors And Virtual Functions, Virtual Destructors, Destructor And Virtual Functions.

**UNIT VI :**

**Objectives: Focus on Files, File operations, generic programming, templates, function templates, Exception handling**

**APPLICATIONS WITH FILES:** Introduction, File Stream Classes, File Opening Modes, File Pointers And Manipulators, Manipulators With Arguments, Sequential Access Files, Binary And ASCII Filesrandom Access Operation,

**GENERIC PROGRAMMING WITH TEMPLATES :** Introduction, Need Of Template, Definition Of Class Template, Normal Function Template, Working Of Function Templates, Class Template With More Parameters, Functions Templates With More Arguments, Overloading Of Template Functions, Member Function Templates,Recursion With Template Function, Class Template With Overloaded Operators, Class Template Revisited, Class Templates And Inheritance, Container Classes , Types Of Containers, Container Adaptors, Iterators

**EXCEPTION HANDLING :** Introduction, Principles Of Exception Handling,The Keywords Try, Throw And Catch , Exception Handling Mechanism, Multiple Catch Statements, Catching Multiple Exceptions, Re-Throwing Exception, Specifying Exception, Exceptions In Constructor And Destructors, Controlling Uncaught Exceptions, Class Template With Exception Handling

**TEXT BOOKS :**


1. Programming In C++ , Ashok N Kamthane. Pearson 2nd Edition.
2. Object Oriented Programming C++ , Joyce Farrell, Cengage
3. Mastering C ++, Venugopal, Rajkumar, Ravi kumar TMH
4. Object Oriented Programming with C++, 2nd ed, Sourav Sahay, OXFORD


**REFERENCE BOOKS:**


1. The Complete Reference, C++, 4ed, Herbert Schildt, TMH

**II Year – I SEMESTER** | **T** | **P** | **C**
**3+1** | **0** | **3**

## MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

**Objectives: Acquaintance with the basic mathematical implication for computer science, applications of mathematics in computer science**

**UNIT I:**

**Objective: Acquiring the relevance of statements, inferences and predicates in computer science**

**Mathematical Logic** :

Propositional Calculus: Statements and Notations, Connectives, Truth Tables, Tautologies, Equivalence of Formulas, Duality law, Tautological Implications, Normal Forms, Theory of Inference for Statement Calculus, **Consistency of Premises, Indirect Method of Proof.**

**Predicate calculus:** Predicative Logic, Statement Functions, Variables and Quantifiers, Free & Bound Variables, Inference theory for predicate calculus.

**UNIT II :**

**Objective: Overview of number theory, basic algorithms in number theory and mathematical induction**

**Number Theory & Induction:**

Properties of integers, Division Theorem, The Greatest Common Divisor, Euclidean Algorithm, Least Common Multiple, Testing for Prime Numbers, The Fundamental Theorem of Arithmetic, Modular Arithmetic ( Fermat's Theorem and Euler 's Theorem)

**Mathematical Induction: Principle of Mathematical Induction, exercises**

**UNIT III:**

**Objective: Focuses on sets and relations and their operations, relations and functions**

**Set Theory:**

Introduction, Operations on Binary Sets, Principle of Inclusion and Exclusion

Relations: Properties of Binary Relations, Relation Matrix and Digraph, Operations on Relations, Partition and Covering, Transitive Closure, Equivalence, Compatibility and Partial Ordering Relations, Hasse Diagrams.

**Functions**: Bijective Functions, Composition of Functions, Inverse Functions, Permutation Functions, Recursive Functions

**UNIT IV:**

**Objectives: Exposure of graphs, their representation, types, trees and tree variants**

**Graph Theory:**

Basic Concepts of Graphs, Sub graphs, Matrix Representation of Graphs: Adjacency Matrices, Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs, Multigraphs, (Problems and Theorems without proofs)

Planar Graphs, Euler's Formula, Graph Colouring and Covering, Chromatic Number,( Problems and Theorems without proofs)

Trees, Directed trees, Binary Trees, Decision Trees,

Spanning Trees: Properties, Algorithms for Spanning trees and Minimum Spanning Tree.

**UNIT V:**

**Objective: Overview of algebraic structures, Group theory, Binomial theorem, permutations and combinations**

**Algebraic Structures: Lattice:** Properties, Lattices as Algebraic Systems, Algebraic Systems with one Binary Operation, Properties of Binary operations, Semi groups and Monoids: Homomorphism of Semi groups and Monoids, Groups: Abelian Group, Cosets, Subgroups ( Definitions and Examples of all Structures) Algebraic Systems with two Binary Operations: Rings

**Combinatorics:** Basic of Counting, Permutations, Derangements, Permutations with Repetition of Objects, Circular Permutations, Restricted Permutations, Combinations, Restricted Combinations, Pigeonhole Principle and its Application.

**Binomial Theorem:** Binomial and Multinomial Coefficients, Generating Functions of Permutations and Combinations, The Principles of Inclusion – Exclusion.

**UNIT VI:**

**Objective: Overview of generating functions, recurrence relations and solving recurrence relations**

**Recurrence Relation:**
Generating Function of Sequences, Partial Fractions, Calculating Coefficient of Generating Functions Recurrence Relations, Formulation as Recurrence Relations, Solving linear homogeneous recurrence Relations by substitution, generating functions and The Method of Characteristic Roots.
Solving Inhomogeneous Recurrence Relations

**TEXT BOOKS :**


1. Discrete Mathematical Structures with Applications to Computer Science, Tremblay, Manohar, TMH
2. Discrete Mathematics for Computer Scientists & Mathematicians, 2/e, Mott, Kandel, Baker, PHI
3. Discrete Mathematics, Swapan Kumar chakrborthy, Bikash kanti sarkar, OXFORD
4. Discrete Mathematics and its Applications with combinatorics and graph theory, 7th ed, Rosen, TMH
5. Discrete Mathematics, Theory and Applications, Malik sen, Cengage
6. Discrete mathematics and Graph theory, 3rd ed, Biswal, PHI


**REFERENCE BOOKS:**


1. Discrete Mathematics, Proofs, Structures and applications, 3rd ed, CRC Press
2. Discrete Mathematics, S.Santha, Cengage
3. Discrete Mathematics with Applications, Thomas Koshy, Elsevier
4. Discrete Mathematics,2/e, JK Sharma ,Macmillan

**II Year – I SEMESTER** | **T** | **P** | **C**
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## DIGITAL LOGIC DESIGN

**UNIT I: Number Systems**

Binary, Octal, Decimal, Hexadecimal Number Systems. Conversion of Numbers From One Radix To Another Radix, r's Complement and (r-1)'s Complement Subtraction of Unsigned Numbers, Problems, Signed Binary Numbers, Weighted and Non weighted codes

**UNIT II:Logic Gates And Boolean Algebra**

Basic Gates NOT, AND, OR, Boolean Theorms,Complement And Dual of Logical Expressions, Universal Gates, Ex-Or and Ex-Nor Gates, SOP,POS, Minimizations of Logic Functions Using Boolean Theorems, Two level Realization of Logic Functions Using Universal Gates

**Gate Level Minimization:** Karnaugh Map Method (K-Map): Minimization of Boolean Functions maximum upto Four Variables, POS and SOP, Simplifications With Don't Care Conditions Using K-Map.

**UNIT III: Combinational Logic Circuits**

Design of Half Adder, Full Adder, Half Subtractor, Full Subtractor, Ripple Adders and Subtractors, Ripple Adder/Subtractor Using Ones and Twos Complement Method. Design of Decoders, Encoders, Multiplexers, Demultiplexers, Higher Order Demultiplexers and Multiplexers, Priority Encoder, Code Converters, Magnitude Comparator.

**UNIT IV: Introduction to Sequential Logic Circuits**

Classification of Sequential Circuits, Basic Sequential Logic Circuits: Latch and Flip-Flop, RS- Latch Using NAND and NOR Gates, Truth Tables. RS,JK,T and D Flip Flops , Truth and Excitation Tables, Conversion of Flip Flops. Flip Flops With Asynchronous Inputs (Preset and Clear).

**UNIT V: Registers and Counters**

Design of Registers, Buffer Register, Control Buffer Registers, Bidirectional Shift Registers, Universal Shift Register, Design of Ripple Counters, Synchronous Counters and Variable Modulus Counters, Ring Counter, Johnson Counter.

**UNIT VI: Introduction to Programmable Logic Device**s (PLOs)

PLA, PAL, PROM. Realization of Switching Functions Using PROM, PAL and PLA. Comparison of PLA, PAL and PROM.

**TEXT BOOKS :**

1. Digital Design ,4/e, M.Morris Mano, Michael D Ciletti, PEA
2. Fundamentals of Logic Design, 5/e, Roth, Cengage

**REFERENCE BOOKS**

1. Switching and Finite Automata Theory,3/e,Kohavi, Jha, Cambridge.
2. Digital Logic Design, Leach, Malvino, Saha,TMH
3.Modern Digital Electronics, R.P. Jain, TMH

**II Year – I SEMESTER** | **T** | **P** | **C**
**3+1** | **0** | **3**

# DATA STRUCTURES

**Objectives: Comprehensive knowledge of data structures and ability to implement the same in software applications**

**UNIT I:**

**Objective: exposure to algorithmic complexities, recursive algorithms, searching and sorting techniques**

Preliminaries of algorithm, Algorithm analysis and complexity,

**Data structure-** Definition, types of data structures

Recursion: Definition, Design Methodology and Implementation of recursive algorithms, Linear and binary recursion, recursive algorithms for factorial function, GCD computation, Fibonacci sequence, Towers of Hanoi, Tail recursion

List Searches using Linear Search, Binary Search, Fibonacci Search

**Sorting Techniques:** Basic concepts, Sorting by : insertion (Insertion sort), selection (heap sort), exchange (bubble sort, quick sort), distribution (radix sort ) and merging (merge sort ) Algorithms.

**UNIT II:**

**Objectives: Applying stack and queue techniques for logical operations**

**Stacks and Queues:** Basic Stack Operations, Representation of a Stack using Arrays, Stack Applications: Reversing list, Factorial Calculation, Infix to postfix Transformation, Evaluating Arithmetic Expressions.

**Queues:** Basic Queues Operations, Representation of a Queue using array, Implementation of Queue Operations using Stack, Applications of Queues-Round robin Algorithm, Circular Queues, Priority Queues.

**UNIT III:**

**Objectives: Exposure to list representation models in various types of applications**

**Linked Lists:** Introduction, single linked list, representation of a linked list in memory, Operations on a single linked list, Reversing a single linked list, applications of single linked list to represent polynomial expressions and sparse matrix manipulation, Advantages and disadvantages of single linked list, Circular linked list, Double linked list

**UNIT IV:**

**Objectives: Implementation of tree implementation in various forms**

**Trees:** Basic tree concepts, Binary Trees: Properties, Representation of Binary Trees using arrays and linked lists, operations on a Binary tree , Binary Tree Traversals (recursive), Creation of binary tree from in, pre and post order traversals

**UNIT-V:**

**Objectives: Advanced understanding of other variants of trees and their operations**

**Advanced concepts of Trees:** Tree Travels using stack (non recursive), Threaded Binary Trees. Binary search tree, Basic concepts, BST operations: insertion, deletion, Balanced binary trees – need, basics and applications in computer science (No operations)

**UNIT VI:**

**Objectives: orientation on graphs, representation of graphs, graph traversals, spanning trees**

**Graphs:** Basic concepts, Representations of Graphs: using Linked list and adjacency matrix, Graph algorithms

Graph Traversals (BFS & DFS), applications: Dijkstra's shortest path, Transitive closure, Minimum Spanning Tree using Prim's Algorithm, warshall's Algorithm( **Algorithemic Concepts Only, No Programs required**).

**TEXT BOOKS:**


1. Data Structure with C, Seymour Lipschutz, TMH
2. Data Structures using C,Reema Thareja, Oxford
3. Data Structures, 2/e, Richard F, Gilberg , Forouzan, Cengage
4. Data structures and algorithm analysis in C, 2nd ed, mark allen weiss

**REFERENCE BOOKS:**


1. Data Structures and Algorithms, 2008,G.A.V.Pai, TMH
2. Classic Data Structures, 2/e, Debasis ,Samanta,PHI,2009
3. Fundamentals of Data Structure in C, 2/e, Horowitz,Sahni, Anderson Freed,University Prees

**II Year – I SEMESTER** **T P C**
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## OBJECT-ORIENTED PROGRAMMING LAB

1. Write a C++ program illustrating Variable Scope.
2. Write a C++ program illustrating Swap integer values by reference.
3. Write a C++ program illustrating Checking whether the number is even or odd using Ternary operator.
4. Write a C++ program illustrating a program to find the roots of a quadratic equation .Use switch statements to handle different values of the discriminant (b^2-4*a*c).
5. Write a C++ program illustrating interactive program to multiply 2 variables after checking the compatibility.
6. Write a C++ program illustrating interactive program for computing the roots of a quadratic equation by handling all possible cases. Use streams to perform I/O operations.
7. Write a C++ program illustrating to sort integer numbers.
8. Write a C++ program illustrating factorial using recursion.
9. Write a C++ program illustrating pass by value, pass by reference, pass by address.
10. Write a C++ program illustrating Function overloading.
11. Write a C++ program illustrating an interactive program for swapping integer, real, and character type variables without using function overloading .Write the same program by using function overloading features and compare the same with its C counterpart.
12. Write a C++ program illustrating inline functions.
13. Write a C++ program illustrating Friend function.
14. Write a C++ program illustrating Exception handling.
15. Write a C++ program illustrating Function template.
16. Write a C++ program illustrating Overloading increment, decrement, binary+&<< operator.
17. Write a C++ program illustrating Virtual function.
18. Write a C++ program illustrating an interactive program to process complex numbers .It has to Perform addition, subtraction, multiplication, and division of complex numbers. print results in x+iy form. Create a class for the complex number representation.
19. Write a C++ program illustrating user defined string processing functions using pointers (string length, string copy, string concatenation)
20. Write a C++ program illustrating Constructor overloading (Both parameterised and default).
21. Write a C++ program illustrating Copy constructor.
22. Write a C++ program illustrating access data members & member functions using ‘THIS’ pointer.
23. Write a C++ program illustrating for overloading ++ operator to increment data.
24. Write a C++ program illustrating overloading of new and delete operator.
25. Write a C++ program illustrating Abstract classes.
26. Write a C++ program illustrating Inheritance (Multiple, Multilevel, Hybrid).
27. Write a C++ program illustrating Virtual classes & virtual functions.
28. Write a C++ program illustrating overloading function template.
29. Write a C++ program illustrating Class template.

**II Year – I SEMESTER** **T P C**
**0 3 2**

# DATA STRUCTURES LAB

**Exercise 1:**
Write recursive program which computes the $n^{th}$ Fibonacci number, for appropriate values of n.
Analyze behavior of the program Obtain the frequency count of the statement for various values of n.

**Exercise 2:**
Write recursive program for the following
a) Write recursive and non recursive C program for calculation of Factorial of an integer
b) Write recursive and non recursive C program for calculation of GCD (n, m)
c) Write recursive and non recursive C program for Towers of Hanoi : N disks are to be transferred from peg S to peg D with Peg I as the intermediate peg.

**Exercise 3:**
a) Write C program that use both recursive and non recursive functions to perform Linear search for a Key value in a given list.
b) Write C program that use both recursive and non recursive functions to perform Binary search for a Key value in a given list.
c) Write C program that use both recursive and non recursive functions to perform Fibonacci search for a Key value in a given list.

**Exercise 4:**
a) Write C program that implement Bubble sort, to sort a given list of integers in ascending order
b) Write C program that implement Quick sort, to sort a given list of integers in ascending order
c) Write C program that implement Insertion sort,to sort a given list of integers in ascending order

**Exercise 5:**
a) Write C program that implement heap sort, to sort a given list of integers in ascending order
b) Write C program that implement radix sort, to sort a given list of integers in ascending order
c) Write C program that implement merge sort, to sort a given list of integers in ascending order

**Exercise 6:**
a) Write C program that implement stack (its operations) using arrays
b) Write C program that implement stack (its operations) using Linked list

**Exercise 7:**
a) Write a C program that uses Stack operations to Convert infix expression into postfix expression
a) Write C program that implement Queue (its operations) using arrays.
b) Write C program that implement Queue (its operations) using linked lists

**Exercise 8:**
a) Write a C program that uses functions to create a singly linked list
b) Write a C program that uses functions to perform insertion operation on a singly linked list
c) Write a C program that uses functions to perform deletion operation on a singly linked list

**Exercise 9:**
a) Adding two large integers which are represented in linked list fashion.
b) Write a C program to reverse elements of a single linked list.
c) Write a C program to store a polynomial expression in memory using linked list
d) Write a C program to representation the given Sparse matrix using arrays.
e) Write a C program to representation the given Sparse matrix using linked list

**Exercise10**:
a) Write a C program to Create a Binary Tree of integers
b) Write a recursive C program for Traversing a binary tree in preorder, inorder and postorder.
c) Write a non recursive C program for Traversing a binary tree in preorder, inorder and postorder.
d) Program to check balance property of a tree.

**Exercise 11:**
**a)** Write a C program to Create a BST
b) Write a C program to insert a node into a BST.
c) Write a C program to delete a node from a BST.

**II Year – I SEMESTER** | **T** | **P** | **C**
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## DIGITAL LOGIC DESIGN LAB

**List of Experiments:**

1) Verification of Basic Logic Gates.
2) Implementing all individual gates with Universal Gates NAND & NOR.
3) Design a circuit for the given Canonical form, draw the circuit diagram and verify the De-Morgan laws.
4) Design a Combinational Logic circuit for 4x1 MUX and verify the truth table.
5) Design a Combinational Logic circuit for 1x4 De- MUX and verify the truth table.
6) Verify the ***data read*** and ***data write*** operations for the IC 74189.
7) Design a Gray code encoder and interface it to SRAM IC 74189 for write operation display on 7-segment.
8) Design a Gray code De-coder and interface it to SRAM IC 74189 for read operation display it on 7-segment.
9) Construct Half Adder and Full Adder using Half Adder and verify the truth table.
10) Verification of truth tables of the basic Flip- Flops with ***Synchronous*** and ***Asynchronous*** modes.
***11)*** Implementation of Master Slave Flip-Flop with J-K Flip- Flop and verify the truth table for ***race around*** condition**.**
12) Design a Decade Counter and verify the truth table.
13) Design the Mod 6 counter using D-Flip -Flop.
14) Construct 4-bit ring counter with T-Flip –Flop and verify the truth table.
15) Design a 8 – bit right Shift Register using D-Flip -Flop and verify the truth table.

**II Year – I SEMESTER** | **T** | **P** | **C**
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## Seminar

**II Year – II SEMESTER**

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# PROBABILITY AND STATISTICS
## (Common to CE, CSE, IT, Chemical, PE, PCE, Civil Branches)

**UNIT I Random variables and Distributions:**

Introduction- Random variables- Distribution function- Discrete distributions ( Review of Binomial and Poisson distributions)-

Continuous distributions: Normal, Normal approximation to Binomial distribution, Gamma and Weibull distributions

Subject Category
ABET Learning Objectives a b e k
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

**UNIT II Moments and Generating functions:**

Introduction-Mathematical expectation and properties - Moment generating function - Moments of standard distributions ( Binomial, Poisson and Normal distributions) – Properties

Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

**UNIT III Sampling Theory:**

Introduction - Population and samples- Sampling distribution of mean for large and small samples (with known and unknown variance) - Proportion sums and differences of means -Sampling distribution of variance -Point and interval estimators for means and proportions

Subject Category
ABET Learning Objectives a e k
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

**UNIT IV Tests of Hypothesis:**

Introduction - Type I and Type II errors - Maximum error - One tail, two-tail tests- Tests concerning one mean and proportion, two means- Proportions and their differences using Z-test, Student's t-test - F-test and Chi -square test - ANOVA for one-way and two-way classified data

Subject Category
ABET Learning Objectives a b d e h k
ABET internal assessments 1 2 6 7 10
JNTUK External Evaluation A B D E F

**UNIT V Curve fitting and Correlation:**

Introduction - Fitting a straight line –Second degree curve-exponential curve-power curve by method of least squares.

Simple Correlation and Regression - Rank correlation - Multiple regression

Subject Category
ABET Learning Objectives a d e h k
ABET internal assessments 1 2 6 10
JNTUK External Evaluation A B E

**UNIT VI Statistical Quality Control Methods:**

Introduction - Methods for preparing control charts – Problems using x-bar, p, R charts and attribute charts

Subject Category
ABET Learning Objectives a e k
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E F

**Books:**


1. Probability and Statistics for Engineers: Miller and John E. Freund, Prentice Hall of India
2. Probability and Statistics for Engineers and Scientists: Ronald E. Walpole, Sharon L. Mayers and Keying Ye: Pearson
3. Probability, Statistics and Random Processes, Murugesan, Anuradha Publishers, Chenai:


| Subject Category | ABET Learning Objectives | ABET Internal Assessments | JNTUK External Evaluation | Remarks |
|---|---|---|---|---|
| Theory<br>Design<br>Analysis<br>Algorithms<br>Drawing<br>Others | a) Apply knowledge of math, science, & engineering<br>b) Design & conduct experiments, analyze & interpret data<br>c) Design a system/process to meet desired needs within economic, social, political, ethical, health/safety, manufacturability, & sustainability constraints<br>d) Function on multidisciplinary teams<br>e) Identify, formulate, & solve engineering problems<br>f) Understand professional & ethical responsibilities<br>g) Communicate effectively<br>h) Understand impact of engineering solutions in global, economic, environmental, & societal context<br>i) Recognize need for & be able to engage in lifelong learning<br>j) Know contemporary issues<br>k) Use techniques, skills, modern tools for engineering practices | 1. Objective tests<br>2. Essay questions tests<br>3. Peer tutoring based<br>4. Simulation based<br>5. Design oriented<br>6. Problem based<br>7. Experiential (project based) based<br>8. Lab work or field work based<br>9. Presentation based<br>10. Case Studies based<br>11. Role-play based<br>12. Portfolio based | A. Questions should have:<br>B. Definitions, Principle of operation or philosophy of concept.<br>C. Mathematical treatment, derivations, analysis, synthesis, numerical problems with inference.<br>D. Design oriented problems<br>E. Trouble shooting type of questions<br>F. Applications related questions<br>G. Brain storming questions | |

**II Year – II SEMESTER**

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# JAVA PROGRAMMING

**Objective: Implementing programs for user interface and application development using core java principles**

**UNIT I:**

**Objective: Focus on object oriented concepts and java program structure and its installation**

**Introduction to OOP**

Introduction, Need of Object Oriented Programming, Principles of Object Oriented Languages, Procedural languages Vs OOP, Applications of OOP, History of JAVA, Java Virtual Machine, Java Features, Program structures, Installation of JDK1.6

**UNIT II:**

**Objective: Comprehension of java programming constructs, control structures in Java**

**Programming Constructs**

Variables , Primitive Datatypes, Identifiers- Naming Coventions, Keywords, Literals, Operators-Binary,Unary and ternary, Expressions, Precedence rules and Associativity, Primitive TypeConversion and Casting, Flow of control-Branching,Conditional, loops.,

**Classes and Objects**- classes, Objects, Creating Objects, Methods, constructors-Constructor overloading, cleaning up unused objects-Garbage collector, Class variable and Methods-Static keyword, this keyword, Arrays, Command line arguments

**UNIT III:**

**Objective: Implementing Object oriented constructs such as various class hierarchies, interfaces and exception handling**

**Inheritance:** Types of Inheritance, Deriving classes using extends keyword, Method overloading, super keyword, final keyword, Abstract class

**Interfaces, Packages and Enumeration:** Interface-Extending interface, Interface Vs Abstract classes, Packages-Creating packages , using Packages, Access protection, java.lang package

**Exceptions & Assertions** - Introduction, Exception handling techniques-try...catch, throw, throws, finally block, user defined exception, Exception Encapsulation and Enrichment, Assertions

**UNIT IV:**

**Objective: Understanding of Thread concepts and I/O in Java**

**MultiThreading :** java.lang.Thread, The main Thread, Creation of new threads, Thread priority, Multithreading- Using isAlive() and join(), Syncronization, suspending and Resuming threads, Communication between Threads

**Input/Output:** reading and writing data, java.io package

**UNIT V:**

**Objective: Being able to build dynamic user interfaces using applets and Event handling in java**

**Applets**- Applet class, Applet structure, An Example Applet Program, Applet Life Cycle, paint(),update() and repaint()

**Event Handling** -Introduction, Event Delegation Model, java.awt.event Description,Sources of Events, Event Listeners, Adapter classes, Inner classes

**UNIT VI:**

**Objective: Understanding of various components of Java AWT and Swing and writing code snippets using them**

**Abstract Window Toolkit**

Why AWT?, java.awt package, Components and Containers, Button, Label, Checkbox, Radio buttons, List boxes, Choice boxes, Text field and Text area, container classes, Layouts, Menu, Scroll bar

**Swing:**

Introduction , JFrame, JApplet, JPanel, Components in swings, Layout Managers, JList and JScroll Pane, Split Pane, JTabbedPane, Dialog Box

Pluggable Look and Feel

**TEXT BOOKS:**


1. The Complete Refernce Java, 8ed, Herbert Schildt, TMH
2. Programming in JAVA, Sachin Malhotra, Saurabh choudhary, Oxford.
3. JAVA for Beginners, 4e, Joyce Farrell, Ankit R. Bhavsar, Cengage Learning.
4. Object oriented programming with JAVA, Essentials and Applications, Raj Kumar Bhuyya, Selvi, Chu TMH
5. Introduction to Java rogramming, 7th ed, Y Daniel Liang, Pearson


**REFERENCE BOOKS:**


1. JAVA Programming, K.Rajkumar.Pearson
2. Core JAVA, Black Book, Nageswara Rao, Wiley, Dream Tech
3. Core JAVA for Beginners, Rashmi Kanta Das, Vikas.
4. Object Oriented Programming Through Java, P. Radha Krishna, Universities Press.

**II Year – II SEMESTER** | **T** | **P** | **C**
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## ADVANCED DATA STRUCTURES

**(Note: C++ and Java implementation is not included in the syllabus)**

**Objectives: Exposed to hashing approaches, variants of trees , heaps, queues, implementation of graph algorithms, analysis of sorting algorithms with respect to bounds and file organizations and operations**

**UNIT I :**

**Objectives: Comprehensive understanding of dictionaries, hashing mechanism which supports faster retrieval and skip lists**

**Dictionaries :** Sets, Dictionaries, Hash Tables, Open Hashing, Closed Hashing (Rehashing Methods), Hashing Functions( Division Method, Multiplication Method, Universal Hashing), Skip Lists, Analysis of Skip Lists. (Reference 1)

**UNIT II :**

**Objectives: Illustartion of Balanced trees and their operations**

AVL Trees: Maximum Height of AVL Tree, Insertions and Deletions. 2-3 Trees : Insertion, Deletion.

**UNIT III :**

**Objectives: Comprehension of heaps, queues and their operations**

**Priority Queues :**

Binary Heaps : Implementation of Insert and Delete min, Creating Heap.

Binomial Queues : Binomial Queue Operations, Binomial Amortized Analysis, Lazy Binomial Queues

**UNIT IV :**

**Objectives: Detailed knowledge of nonlinear data structures and various algorithms using them**

**Graph algorithms :** Minimum-Cost Spanning Trees- Prim's Algorithm, Kruskal's Algorithm Shortest Path Algorithms: Dijkstra's Algorithm, All Pairs Shortest Paths Problem: Floyd's Algorithm, Warshall's Algorithm,

**UNIT V :**

**Objectives: Analysis of complexities in various sorting techniques along with their lower bounds**

**Sorting Methods :** Order Statistics: Lower Bound on Complexity for Sorting Methods: Lower Bound on Worst Case Complexity, Lower Bound on Average Case Complexity, Heap Sort, Quick Sort, Radix Sorting, Merge Sort.

**UNIT VI :**

**Objectives: Illustration of tries which share some properties of table look up, various issues related to the design of file structures**

**Pattern matching and Tries :** Pattern matching algorithms- the Boyer –Moore algorithm, the Knuth-Morris-Pratt algorithm

Tries: Definitions and concepts of digital search tree, Binary trie, Patricia , Multi-way trie

**File Structures:** Fundamental File Processing Operations-opening files, closing files, Reading and Writing file contents, Special characters in files.

Fundamental File Structure Concepts- Field and record organization, Managing fixed-length, fixed-field buffers.

( Reference 5)

**Text Books :**


1. Data Structures, A Pseudocode Approach, Richard F Gilberg, Behrouz A Forouzan, Cengage.
2. Fundamentals of DATA STRUCTURES in C: 2nd ed, , Horowitz , Sahani, Anderson-freed, Universities Press
3. Data structures and Algorithm Analysis in C, 2nd edition, Mark Allen Weiss, Pearson


**Reference Books:**


1. Web : http://lcm.csa.iisc.ernet.in/dsa/dsa.html
2. http://utubersity.com/?page_id=878
3. http://freevideolectures.com/Course/2519/C-Programming-and-Data-Structures
4. http://freevideolectures.com/Course/2279/Data-Structures-And-Algorithms
5. File Structures :An Object oriented approach with C++, 3rd ed, Michel J Folk, Greg Riccardi, Bill Zoellick

6. C and Data Structures: A Snap Shot oriented Treatise with Live examples from Science and Engineering, NB Venkateswarlu & EV Prasad, S Chand, 2010.

**II Year – II SEMESTER**

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## COMPUTER ORGANIZATION

**Objectives: Comprehensive knowledge of computer system including the analysis and design of components of the system**

**UNIT I :**

**Objectives: Gives a view of computer system from user's perspective, representation of data**

**BASIC STRUCTURE OF COMPUTERS :** Computer Types, Functional unit, Basic Operational concepts, Bus structures,

Data Representation: Data types, Complements, Fixed Point Representation. Floating – Point Representation. Other Binary Codes, Error Detection codes.

**UNIT II :**

**Objectives: Understanding RTL, Micro operations, ALU, Organization of stored program computer, types of instructions and design of basic components of the system**

**REGISTER TRANSFER LANGUAGE AND MICROOPERATIONS:** Register Transfer language. Register Transfer Bus and memory transfers, Arithmetic Micro operations, logic micro operations, shift micro operations, Arithmetic logic shift unit.

**BASIC COMPUTER ORGANIZATION AND DESIGN :** Instruction codes, Computer Register Computer instructions, Timing and control, Instruction cycle, Memory – Reference Instructions. Input – Output and Interrupt, Design of basic computer, Design of Accumulator Logic.

**UNIT III :**

**Objectives: Illustration of data paths and control flow for sequencing in CPUs, Microprogramming of control unit of CPU**

**CENTRAL PROCESSING UNIT :** General Register Organization, STACK organization. Instruction formats. Addressing modes. DATA Transfer and manipulation. Program control. Reduced Instruction set computer.

**MICRO PROGRAMMED CONTROL :** Control memory, Address sequencing, micro program example, design of control unit

**UNIT IV :**

**Objectives: Illustration of algorithms for basic arithmetic operations using binary and decimal representation**

**COMPUTER ARITHMETIC :** Addition and subtraction, multiplication Algorithms, Division Algorithms, Floating – point Arithmetic operations. Decimal Arithmetic unit, Decimal Arithmetic operations.

**UNIT V :**

**Objectives: Description of different parameters of a memory system, organization and mapping of various types of memories**

**THE MEMORY SYSTEM :** Memory Hierarchy, Main memory, Auxiliary memory, Associative Memory, Cache Memory, Virtual Memory.

**UNIT-VI**

**Objectives: Describes the means of interaction devices with CPU, their characteristics, modes and introduction multiprocessors.**

**INPUT-OUTPUT ORGANIZATION :** Peripheral Devices, Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupts, Direct memory Access.

**MULTI PROCESSORS :** Introduction, Characteristics or Multiprocessors, Interconnection Structures, Inter processor Arbitration.

**TEXT BOOKS :**

1. Computer System Architecture, M.Moris Mano, 3rd Edition, Pearson/PHI
2. Computer Organization , Carl Hamacher, Zvonks Vranesic, SafeaZaky, 5th Edition, McGraw Hill.
3. Computer Architecture a quantitative approach, John L. Hennessy and David A. Patterson, Fourth Edition Elsevier

**REFERENCES :**

1. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI

2. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition PHI/Pearson
3. Fundamentals or Computer Organization and Design, - Sivaraama Dandamudi Springer Int. Edition.

**II Year – II SEMESTER**

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# FORMAL LANGUAGES & AUTOMATA THEORY

**Objectives: Understanding of programming language construct, how input is converted into output from the machine hardware level**

**UNIT I:**

**Objectives: Analysis of Finite state machine, its representation and automata**

**Fundamentals of Automata-** Computation, Finite State Machine, Components of Finite State Automata, Elements of Finite State System ,Mathematical representation of Finite State Machine, Automata Classification, Automata in Real World

**UNIT II:**

**Objectives: Delineation of various components of formal languages and grammars.**

**Formal Language Theory**- Symbols, Alphabets and Strings, Operations on Strings, Formal Languages, Operations on Languages,

**Formal Languages/ Grammar Hierarchy:** Formal Languages, Regular Language, Context-Free Language, Context-Sensitive Language, Recursive Language, Recursively Enumerable Language, Other Forms of Formal Languages, Relationship between Grammars and Languages

**UNIT III:**

**Objectives: Description of finite automata, variants in it and their equivalence**

**Finite Automata:** Introduction, Deterministic Finite Automata(DFA), Design of DFAs, Non Deterministic Finite Automata(NFA), Non-Deterministic Automata with Є-moves , Design of NFA- Є s, Advantages of Non-Deterministic Finite Automata, NFA Versus DFA

**Equivalent Automata:** Equivalent Finite-State Automata, Equivalence of NFA/NFA- □ and DFA, Equivalence of NFA, with Є moves to NFA, without Є - moves.

**UNIT IV:**

**Objectives: Minimization, optimization of finite automata, regular expressions and equivalence of finite automata and regular expressions.**

**Minimization/ Optimization of DFA:** Optimum DFA, Minimal DFA, Two way DFA, DFA Vs 2DFA

**Regular Expressions and Languages:**Regular languages, Regular expressions, Components of Regular Expression, Properties of Regular Expressions, Uses of Regular Expressions**.**

**Finite Automata and Regular Expressions:**Properties of Regular Sets and Regular Languages, Arden's Theorem, Equivalence of Finite Automata and Regular Expressions, Equivalence of DFA and Regular Expression, Equivalence of NFA and Regular Expression

**UNIT V:**

**Objectives: Illustration about grammars, classification and simplification of grammaers**

**Transducers:** Moore Machine, Mealy Machine, Difference between Moore and Mealy Machines, Properties / Equivalence of Moore and Mealy Machines.

**Context-Free Grammars and Context-Free Languages:** Types of Grammar, Ambiguous and Unambiguous Grammars, Noam Chomsky's Classification of Grammar and Finite Automata, Relation between Regular Grammar and Finite Automata.

**Simplification of Context – Free Grammar:** Simplification of Context-Free Grammars, Elimination of Є - Productions, Elimination of Unit Productions, Normal Forms for Context Free Grammars, Chomsky Normal Form, Greibach Normal Form, Chomsky Vs. Greibach Normal Form, Application of Context- Free Grammars

**UNIT VI:**

**Objectives: Delineation of turing machines**

**Turing Machine:** Introduction, Components of Turing Machine, Description of Turing Machine, Elements of TM, Moves of a TM, Language accepted by a TM, Role of TM's , Design of TM's

**TM Extensions and Languages:** TM Languages, Undecidable Problem, P and NP Classes of Languages

**Text Books:**

1. A Text Book on Automata Theory, Nasir S.F.B, P.K. Srimani, Cambridge university Press
2. Introduction to Automata Theory, Formal languages and computation, Shamalendu kandar, Pearson
3. Elements of Theory of Compuation, Harry R Lewis, Papdimitriou, PHI

4. Introduction to theory of computation, 2nd ed, Michel sipser, CENGAGE

**Reference Books:**

1. Formal Languages and automata theory, C.K. Nagpal, OXFORD
2. Theory of Computation , aproblem solving approach, kavi Mahesh, Wiley
3. Automata, computability and complexity, Theory and applications, Elaine rich, PEARSON
4. Theory of Computation, Vivek kulkarni, OXFORD

**II Year – II SEMESTER**

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## ADVANCED DATA STRUCTURES LAB

1. To implement functions of Dictionary using Hashing ( division method, Multiplication method, Universal hashing)
2. To perform various operations i.e, insertions and deletions on AVL trees
3. To perform various operations i.e., insertions and deletions on 2-3 trees.
4. To implement operations on binary heap.
5. To implement operations on graphs
   i) vertex insertion
   ii) Vertex deletion
   iii) finding vertex
   iv)Edge addition and deletion
6. To implement Depth First Search for a graph non recursively.
7. To implement Breadth First Search for a graph non recursively.
8. To implement Prim's algorithm to generate a min-cost spanning tree.
9. To implement Krushkal's algorithm to generate a min-cost spanning tree.
10. To implement Dijkstra's algorithm to find shortest path in the graph.
11. To implement pattern matching using Boyer-Moore algorithm.
12. To implement Knuth-Morris-Pratt algorithm for pattern matching.

**II Year – II SEMESTER**

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## JAVA PROGRAMMING LAB

1. Write a JAVA program to display default value of all primitive data types of JAVA
2. Write a JAVA program that displays the roots of a quadratic equation ax2+bx+c=0. Calculate the discriminent D and basing on the value of D, describe the nature of roots.
3. Write a JAVA program to display the Fibonacci sequence
4. Write a JAVA program give example for command line arguments.
5. Write a JAVA program to sort given list of numbers.
6. Write a JAVA program to search for an element in a given list of elements (linear search).
7. Write a JAVA program to search for an element in a given list of elements using binary search mechanism.
8. Write a JAVA program to determine the addition of two matrices.
9. Write a JAVA program to determine multiplication of two matrices.
10. Write a JAVA program to sort an array of strings
11. Write a JAVA program to check whether given string is palindrome or not.
12. Write a JAVA program for the following
    - 1. Example for call by value. 2. Example for call by reference.
13. Write a JAVA program to give the example for 'this' operator. And also use the'this' keyword as return statement.
14. Write a JAVA program to demonstrate static variables, methods, and blocks.
15. Write a JAVA program to give the example for 'super' keyword.
16. Write a JAVA program that illustrates simple inheritance.
17. Write a JAVA program that illustrates multi-level inheritance
18. Write a JAVA program demonstrating the difference between method overloading and method overriding.
19. Write a JAVA program demonstrating the difference between method overloading and constructor overloading.
20. Write a JAVA program that describes exception handling mechanism.
21. Write a JAVA program for example of try and catch block. In this check whether the given array size is negative or not.
22. Write a JAVA program to illustrate sub class exception precedence over base class.
23. Write a JAVA program for creation of user defined exception.
24. Write a JAVA program to illustrate creation of threads using runnable class.(start method start each of the newly created thread. Inside the run method there is sleep() for suspend the thread for 500 milliseconds).
25. Write a JAVA program to create a class MyThread in this class a constructor, call the base class constructor, using super and starts the thread. The run method of the class starts after this. It can be observed that both main thread and created child thread are executed concurrently
26. Write a JAVA program illustrating multiple inheritance using interfaces.
27. Write a JAVA program to create a package named pl, and implement this package in ex1 class.
28. Write a JAVA program to create a package named mypack and import it in circle class.
29. Write a JAVA program to give a simple example for abstract class.
30. Write a JAVA program that describes the life cycle of an applet.
    - Write a JAVA program to create a dialogbox and menu.
    - Write a JAVA program to create a grid layout control.
31. Write a JAVA program to create a border layout control.
32. Write a JAVA program to create a padding layout control.
33. Write a JAVA program to create a simple calculator.
34. Write a JAVA program that displays the x and y position of the cursor movement using Mouse.
35. Write a JAVA program that displays number of characters, lines and words in a text file.

**II Year – II SEMESTER**

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## FREE OPEN SOURCE SOFTWARE (FOSS) LAB

**Objectives:**

- To teach students various unix utilities and shell scripting

**Programs:**

**1.**

Session-1
a)Log into the system
b)Use vi editor to create a file called myfile.txt which contains some text.
c)correct typing errors during creation.
d)Save the file
e)logout of the system

Session-2
a)Log into the system
b)open the file created in session 1
c)Add some text
d)Change some text
e)Delete some text
f)Save the Changes
g)Logout of the system

**2.**

a)Log into the system
b)Use the cat command to create a file containing the following data. Call it mytable use tabs to separate the fields.

| | | |
|---|---|---|
| 1425 | Ravi | 15.65 |
| 4320 | Ramu | 26.27 |
| 6830 | Sita | 36.15 |
| 1450 | Raju | 21.86 |

c)Use the cat command to display the file, mytable.
d)Use the vi command to correct any errors in the file, mytable.
e)Use the sort command to sort the file mytable according to the first field. Call the sorted file my table (same name)
f)Print the file mytable
g)Use the cut and paste commands to swap fields 2 and 3 of mytable. Call it my table (same name)
h)Print the new file, mytable
i)Logout of the system.

**3.**

1) a)Login to the system
b)Use the appropriate command to determine your login shell
c)Use the /etc/passwd file to verify the result of step b.
d)Use the who command and redirect the result to a file called myfile1. Use the more command to see the contents of myfile1.
e)Use the date and who commands in sequence (in one line) such that the output of date will display on the screen and the output of who will be redirected to a file called myfile2. Use the more command to check the contents of myfile2.

2) a)Write a sed command that deletes the first character in each line in a

file.

b)Write a sed command that deletes the character before the last character in each line in a file.

c)Write a sed command that swaps the first and second words in each line in a file.

**4.** a)Pipe your /etc/passwd file to awk, and print out the home directory of each user.

b)Develop an interactive grep script that asks for a word and a file name and then tells how many lines contain that word.

c)Repeat

d)Part using awk

**5.** a)Write a shell script that takes a command –line argument and reports on whether it is directory, a file, or something else.

b)Write a shell script that accepts one or more file name as arguments and converts all of them to uppercase, provided they exist in the current directory.

c)Write a shell script that determines the period for which a specified user is working on the system.

**6.** a)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.

b)Write a shell script that deletes all lines containing a specified word in one or more files supplied as arguments to it.

**7.** a)Write a shell script that computes the gross salary of a employee according to the following rules:

i)If basic salary is < 1500 then HRA =10% of the basic and DA =90% of the basic.

ii)If basic salary is >=1500 then HRA =Rs500 and DA=98% of the basic

The basic salary is entered interactively through the key board.

b)Write a shell script that accepts two integers as its arguments and computers the value of first number raised to the power of the second number.

**8.** a)Write an interactive file-handling shell program. Let it offer the user the choice of copying, removing, renaming, or linking files. Once the user has made a choice, have the program ask the user for the necessary information, such as the file name, new name and so on.

b)Write shell script that takes a login name as command – line argument and reports when that person logs in

c)Write a shell script which receives two file names as arguments. It should check whether the two file contents are same or not. If they are same then second file should be deleted.

**9.** a)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.

b)Develop an interactive script that ask for a word and a file name and then tells how many times that word occurred in the file.

c)Write a shell script to perform the following string operations:

i)To extract a sub-string from a given string.

ii)To find the length of a given string.

**10 .**Write a C program that takes one or more file or directory names as command line input and reports the following information on the file:

i)File type ii)Number of links iii)Read, write and execute permissions

iv)Time of last access

(Note : Use stat/fstat system calls)

**11.** Write C programs that simulate the following unix commands:

a)mv b)cp (Use system calls)

**12.** Write a C program that simulates ls Command

(Use system calls / directory API)

13. Do the following Shell programs also

1) Write a shell script to check whether a particular user has logged in or not. If he has logged in, also check whether he has eligibility to receive a message or not

2) Write a shell script to accept the name of the file from standard input and perform the following tests on it

a) File executable b) File readable c) File writable d) Both readable & writable

3) Write a shell script which will display the username and terminal name who login recently in to the unix system

4) Write a shell script to find no. of files in a directory

5) Write a shell script to check whether a given number is perfect or not

6) Write a menu driven shell script to copy, edit, rename and delete a file

7) Write a shell script for concatenation of two strings

3) Write a shell script which will display Fibonacci series up to a given number of argument

9) Write a shell script to accept student number, name, marks in 5 subjects. Find total, average and grade. Display the result of student and store in a file called stu.dat

Rules: avg>=80 then grade A
Avg<80&&Avg>=70 then grade B
Avg<70&&Avg>=60 then grade C
Avg<60&&Avg>=50 then grade D
Avg<50&&Avg>=40 then grade E
Else grade F

10) Write a shell script to accept empno,empname,basic. Find DA,HRA,TA,PF using following rules. Display empno, empname, basic, DA,HRA,PF,TA,GROSS SAL and NETSAL. Also store all details in a file called emp.dat

Rules: HRA is 18% of basic if basic > 5000 otherwise 550
DA is 35% of basic
PF is 13% of basic
IT is 14% of basic
TA is 10% of basic

11) Write a shell script to demonstrate break and continue statements

12) Write a shell script to satisfy the following menu options

a. Display current directory path b. Display todays date
c. Display users who are connected to the unix system d. Quit

13) Write a shell script to delete all files whose size is zero bytes from current directory

14) Write a shell script to display string palindrome from given arguments

15) Write a shell script which will display Armstrong numbers from given arguments

16) Write a shell script to display reverse numbers from given argument list

17) Write a shell script to display factorial value from given argument list

18) Write a shell script which will find maximum file size in the given argument list

19) Write a shell script which will greet you “Good Morning”, ”Good Afternoon”, “Good Evening’ and “Good Night” according to current time

20) Write a shell script to sort the elements in a array using bubble sort technique

21) Write a shell script to find largest element in a array

22) Write an awk program to print sum, avg of students marks list

23) Write an awk program to display students pass/fail report

24) Write an awk program to count the no. of vowels in a given file

25) Write an awk program which will find maximum word and its length in the given input File

26) Write a shell script to generate the mathematical tables.

27) Write a shell script to sort elements of given array by using selection sort.

28) Write a shell script to search given number using binary search.

29) Write a shell script to find number of vowels, consonants, numbers, white spaces and special characters in a given string.

30) Write a shell script to lock the terminal.

**III Year – I SEMESTER** | **T** | **P** | **C**
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# Compiler Design

**Course Objectives:** To make the student to understand the process involved in a compiler, create an overall view of various types of translators, linkers, loaders, and phases of a compiler, understand what is syntax analysis, various types of parsers especially the top down approach, awareness among students the various types of bottom up parsers, understand the syntax analysis and, intermediate code generation, type checking, the role of symbol table and its organization, Code generation, machine independent code optimization and instruction scheduling.

**Course Outcomes:**
1. To introduce the major concept areas of language translation and compiler design
2. To develop an awareness of the function and complexity of compilers.
3. To provide practical, hands on experience in compiler design
4. Identify the similarities and differences among various parsing techniques and grammar transformation techniques

**Unit–I:**
Overview of language processing – pre-processors – compiler – assembler – interpreters, pre-processors, – linkers & loaders - structure of a compiler – phases of a compiler (TEXT BOOK 2). Lexical Analysis – Role of Lexical Analysis – Lexical Analysis Vs. Parsing – Token, patterns and Lexemes – Lexical Errors – Regular Expressions – Regular definitions for the language constructs – Strings, Sequences, Comments – Transition diagram for recognition of tokens, Reserved words and identifiers, Examples.

**Unit–II**
Syntax Analysis – discussion on CFG, LMD,RMD, parse trees, Role of a parser – classification of parsing techniques – Brute force approach, left recursion, left factoring, Top down parsing – First and Follow- LL(1) Grammars, Non-Recursive predictive parsing – Error recovery in predictive parsing.

**Unit–III**
What is bottom up parsing approach, Types of Bottom up approaches; Introduction to simple LR – Why LR Parsers – Model of an LR Parsers – Operator Precedence- Shift Reduce Parsing – Difference between LR and LL Parsers, Construction of SLR Tables.
More powerful LR parses, construction of CLR (1), LALR Parsing tables, Dangling ELSE Ambiguity, Error recovery in LR Parsing. Comparison of all bottoms up approaches with all top down approaches

**Unit–IV**
Semantic analysis, SDT Schemes, evaluation of semantic rules. Intermediate code, three address code, quadruples, triples, abstract syntax trees. Types and declarations, type Checking.

**Unit–V**
Symbol tables: use and need of symbol tables. Runtime Environment: storage organization, stack allocation, access to non-local data, heap management, parameter passing mechanisms, introduction to garbage collection. Reference counting garbage collectors.
Code generation: Issues, target language, Basic blocks & flow graphs, Simple code generator, Peephole optimization, Register allocation and assignment.

**Unit–VI**
Machine independent code optimization – semantic preserving transformations, global common sub expression elimination, copy propagation, dead code elimination, constant folding, strength reduction, loop optimization. Instruction scheduling, inter procedural optimization.

**TEXT BOOKS:**


1. Compilers, Principles Techniques and Tools- Alfred V Aho, Monica S Lam, Ravi Sethi, Jeffrey D. Ullman,2nd ed, Pearson,2007.
2. Compiler Design, K. Muneeswaran, Oxford.


**REFERENCE BOOKS:**

1. Engineering a compiler, 2nd edition, Keith D.Cooper & Linda Torczon, Morgan Kaufman.
2. http://www.nptel.iitm.ac.in/downloads/106108052/
3. Principles of compiler design, V. Raghavan, 2nd ed, TMH, 2011.
4. Compiler construction, Principles and Practice, Kenneth C Louden, CENGAGE
5. Implementations of Compiler, A new approach to Compilers including the algebraic methods, Yunlinsu, SPRINGER

**III Year – I SEMESTER**

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# Data Communication

**Course Objectives:**

1. To have a detailed study of various analog and digital modulation and demodulation techniques
2. To have a thorough knowledge of various multiplexing schemes and Data communication protocols
3. To know about the standards and mechanisms of television systems

**Course Outcomes:**

1. Knowledge of working of basic communication systems
2. Ability to evaluate alternative models of communication system design

**Syllabus:**

**Unit I:**

**INTRODUCTION TO DATA COMMUNICATIONS AND NETWORKING**: Standards Organizations for Data Communications, Layered Network Architecture, Open Systems Interconnection, Data Communications Circuits, Serial and parallel Data Transmission, Data communications Networks, Alternate Protocol Suites.

**SIGNALS, NOISE, MODULATION, AND DEMODULATION**:Signal Analysis, Electrical Noise and Signal-to-Noise Ratio, Analog Modulation Systems, Information Capacity, Bits, Bit Rate, Baud, and *M*-ary Encoding, Digital Modulation.

**Unit II :**

**METALLIC CABLE TRANSMISSION MEDIA:** Metallic Transmission Lines, Transverse Electromagnetic Waves, Characteristics of Electromagnetic Waves

**OPTICAL FIBER TRANSMISSION MEDIA:** Advantages of Optical Fiber cables, Disadvantages of Optical Fiber Cables, Electromagnetic spectrum, Optical Fiber Communications System Block Diagram, Optical Fiber construction, Propagation of Light Through an Optical fiber Cable, Optical Fiber Modes and Classifications, Optical Fiber Comparison, Losses in Optical Fiber Cables, Light sources, Light Detectors, Lasers.

**Unit III :**

**DIGITAL TRANSMISSION:** Pulse Modulation, Pulse code Modulation, Dynamic Range, Signal Voltage –to-Quantization Noise Voltage Ratio, Linear Versus Nonlinear PCM Codes, Companding, PCM Line Speed, Delta Modulation PCM and Differential PCM.

**MULTIPLEXING AND T CARRIERS:** Time- Division Multiplexing, T1 Digital Carrier System, Digital Line Encoding, T Carrier systems, Frequency- Division Multiplexing, Wavelength- Division Multiplexing, Synchronous Optical Network

**Unit IV:**

**WIRELESS COMMUNICATIONS SYSTEMS:** Electromagnetic Polarization, Electromagnetic Radiation, Optical Properties of Radio Waves, Terrestrial Propagation of Electromagnetic Waves, Skip Distance, Free-Space Path Loss, Microwave Communications Systems, Satellite Communications Systems.

**Unit V:**

**TELEPHONE INSTRUMENTS AND SIGNALS:** The Subscriber Loop, Standard Telephone Set, Basic Telephone Call Procedures, Call Progress Tones and Signals, Cordless Telephones, Caller ID, Electronic Telephones, Paging systems.

**CELLULAR TELEPHONE SYSTEMS:** First- Generation Analog Cellular Telephone, Personal Communications system, Second-Generation Cellular Telephone Systems, N-AMPS, Digital Cellular Telephone, Interim Standard, Global system for Mobile Communications.

**Unit VI:**

**DATA COMMUNICATIONS CODES, ERROR CONTROL, AND DATA FORMATS:**

Data Communications Character Codes, Bar Codes, Error Control, Error Detection and Correction, Character Synchronization.

**DATA COMMUNICATIONS EQUIPMENT:** Digital Service Unit and Channel Service Unit, Voice- Band Data Communication Modems, Bell Systems-Compatible Voice- Band Modems, Voice- Band Modem Block Diagram, Voice- Band Modem Classifications, Asynchronous Voice-Band Modems, Synchronous Voice-Band Modems, Modem Synchronization, 56K Modems, Modem Control: The AT Command Set, Cable Modems.

**TEXT BOOKS:**

1. Introduction to Data Communications and Networking, Wayne Tomasi, Pearson Education.

**Reference Books :**

1. Data Communications and Networking, Behrouz A Forouzan, Fourth Edition.TMH.
2. Data and Computer communications, 8/e, William Stallings, PHI.
3. Computer Communications and Networking Technologies, Gallow, Second Edition Thomson
4. Computer Networking and Internet, Fred Halsll, Lingana Gouda Kulkarni, Fifth Edition, Pearson Education

**III Year – I SEMESTER** | **T** | **P** | **C**
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# Principles of Programming Languages

**Course objectives:**

1. To understand and describe syntax and semantics of programming languages
2. To understand data, data types, and basic statements
3. To understand call-return architecture and ways of implementing them
4. To understand object-orientation, concurrency, and event handling in programming languages
5. To develop programs in non-procedural programming paradigms

**Course Outcomes:**

Upon Completion of the course, the students will be able to

1. Describe syntax and semantics of programming languages
2. Explain data, data types, and basic statements of programming languages
3. Design and implement subprogram constructs, Apply object - oriented, concurrency, and event handling programming constructs
4. Develop programs in Scheme, ML, and Prolog
5. Understand and adopt new programming languages

## Syllabus:

**UNIT I :**

**SYNTAX AND SEMANTICS:** Evolution of programming languages, describing syntax, context,free grammars, attribute grammars, describing semantics, lexical analysis, parsing, recursive - decent bottom - up parsing

**UNIT II:**

**DATA, DATA TYPES, AND BASIC STATEMENTS:** Names, variables, binding, type checking, scope, scope rules, lifetime and garbage collection, primitive data types, strings, array types, associative arrays, record types, union types, pointers and references, Arithmetic expressions, overloaded operators, type conversions, relational and boolean expressions , assignment statements , mixed mode assignments, control structures – selection, iterations, branching, guarded Statements

**UNIT III:**

**SUBPROGRAMS AND IMPLEMENTATIONS:** Subprograms, design issues, local referencing, parameter passing, overloaded methods, generic methods, design issues for functions, semantics of call and return, implementing simple subprograms, stack and dynamic local variables, nested subprograms, blocks, dynamic scoping

**UNIT IV:**

**OBJECT- ORIENTATION, CONCURRENCY, AND EVENT HANDLING:** Object – orientation, design issues for OOP languages, implementation of object, oriented constructs, concurrency, semaphores,
Monitors, message passing, threads, statement level concurrency, exception handling, event handling

**UNIT V :**

**FUNCTIONAL PROGRAMMING LANGUAGES:** Introduction to lambda calculus, fundamentals of functional programming languages, Programming with Scheme, –
Programming with ML,

**UNIT VI :**

**LOGIC PROGRAMMING LANGUAGES:** Introduction to logic and logic programming, –
Programming with Prolog, multi - paradigm languages

**TEXT BOOKS:**

1. Robert W. Sebesta, "Concepts of Programming Languages", Tenth Edition, Addison Wesley, 2012.
2. Programming Langugaes, Principles & Paradigms, 2ed, Allen B Tucker, Robert E Noonan, TMH

**REFERENCES:**

1. R. Kent Dybvig, "The Scheme programming language", Fourth Edition, MIT Press, 2009.
2. Jeffrey D. Ullman, "Elements of ML programming", Second Edition, Prentice Hall, 1998.
3. Richard A. O'Keefe, "The craft of Prolog", MIT Press, 2009.
4. W. F. Clocksin and C. S. Mellish, "Programming in Prolog: Using the ISO Standard", Fifth Edition, Springer, 2003

**III Year – I SEMESTER**

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# Database Management Systems

**Course Objectives:**
Provides students with theoretical knowledge and practical skills in the use of databases and database management systems in information technology applications. The logical design, physical design and implementation of relational databases are covered.

**Course Outcomes:**

- define a Database Management System
- give a description of the Database Management structure
- understand the applications of Databases
- know the advantages and disadvantages of the different models
- compare relational model with the Structured Query Language (SQL)
- know the constraints and controversies associated with relational database model.
- know the rules guiding transaction ACID
- understand the concept of data planning and Database design
- identify the various functions of Database Administrator

**Syllabus:**

**Unit – I: INTRODUCTION**
Database system, Characteristics (Database Vs File System), Database Users(Actors on Scene, Workers behind the scene), Advantages of Data base systems, Database applications.
Brief introduction of different Data Models; Concepts of Schema, Instance and data independence; Three tier schema architecture for data independence; Database system structure, environment, Centralized and Client Server architecture for the database.

**Unit – II:**
**RELATIONAL MODEL :** Introduction to relational model, concepts of domain, attribute, tuple, relation, importance of null values, constraints (Domain, Key constraints, integrity constraints) and their importance
**BASIC SQL :** Simple Database schema, data types, table definitions (create, alter), different DML operations (insert, delete, update), basic SQL querying (select and project) using where clause, arithmetic & logical operations, SQL functions(Date and Time, Numeric, String conversion).

**Unit – III:**
**Entity Relationship Model:** Introduction, Representation of entities, attributes, entity set, relationship, relationship set, constraints, sub classes, super class, inheritance, specialization, generalization using ER Diagrams.
**SQL :** Creating tables with relationship, implementation of key and integrity constraints, nested queries, sub queries, grouping, aggregation, ordering, implementation of different types of joins, view(updatable and non-updatable), relational set operations.

**Unit – IV:**
**SCHEMA REFINEMENT (NORMALIZATION) :** Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency(1NF, 2NF and 3 NF), concept of surrogate key, Boyce-codd normal form(BCNF), Lossless join and dependency preserving decomposition, Fourth normal form(4NF).

**Unit – V:**
**TRANSACTION MANAGEMENT AND CONCURRENCY CONTROL :** Transaction, properties of transactions, transaction log, and transaction management with SQL using commit rollback and savepoint.
Concurrency control for lost updates, uncommitted data, inconsistent retrievals and the Scheduler. Concurrency control with locking methods : lock granularity, lock types, two phase locking for ensuring serializability, deadlocks, Concurrency control with time stamp ordering : Wait/Die and Wound/Wait Schemes, Database Recovery management : Transaction recovery.
SQL constructs that grant access or revoke access from user or user groups. Basic PL/SQL procedures, functions and triggers.

**UNIT – VI:**

**STORAGE AND INDEXING :** Database file organization, file organization on disk, heap files and sorted files, hashing, single and multi-level indexes, dynamic multilevel indexing using B-Tree and B+ tree, index on multiple keys.

**Text Books :**

1. Database Management Systems, 3/e Raghuram Krishnan, Johannes Gehrke, TMH
2. Database Management System, 6/e Ramez Elmasri, Shamkant B. Navathe, PEA
3. Database Principles Fundamentals of Design Implementation and Management, Corlos Coronel, Steven Morris, Peter Robb, Cengage Learning.

**Reference Books :**

1. Database System Concepts. 5/e Silberschatz, Korth, TMH
2. Introduction to Database Systems, 8/e C J Date, PEA
3. The Database book principles & practice using Oracle/MySql Narain Gehani, University Press.

**III Year – I SEMESTER**

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# Operating Systems

**Course Objectives:**
To gain knowledge about the Operating Systems concepts such as process, main memory management, secondary memory management, CPU and disk scheduling etc

**Course Outcomes:**
By the end of the course student will be able to

- describe the general architecture of computers
- describe, contrast and compare differing structures for operating Systems
- understand and analyse theory and implementation of: processes, resource control (concurrency etc.), physical and virtual memory, scheduling, I/O and files

## Syllabus:

**UNIT-I:**
**Computer System and Operating System Overview:** Overview of computer operating systems, operating systems functions, protection and security, distributed systems, special purpose systems, operating systems structures and systems calls, operating systems generation.

**UNIT-II:**
**Process Management** – Process concept- process scheduling, operations, Inter process communication. Multi Thread programming models. Process scheduling criteria and algorithms, and their evaluation.

**UNIT-III:**
**Concurrency:** Process synchronization, the critical- section problem, Peterson's Solution, synchronization Hardware, semaphores, classic problems of synchronization, monitors, Synchronization examples

**UNIT-IV:**
**Memory Management:** Swapping, contiguous memory allocation, paging, structure of the page table, segmentation
**Virtual Memory Management:**
virtual memory, demand paging, page-Replacement, algorithms, Allocation of Frames, Thrashing

**UNIT-V:**
**Principles of deadlock** – system model, deadlock characterization, deadlock prevention, detection and avoidance, recovery form deadlock,

**UNIT-VI:**
**File system Interface-** the concept of a file, Access Methods, Directory structure, File system mounting, file sharing, protection.
**File System implementation-** File system structure, allocation methods, free-space management
**Mass-storage structure** overview of Mass-storage structure, Disk structure, disk attachment, disk scheduling

**TEXT BOOKS:**


1. Operating System Concepts- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley.
2. Operating Systems' – Internal and Design Principles Stallings, Sixth Edition–2005, Pearson education


**REFERENCE BOOKS:**


1. http://nptel.iitm.ac.in/courses/Webcourse-contents/IISc-BANG/ Operating%20Systems/New_index1.html
2. Operating systems- A Concept based Approach-D.M.Dhamdhere, 2nd Edition, TMH
3. Operating System A Design Approach-Crowley, TMH.
4. Modern Operating Systems, Andrew S Tanenbaum 3rd edition PHI.

**III Year – I SEMESTER**

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# Compiler Design Lab

## Course Objectives:

To enlighten the student with knowledge base in compiler design and its applications

## Course Outcomes:

Demonstrate a working understanding of the process of lexical analysis, parsing and other compiler design aspects.

## Lab Experiments:

1. Design a lexical analyzer for given language and the lexical analyzer should ignore redundant spaces, tabs and new lines
2. Simulate First and Follow of a Grammar**.**
3. Develop an operator precedence parser for a given language.
4. Construct a recursive descent parser for an expression.
5. Construct a LL(1) parser for an expression
6. Design predictive parser for the given language
7. Implementation of shift reduce parsing algorithm.
8. Design a LALR bottom up parser for the given language.
9. Implement the lexical analyzer using JLex, flex or lex or other lexical analyzer generating tools
10. Write a program to perform loop unrolling.
11. Convert the BNF rules into YACC form and write code to generate abstract syntax tree.
12. Write a program for constant propagation.

**III Year – I SEMESTER**

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# Operating System Lab

**Objective :**

- To provide an understanding of the design aspects of operating system

**Recommended Systems/Software Requirements:**

- Intel based desktop PC with minimum of 166 MHZ or faster processor with atleast 64 MB RAM and 100 MB free disk space

**Lab Experiments:**

1. Simulate the following CPU scheduling algorithms
   a) Round Robin b) SJF c) FCFS d) Priority

2. Loading executable programs into memory and execute System Call implementation-read(), write(), open () and close()

3. . Multiprogramming-Memory management- Implementation of Fork(), Wait(), Exec() and Exit() System calls

4. Simulate all File allocation strategies a) Sequenced b) Indexedc) Linked

5. Simulate MVT and MFT

6. Simulate all File Organization Techniques
   a) Single level directory b) Two level c) Hierarchical d) DAG

7. Simulate Bankers Algorithm for Dead Lock Avoidance

8. Simulate Bankers Algorithm for Dead Lock Prevention.

9. Simulate all page replacement algorithms.
   a) FIFO b) LRU c) LFU etc….

10. Simulate Paging Technique of memory management.

**III Year – I SEMESTER** **T P C**
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# Database Management Systems Lab

**Objectives:**

- To teach the student database design and query and PL/SQL.

**System/Software Requirements:**

- Intel based desktop PC
- Mysql /Oracle latest version Recommended

**PROGRAMS LIST:**

**1)** Creation, altering and droping of tables and inserting rows into a table (use constraints while creating tables) examples using SELECT command.

2) Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints.
Example:- Select the roll number and name of the student who secured fourth rank in the class.

3) Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.

4) Queries using Conversion functions (to_char, to_number and to_date), string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), date functions (Sysdate, next_day, add_months, last_day, months_between, least, greatest, trunc, round, to_char, to_date)

5)
i)Creation of simple PL/SQL program which includes declaration section, executable section and exception –Handling section (Ex. Student marks can be selected from the table and printed for those who secured first class and an exception can be raised if no records were found)

ii)Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.

6) Develop a program that includes the features NESTED IF, CASE and CASE expression. The program can be extended using the NULLIF and COALESCE functions.

7) Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT –IN Exceptions, USE defined Exceptions, RAISE- APPLICATION ERROR.

8) Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES.

9) Program development using creation of stored functions, invoke functions in SQL Statements and write complex functions.

10) Program development using creation of package specification, package bodies, private objects, package variables and cursors and calling stored packages.

11) Develop programs using features parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of clause and CURSOR variables.

12) Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers

**TEXT BOOKS :**

**1)** ORACLE PL/SQL by example. Benjamin Rosenzweig, Elena Silvestrova, Pearson Education 3rd Edition
**2)** ORACLE DATA BASE LOG PL/SQL Programming SCOTT URMAN, Tata Mc-Graw Hill.

**3)** SQL & PL/SQL for Oracle 10g, Black Book, Dr.P.S. Deshpande.

**4)** Data Base Management System, Oracle SQL and PL/SQL, Pranab kumar Das Gupta, P Radha Krishna, PHI

**III Year – I SEMESTER**

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# Linux Programming Lab

**Objectives:**
To give a practical orientation of programming in Linux environment using system calls and advanced concepts in unix programming

**PROGRAMS LIST:**

1. Write C programs that uses open, read, write system calls.
2. Write C programs that differentiates FILE *( file stream pointers in C standard library) and file descriptors by using functions such as fdopen, fileno.
3. Write a C program which displays a given files meta data by using stat system call and st_mode structure.
4. Write a C program which lists all the files of current working directory whose size is more than given number of data blocks.
5. Write a C program which lists all the files of current working directory which contains hard link files.
6. Write a C program to emulates file system checking utility (fsck command) using system calls.
7. Example C program which supports that child process inherits environment variables, command line arguments, opened' files.
8. Simple C programs to have process trees and process chains.
9. Simple C program that demonstrates the failure of fork system call because of crossing system limits.
10. Simple C programs to demonstrate the use of pipe system call for inter process communication and also emulating piping in shell.
11. Simple C programs to demonstrate the use of popen standard library function call for inter process communication and also emulating piping in shell.
12. Simple C program to use named pipes for inter process communication.
13. Simple C programs to illustrate the use of exec family of functions.
14. Write a C program which emulates simple shell.
15. Write C program to create a thread using pthreads library and let it run its function.
16. Write a C program to illustrate concurrent execution of threads using pthreads library.
17. Write a C program to simulate ptrhead_create function failure by repeatedly calling the same.
18. Write a C program which creates a thread using pthread and passes arguments to the thread function.
19. Write C programs which uses sigset, sifillset, sigprocmask, related system calls and structures.
20. Write a C program to simulate memory segment violation run time error and implement a signal handler (both reliable and unreliable) which handles situation.
21. Write a C program to illustrate the use of sbrk system call.
22. Write a C program to illustrate inter process communication via message queues.
23. Write a C program to illustrate inter process communication via shared memory.
24. Write a C program to simulate producer and consumer problem using semaphores, shared memory, and fork.
25. Write a C program to simulate producer and consumer problem using semaphores, shared memory, and pthread_create.
26. Write a C program to simulate producer and consumer problem using muexes, shared memory, and threads.
27. Write socket Programs in C for Echo/Ping/Talk Commands.
28. Create a Socket (TCP) between two computers and enable file transfer between them.
29. Write a Program to implement Remote Command Execution.
30. Write a code simulating ARP/RARP.

**III Year – I SEMESTER**

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## INTELLECTUAL PROPERTY RIGHTS AND PATENTS – 1

**Unit 1**

Introduction to Intellectual Property Law – The Evolutionary Past - The IPR Tool Kit- Para -Legal Tasks in Intellectual Property Law – Ethical

obligations in Para Legal Tasks in Intellectual Property Law - Introduction to Cyber Law – Innovations and Inventions Trade related Intellectual Property Right

**Unit 2**

Introduction to Trade mark – Trade mark Registration Process – Post registration procedures – Trade mark maintenance - Transfer of Rights - Inter partes Proceeding – Infringement - Dilution Ownership of Trade mark – Likelihood of confusion - Trademarks claims – Trade marks Litigations – International Trade mark Law –

**Unit 3**

Introduction to Copyrights – – Principles of Copyright Principles -The subjects Matter of Copy right – The Rights Afforded by Copyright Law – Copy right Ownership, Transfer and duration – Right to prepare Derivative works – Rights of Distribution – Rights of Perform the work Publicity Copyright Formalities and Registrations - Limitions - Copyright disputes and International Copyright Law – Semiconductor Chip Protection Act

**Unit 4**

Introduction to Trade Secret – Maintaining Trade Secret – Physical Secrurity –Employee Limitation - Employee confidentiality agreement - Trade Secret Law - Unfair Competation – Trade Secret Letigation – Breach of Contract – Applying State Law

**Books:**


1. Deborah E.Bouchoux: “Intellectual Property”. Cengage learning , New Delhi
2. Kompal Bansal & Parishit Bansal "Fundamentals of IPR for Engineers", BS Publications (Press)
3. Cyber Law. Texts & Cases, South-Western’s Special Topics Collections
4. Prabhuddha Ganguli: ‘ Intellectual Property Rights” Tata Mc-Graw – Hill, New Delhi
5. Richard Stim: "Intellectual Property", Cengage Learning, New Delhi.
6. R. Radha Krishnan, S. Balasubramanian: "Intellectual Property Rights", Excel Books. New Delhi.

M.Ashok Kumar and Mohd.Iqbal Ali: “Intellectual Property Right” Serials Pub.


**III Year – I SEMESTER**

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## Seminar

**III Year –II SEMESTER**

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# Computer Networks

## Course Objectives:

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

1. Build an understanding of the fundamental concepts of computer networking.
2. Familiarize the student with the basic taxonomy and terminology of the computer networking area.
3. Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.

## Course Outcomes:

After completing this course the student must demonstrate the knowledge and ability to:

1. Independently understand basic computer network technology.
2. Identify the different types of network topologies and protocols.
3. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.

## Syllabus:

**UNIT – I :**

**Introduction**: OSI overview, TCP/IP and other networks models, Examples of Networks: Novell Networks, Arpanet, Internet, Network Topologies WAN, LAN, MAN.

**UNIT – II :**

**Physical Layer and overview of PL Switching**: Multiplexing: frequency division multiplexing, wave length division multiplexing, synchronous time division multiplexing, statistical time division multiplexing, introduction to switching: Circuit Switched Networks, Datagram Networks, Virtual Circuit Networks.

**UNIT – III:**

**Data link layer**: Design issues, **Framing**: fixed size framing, variable size framing, flow control, error control, error detection and correction, CRC, Checksum: idea, one's complement internet checksum, services provided to Network Layer, **Elementary Data Link Layer protocols**: simplex protocol, Simplex stop and wait, Simplex protocol for Noisy Channel.

**Sliding window protocol**: One bit, Go back N, Selective repeat-Stop and wait protocol, Data link layer in HDLC: configuration and transfer modes, frames, control field, point to point protocol (PPP): framing transition phase, multiplexing, multi link PPP.

**UNIT – IV :**

**Random Access**: ALOHA, MAC addresses, Carrier sense multiple access (CSMA), CSMA with Collision Detection, CSMA with Collision Avoidance, Controlled Access: Reservation, Polling, Token Passing, Channelization: frequency division multiple access(FDMA), time division multiple access(TDMA), code division multiple access(CDMA).

**Network Layer**: Virtual circuit and Datagram subnets-Routing algorithm shortest path routing, Flooding, Hierarchical routing, Broad cast, Multi cast, distance vector routing.

**UNIT –V :**

**IEEE Standards**: – data link layer, physical layer, Manchester encoding, Standard Ethernet: MAC sub layer, physical layer, Fast Ethernet: MAC sub layer, physical layer, IEEE-802.11: Architecture, MAC sub layer, addressing mechanism, frame structure.

**UNIT –VI :**

**Application layer (WWW and HTTP):** ARCHITECTURE : Client (Browser) ,Server ,Uniform Resource Locator HTTP: HTTP Transaction, HTTP Operational Model and Client/Server Communication, HTTP Generic Message Format, HTTP Request Message Format, HTTP Response Message Format

**The wireless web :** WAP—The Wireless Application Protocol

**TEXT BOOKS :**

1. Data Communications and Networks – Behrouz A. Forouzan.Third Edition TMH.
2. Computer Networks, 5ed, David Patterson, Elsevier
3. Computer Networks — Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI
4. Computer Networks, Mayank Dave, CENGAGE

**REFERENCES :**

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education
2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson

**III Year –II SEMESTER**

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# Data Ware housing and Mining

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

**Course Outcomes:**

a) understand why there is a need for data warehouse in addition to traditional operational database systems;
b) identify components in typical data warehouse architectures;
c) design a data warehouse and understand the process required to construct one;
d) understand why there is a need for data mining and in what ways it is different from traditional statistical techniques;
e) understand the details of different algorithms made available by popular commercial data mining software;
f) solve real data mining problems by using the right tools to find interesting patterns

**Syllabus:**

**UNIT –I:**
**Introduction :** What Motivated Data Mining? Why Is It Important, Data Mining—On What Kind of Data, Data Mining Functionalities—What Kinds of Patterns Can Be Mined? Are All of the Patterns Interesting? Classification of Data Mining Systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or Data Warehouse System, Major Issues in Data Mining. **(Han & Kamber)**

**UNIT –II:**
**Data Pre-processing :** Why Pre-process the Data? Descriptive Data Summarization, Data Cleaning, Data Integration and Transformation, Data Reduction, Data Discretization and Concept Hierarchy Generation. **(Han & Kamber)**

**UNIT –III:**
**Data Warehouse and OLAP Technology: An Overview :** What Is a Data Warehouse? A Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, From Data Warehousing to Data Mining. **(Han & Kamber)**

**UNIT –IV:**
**Classification :** Basic Concepts, General Approach to solving a classification problem, Decision Tree Induction: Working of Decision Tree, building a decision tree, methods for expressing an attribute test conditions, measures for selecting the best split, Algorithm for decision tree induction.
**Model Over fitting:** Due to presence of noise, due to lack of representation samples, evaluating the performance of classifier: holdout method, random sub sampling, cross-validation, bootstrap. **(Tan & Vipin)**

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

**UNIT –VI**
**Cluster Analysis: Basic Concepts and Algorithms :** What Is Cluster Analysis? Different Types of Clustering, Different Types of Clusters, K-means, The Basic K-means Algorithm, K-means: Additional Issues, Bisecting K-means, K-means and Different Types of Clusters, Strengths and Weaknesses, K-means as an Optimization Problem, Agglomerative Hierarchical Clustering, Basic Agglomerative Hierarchical Clustering Algorithm, Specific Techniques, DBSCAN, Traditional Density: Center-Based Approach, The DBSCAN Algorithm, Strengths and Weaknesses. **(Tan & Vipin)**

**Text Books :**

1. Introduction to Data Mining : Pang-Ning Tan & Michael Steinbach, Vipin Kumar, Pearson.
2. Data Mining concepts and Techniques, 3/e, Jiawei Han, Michel Kamber, Elsevier.

**Reference Books :**

1. Data Mining Techniques and Applications: An Introduction, Hongbo Du, Cengage Learning.
2. Data Mining : Introductory and Advanced topics : Dunham, Pearson.
3. Data Warehousing Data Mining & OLAP, Alex Berson, Stephen Smith, TMH.
4. Data Mining Techniques, Arun K Pujari, Universities Press.

**III Year –II SEMESTER**

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# Design and Analysis of Algorithms

**Course Objectives:**

Upon completion of this course, students will be able to do the following:

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

**Course Outcomes:**

Students who complete the course will have demonstrated the ability to do the following:

- Analyze worst-case running times of algorithms using asymptotic analysis.
- Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it.
- Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it.
- Describe the greedy paradigm and explain when an algorithmic design situation calls for it.
- Explain the major graph algorithms and their analyses. Employ graphs to model engineering problems, when appropriate. Synthesize new graph algorithms and algorithms that employ graph computations as key components, and analyze them.
- Explain the different ways to analyze randomized algorithms (expected running time, probability of error). Recite algorithms that employ randomization. Explain the difference between a randomized algorithm and an algorithm with probabilistic inputs.
- Analyze randomized algorithms. Employ indicator random variables and linearity of expectation to perform the analyses. Recite analyses of algorithms that employ this method of analysis.

**Syllabus:**

**UNIT-I:**
Introduction: Algorithm, Psuedo 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 analysis.

**UNIT-II:**
Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort

**UNIT-III:**

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

**UNIT-IV:**
Dynamic Programming: General method, applications-Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Travelling sales person problem, Reliability design.

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

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

**TEXT BOOKS:**


1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharam, Universities Press.
2. Design and Analysis of Algorithms , S Sridhar, Oxford
3. Design and Analysis of Algorithms, Parag Himanshu Dave, Himansu BAlachandra Dave, 2ed,Pearson Education.


**REFERENCE BOOKS:**


1. Design and Analysis of algorithms, Aho, Ullman and Hopcroft,Pearson education.
2. Introduction to the Design and Analysis of Algorithms, Anany Levitin, PEA
3. Introduction to Algorithms, second edition, T.H.Cormen, C.E.Leiserson, R.L.Rivest and C.Stein,PHI Pvt. Ltd.
4. Algorithm Design, Foundation, Analysis and internet Examples, Michel T Goodrich, Roberto Tamassia, Wiley

**III Year –II SEMESTER** | **T** | **P** | **C**
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# Software Engineering

**Course Objectives:**
The students will have a broad understanding of the discipline of software engineering and its application to the development of and management of software systems.

**Course Outcomes:**
1. knowledge of basic SW engineering methods and practices, and their appropriate application;
2. general understanding of software process models such as the waterfall and evolutionary models.
3. understanding of the role of project management including planning, scheduling, risk management, etc.
4. understanding of software requirements and the SRS document.
5. understanding of different software architectural styles.
6. understanding of implementation issues such as modularity and coding standards.
7. understanding of approaches to verification and validation including static analysis, and reviews.
8. understanding of software testing approachs such as unit testing and integration testing.
9. understanding of software evolution and related issues such as version management.
10. understanding on quality control and how to ensure good quality software.
11. understanding of some ethical and professional issues that are important for software engineers.
12. development of significant teamwork and project based experience

## Syllabus:

**UNIT I:**
**Introduction to Software Engineering:** Software, Software Crisis, Software Engineering definition, Evolution of Software Engineering Methodologies, Software Engineering Challenges.
**Software Processes:** Software Process, Process Classification, Phased development life cycle, Software Development Process Models- Process, use, applicability and Advantages/limitations

**UNIT II:**
**Requirements Engineering:** Software Requirements, Requirements engineering Process, Requirements elicitation, Requirements Analysis, Structured Analysis, Data Oriented Analysis, Object oriented Analysis, Prototyping Analysis, Requirements Specification, Requirements Validation, requirement Management.

**UNIT III:**
**Software Design:** Software Design Process, Characteristics of Good Software Design, Design Principles, Modular Design, Design Methodologies, Structured Design, Structured Design Methodology, Transform Vs Transaction Analysis.
**Object-Oriented Design:** Object oriented Analysis and Design Principles

**UNIT IV:**
**Implementation:** Coding Principles, Coding Process, Code verification, Code documentation
**Software Testing:** Testing Fundamentals, Test Planning, Black Box Testing, White Box Testing, Levels of Testing, Usability Testing, Regression testing, Debugging approaches

**UNIT V:**
**Software Project Management**: Project Management Essentials, What is Project management, Software Configuration Management.
**Project Planning and Estimation**: Project Planning activities, Software Metrics and measurements, Project Size Estimation, Effort Estimation Techniques.

**UNIT VI:**
**Software Quality:** Software Quality Factors, Verification & Validation, Software Quality Assurance, The Capability Maturity Model
**Software Maintenance:** Software maintenance, Maintenance Process Models, Maintenance Cost, Reengineering, Reengineering activities, Software Reuse.

**TEXT BOOKS:**


1. Software Engineering, concepts and practices, Ugrasen Suman, Cengage learning
2. Software Engineering, 8/e, Sommerville, Pearson.
3. Software Engineering, 7/e , Roger S.Pressman , TMH


**REFERENCE BOOKS:**


1. Software Engineering, A Precise approach, Pankaj Jalote, Wiley
2. Software Engineering principles and practice, W S Jawadekar, TMH
3. Software Engineering concepts, R Fairley, TMH

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# Web Technologies

**Course Objectives:**
This course is designed to introduce students with no programming experience to the programming languages and techniques associated with the World Wide Web. The course will introduce web-based media-rich programming tools for creating interactive web pages.

**Course Outcomes:**
1. Analyze a web page and identify its elements and attributes.
2. Create web pages using XHTML and Cascading Styles sheets.
3. Build dynamic web pages .
4. Build web applications using PHP.
5. Programming through PERL and Ruby
6. write simple client-side scripts using AJAX

**Syllabus:**

**UNIT-I:**
HTML tags, Lists, Tables, Images, forms, Frames. Cascading style sheets. Introduction to Java script. Objects in Java Script. Dynamic HTML with Java Script

**UNIT-II:**
**Working with XML:** Document type Definition, XML schemas, Document object model, XSLT, DOM and SAX.

**UNIT-III:**
**AJAX A New Approach:** Introduction to AJAX, Integrating PHP and AJAX. Consuming WEB services in AJAX**:** (SOAP, WSDL,UDDI)

**UNIT-IV:**
**PHP Programming: Introducing PHP:** Creating PHP script, Running PHP script. **Working with variables and constants:** Using variables,Using constants,Data types,Operators.**Controlling program flow:** Conditional statements,Control statements,Arrays,functions.Working with forms and Databases such as mySql, Oracle, SQL Sever.

**UNIT-V:**
Introduction to PERL, Perl language elements, Interface with CGI- A form to mail program, Simple page search

**UNIT-VI:**
Introduction to Ruby, variables, types, simple I/O, Control, Arrays, Hashes, Methods, Classes, Iterators, Pattern Matching, Practical Web Applications

**Text Books:**


1. Programming the World Wide Web, Robet W Sebesta, 7ed, Pearson.
2. Web Technologies, Uttam K Roy, Oxford
3. The Web Warrior Guide to Web Programming, Bai, Ekedahl, Farrelll, Gosselin, Zak, Karparhi, Maclntyre, Morrissey, Cengage


**Reference Books:**

1. Ruby on Rails Up and Running, Lightning fast Web development, Bruce Tate, Curt Hibbs, Oreilly ( 2006)
2. Programming Perl, 4ed, Tom Christiansen, Jonathan Orwant, Oreilly (2012)
3. Web Technologies, HTML< JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech.
4. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage

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# Computer Networks & Network Programming Lab

**Objectives:**
· To teach students practicle orientation of f networking concepts
· To teach students various forms of IPC through Unix and socket Programming

## PART – A

1. **I**mplement the data link layer framing methods such as 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 art each node using distance vector routing algorithm
5. Take an example subnet of hosts. Obtain broadcast tree for it.

## PART – B

1. Implement the following forms of IPC.
   a)Pipes b)FIFO
2. Implement file transfer using Message Queue form of IPC
3. Write a programme to create an integer variable using shared memory concept and increment the variable
4. simultaneously by two processes. Use senphores to avoid race conditions
5. Design TCP iterative Client and server application to reverse the given input sentence
6. Design TCP iterative Client and server application to reverse the given input sentence
7. Design TCP client and server application to transfer file
8. Design a TCP concurrent server to convert a given text into upper case using multiplexing system call "select"
9. Design a TCP concurrent server to echo given set of sentences using poll functions
10. Design UDP Client and server application to reverse the given input sentence
11. Design UDP Client server to transfer a file
12. Design using poll client server application to multiplex TCP and UDP requests for converting a given text into upper case.
13. Design a RPC application to add and subtract a given pair of integers

**III Year –II SEMESTER**

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# Software Engineering Lab

**Objective:**

- The Software Engineering lab will facilitate the students to develop a preliminary yet practical understanding of software development process and tools

**Experiments:**

Take any real time problem and do the following experiments

1. Do the Requirement Analysis and Prepare SRS
2. Using COCOMO model estimate effort.
3. Calculate effort using FP oriented estimation model.
4. Analyze the Risk related to the project and prepare RMMM plan.
5. Develop Time-line chart and project table using PERT or CPM project scheduling methods.
6. Draw E-R diagrams, DFD, CFD and structured charts for the project.
7. Design of Test cases based on requirements and design.
8. Prepare FTR
9. Prepare Version control and change control for software configuration items.

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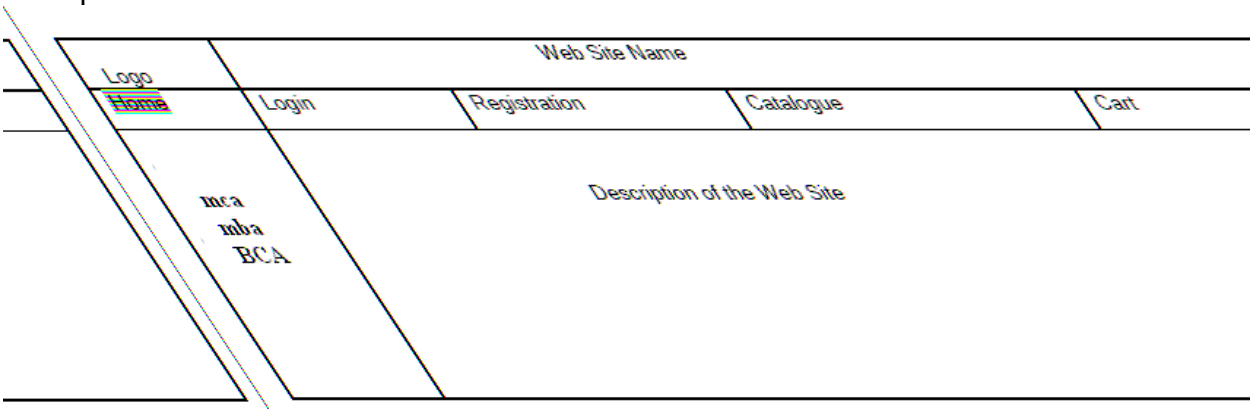
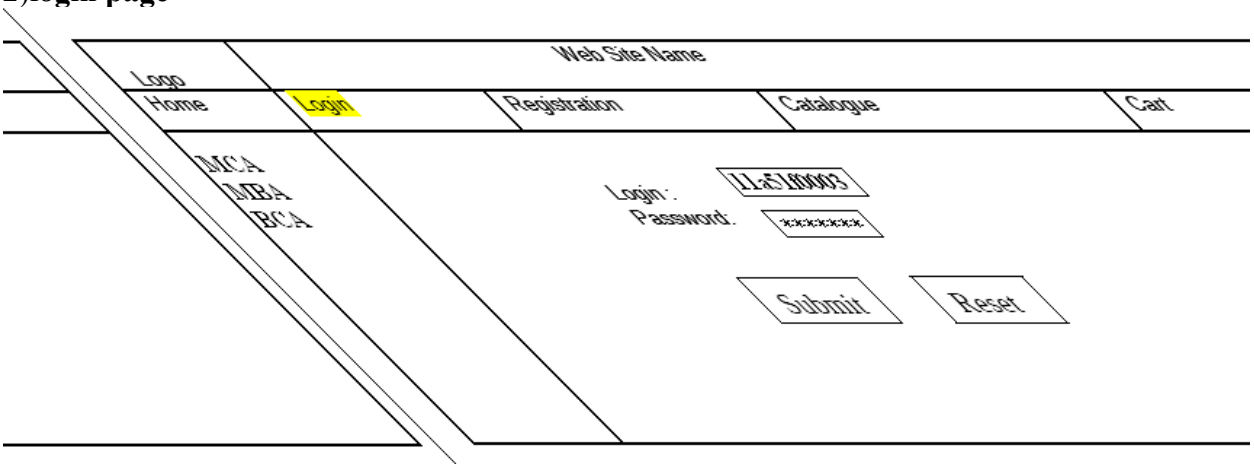
# Web Technologies Lab

1. Design the following static web pages required for an online book store web site.

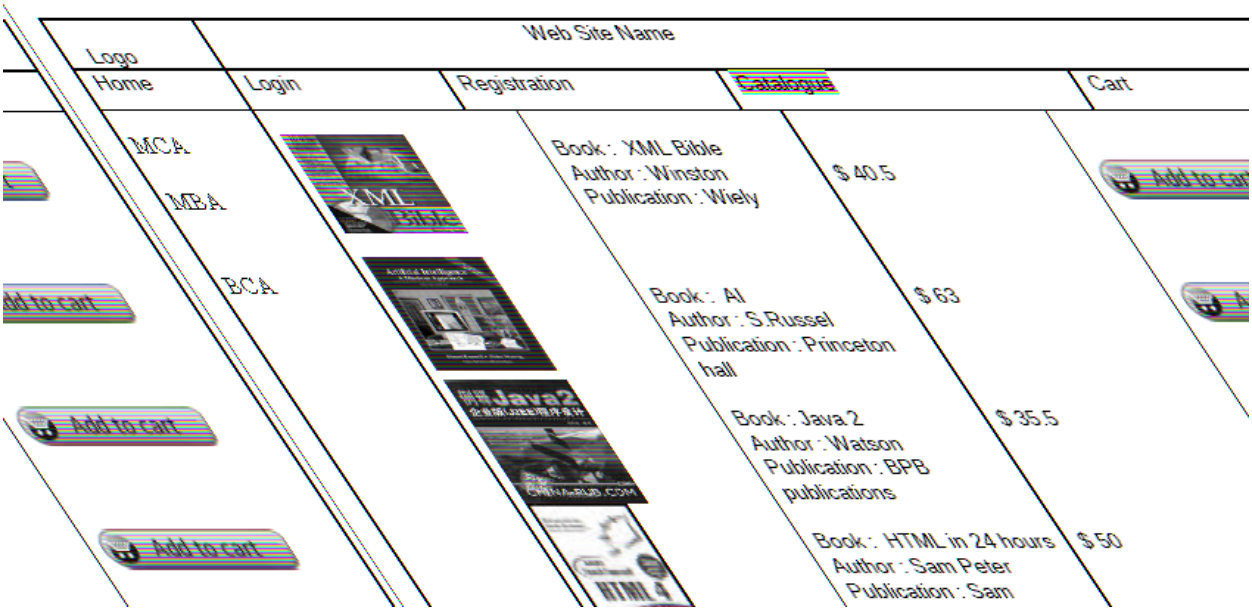
1) **HOME PAGE:**
The static home page must contain three **frames**.
Top frame : Logo and the college name and links to Home page, Login page, Registration page, Catalogue page and Cart page (the description of these pages will be given below).
Left frame : At least four links for navigation, which will display the catalogue of respective links.
For e.g.: When you click the link **"MCA"** the catalogue for MCA Books should be displayed in the Right frame.
Right frame: The *pages to the links in the left frame must be loaded here*. Initially this page contains description of the web site.




2)**login page**




3) **CATOLOGUE PAGE:**
The catalogue page should contain the details of all the books available in the web site in a table.
The details should contain the following:
1. Snap shot of Cover Page.
2. Author Name.
3. Publisher.
4. Price.
5. Add to cart button.




4. **REGISTRATION PAGE:**
Create a "*registration form* "with the following fields
1) Name (Text field)
2) Password (password field)
3) E-mail id (text field)
4) Phone number (text field)
5) Sex (radio button)
6) Date of birth (3 select boxes)
7) Languages known (check boxes – English, Telugu, Hindi, Tamil)
8) Address (text area)

5. Design a web page using **CSS (C**ascading **S**tyle **S**heets**)** which includes the following:
1) Use different font, styles:
In the style definition you define how each selector should work (font, color etc.).
Then, in the body of your pages, you refer to these selectors to activate the styles

6. Write an XML file which will display the Book information which includes the following:
1) Title of the book
2) Author Name
3) ISBN number
4) Publisher name
5) Edition
6) Price
Write a Document Type Definition (DTD) to validate the above XML file.

7. Write Ruby program reads a number and calculates the factorial value of it and prints the same.

8. Write a Ruby program which counts number of lines in a text file using its regular expressions facility.

9. Write a Ruby program that uses iterator to find out the length of a string.

10. Write simple Ruby programs that uses arrays in Ruby.

11. Write programs which uses associative arrays concept of Ruby.

12. Write Ruby program which uses Math module to find area of a triangle.

13. Write Ruby program which uses tk module to display a window

14. Define complex class in Ruby and do write methods to carry operations on complex objects.

15. Write a program which illustrates the use of associative arrays in perl.

16. Write perl program takes a set names along the command line and prints whether they are regular files or special files

17. Write a perl program to implement UNIX `passwd' program

18. An example perl program to connect to a MySQl database table and executing simple commands.

19. Example PHP program for cotactus page.

**20. User Authentication :**
Assume four users user1,user2,user3 and user4 having the passwords pwd1,pwd2,pwd3 and pwd4 respectively. Write a PHP for doing the following.
1. Create a Cookie and add these four user id's and passwords to this Cookie.
2. Read the user id and passwords entered in the Login form (week1) and authenticate with the values (user id and passwords ) available in the cookies.
If he is a valid user(i.e., user-name and password match) you should welcome him by name(user-name) else you should display " You are not an authenticated user ''.
Use init-parameters to do this.

21. Example PHP program for registering users of a website and login.

22. Install a database(Mysql or Oracle).
Create a table which should contain at least the following fields: name, password, email-id, phone number(these should hold the data from the registration form).
Write a PHP program to connect to that database and extract data from the tables and display them. Experiment with various SQL queries.
Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration page (week2).

**23.** Write a PHP which does the following job:
Insert the details of the 3 or 4 users who register with the web site (week9) by using registration form. Authenticate the user when he submits the login form using the user name and password from the database ( similar to week8 instead of cookies).

**24.** Create tables in the database which contain the details of items (books in our case like Book name , Price, Quantity, Amount ) of each category. Modify your catalogue page (week 2)in such a way that you should connect to the database and extract data from the tables and display them in the catalogue page using PHP

**25. HTTP** is a stateless protocol. Session is required to maintain the state.
The user may add some items to cart from the catalog page. He can check the cart page for the selected items. He may visit the catalogue again and select some more items. Here our interest is the selected items should be added to the old cart rather than a new cart. Multiple users can do the same thing at a time(i.e., from different systems in the LAN using the ip-address instead of localhost). This can be achieved through the use of sessions. Every user will have his own session which will be created after his successful login to the website. When the user logs out his session should get invalidated (by using the method session.invalidate() ).
Modify your catalogue and cart PHP pages to achieve the above mentioned functionality using sessions.

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## INTELLECTUAL PROPERTY RIGHTS AND PATENTS – II

### UNIT - I

Intellectual Property Law Basics – Types of Intellectual Property – Agencies responsible for Intellectual Property Regristration - Cyber crime and E-commerce – International Aspects of Computer and Online Crime

### UNIT - II

Introduction to Patent Law – Rights and Limitations – Rights under Patent Law –Patent requirements - Ownership - Transfer - Patents Application Process – Patent Infringement - Patent Litigation - International Patent Law – Double Patenting – Patent Searching – Patent Law Treaty - New developments in Patent Law - Invention Developers and Promoters

### UNIT - III

Introduction to Transactional Law: Creating Wealth and Managing Risk – The Employment Relationship in the Internet and Tech Sector – Contact for the Internet and Tech Sector - Business Assets in Information Age – Symbol and Trademark – Trolls and Landmines and other Metaphors

### UNIT - IV

Regulatory , Compliance and Liability Issues – State Privacy Law - Date Security – Privacy issues - Controlling Over use or Misuse of 1 Intellectual Property Rights

### BOOKS:


1. Deborah E.Bouchoux: “Intellectual Property”. Cengage learning , New Delhi
2. Kompal Bansal & Parishit Bansal "Fundamentals of IPR for Engineers", BS Publications (Press)
3. Cyber Law. Texts & Cases, South-Western’s Special Topics Collections
4. Prabhuddha Ganguli: ‘ Intellectual Property Rights” Tata Mc-Graw – Hill, New Delhi
5. Richard Stim: "Intellectual Property", Cengage Learning, New Delhi.
6. R. Radha Krishnan, S. Balasubramanian: "Intellectual Property Rights", Excel Books. New Delhi.
7. M.Ashok Kumar and Mohd.Iqbal Ali: “Intellectual Property Right” Serials Pub.

**IV Year – I SEMESTER** | **T** | **P** | **C**
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# Cryptography and Network Security

**Course objectives:**

The main objective of this course is to teach students to understand and how to address various software security problems in a secure and controlled environment. During this course the students will gain knowledge (both theoretical and practical) in various kinds of software security problems, and techniques that could be used to protect the software from security threats. The students will also learn to understand the "modus operandi" of adversaries; which could be used for increasing software dependability.

**Course outcomes:**

1. be able to individually reason about software security problems and protection techniques on both an abstract and a more technically advanced level.
2. be able to individually explain how software exploitation techniques, used by adversaries, function and how to protect against them.

## Syllabus:

**UNIT I : Classical Encryption Techniques**
**Objectives:** *The Objectives of this unit is to present an overview of the main concepts of cryptography, understand the threats & attacks, understand ethical hacking.*

**Introduction:** Security attacks, services & mechanisms, Symmetric Cipher Model, Substitution Techniques, Transportation Techniques, Cyber threats and their defense( Phishing Defensive measures, web based attacks, SQL injection & Defense techniques)(TEXT BOOK 2), Buffer overflow & format string vulnerabilities, TCP session hijacking(ARP attacks, route table modification) UDP hijacking ( man-in-the-middle attacks)(TEXT BOOK 3).

**UNIT II: Block Ciphers & Symmetric Key Cryptography**
**Objectives:** *The Objectives of this unit is to understand the difference between stream ciphers & block ciphers, present an overview of the Feistel Cipher and explain the encryption and decryption, present an overview of DES, Triple DES, Blowfish, IDEA.*

Traditional Block Cipher Structure, DES, Block Cipher Design Principles, AES-Structure, Transformation functions, Key Expansion, Blowfish, CAST-128, IDEA, Block Cipher Modes of Operations

**UNIT III: Number Theory & Asymmetric Key Cryptography**
**Objectives:** *Presents the basic principles of public key cryptography, Distinct uses of public key cryptosystems*

**Number Theory:** Prime and Relatively Prime Numbers, Modular Arithmetic, Fermat's and Euler's Theorems, The Chinese Remainder theorem, Discrete logarithms.
**Public Key Cryptography**: Principles, public key cryptography algorithms, RSA Algorithms, Diffie Hellman Key Exchange, Elgamal encryption & decryption, Elliptic Curve Cryptography.

**UNIT IV : Cryptographic Hash Functions & Digital Signatures**
**Objectives:** *Present overview of the basic structure of cryptographic functions, Message Authentication Codes, Understand the operation of SHA-512, HMAC, Digital Signature*

Application of Cryptographic hash Functions, Requirements & Security, Secure Hash Algorithm, Message Authentication Functions, Requirements & Security, HMAC & CMAC. Digital Signatures, NIST Digital Signature Algorithm. Key management & distribution.

**UNIT V: User Authentication, Transport Layer Security & Email Security**
**Objectives:** *Present an overview of techniques for remote user authentication, Kerberos, Summarize Web Security threats and Web traffic security approaches, overview of SSL & TLS. Present an overview of electronic mail security.*

**User Authentication:** Remote user authentication principles, Kerberos
**Transport Level Security:** Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Shell(SSH)
**Electronic Mail Security:** Pretty Good Privacy (PGP) and S/MIME.

**UNIT VI: IP Security & Intrusion Detection Systems**
**Objectives:** *Provide an overview of IP Security, concept of security association, Intrusion Detection Techniques*

**IP Security:** IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.
**Intrusion detection**: Overview, Approaches for IDS/IPS, Signature based IDS, Host based IDS/IPS. (TEXT BOOK 2)

**TEXT BOOKS:**

1. Cryptography & Network Security: Principles and Practices, William Stallings, PEA, Sixth edition.
2. Introduction to Computer Networks & Cyber Security, Chwan Hwa Wu, J.David Irwin, CRC press
3. Hack Proofing your Network, Russell, Kaminsky, Forest Puppy, Wiley Dreamtech.

**REFERENCE BOOKS:**

1.Everyday Cryptography, Fundamental Principles & Applications, Keith Martin, Oxford
2. Network Security & Cryptography, Bernard Menezes, Cengage,2010

**IV Year – I SEMESTER**

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# UML & Design Patterns

## Course Objectives:

The focus of this course is on design rather than implementation.

1. Introducing the Unified Process and showing how UML can be used within the process.
2. Presenting a comparison of the major UML tools for industrial-strength development.
3. introduction to design patterns, practical experience with a selection of central patterns.

## Course Outcomes:

Students successfully completing this course will be able to:

1. identify the purpose and methods of use of common object-oriented design patterns
2. select and apply these patterns in their own designs for simple programs
3. represent the data dependencies of a simple program using UML
4. represent user and programmatic interactions using UML
5. create design documentation outlining the testable and complete design of a simple program
6. produce and present documents for the purpose of capturing software requirements and specification
7. produce plans to limit risks specific to software designed for use in a particular social context

## Syllabus:

**Unit I: Introduction :** Introduction to OOAD; typical activities / workflows / disciplines in OOAD, Introduction to iterative development and the Unified Process, Introduction to UML; mapping disciplines to UML artifacts, Introduction to Design Patterns - goals of a good design, Introducing a case study & MVC architecture

**Unit II: Inception:** Artifacts in inception, Understanding requirements - the FURPS model, Understanding Use case model - introduction, use case types and formats, Writing use cases - goals and scope of a use case, elements / sections of a use case, Use case diagrams, Use cases in the UP context and UP artifacts, Identifying additional requirements, Writing requirements for the case study in the use case model

**Unit III: Elaboration:** System sequence diagrams for use case model, Domain model : identifying concepts, adding associations, adding attributes, Interaction Diagrams, Introduction to GRASP design Patterns ,Design Model: Use case realizations with GRASP patterns, Design Class diagrams in each MVC layer
Mapping Design to Code, Design class diagrams for case study and skeleton code

**Unit 4: More Design Patterns:** Fabrication, Indirection, Singleton, Factory, Facade, Publish-Subscribe

**Unit 5: More UML diagrams :** State-Chart diagrams, Activity diagrams, Component Diagrams, Deployment diagrams, Object diagrams

**Unit 6: Advanced concepts in OOAD :** Use case relationships, Generalizations
Domain Model refinements, Architecture, Packaging model elements

**Textbooks:**

1. 'Applying UML and patterns' by Craig Larman, Pearson
2. Object-Oriented Analysis & Design with the Unified Process by Satzinger, Jackson & Burd Cengage Learning
3. 'UML distilled' by Martin Fowler , Addison Wesley, 2003

**Reference:**

1. O'reilly ' s 'Head-First Design Patterns' by Eric Freeman et al, Oreillly
2. UML 2 Toolkit, by Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: WILE\'-Dreamtech lndia Pvt. Lid.

IV Year – I SEMESTER

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# Mobile Computing

## Course Objective:

1) To make the student understand the concept of mobile computing paradigm, its novel applications and limitations.
2) To understand the typical mobile networking infrastructure through a popular GSM protocol
3) To understand the issues and solutions of various layers of mobile networks, namely MAC layer, Network Layer & Transport Layer
4) To understand the database issues in mobile environments & data delivery models.
5) To understand the ad hoc networks and related concepts.
6) To understand the platforms and protocols used in mobile environment.

## Course Outcomes:

1) Able to think and develop new mobile application.
2) Able to take any new technical issue related to this new paradigm and come up with a solution(s).
3) Able to develop new ad hoc network applications and/or algorithms/protocols.
4) Able to understand & develop any existing or new protocol related to mobile environment

## Syllabus:

**UNIT I**

**Introduction:** Mobile Communications, Mobile Computing – Paradigm, Promises/Novel Applications and Impediments and Architecture; Mobile and Handheld Devices, Limitations of Mobile and Handheld Devices.

GSM – Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Handover, Security, New Data Services, GPRS.

**UNIT –II**

**(Wireless) Medium Access Control (MAC) :** Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA, Wireless LAN/(IEEE 802.11)

**UNIT –III**

**Mobile Network Layer :** IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, DHCP.

**UNIT –IV**

**Mobile Transport Layer :** Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Transport Layer Protocols for Mobile Networks.

**Database Issues :** Database Hoarding & Caching Techniques, Client-Server Computing & Adaptation, Transactional Models, Query processing, Data Recovery Process & QoS Issues.

**UNIT V**

**Data Dissemination and Synchronization :** Communications Asymmetry, Classification of Data Delivery Mechanisms, Data Dissemination, Broadcast Models, Selective Tuning and Indexing Methods, Data Synchronization – Introduction, Software, and Protocols.

**UNIT VI**

**Mobile Ad hoc Networks (MANETs) :** Introduction, Applications & Challenges of a MANET, Routing, Classification of

Routing Algorithms, Algorithms such as DSR, AODV, DSDV, etc. , Mobile Agents, Service Discovery.

**Protocols and Platforms for Mobile Computing :** WAP, Bluetooth, XML, J2ME, JavaCard, PalmOS, Windows CE, SymbianOS, Linux for Mobile Devices,Android.

**Text Books:**

1. Jochen Schiller, "Mobile Communications", Addison-Wesley, Second Edition, 2009.
2. Raj Kamal, "Mobile Computing", Oxford University Press, 2007, ISBN: 0195686772

**Reference Book:**

1. ASOKE K TALUKDER, HASAN AHMED, ROOPA R YAVAGAL, "Mobile Computing, Technology Applications and Service Creation" Second Edition, Mc Graw Hill.
2. UWE Hansmann, Lother Merk, Martin S. Nocklous, Thomas Stober, "Principles of Mobile Computing," Second Edition, Springer.

**IV Year – I SEMESTER**

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## Elective - I
## Software Testing Methodologies

**Course Objectives:**

1. To study fundamental concepts in software testing, including software testing objectives, process, criteria, strategies, and methods.
2. To discuss various software testing issues and solutions in software unit test; integration, regression, and system testing.
3. To learn how to planning a test project, design test cases and data, conduct testing operations, manage software problems and defects, generate a testing report.
4. To expose the advanced software testing topics, such as object-oriented software testing methods, and component-based software testing issues, challenges, and solutions.
5. To gain software testing experience by applying software testing knowledge and methods to practice-oriented software testing projects.
6. To understand software test automation problems and solutions.
7. To learn how to write software testing documents, and communicate with engineers in various forms.
8. To gain the techniques and skills on how to use modern software testing tools to support software testing projects.

**Course Outcomes:**

By the end of the course, the student should:

1. Have an ability to apply software testing knowledge and engineering methods.
2. Have an ability to design and conduct a software test process for a software testing project.
3. Have an ability to identify the needs of software test automation, and define and develop a test tool to support test automation.
4. Have an ability understand and identify various software testing problems, and solve these problems by designing and selecting software test models, criteria, strategies, and methods.
5. Have an ability to use various communication methods and skills to communicate with their teammates to conduct their practice-oriented software testing projects.
6. Have basic understanding and knowledge of contemporary issues in software testing, such as component-based software testing problems
7. Have an ability to use software testing methods and modern software testing tools for their testing projects.

**Syllabus:**

**UNIT I:**

**Software Testing:** Introduction, Evolution, Myths & Facts, Goals, Psychology, Definition, Model for testing, Effective Vs Exhaustive Software Testing.

**Software Testing Terminology and Methodology:** Software Testing Terminology, Software Testing Life Cycle, relating test life cycle to developmentlife cycle Software Testing Methodology.

**UNIT II:**
**Verification and Validation:** Verification & Validation Activities, Verification, Verification of Requirements, High level and low level designs, How to verify code, Validation
**Dynamic Testing I: Black Box testing techniques:** Boundary Value Analysis, Equivalence class Testing, State Table based testing, Decision table based testing, Cause-Effect Graphing based testing, Error guessing

**UNIT III:**
**Dynamic Testing II: White-Box Testing:** need, Logic coverage criteria, Basis path testing, Graph matrices, Loop testing, data flow testing, mutation testing
**Static Testing:** inspections, Structured Walkthroughs, Technical reviews

**UNIT IV:**
**Validation activities:** Unit testing, Integration Testing,. Function testing, system testing, acceptance testing
**Regression testing:** Progressives Vs regressive testing, Regression testability, Objectives of regression testing, When regression testing done?, Regression testing types, Regression testing techniques

**UNIT V:**
**Efficient Test Suite Management:** Test case deisgnWhy does a test suite grow, Minimizing the test suite and its benefits, test suite prioritization, Types of test case prioritization, prioritization techniques, measuring the effectiveness of a prioritized test suite
**Software Quality Management:** Software Quality metrics, SQA models
Debugging: process, techniques, correcting bugs, Basics of testing management tools, test link and Jira

**UNIT VI:**
**Automation and Testing Tools:** need for automation, categorization of testing tools, selection of testing tools, Cost incurred, Guidelines for automated testing, overview of some commercial testing tools.
**Testing Object Oriented Software:** basics, Object oriented testing
**Testing Web based Systems:** Challenges in testing for web based software, quality aspects, web engineering, testing of web based systems, Testing mobile systems

**Text Books:**


1. Software Testing, Principles and Practices, Naresh Chauhan, Oxford
2. Foundations of Software testing, Aditya P Mathur, 2ed, Pearson
3. Software Testing- Yogesh Singh, CAMBRIDGE


**Reference books:**


1. *Software testing techniques - Baris Beizer, International Thomson computer press, second edition.*
2. Software Testing, Principles, techniques and Tools, M G Limaye, TMH
3. Effective Methods for Software testing, Willian E Perry, 3ed, Wiley

# Simulation Modeling

**Course Objectives:**

1. Introduce computer simulation technologies and techniques, provides the foundations for the student to understand computer simulation needs, and to implement and test a variety of simulation and data analysis libraries and programs. This course focusses what is needed to build simulation software environments, and not just building simulations using preexisting packages.

2. Introduce concepts of modeling layers of society's critical infrastructure networks.

3. Build tools to view and control simulations and their results.

**Course Outcomes:**

1. provide a strong foundation on concept of simulation, and modeling.
2. understand the techniques of random number generations.
3. understand the techniques of testing randomness.
4. design simulation models for various case studies like inventory, traffic flow networks, etc.
5. practice on simulation tools and impart knowledge on building simulation systems.

## Syllabus:

**UNIT-I:**
System models: Concepts, continuous and discrete systems, System modeling, types of models, subsystems, system study.

**UNIT-II:**
System Simulation: Techniques, comparison of simulation and analytical methods, types of simulation, Distributed log models, cobweb models.

**UNIT-III:**
Continuous system Simulation: Numerical solution of differential equations, Analog Computers, Hybrid Computers, continuous system simulation languages CSMP, system dynamic growth models, logistic curves.

**UNIT-IV:**
Probability concepts in simulation: Monte Carlo techniques, stochastic variables, probability functions, Random Number generation algorithms.

**UNIT-V:**
Queuing Theory: Arrival pattern distributions, servicing times, queuing disciplines, measure of queues, mathematical solutions to queuing problems.
Discrete System Simulation: Events, generation of arrival patterns, simulation programming tasks, analysis of simulation output.

**UNIT-VI:**
GPSS & SIMSCRIPT: general description of GPSS and SIMSCRIPT, programming in GPSS & SIMSCRIPT, Data structures, Implementation of activities, events and queues, Event scanning, simulation algorithms in GPSS and SIMSCRIPT.

**TEXT BOOKS**

1. Geoffrey Gordon, "System Simulation", 2nd Edition, Prentice Hall, India, 2002.
2. Narsingh Deo, "System Simulation with Digital Computer, "Prentice Hall, India, 2001.

**REFERENCES**

1. Jerry Banks and John S.Carson, Barry L. Nelson, David M.Nicol, "Discrete Event System Simulation", 3rd Edition, Prentice Hall, India, 2002.

2. Shannon, R.E. Systems simulation, The art and science, Prentice Hall, 1975.
3. Thomas J. Schriber, Simulation using GPSS, John Wiley, 1991

# Information Retrieval Systems

**COURSE OBJECTIVES**

- To provide the foundation knowledge in information retrieval.
- To equip students with sound skills to solve computational search problems.
- To appreciate how to evaluate search engines.
- To appreciate the different applications of information retrieval techniques in the Internet or Web environment.
- To provide hands-on experience in building search engines and/or hands-on experience in evaluating search engines.

**COURSE OUTCOMES**

After completing the course student will be able to:

- Identify basic theories in information retrieval systems
- Identify the analysis tools as they apply to information retrieval systems
- Understands the problems solved in current IR systems
- Describes the advantages of current IR systems
- Understand the difficulty of representing and retrieving documents.
- Understand the latest technologies for linking, describing and searching the web.
- Explain the concepts of indexing, vocabulary, normalization and dictionary in information retrieval.
- Evaluate information retrieval algorithms, and give an account of the difficulties of evaluation
- Use different information retrieval techniques in various application areas
- Apply IR principles to locate relevant information large collections of data
- Analyze performance of retrieval systems when dealing with unmanaged data sources
- Implement retrieval systems for web search tasks.
- Understand and apply the basic concepts of information retrieval;
- Appreciate the limitations of different information retrieval techniques;
- Write programs to implement search engines;
- Evaluate search engines;
- Develop skills in problem solving using systematic approaches;
- Solve complex problems in groups and develop group work.

**SYLLLABUS:**

**Unit I:**
**Introduction to Information Storage and Retrieval System:** Introduction, Domain Analysis of IR systems and other types of Information Systems, IR System Evaluation.
Introduction to Data Structures and Algorithms related to Information Retrieval: Basic Concepts, Data structures, Algorithms

**Unit II:**
**Inverted files:** Introduction, Structures used in Inverted Files, Building Inverted file using a sorted array, Modifications to Basic Techniques.

**Unit III:**
**Signature Files:** Introduction, Concepts of Signature Files, Compression, Vertical Partitioning, Horizontal Partitioning.

**Unit IV:**

**New Indices for Text:** PAT Trees and PAT Arrays: Introduction, PAT Tree structure, algorithms on the PAT Trees, Building PAT trees as PATRICA Trees, PAT representation as arrays.

**Unit V:**

**Stemming Algorithms:** Introduction, Types of Stemming Algorithms, Experimental Evaluations of Stemming to Compress Inverted Files

**Unit VI:**

**Thesaurus Construction:** Introduction, Features of Thesauri, Thesaurus Construction, Thesaurus construction from Texts, Merging existing Thesauri

**TEXT BOOK :**

1. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall, 1992.
2. Modern Information Retrival By Yates Pearson Education.
3. Information Storage & Retieval By Robert Korfhage – John Wiley & Sons.

**REFERENCES :**


1. Kowalski, Gerald, Mark T Maybury: Information Retrieval Systems: Theory and Implementation, Kluwer Academic Press, 1997.
2. Information retrieval Algorithms and Heuristics, 2ed, Springer

# Artificial Intelligence

**Course Objectives:**

1. To have a basic proficiency in a traditional AI language including an ability to write simple to intermediate programs and an ability to understand code written in that language.
2. To have an understanding of the basic issues of knowledge representation and blind and heuristic search, as well as an understanding of other topics such as minimax, resolution, etc. that play an important role in AI programs.
3. To have a basic understanding of some of the more advanced topics of AI such as learning, natural language processing, agents and robotics, expert systems, and planning

**Course Outcomes:**

After completing this course, students should be able to:

1. Identify problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem.
2. Formalize a given problem in the language/framework of different AI methods (e.g., as a search problem, as a constraint satisfaction problem, as a planning problem, as a Markov decision process, etc).
3. Implement basic AI algorithms (e.g., standard search algorithms or dynamic programming).
4. Design and carry out an empirical evaluation of different algorithms on a problem formalization, and state the conclusions that the evaluation supports.

**Syllabus:**

**UNIT-I:**

**Introduction to artificial intelligence:** Introduction ,history, intelligent systems, foundations of AI, applications, tic-tac-tie game playing, development of ai languages, current trends in AI

**UNIT-II:**

**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

**Problem reduction and game playing:** Introduction, problem reduction, game playing, alpha-beta pruning, two-player perfect information games

**UNIT-III:**

**Logic concepts:** Introduction, propositional calculus, proportional logic, natural deduction system, axiomatic system, semantic tableau system in proportional logic, resolution refutation in proportional logic, predicate logic

**UNIT-IV:**

**Knowledge representation:** Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames **advanced knowledge representation techniques:** Introduction, conceptual dependency theory, script structure, cyc theory, case grammars, semantic web

**UNIT-V:**

**Expert system and applications:** Introduction phases in building expert systems, expert system versus traditional systems, rule-based expert systems blackboard systems truth maintenance systems, application of expert systems, list of shells and tools

**UNIT-VI:**

**Uncertainty measure: probability theory:** Introduction, probability theory, Bayesian belief networks, certainty factor theory, dempster-shafer theory

**Fuzzy sets and fuzzy logic:** Introduction, fuzzy sets, fuzzy set operations, types of membership functions, multi valued logic, fuzzy logic, linguistic variables and hedges, fuzzy propositions, inference rules for fuzzy propositions, fuzzy systems.

**TEXT BOOKS:**


1. Artificial Intelligence- Saroj Kaushik, CENGAGE Learning,
2. Artificial intelligence, A modern Approach , 2nd ed, Stuart Russel, Peter Norvig, PEA
3. Artificial Intelligence- Rich, Kevin Knight, Shiv Shankar B Nair, 3rd ed, TMH
4. Introduction to Artificial Intelligence, Patterson, PHI


**REFERNCE BOOKS:**


1. Atificial intelligence, structures and Strategies for Complex problem solving, -George F Lugar, 5th ed, PEA
2. Introduction to Artificial Intelligence, Ertel, Wolf Gang, Springer
3. Artificial Intelligence, A new Synthesis, Nils J Nilsson, Elsevier

# Multimedia Computing

**Course objectives:**
To provide the foundation knowledge of multimedia computing, e.g. media characteristics, compression standards, multimedia representation, data formats, multimedia technology development.

**Course outcomes:**
1. understand the characteristics of different media; understand the representations of different multimedia data; understand different data formats; be able to take into considerations in multimedia system designs;
2. understand the characteristics of human's visual system; understand the characteristics of human's audio system; be able to take into considerations in multimedia techniques design and implementation;
3. understand different compression principles; understand different compression techniques; understand different multimedia compression standards; be able to design and develop multimedia systems according to the requirements of multimedia applications.
4. program multimedia data and be able to design and implement media applications; 

**Syllabus:**

**UNIT–I:**
Fundamental concepts in Text and Image: Multimedia and hypermedia, World Wide Web, overview of multimedia software tools. Graphics and image data representation graphics/image data types, file formats, Color in image and video: color science, color models in images, color models in video.

**UNIT–II:**
Fundamental concepts in video and digital audio: Types of video signals, analog video, digital video, digitization of sound, MIDI, quantization and transmission of audio.

**UNIT–III:**
**Multimedia data compression I:** Lossless compression algorithm: Run-Length Coding, Variable Length Coding, Dictionary Based Coding, Arithmetic Coding, Lossless Image Compression,

**UNIT–IV:**
**Multimedia data compression II:** Lossy compression algorithm: Quantization, Transform Coding, Wavelet-Based Coding, Embedded Zerotree of Wavelet Coefficients Set Partitioning in Hierarchical Trees (SPIHT).

**UNIT–V:**
**Basic** Video Compression Techniques: Introduction to video compression, video compression based on motion compensation, search for motion vectors, MPEG, Basic Audio Compression Techniques.

**UNIT–VI:**
Multimedia Networks: Basics of Multimedia Networks, Multimedia Network Communications and Applications: Quality of Multimedia Data Transmission, Multimedia over IP, Multimedia over ATM Networks, Transport of MPEG-4, Media-on-Demand (MOD).

**TEXT BOOKS:**

1. Fudamentals of Multimedia by Ze-Nian Li and Mark S. Drew Pearson Education.

**REFERENCE BOOKS:**

1. Digital Multimedia, Nigel chapman and jenny chapman, Wiley-Dreamtech
2. Macromedia Flash MX Professional 2004 Unleashed, Pearson.
3. Multimedia and communications Technology, Steve Heath, Elsevier (Focal Press).
4. Multimedia Applications, Steinmetz, Nahrstedt, Springer.
5. Multimedia Basics by Weixel Thomson
6. Multimedia Technology and Applications, David Hilman , Galgotia

# High Performance Computing

**Course Objectives:**
This course covers the design of advanced modern computing systems. In particular, the design of modern microprocessors, characteristics of the memory hierarchy, and issues involved in multi-threading and multi-processing are discussed. The main objective of this course is to provide students with an understanding and appreciation of the fundamental issues and tradeoffs involved in the design and evaluation of modern computers

**Course Outcomes:**

1. Understand the concepts and terminology of high performance computing.
2. Can write and analyze the behavior of high performance parallel programs for distributed memory architectures (using MPI).
3. Can write and analyze the behavior of high performance parallel programs for shared memory architectures (using Pthreads and OpenMP).
4. Can write simple programs for the GPU.
5. Can independently study, learn about, and present some aspect of high performance computing.

**Syllabus:**

**UNIT I:**
Introduction to Parallel hardware and software, need for high performance systems and Parallel Programming, SISD, SIMD, MISD, MIMD models, Performance issues.

**UNIT II:**
Processors, PThreads, Thread Creation, Passing arguments to Thread function, Simple matrix multiplication using Pthreads, critical sections, mutexes, semaphores, barriers and conditional variables, locks, thread safety, simple programming assignments.

**UNIT III:**
OpenMP Programming: introduction, reduction clause, parallel for-loop scheduling, atomic directive, critical sections and locks, private directive, Programming assignments, n body solvers using openMP.

**UNIT IV:**
Introduction to MPI programming: MPI primitives such as MPI_Send, MPI-Recv, MPI_Init, MPI-Finalize, etc., Application of MPI to Trepizoidal rule, Collective Communication primitives in MPI, MPI derived datatypes, Performance evaluation of MPI programs, Parallel sorting algorithms, Tree search solved using MPI, Programming Assignments.

**UNIT V:**
Introduction to GPU computing, Graphics pipelines, GPGPU, Data Parallelism and CUDA C Programming, CUDA Threads Organization, Simple Matrix multiplication using CUDA, CUDA memories.

**UNIT VI:**
Bench Marking and Tools for High Performance Computing Environments, Numerical Linear Algebra Routines BLAS for Parallel Systems evaluation.

**Text Books:**
1. An Introduction to Parallel Programming, Peter S Pacheco, Elsevier, 2011
2. Programming Massively Parallel Processors, Kirk & Hwu, Elsevier, 2012

**Reference Books:**


1. CUDA by example: An introduction to General Purpose GPU Programming, Jason, Sanders, Edward Kandrit, Perason, 2011
2. CUDA Programming, Shame Cook, Elsevier
3. High Performance Heterogeneous Computing, Jack Dongarra, Alexey & Lastovetsky , Wiley
4. Parallel computing theory and practice, Michel J.Quinn, TMH

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# Elective - II
# Digital Forensics

**Course Objectives:**
This course is intended to provide students with greater depth of study in a number of key topics in the area of computer security in society: cybercrime, computer and forensics, analysis

**Course Outcomes:**
1. Understand financial and accounting forensics, and explain their role in preventing various forms of fraud.
2. Distinguish various types of computer crime, and use computer forensic techniques to identify the digital fingerprints associated with criminal activities

**Syllabus:**

**Unit-I:**
**Computer Forensics and Investigations:** Understanding Computer Forensics, Preparing for Computer Investigations, Taking A Systematic Approach, Procedure for Corporate High-Tech Investigations, Understanding Data Recovery Workstations and Software,
**Investor's Office and Laboratory:** Understanding Forensics Lab Certification Requirements, Determining the Physical Requirements for a Computer Forensics Lab, Selecting a Basic Forensic Workstation

**Unit-II:**
**Data Acquisition:** Understanding Storage Formats for Digital Evidence, Determining the Best Acquisition Method, Contingency Planning for Image Acquisitions, Using Acquisition Tools, Validating Data Acquisition, Performing RAID Data Acquisition, Using Remote Network Acquisition Tools, Using Other Forensics Acquisition Tools

**Unit-III:**
**Processing Crime and Incident Scenes**: Identifying Digital Evidence, Collecting the Evidence in Private-Sector Incident Scenes, Processing law Enforcement Crime Scenes, Preparing for a Search, Securing a Computer Incident or Crime Scene, Sizing Digital evidence at the Scene, Storing Digital evidence, obtaining a Digital Hash.

**Unit-IV:**
**Current Computer Forensic**s **Tools:** Evaluating Computer Forensics Toll Needs, Computer Forensics Software Tools, Computer Forensics Hardware Tools, Validating and Testing Forensics Software
**Computer Forensics Analysis and Validation:** Determining What Data to Collect and Anlyze, Validating Forensic Data, Addressing Data-Hiding Techniques, Performing Remote Acquisition

**Unit-V:**
**Recovering Graphics and Network Forensics:** Recognizing a Graphics File, Understanding Data Compression, Locating and Recovering Graphics Files, Understanding Copyright Issues with Graphics, Network Forensic, Developing Standard Procedure for Network Forensics, Using Network Tools, Examining Hiney Project

**Unit-VI:**
**E-mail Investigations Cell Phone and Mobile Device Forensics:** Exploring the Role of E-mail in Investigations, Exploring the Role of Client and Server in E-mail, Investigating E-mail Crimes and Violations, Understanding E-mail Servers, Using Specialized E-mail Forensics Tools, Understanding Mobile Device Forensics, Understanding Acquisition Procedure for Cell Phones and Mobile Devoices

**TEXT BOOK:**

1. Nelson, Phillips Enfinger,Steuart, " Computer Forensics and Investigations, Cengage Learning

# Hadoop and Big Data

**Course Objectives:**

- Optimize business decisions and create competitive advantage with Big Data analytics
- Introducing Java concepts required for developing map reduce programs
- Derive business benefit from unstructured data
- Imparting the architectural concepts of Hadoop and introducing map reduce paradigm
- To introduce programming tools PIG & HIVE in Hadoop echo system.

**Course Outcomes:**

- Preparing for data summarization, query, and analysis.
- Applying data modelling techniques to large data sets
- Creating applications for Big Data analytics
- Building a complete business data analytic solution

**Unit 1:**
Data structures in Java: Linked List, Stacks, Queues, Sets, Maps; Generics: Generic classes and Type parameters, Implementing Generic Types, Generic Methods, Wrapper Classes, Concept of Serialization

Reference:
Big Java 4th Edition, Cay Horstmann, Wiley John Wiley & Sons, INC

**Unit 2:**
Working with Big Data: Google File System, Hadoop Distributed File System (HDFS) – Building blocks of Hadoop (Namenode, Datanode, Secondary Namenode, JobTracker, TaskTracker), Introducing and Configuring Hadoop cluster (Local, Pseudo-distributed mode, Fully Distributed mode), Configuring XML files.

References:
Hadoop: The Definitive Guide by Tom White, 3rd Edition, O'reilly
Hadoop in Action by Chuck Lam, MANNING Publ.

**Unit 3:**
Writing MapReduce Programs: A Weather Dataset, Understanding Hadoop API for MapReduce Framework (Old and New), Basic programs of Hadoop MapReduce: Driver code, Mapper code, Reducer code, RecordReader, Combiner, Partitioner

Reference:
Hadoop: The Definitive Guide by Tom White, 3rd Edition, O'reilly

**Unit 4:**
Hadoop I/O: The Writable Interface, WritableComparable and comparators, Writable Classes: Writable wrappers for Java primitives, Text, BytesWritable, NullWritable, ObjectWritable and GenericWritable, Writable collections, Implementing a Custom Writable: Implementing a RawComparator for speed, Custom comparators

Reference:
Hadoop: The Definitive Guide by Tom White, 3rd Edition, O'reilly

**Unit 5:**

Pig: Hadoop Programming Made Easier
Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin

Reference:
Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk,Bruce Brown, Rafael Coss

**Unit 6:**

Applying Structure to Hadoop Data with Hive:
Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data

References:
Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk,Bruce Brown, Rafael Coss

**Text Books:**

1. Big Java 4th Edition, Cay Horstmann, Wiley John Wiley & Sons, INC
2. Hadoop: The Definitive Guide by Tom White, 3rd Edition, O'reilly
3. Hadoop in Action by Chuck Lam, MANNING Publ.
4. Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk,Bruce Brown, Rafael Coss

**References:**

1. Hadoop in Practice by Alex Holmes, MANNING Publ.
2. Hadoop MapReduce Cookbook,Srinath Perera, Thilina Gunarathne

**Software Links:**

1. Hadoop:http://hadoop.apache.org/
2. Hive: https://cwiki.apache.org/confluence/display/Hive/Home

Piglatin: http://pig.apache.org/docs/r0.7.0/tutorial.html

# Software Project Management

**Course Objectives:**

1. To study how to plan and manage projects at each stage of the software development life cycle (SDLC)
2. To train software project managers and other individuals involved in software project planning and tracking and oversight in the implementation of the software project management process.
3. To understand successful software projects that support organization's strategic goals

**Course Outcomes:**

1. To match organizational needs to the most effective software development model
2. To understand the basic concepts and issues of software project management
3. To effectively Planning the software projects
4. To implement the project plans through managing people, communications and change
5. To select and employ mechanisms for tracking the software projects
6. To conduct activities necessary to successfully complete and close the Software projects
7. To develop the skills for tracking and controlling software deliverables
8. To create project plans that address real-world management challenges

## Syllabus:

**Unit I: Introduction**
Project, Management, Software Project Management activities, Challenges in software projects, Stakeholders, Objectives & goals
Project Planning: Step-wise planning, Project Scope, Project Products & deliverables, Project activities, Effort estimation, Infrastructure

**Unit II: Project Approach**
Lifecycle models, Choosing Technology, Protoyping
Iterative & incremental Process Framework: Lifecycle phases, Process Artifacts, Process workflows (Book 2)

**Unit III: Effort estimation & activity Planning**
Estimation techniques, Function Point analysis, SLOC, COCOMO, Usecase-based estimation , Activity Identification Approaches, Network planning models, Critical path analysis

**Unit IV: Risk Management**
Risk categories, Identification, Assessment, Planning and management, PERT technique, Monte Carlo approach

**Unit V: Project Monitoring & Control , Resource Allocation**
Creating a framework for monitoring & control, Progress monitoring, Cost monitoring, Earned value Analysis, Defects Tracking, Issues Tracking, Status reports, Types of Resources, Identifying resource requirements, Resource scheduling

**Unit VI: Software Quality**
Planning Quality, Defining Quality - ISO 9016, Quality Measures, Quantitative Quality Management Planning, Product Quality & Process Quality
Metrics, Statistical Process Control Capability Maturity Model, Enhancing software Quality ( Book3)

**Text Books:**

1. Software Project Management, Bob Hughes & Mike Cotterell, TATA Mcgraw-Hill
2. Software Project Management, Walker Royce: Pearson Education, 2005.
3. Software Project Management in practice, Pankaj Jalote, Pearson.

**Reference Book:**

1. Software Project Management, Joel Henry, Pearson Education.

# Machine Learning

## Course objectives:

The main objective of this course is for the students to achieve basic knowledge of artificial intelligence, a deepened technical understanding of machine learning research and theories, as well as practical experience of the use and design of machine learning and data mining algorithms for applications and experiments. The course has a strong focus towards applied IT. The student not only learns how to critically review and compare different algorithms and methods, but how to plan, design, and implement learning components and applications and how to conduct machine learning experiments.

## Course outcomes:

- The student will be able evaluate and compare the performance or, other qualities, of algorithms for typical learning problems.
- The student will be able to design a supervised or unsupervised learning system.

## Syllabus:

**UNIT I: Introduction :**

Well-posed learning problems, Designing a learning system, Perspectives and issues in machine learning. Concept learning and the general to specific ordering – Introduction, A concept learning task, Concept learning as search, Find-S: finding a maximally specific hypothesis, Version spaces and the candidate elimination algorithm, Remarks on version spaces and candidate elimination, Inductive bias.

**UNIT II: Linear Regression & Logistic Regression:**

**Predicting numeric values: regression** - Finding the best fit lines with linear regression, Locally weighted linear regression, Shrinking Coefficients, The bias / Variance tradeoff.

**Logistic Regression:** Classification with logistic regression and the sigmoid function, Using optimization to find the best regression coefficients.

**UNIT III: Artificial Neural Networks:**

Introduction, Neural network representation, Appropriate problems for neural network learning, Perceptions, Multilayer networks and the back propagation algorithm, Remarks on the back propagation algorithm, An illustrative example face recognition, Advanced topics in artificial neural networks

**UNIT IV: Evaluation Hypotheses:** Motivation, Estimation hypothesis accuracy, Basics of sampling theory, A general approach for deriving confidence intervals, Difference in error of two hypotheses, Comparing learning algorithms.

**UNIT V: Support vector machines & Dimensionality Reduction techniques:**

Separating data with the maximum margin, finding the maximum margin, efficient optimization with SMO algorithm, speeding up optimization with full platt SMO, Using Kernels for more Complex data.

**Dimensionality Reduction techniques:** Principal Component analysis, Example.

**UNIT VI:**

**Instance-Based Learning**- Introduction, k -Nearest Neighbor Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks on Lazy and Eager Learning.

**Genetic Algorithms:** Representing Hypotheses, Genetic Operators, Fitness Function and Selection, Illustrative Example.

**TEXT BOOKS:**


1. Machine Learning ,Tom M. Mitchell, MGH
2. Machine Learning in Action, Peter Harington, 2012, Cengage.`


**REFERENCE BOOKS:**


1. Introduction to Machine Learning, Ethem Alpaydin, PHI, 2004

# Advanced Databases

## Course Objectives:

1. Be able to design high-quality relational databases and database applications.
2. Have developed skills in advanced visual& conceptual modeling and database design.
3. Be able to translate complex conceptual data models into logical and physical data
4. Base designs.
5. Have developed an appreciation of emergingdatabase trends as theyapplyto semi-structured data, the internet,andobject-oriented databases

## Course Outcomes:

1. Identify, describe, and categorize database objects
2. Design and implement advanced queries using Structured Query Language
3. Design, construct and maintain a database and various database objects using procedural language constructs, forms and reports to solve problems
4. Administer a database by recommending and implementing procedures including database tuning, backup and recovery
5. Propose, implement and maintain database security mechanisms
6. Explore non-relational database systems and structures

## Syllabus:

**UNIT – I :**

**Algorithms for Query Processing and Optimization:**Translating SQL queries into relational algebra-algorithms for external sorting-algorithms for select and join operations-algorithms for project and set operations-implementing aggregate operations and outer joins-combining operations using pipelining-using heuristics in query optimization.

**UNIT –II:**

**Data base systems architecture and the system Catalog:**System architectures for DBMSs, Catalogs for Relational DBMSs, System catalog information in oracle.

**Practical database design and tuning:**Physical Database Design in Relational Databases-an overview of Database Tuning in Relational systems.

**UNIT – III:**

**Distributed DBMS Concepts and Design:**Introduction-function and architecture of a Distributed DBMS-Distributed Relational Database Design-transparencies in a Distributed DBMS-Date's Twelve Rules for Distributed DBMS.

**Distributed DBMS-Advanced Concepts:**Distributed Transaction Management-Distributed Concurrency Control-Distributed Deadlock Management-Distributed Database Recovery-The X/Open Distributed Transaction processing model-Replication Servers.

**UNIT – IV:**

**Introduction to Object DBMSs:**Advanced Database Applications-Weaknesses of RDBMSs-Object oriented Concepts-Storing objects in a Relational Database-Next generation Database systems.

**Object-Oriented DBMSs-Concepts and Design :**Introduction to Object-Oriented Data Models and DBMSs-OODBMS perspectives-Persistence-Issues in OODBMSs-The object Oriented Database System Manifesto-Advantages and Disadvantages of OODBMSs-Object oriented Database Design.

**UNIT V:**

**Object-Oriented DBMSs-Standards and Systems:**Object management group-Object Database Standard ODMG3.0, 1999-Object store.

**Object relational DBMSs:**Introduction to Object-relational Database systems- third generation Database manifesto-Postgres-an early ORDBMS-SQL3.

**UNIT – VI :**

**Emerging database technologies and applications:** Hadoop, BIg Data characteristics, NO SQL databases, BASE, Brewer's theorem, Relationship between CAP, ACID and No SQL databases, comparison with Relational databases, No SQL databases types, Comparative study of NoSQL products, Case studies using MangoDB and Cassandra

**TEXT BOOK**:

1. "Fundamentals of Database Systems", ElmasriNavate, 5/e, Pearson Education.
2. Principles of distributed databases S Ceri and Palgettgi TMH
3. Getting started with No SQL Databases , Gaurav Vaish

**REFERENCES BOOKS:**

1. "Principles of Distributed Database Systems", Ozsu, 2/e, PHI.

**IV Year – I SEMESTER** **T P C**
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# UML & Design Patterns Lab

**(Textbook no.2 i.e.** Object-Oriented Analysis & Design with the Unified Process by Satzinger, Jackson & Burd Cengage Learning will be the primary source for finding templates for developing different artifacts / diagrams)

**Take three case studies:**

- **Customer Support System (in the** Object-Oriented Analysis & Design with the Unified Process by Satzinger, Jackson & Burd Cengage Learning )
- **Point-Of-Sale Terminal (in Larman textbook)**
- **Library Management System (in the reference book no. 2 i.e. UML toolkit)**

**Week 1:**

**Familiarization with Rational Rose or Umbrello**

**For each case study:**

**Week 2, 3 & 4:**
**For each case study:**
a) Identify and analyze events
b) Identify Use cases
c) Develop event table
d) Identify & analyze domain classes
e) Represent use cases and a domain class diagram using Rational Rose
f) Develop CRUD matrix to represent relationships between use cases and problem domain classes

**Week 5 & 6:**
**For each case study:**
a) Develop Use case diagrams
b) Develop elaborate Use case descriptions & scenarios
c) Develop prototypes (without functionality)
d) Develop system sequence diagrams

**Week 7, 8, 9 & 10:**
**For each case study:**
a) Develop high-level sequence diagrams for each use case
b) Identify MVC classes / objects for each use case
c) Develop Detailed Sequence Diagrams / Communication diagrams for each use case showing interactions among all the three-layer objects
d) Develop detailed design class model (use GRASP patterns for responsibility assignment)
e) Develop three-layer package diagrams for each case study

**Week 11 & 12:**
**For each case study:**
a) Develop Use case Packages
b) Develop component diagrams
c) Identify relationships between use cases and represent them
d) Refine domain class model by showing all the associations among classes

**Week 13 onwards:**
**For each case study:**
a) Develop sample diagrams for other UML diagrams - state chart diagrams, activity diagrams and deployment diagrams

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# Mobile Application Development Lab

1. Write a J2ME program to show how to change the font size and colour.
2. Write a J2ME program which creates the following kind of menu.
    * cut
    * copy
    * past
    * delete
    * select all
    * unselect all
3. Create a J2ME menu which has the following options (Event Handling):
    - cut - can be on/off
    - copy - can be on/off
    - paste - can be on/off
    - delete - can be on/off
    - select all - put all 4 options on
    - unselect all - put all

4. Create a MIDP application, which draws a bar graph to the display. Data values can be given at int[] array. You can enter four data (integer) values to the input text field.

5. Create an MIDP application which examine, that a phone number, which a user has entered is in the given format (Input checking):
* Area code should be one of the following: 040, 041, 050, 0400, 044
* There should 6-8 numbers in telephone number (+ area code)

6. Write a sample program to show how to make a SOCKET Connection from J2ME phone. This J2ME sample program shows how to how to make a SOCKET Connection from a J2ME Phone. Many a times there is a need to connect backend HTTP server from the J2ME application. Show how to make a SOCKET connection from the phone to port 80.

7. Login to HTTP Server from a J2ME Program. This J2ME sample program shows how to display a simple LOGIN SCREEN on the J2ME phone and how to authenticate to a HTTP server. Many J2ME applications for security reasons require the authentication of the user. This free J2ME sample program, shows how a J2ME application can do authentication to the backend server. Note: Use Apache Tomcat Server as Web Server and MySQL as Database Server.
8. The following should be carried out with respect to the given set of application domains: (Assume that the Server is connected to the well-maintained database of the given domain. Mobile Client is to be connected to the Server and fetch the required data value/information)
    • Students Marks Enquiry
    • Town/City Movie Enquiry
    • Railway/Road/Air (For example PNR) Enquiry/Status
    • Sports (say, Cricket) Update
    • Town/City Weather Update
    • Public Exams (say Intermediate or SSC)/ Entrance (Say EAMCET) Results Enquiry

Divide Student into Batches and suggest them to design database according to their domains and render information according the requests.

9. Write an Android application program that displays Hello World using Terminal.

10. Write an Android application program that displays Hello World using Eclipse.

11. Write an Android application program that accepts a name from the user and displays the hello name to the user in response as output using Eclipse.

12. Write an Android application program that demonstrates the following:
    (i) LinearLayout
    (ii) RelativeLayout
    (iii) TableLayout
    (iv) GridView layout

13. Write an Android application program that converts the temperature in Celsius to Fahrenheit.

14. Write an Android application program that demonstrates intent in mobile application development.

**IV Year – I SEMESTER**

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# Software Testing Lab

## Lab Assignments

**Problem Statement 01**
Consider an automated banking application. The user can dial the bank from a personal computer, provide a six-digit password, and follow with a series of keyword commands that activate the banking function. The software for the application accepts data in the following form:

| | |
|---|---|
| Area Code | Blank or three-digit number |
| Prefix | Three-digit number, not beginning with 0 or 1 |
| Suffix | Four-digit number |
| Password | Six-character alphanumeric |
| Commands | "Check status", "Deposit", "Withdrawal" |

Design adhoc test cases to test the system

**Problem Statement 02**
Consider an automated banking application. The user can dial the bank from a personal computer, provide a six-digit password, and follow with a series of keyword commands that activate the banking function. The software for the application accepts data in the following form:

| | |
|---|---|
| Area Code | Blank or three-digit number |
| Prefix | Three-digit number, not beginning with 0 or 1 |
| Suffix | Four-digit number |
| Password | Six-character alphanumeric |
| Commands | "Check status", "Deposit", "Withdrawal" |

Design the test cases to test the system using following Black Box testing technique:
BVA, Worst BVA, Robust BVA, Robust Worst BVA
Equivalence class testing (Input/Output domain)

**Problem Statement 03**
Consider an application that is required to validate a number according to the following simple rules:
1. A number can start with an optional sign.
2. The optional sign can be followed by any number of digits.
3. The digits can be optionally followed by a decimal point, represented by a period.
4. If there is a decimal point, then there should be two digits after the decimal.
5. Any number-whether or not it has a decimal point, should be terminated a blank.
6. A number can start with an optional sign.
7. The optional sign can be followed by any number of digits.
8. The digits can be optionally followed by a decimal point, represented by a period.
9. If there is a decimal point, then there should be two digits after the decimal.
10. Any number-whether or not it has a decimal point, should be terminated a blank. Generate test cases to test valid and invalid numbers.

**(HINT)** Use Decision table and cause-effect graph to generate test cases.

**Problem Statement 04**
Generate test cases using Black box testing technique to Calculate Standard Deduction on Taxable Income. The standard deduction is higher for tax payers who are 65 or older or blind. Use the method given below to calculate tax.

1. The first factor that determines the standard deduction is the filing status. The basic standard deduction for the various filing status are:

| | |
|---|---|
| Single | $4,750 |
| Married, filing a joint return | $9,500 |
| Married, filing a separate return | $7,000 |

2. If a married couple is filing separate returns and one spouse is not taking standard Deduction, the other spouse also is not eligible for standard deduction.

3. An additional $1,000 is allowed as standard deduction, if either the filer is 65 yrs or the spouse is 65 yrs or older (the latter case applicable when the filing status is "Married" and filing "joint").

4. An additional $1,000 is allowed as standard deduction, if either the filer is blind or the spouse is blind (the latter case applicable when the filing status is "married" and filing "joint").

**(HINT):**
From the above description, it is clear that the calculation of standard deduction depends on the following 3 factors:
1. Status of filing of the filer
2. Age of the filer
3. Whether the filer is blind or not

In addition, in certain cases, the following additional factors also come into play in calculating the standard deduction.
1. Whether spouse has claimed standard deduction
2. Whether spouse is blind
3. Whether the spouse is more than 65 years old

**Problem Statement 05**
Consider the following program segment:

```
1. int max (int i, int j, int k)
2. {
3. int max;
4. if (i>j) then
5. if (i>k) then max=i;
6. else max=k;
7. else if (j > k) max=j
8. else max=k
9. return (max);
10. }
```

a) Draw the control flow graph for this program segment
b) Determine the cyclomatic complexity for this program
c) Determine the independent paths

**Problem Statement 06**
Source code of simple insertion sort implementation using array in ascending order in c programming language

```
#include<stdio.h>
int main(){
int i,j,s,temp,a[20];
```

```
Printf ("Enter total elements: "); Scanf ("%d",&s);
printf("Enter %d elements: ",s); for(i=0;i<s;i++) scanf("%d",&a[i]); for(i=1;i<s;i++){
temp=a[i]; j=i-1; while((temp<a[j])&&(j>=0)){ a[j+1]=a[j];
j=j-1;
}
a[j+1]=temp;
}
printf("After sorting: ");
for(i=0;i<s;i++)
printf(" %d",a[i]);
return 0;
}
```

**HINT:** for loop is represented as while loop

a) Draw the program graph for given program segment b) Determine the DD path graph
c) Determine the independent paths
d) Generate the test cases for each independent path

**Problem Statement 07**

Consider a system having an FSM for a stack having the following states and transitions:

**States**

Initial: Before creation
Empty: Number of elements = 0
Holding: Number of elements > 0, but less than the maximum capacity
Full: Number elements = maximum
Final: After destruction
Initial to Empty: Create
Empty to Holding, Empty to Full, Holding to Holding, Holding to Full: Add
Empty to Final, Full to Final, Holding to Final: Destroy
Holding to Empty, Full to Holding, Full to Empty: Delete

Design test cases for this FSM using state table-based testing.

**Problem Statement 08**

Given the following fragment of code, how many tests are required for 100% decision coverage? Give the test cases**.**

```
if width > length
then biggest_dimension = width if height > width
then biggest dimension = height end_if
else if biggest dimension = length then if height > length
then biggest_dimension = height end_if
end_if end_if
```

**Hint** 04 test cases

**Problem Statement 09**

Given the following code, how much minimum number of test cases is required for full statement and branch coverage?

```
read p read q
if p+q> 100
then print "Large" endif
if p > 50
then print "p Large" endif
```

**Hint** 1 test for statement coverage, 2 for branch coverage

**Problem Statement 10**
Consider a program to input two numbers and print them in ascending order given below. Find all du paths and identify those du-paths that are not feasible. Also find all dc paths and generate the test cases for all paths (dc paths and non dc paths).

```
#include<stdio.h>
#include<conio.h>
1. void main ()
2. {
3 int a, b, t;
4. Clrscr ();
5. Printf ("Enter first number");
6. scanf ("%d",&a);
7. printf("Enter second number");
8. scanf("%d",&b);
9. if (a<b){
10. t=a;
11a=b;
12 b=t;
13}
14. printf ("%d %d", a, b);
15 getch ();
}
```

**Problem Statement 11**
Consider the above program and generate possible program slices for all variables. Design at least one test case from every slice.

**Problem Statement 12**
Consider the code to arrange the nos. in ascending order. Generate the test cases for relational coverage, loop coverage and path testing. Check the adequacy of the test cases through mutation testing and also compute the mutation score for each.

```
i = 0;
n=4; //N-Number of nodes present in the graph
While (i<n-1) do j = i + 1;
While (j<n) do
if A[i]<A[j] then swap (A[i], A[j]); end do;
i=i+1;
end do
```

**IV Year – I SEMESTER** **T P C**
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# Hadoop & BigData Lab

*Week 1,2:*

1. **Implement the following Data structures in Java**

   **a)Linked Lists b) Stacks c) Queues d) Set e) Map**

*Week 3, 4:*

2. **(i)Perform setting up and Installing Hadoop in its three operating modes:**
   **Standalone,**
   **Pseudo distributed,**
   **Fully distributed**

   **(ii)Use web based tools to monitor your Hadoop setup.**

*Week 5:*

3. **Implement the following file management tasks in Hadoop:**
   - **Adding files and directories**
   - **Retrieving files**
   - **Deleting files**

   **Hint:** A typical Hadoop workflow creates data files (such as log files) elsewhere and copies them into HDFS using one of the above command line utilities.

*Week 6:*

4. **Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm.**

*Week 7:*

5. **Write a Map Reduce program that mines weather data.**

   Weather sensors collecting data every hour at many locations across the globe gather a large volume of log data, which is a good candidate for analysis with MapReduce, since it is semi structured and record-oriented.

*Week 8:*

6. **Implement Matrix Multiplication with Hadoop Map Reduce**

*Week 9,10:*

7. **Install and Run Pig then write Pig Latin scripts to sort, group, join, project, and filter your data.**

*Week 11,12:*

8. **Install and Run Hive then use Hive to create, alter, and drop databases, tables, views, functions, and indexes**

**IV Year – II SEMESTER**

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# Elective - III

# Human Computer Interaction

**Course Objectives:**
The main objective is to get student to think constructively and analytically about how to design and evaluate interactive technologies.

**Course Outcomes:**

1. Explain the capabilities of both humans and computers from the viewpoint of human information processing.
2. Describe typical human–computer interaction (HCI) models, styles, and various historic HCI paradigms.
3. Apply an interactive design process and universal design principles to designing HCI systems.
4. Describe and use HCI design principles, standards and guidelines.
5. Analyze and identify user models, user support, socio-organizational issues, and stakeholder requirements of HCI systems.
6. Discuss tasks and dialogs of relevant HCI systems based on task analysis and dialog design.

**Syllabus:**

**UNIT I:**
**Introduction:** Usability of Interactive Systems- introduction, usability goals and measures, usability motivations, universal usability, goals for our profession
**Managing Design Processes:** Introduction, Organizational design to support usability, Four pillars of design, development methodologies, Ethnographic observation, Participatory design, Scenario Development, Social impact statement for early design review, legal issues, Usability Testing and Laboratories

**UNIT II:**
**Menu Selection, Form Fill-In and Dialog Boxes:** Introduction, Task- Related Menu Organization, Single menus, Combinations of Multiple Menus, Content Organization, Fast Movement Through Menus, Data entry with Menus: Form Fill-in, dialog Boxes, and alternatives, Audio Menus and menus for Small Displays

**UNIT III:**
**Command and Natural Languages:** Introduction, Command organization Functionality, Strategies and Structure, Naming and Abbreviations, Natural Language in Computing
**Interaction Devices:** Introduction, Keyboards and Keypads, Pointing Devices, Speech and Auditory Interfaces, Displays- Small and large

**UNIT IV:**
**Quality of Service:** Introduction, Models of Response-Time impacts, Expectations and attitudes, User Productivity, Variability in Response Time, Frustrating Experiences
**Balancing Function and Fashion:** Introduction, Error Messages, Nonanthropomorphic Design, Display Design, Web Page Design, Window Design, Color

**UNIT V:**
**User Documentation and Online Help**: Introduction, Online Vs Paper Documentation, Reading from paper Vs from Displays, Shaping the content of the Documentation, Accessing the Documentation, Online tutorials and animated documentation, Online communities for User Assistance, The Development Process

**UNIT VI:**
**Information Search:** Introduction, Searching in Textual Documents and Database Querying, Multimedia Document Searches, Advanced Filtering and Searching Interfaces
**Information Visualization:** Introduction, Data Type by Task Taxonomy, Challenges for Information Visualization

**Text Books:**

1. Designing the User Interface, Strategies for Effective Human Computer Interaction, 5ed, Ben Shneiderman, Catherine Plaisant, Maxine Cohen, Steven M Jacobs, Pearson
2. The Essential guide to user interface design,2/e, Wilbert O Galitz, Wiley DreamaTech.

**Reference Books:**

1. Human Computer, Interaction Dan R.Olsan, Cengage ,2010.
2. Designing the user interface. 4/e, Ben Shneidermann , PEA.
3. User Interface Design, Soren Lauesen , PEA.
4. Interaction Design PRECE, ROGERS, SHARPS, Wiley.

# Advanced Operating Systems

**Course Objectives:**
The aim of this module is to study, learn, and understand the main concepts of advanced operating systems (parallel processing systems, distributed systems, real time systems, network operating systems, and open source operating systems); Hardware and software features that support these systems.

**Course Outcomes:**
1. Outline the potential benefits of distributed systems
2. Summarize the major security issues associated with distributed systems along with the
3. range of techniques available for increasing system security

**Syllabus:**

**UNIT–I:**
**Introduction to Distributed systems:** Goals of distributed system, hardware and software concepts, design issues. **Communication in Distributed systems**: Layered protocols, ATM networks, the Client - Server model, remote procedure call and group communication.

**UNIT–II:**
**Synchronization in Distributed systems**: Clock synchronization, Mutual exclusion, E-tech algorithms, the Bully algorithm, a ring algorithm, atomic transactions,

**UNIT-III:**
**Deadlocks:** deadlock in distributed systems, Distributed deadlock prevention, and distributed dead lock detection.

**UNIT–IV:**
**Processes:** Processes and Processors in distributed systems: Threads, system models, Processor allocation, Scheduling in distributed system, Fault tolerance and real time distributed systems.

**UNIT-V:**

**Distributed file systems:** Distributed file systems design, distributed file system implementation, trends in distributed file systems**.**

**Distributed shared memory** : What is shared memory, consistency models, page based distributed shared memory, shared variable distributed shared memory, object based DSM.

**UNIT-VI:**

**Case study MACH :** Introduction to MACH, process management in MACH, memory management in MACH, communication in MACH, UNIX emulation in MACH. Case study DCE : Introduction to DCE threads, RPC's, Time service, Directory service, security service, Distributed file system.
**TEXT BOOKS**:


1. Distributed Operating System - Andrew. S. Tanenbaum, PHI
2. Operating Systems' – Internal and Design Principles Stallings, Fifth Edition–2005, Pearson education/PHI


**REFERENCE BOOKS:**


1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne
   7th Edition, John Wiley.
2. Modern Operating Systems, Andrew S Tanenbaum 2nd edition Pearson/PHI

# Mobile Adhoc & Sensor Networks

**Course Objectives:**

1) To make the student understand the concepts of MOBILE AD HOC NETWORKS (Manets) as well as Wireless Sensor Networks (WSN), their characteristics, novel applications, and technical challenges.
2) To understand the issues and solutions of various layers of Manets, namely MAC layer, Network Layer & Transport Layer in Manets and WSN.
3) To understand the platforms and protocols used in Manets and WSN.
4) To make the student take up further research as part of his higher studies

**Course Outcomes:**

1) Able to think and develop new applications in Manets and WSN.
2) Able to take any new technical issue related to these new thrust areas and come up with a solution(s).
3) Able to develop algorithms/protocols for Manets and WSN.

**Syllabus:**

**UNIT I :**
*Introduction to Ad Hoc Networks:* Characteristics of MANETs, applications of MANETs, and challenges of MANETs.
*Routing in MANETs:* Criteria for classification, Taxonomy of MANET routing algorithms, Topology based routing algorithms, Position based routing algorithms,

**UNIT II:**
*Data Transmission*: Broadcast storm problem, Broadcasting, Multicasting and Geocasting

**UNIT III:**
*TCP over Ad Hoc:* TCP protocol overview, TCP and MANETs, and Solutions for TCP over Ad hoc

**UNIT IV:**
*Basics of Wireless Sensors and Applications*: Applications, Classification of sensor networks, Architecture of sensor networks, Physical layer, MAC layer, Link layer

**UNIT V :**
*Data Retrieval in Sensor Networks:* Routing layer, Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs, and Sensor Networks and mobile robots.

**UNIT VI :**
*Security:* Security in ad hoc networks, Key management, Secure routing, Cooperation in MANETs, and Intrusion detection systems.
*Sensor Network Platforms and Tools*: Sensor Network Hardware, Berkeley motes, Sensor Network Programming Challenges, Node-Level Software Platforms, TinyOS, NS-2 and TOSSIM.

**Textbook:**

1. *Ad hoc and Sensor Networks* - Theory and Applications, by Carlos Cordeiro and Dharma P. Agrawal, World Scientific Publications, March 2006, ISBN 981-256-681-3.
2. Wireless Sensor Networks: An Information Processing Approach, Feng Zhao, Leonidas Guibas, Elsevier Science ISBN: 978-1-55860-914-3,
(Morgan Kauffman)

# Pattern Recognition

**Course Objectives:**
The course is designed to introduce students to theoretical concepts and practical issues associated with pattern recognition

**Course Outcomes:**

1. Design systems and algorithms for pattern recognition (signal classification), with focus on sequences of patterns that are analyzed using, e.g., hidden Markov models (HMM),
2. Analyse classification problems probabilistically and estimate classifier performance,
3. Understand and analyse methods for automatic training of classification systems,
4. Apply Maximum-likelihood parameter estimation in relatively complex probabilistic models, such as mixture density models and hidden Markov models,
5. Understand the principles of Bayesian parameter estimation and apply them in relatively simple probabilistic models

## Syllabus:

**UNIT-I:**
**Introduction**: Machine perception, pattern recognition example, pattern recognition systems, the Design cycle, learning and adaptation
**Bayesian Decision Theory**: Introduction, continuous features – two categories classifications, minimum error-rate classification-zero–one loss function, classifiers, discriminant functions, and decision surfaces

**UNIT-II:**
**Normal density**: Univariate and multivariate density, discriminant functions for the normal Density different cases, Bayes decision theory – discrete features, compound Bayesian decision theory and context

**UNIT-III :**
**Maximum likelihood and Bayesian parameter estimation:** Introduction, maximum likelihood Estimation, Bayesian estimation, Bayesian parameter estimation–Gaussian case

**UNIT-IV :**
**Un-supervised learning and clustering:** Introduction, mixture densities and identifiability, maximum likelihood estimates, application to normal mixtures, K-means clustering. Date description and clustering – similarity measures, criteria function for clustering

**UNIT-V :**
**Pattern recognition using discrete hidden Markov models:** Discrete-time Markov process, Extensions to hidden Markov models, three basic problems of HMMs, types of HMMs

**UNIT-VI :**
**Continuous hidden Markov models :**
Continuous observation densities, multiple mixtures per state, speech recognition applications.

**Text Books:**
1. Pattern classifications, Richard O. Duda, Peter E. Hart, David G. Stroke. Wiley student edition, Second Edition.
2. Pattern Recognition, An Introduction, V Susheela Devi, M Narsimha Murthy, Universiy Press

**Reference Books:**
1. R.C Gonzalez and R.E. Woods, “Digital Image Processing”, Addison Wesley, 1992.
2.Pattern Recognition and Image Analysis – Earl Gose, Richard John baugh, Steve Jost PHI 2004
3. Fundamentals of speech Recognition, Lawerence Rabiner, Biing – Hwang Juang Pearson education.
4. Pattern Recognition, Sergios Theodoridis, Konstantinos Koutroumbas, Academic Press, Elsevier, 4ed,

# Digital Image Processing

**Course Objectives:**
To make the students to understand

1. The fundamentals of Computer Graphics and Image Processing
2. The concepts related edge detection, segmentation, morphology and image compression methods.

**Course Outcomes:**

1. understanding of digital image processing fundamentals: hardware and software, digitization, enhancement and restoration, encoding, segmentation, feature detection
2. ability to apply image processing techniques in both the spatial and frequency (Fourier) domains
3. Ability To understand (i.e., be able to describe, analyse and reason about) how digital images are represented, manipulated, encoded and processed, with emphasis on algorithm design, implementation and performance evaluation

**SYLLABUS:**

**UNIT I:**
**Introduction:** Applications of Computer Graphics and Image Processing, Fundamentals on Pixel concepts, effect of Aliasing and Jaggles, Advantages of high resolution systems
**DDA line algorithms:** Bresenhams line and circle derivations and algorithms

**UNIT II:**
**2-D Transformations:** Translations, Scaling, rotation, reflection and shear transformations, Homogeneous coordinates, **Composite Transformations**- Reflection about an arbitrary line; Windowing and clipping, viewing transformations, Cohen- Sutherland clipping algorithm

**UNIT III:**
**Digital Image Properties:** Metric and topological properties of Digital Images, Histogram, entropy, Visual Perception, Image Quality, Color perceived by humans, Color Spaces, Palette Images, color Constancy
**Color Images:** Pixel brightness transformations, Local Preprocessing, image smoothing, Edge detectors, Robert Operators, Laplace, Prewitt, Sobel, Fri-chen, Canny Edge detection

**UNIT IV:**
**Mathematical Morphology:** Basic Mathematical Concepts, Binary dilation and Erosion, Opening and closing, Gray Scale dilation and erosion, Skeleton, Thinning , Thickening Ultimate erosion, Geodesic transformations, Morphology and reconstruction, Morphological Segmentation

**UNIT V:**
**SEGMENTATION:** Threshold detection methods, Optimal Thresholding, Edge based Segmentation-Edge image thresholding, Edge relaxation, Border tracing, Hough Transforms, Region based segmentation: Region Mergingm Region Splitting, Splitting and Merging, Watershed Segmentation.

**UNIT VI:**
**Image Data Compression:** Image data Properties, Discrete Image Transformations in data compression, Discrete Cosine and Wavelet Transforms, Types of DWT and merits; Predicative Compression methods, Hierarchical and Progressive Compression methods, Comparison of Compression methods, JPEG- MPEG Image Compression methods.

**Text Books:**


1. Computer Graphics C Version, Donald Hearn, M Paulli Baker , Pearson ( Uniit I and Unit II)
2. Image Processing, Analysis and Machine Vision, Millan Sonka, Vaclov Halvoc, Roger Boyle, Cengage Learning, 3ed, ( Unit III, Unit IV, Unit V and Unit VI)


**References:**


1. Computer & Machine Vision, Theory , Algorithms , Practicles, E R Davies, Elsevier, 4ed
2. Digital Image Processing with MATLAB and LABVIEW, Vipul Singh, Elsevier
3. Digital Image Processing, R C Gonzalez &R E woods, Addison Pearson, 3ed.

# Microprocessors and Multi core systems

**Course objectives:**
The objective of this course is to provide extensive knowledge of microprocessor based systems. The student will

- learn how the hardware and software components of a microprocessor-based system work together to implement system-level features;
- learn both hardware and software aspects of integrating digital devices (such as memory and I/O interfaces) into microprocessor-based systems;

**Course Outcomes:**

1. able to solve basic binary math operations using the microprocessor.
2. able to demonstrate programming proficiency using the various addressing modes and data transfer instructions of the target microprocessor.
3. able to program using the capabilities of the stack, the program counter, and the status register and show how these are used to execute a machine code program.
4. able to apply knowledge of the microprocessor's internal registers and operations by use of a PC based microprocessor simulator.
5. able to write assemble assembly language programs, assemble into machine a cross assembler utility and download and run their program on the training boards.

**Syllabus:**

**UNIT-I:**
overview of microcomputer structure and operation., execution of a three instruction program, microprocessor evolution and types, the 8086 micro processor family , 8086 internal architecture , introduction to programming the 8086,
**8086 family assembly language programming :**Program development steps , constructing the machine codes for 8086 instructions, writing programs for use with an assembler, assembly language program development tools.
( Text Book 1)

**UNIT-II:**
**Implementing standard program structures in 8086 assembly language**
Simple sequence programs, jumps, flags and conditional jumps, if-then, if-then-else and multiple if-then-else programs, while-do programs, repeat-until programs, instruction timing and delay loops.
( Text Book 1)

**UNIT-III:**
**Strings, procedures and macros**
The 8086 string instructions, writing and using procedures, writing and using assembler
macros.
**8086 instruction descriptions and assembler directives**
Instruction descriptions, assembler directives , DB, DD, DQ, DT, DW, end-program, endp, ends, equ ,even-align on even memory address, extrn , global, public / extrn, group, include, label, length- not implemented IBM MASM, name – off set, ORG, proc, ptr, segment, short, type
( Text Book 1)

**UNIT-IV:**
**8086: 8086 interrupts and interrupt applications**
8086 interrupts and interrupt responses, hardware interrupt applications, Software Interrupts, priority of interrupts, software interrupt applications, programming.
**8086 assembly language programmes** - Bit & Logic operations, strings, procedures, Macros, Number Format, Conversions, ASCII operations, signed Numbers Arithmetic, Programming using High level language constructs.
( Text Book 1)

**UNIT-V:**
CPU: architecture of Intel 80286 CPU, Intel 80386, and 32-bit CPU- 80486-Microprocessor( No instruction set).( Text Book 2)

**UNIT-VI:**

**The Pentium Family and Core 2 Microprocessors:**
Introduction to the Pentium Processor, Pentium II Microprocessor, Pentium III, Pentium IV and Core2 Processors.( Text Book 2)

**TEXT BOOKS:**


1. Microprocessors and Interfacing, Douglas V Hall, Revised 2nd ed, TMH
2. The Intel Microprocessors, Architecture, programming and interfacing, 8ed, Barry Bray, Pearson
3. The X86 Microprocessors, architecture, Programming and Interfacing(8086 to Pentium), Lyla B Das, PEA


**REFERENCE BOOKS:**


1. The 8088 and 8086 Microprocessors, Programming, Interfacing, Hardware and Applications, Walter A Triebel, Avtar Singh, 4 ed, Pearson

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# Elective - IV
# Embedded and Real Time Systems

## Course Objectives:

Develop an understanding of the technologies behind the embedded computing systems

1. technology capabilities and limitations of the hardware, software components
2. methods to evaluate design tradeoffs between different technology choices.
3. design methodologies

## Course Outcomes:

Understand the basics of an embedded system

1. Program an embedded system
2. Design, implement and test an embedded system.

Identify the unique characteristics of real-time systems

1. Explain the general structure of a real-time system
2. Define the unique design problems and challenges of real-time systems

## Syllabus:

### Unit-I:

**Introduction to Embedded systems:** What is an embedded system Vs. General computing system, history, classification, major application areas, and purpose of embedded systems. Core of embedded system, memory, sensors and actuators, communication interface, embedded firmware, other system components, PCB and passive components.

### UNIT-II:

**8—bit microcontrollers architecture:** Characteristics, quality attributes application specific, domain specific, embedded systems. Factors to be considered in selecting a controller, 8051 architecture, memory organization, registers, oscillator unit, ports, source current, sinking current, design examples.

### UNIT-III:

RTOS and Scheduling, Operating basics, types, RTOS, tasks, process and threads, multiprocessing and multitasking, types of multitasking, non preemptive, preemptive scheduling.

### UNIT-IV:

Task communication of RTOS, Shared memory, pipes, memory mapped objects, message passing, message queue, mailbox, signaling, RPC and sockets, task communication/synchronization issues, racing, deadlock, live lock, the dining philosopher's problem.

### UNIT-V:

The producer-consumer problem, Reader writers problem, Priority Inversion, Priority ceiling, Task Synchronization techniques, busy waiting, sleep and wakery, semaphore, mutex, critical section objects, events, device, device drivers, how to clause an RTOS, Integration and testing of embedded hardware and fire ware.

### UNIT-VI:

Simulators, emulators, Debuggers, Embedded Product Development life cycle (EDLC), Trends in embedded Industry, Introduction to ARM family of processor.

## TEXT BOOK:

1. Introduction to embedded systems Shibu. K.V, TMH, 2009.

## REFERENCE BOOKS:

1. Ayala & Gadre: The 8051 Microcontroller & Embedded Systems using Assembly and C, CENGAGE

2. Embedded Systems, Rajkamal, TMH, 2009.
3. Embedded Software Primer, David Simon, Pearson.
4. The 8051 Microcontroller and Embedded Systems, Mazidi,  Mazidi, Pearson,.

# Neural Networks & Soft Computing

**Course Objectives:**

1. To have a detailed study of neural networks, Fuzzy Logic and uses of Heuristics based on human experience.
2. To Familiarize with Soft computing concepts.
3. To introduce the concepts of genetic algorithm and its applications to soft computing using some applications

**Course Outcomes:**

1. Identify and describe soft computing techniques and their roles in building intelligent machines.
2. Recognize the feasibility of applying a soft computing methodology for a particular problem.
3. Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems.

**Syllabus:**

**UNIT I:**
**INTRODUCTION:** what is a neural network? Human Brain, Models of a Neuron, Neural networks viewed as Directed Graphs, Network Architectures, Knowledge Representation, Artificial Intelligence and Neural

**UNIT II:**
**LEARNING PROCESS:** Error Correction learning, Memory based learning, Hebbian learning, Competitive, Boltzmann learning, Credit Assignment Problem, Memory, Adaption, Statistical nature of the learning process.

**UNIT III:**
**CLASSICAL & FUZZY SETS:** Introduction to classical sets – properties, operations and relations; Fuzzy sets – memberships, uncertainty, operations, properties, fuzzy relations, cardinalities, membership functions.

**UNIT IV:**
**FUZZY LOGIC SYSTEM COMPONENTS:** Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods

**UNIT V:**
**CONCEPT LEARNING:** Introduction, A concept learning task, Concept learning as search, Find-S: finding a maximally specific hypothesis, Version spaces and the candidate elimination algorithm
**DECISION TREE LEARNING:** Introduction, Decision tree representation, Appropriate problems for decision tree learning, The basic decision tree learning algorithm, Hypothesis space search in decision tree learning

**UNIT VI:**
**GENETIC ALGORITHMS:** Motivation, Genetic Algorithms, an Illustrative Example, Hypothesis Space Search, Genetic Programming, Models of Evolution and Learning, Parallelizing Genetic Algorithms

**TEXT BOOKS:**


1. Neural networks A comprehensive foundations, Simon Hhaykin, Pearson Education 2nd edition 2004
2. Neural Networks, Fuzzy Logic, Genetic Algorithms: Sysnthesis and Applications by Rajasekharan and Pai, PHI Publications
3. Machine Learning, Tom M. Mitchell, MGH


**References:**

# Social Networks and the Semantic Web

**Course Objectives:**
This course addresses the issues needed to realize the vision of the *Semantic Web* through the use of *Intelligent Agents*. The objectives are :
- to understand semantic web
- to understand the role of ontology and inference engines in semantic web

**Course Outcomes:**
Students will
1. demonstrate knowledge and be able to explain the three different "named" generations of the web.
2. demonstrate the ability to participate materially in projects that develop programs relating to Web applications and the analysis of Web data.
3. be able to understand and analyze key Web applications including search engines and social networking sites.
4. be able to understand and explain the key aspects of Web architecture and why these are important to the continued functioning of the World Wide Web.
5. be able to analyze and explain how technical changes affect the social aspects of Web-based computing.
6. be able to develop "linked data" applications using Semantic Web technologies.

**Syllabus:**

**UNIT-I:**
**The Semantic web:** Limitations of the current Web, The semantic solution, Development of the Semantic Web, The emergence of the social web.

**UNIT-II:**
**Social Network Analysis:** What is network analysis?, Development of Social Network Analysis, Key concepts and measures in network analysis.
**Electronic sources for network analysis:** Electronic discussion networks, Blogs and online communities, Web-based networks.

**UNIT-III:**
**Knowledge Representation on the Semantic Web:** Ontologies and their role in the Semantic Web, Ontology languages for the semantic Web.

**UNIT-IV:**
**Modeling and Aggregating Social Network Data:** State of the art in network data representation, Ontologicl representation of Social individuals, Ontological representation of social relationships, Aggregating and reasoning with social network data.

**UNIT-V:**
**Developing social semantic applications:** Building Semantic Web applications with social network features, Flink- the social networks of the Semantic Web community, Open academia: distributed, semantic-based publication management.

**UNIT-VI:**
**Evaluation of Web-Based Social Network Extraction:** Differences between survey methods and electronic data extraction, context of the empirical study, Data collection, Preparing the data, Optimizing goodness of fit, Comparison across methods and networks, Predicting the goodness of fit, Evaluation through analysis.

**Text Book:**

1. Social Networks and the Semantic Web ,Peter Mika,Springer,2007.
2. Semantic Web Technologies ,Trends and Research in OntologyBased Systems, J.Davies,Rudi Studer,Paul Warren,JohnWiley&Sons.

**Reference Books:**


1. Semantic Web and Semantic Web Services –Liyang Lu Chapman and Hall/CRC Publishers,(Taylor & Francis Group)
2. Information Sharing on the semantic Web – Heiner Stuckenschmidt; Frank Van Harmelen, Springer Publications

# Cloud Computing

**Course Objectives:** The student will learn about the cloud environment, building software systems and components that scale to millions of users in modern internet, cloud concepts capabilities across the various cloud service models including Iaas,Paas,Saas, and developing cloud based software applications on top of cloud platforms.

**Course Outcomes:**

1. Understanding the key dimensions of the challenge of Cloud Computing
2. Assessment of the economics , financial, and technological implications for selecting cloud computing for own organization
3. Assessing the financial, technological, and organizational capacity of employer's for actively initiating and installing cloud-based applications.
4. Assessment of own organizations' needs for capacity building and training in cloud computing-related IT areas

## Syllabus:

**UNIT I: Systems modeling, Clustering and virtualization:**

Scalable Computing over the Internet, Technologies for Network based systems, System models for Distributed and Cloud Computing, Software environments for distributed systems and clouds, Performance, Security And Energy Efficiency

**UNIT II: Virtual Machines and Virtualization of Clusters and Data Centers:**

Implementation Levels of Virtualization, Virtualization Structures/ Tools and mechanisms, Virtualization of CPU, Memory and I/O Devices, Virtual Clusters and Resource Management, Virtualization for Data Center Automation.

**UNIT III: Cloud Platform Architecture:**

Cloud Computing and service Models, Architectural Design of Compute and Storage Clouds, Public Cloud Platforms, Inter Cloud Resource Management, Cloud Security and Trust Management. Service Oriented Architecture, Message Oriented Middleware.

**UNIT IV: Cloud Programming and Software Environments:**

Features of Cloud and Grid Platforms, Parallel & Distributed Programming Paradigms, Programming Support of Google App Engine, Programming on Amazon AWS and Microsoft Azure, Emerging Cloud Software Environments.

**UNIT V: Cloud Resource Management and Scheduling:**

Policies and Mechanisms for Resource Management Applications of Control Theory to Task Scheduling on a Cloud, Stability of a Two Level Resource Allocation Architecture, Feedback Control Based on Dynamic Thresholds. Coordination of Specialized Autonomic Performance Managers, Resource Bundling, Scheduling Algorithms for Computing Clouds, Fair Queuing, Start Time Fair Queuing, Borrowed Virtual Time, Cloud Scheduling Subject to Deadlines, Scheduling MapReduce Applications Subject to Deadlines.

**UNIT VI:**

**Storage Systems:** Evolution of storage technology, storage models, file systems and database, distributed file systems, general parallel file systems. Google file system., Apache Hadoop, BigTable, Megastore, Amazon Simple Storage Service(S3)

**TEXT BOOKS:**


1. Distributed and Cloud Computing, Kai Hwang, Geoffry C. Fox, Jack J. Dongarra MK Elsevier.
2. Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier.
3. Cloud Computing, A Hands on approach, Arshadeep Bahga, Vijay Madisetti, University Press


**REFERNCE BOOK:**


1. Cloud Computing, A Practical Approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter, TMH
2. Mastering Cloud Computing, Foundations and Application Programming, Raj Kumar Buyya, Christen vecctiola, S Tammarai selvi, TMH

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# Distributed Systems

**Course Objectives:**

1. provides an introduction to the fundamentals of distributed computer systems, assuming the availability of facilities for data transmission, IPC mechanisms in distributed systems, Remote procedure calls.
2. Expose students to current technology used to build architectures to enhance distributed computing infrastructures with various computing principles

**Course Outcomes:**

1. Develop a familiarity with distributed file systems.
2. Describe important characteristics of distributed systems and the salient architectural features of such systems.
3. Describe the features and applications of important standard protocols which are used in distributed systems.
4. Gaining practical experience of inter-process communication in a distributed environment

**Syllabus:**

**UNIT-I:**

**Characterization of Distributed Systems:** Introduction, Examples of Distributed Systems, Resource Sharing and the Web, Challenges.

**System Models:** Introduction, Architectural Models- Software Layers, System Architecture, Variations, Interface and Objects, Design Requirements for Distributed Architectures, Fundamental Models- Interaction Model, Failure Model, Security Model.

**UNIT-II:**

**Interprocess Communication:** Introduction, The API for the Internet Protocols- The Characteristics of Interprocess communication, Sockets, UDP Datagram Communication, TCP Stream Communication; External Data Representation and Marshalling; Client Server Communication; Group Communication- IP Multicast- an implementation of group communication, Reliability and Ordering of Multicast.

**UNIT-III:**

**Distributed Objects and Remote Invocation:** Introduction, Communication between Distributed Objects- Object Model, Distributed Object Modal, Design Issues for RMI, Implementation of RMI, Distributed Garbage Collection; Remote Procedure Call, Events and Notifications, Case Study: JAVA RMI

**UNIT-IV:**

**Operating System Support:** Introduction, The Operating System Layer, Protection, Processes and Threads –Address Space, Creation of a New Process, Threads.

**UNIT-V:**

**Distributed File Systems:** Introduction, File Service Architecture; Peer-to-Peer Systems: Introduction, Napster and its Legacy, Peer-to-Peer Middleware, Routing Overlays.

**Coordination and Agreement:** Introduction, Distributed Mutual Exclusion, Elections, Multicast Communication.

**UNIT-VI:**

**Transactions & Replications:** Introduction, System Model and Group Communication, Concurrency Control in Distributed Transactions, Distributed Dead Locks, Transaction Recovery; Replication-Introduction, Passive (Primary) Replication, Active Replication.

**TEXT BOOKS:**

1. Ajay D Kshemkalyani, Mukesh Sighal, “Distributed Computing, Principles, Algorithms and Systems”, Cambridge
2. George Coulouris, Jean Dollimore, Tim Kindberg, “Distributed Systems- Concepts and Design”, Fourth Edition, Pearson Publication

**IV Year – II SEMESTER**

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# Management Science

**Unit I**

**Introduction to Management**: Concept –nature and importance of Management – Functions of Management – Evaluation of Management thought- Theories of Motivation – Decision making process-Designing organization structure- Principles of organization - Types of organization structure

**Unit II**

**Operations Management**: Principles and Types of Management – Work study- Statistical Quality Control- Control charts (P-chart, R-chart, and Cchart) Simple problems- Material Management: Need for Inventory control- EOQ, ABC analysis (simple problems) and Types of ABC analysis (HML, SDE, VED, and FSN analysis)

**Unit III**

**Functional Management**: Concept of HRM, HRD and PMIR- Functions of HR Manager- Wage payment plans(Simple Problems) – Job Evaluation and Merit Rating - Marketing Management- Functions of Marketing – Marketing strategies based on product Life Cycle, Channels of distributions.

**Unit IV**

**Project Management**: (PERT/CPM): Development of Network – Difference between PERT and CPM Identifying Critical Path- Probability- Project Crashing (Simple Problems)

**Unit V**

**Strategic Management**: Vision, Mission, Goals, Strategy – Elements of Corporate Planning Process – Environmental Scanning – SWOT analysis- Steps in Strategy Formulation and Implementation, Generic Strategy alternatives

**Unit VI**

**Contemporary Management Practice**: Basic concepts of MIS, MRP, Justin-Time(JIT) system, Total Quality Management(TQM), Six sigma and Capability Maturity Model(CMM) Levies, Supply Chain Management , Enterprise Resource Planning (ERP), Business Process outsourcing (BPO), Business process Re-engineering and Bench Marking, Balanced Score Card.

**Text Books**

1. Dr. P. Vijaya Kumar & Dr. N. Appa Rao, '*Management Science'* Cengage, Delhi, 2012.
2. Dr. A. R. Aryasri, *Management Science'* TMH 2011.

**References**

1. Koontz & Weihrich: 'Essentials *of management'* TMH 2011
2. Seth & Rastogi: Global Management Systems, Cengage learning , Delhi, 2011
3. Robbins: Organizational Behaviour, Pearson publications, 2011
4. Kanishka Bedi: Production & Operations Management, Oxford

Publications, 2011
5. Philip Kotler & Armstrong: Principles of Marketing, Pearson publications
6. Biswajit Patnaik: Human Resource Management, PHI, 2011
7. Hitt and Vijaya Kumar: Starategic Management, Cengage learning

**Objective**: To familiarize with the process of management and to provide basic insights into select contemporary management practices.
**Codes/ Tables**: Normal Distribution Function Tables need to be permitted into the examination Halls

**IV Year – II SEMESTER**

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## Project

**ACADEMIC REGULATIONS**
**COURSE STRUCTURE**
**AND**
**DETAILED SYLLABUS**

**INFORMATION TECHNOLOGY**

**For**
INFORMATION TECHNOLOGY FOUR DEGREE COURSE
*(Applicable for batches admitted from 2013-2014)*

# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
## KAKINADA - 533 003, Andhra Pradesh, India

# COURSE STRUCTURE

**I Year – I SEMESTER**

| S. No. | Subject | T | P | Credits |
|---|---|---|---|---|
| 1 | English – I | 3+1 | -- | 3 |
| 2 | Mathematics - I | 3+1 | -- | 3 |
| 3 | Engineering Chemistry | 3+1 | -- | 3 |
| 4 | Engineering Mechanics | 3+1 | -- | 3 |
| 5 | Computer Programming | 3+1 | - | 3 |
| 6 | Environmental Studies | 3+1 | -- | 3 |
| 7 | Engineering Chemistry Laboratory | -- | 3 | 2 |
| 8 | English - Communication Skills Lab - I | -- | 3 | 2 |
| 9 | C Programming Lab | -- | 3 | 2 |
| **Total Credits** | | | | **24** |

**I Year – II SEMESTER**

| S. No. | Subject | T | P | Credits |
|---|---|---|---|---|
| 1 | English – II | 3+1 | -- | 3 |
| 2 | Mathematics – II (Mathematical Methods) | 3+1 | -- | 3 |
| 3 | Mathematics – III | 3+1 | -- | 3 |
| 4 | Engineering Physics | 3+1 | -- | 3 |
| 5 | Professional Ethics and Human Values | 3+1 | -- | 3 |
| 6 | Engineering Drawing | 3+1 | -- | 3 |
| 7 | English - Communication Skills Lab - II | -- | 3 | 2 |
| 8 | Engineering Physics Lab | -- | 3 | 2 |
| 9 | Engineering Physics – Virtual Labs - Assignments | -- | 2 | -- |
| 10 | Engg.Workshop & IT Workshop | -- | 3 | 2 |
| **Total Credits** | | | | **24** |

**II Year – I SEMESTER**

| S. No. | Subject | T | P | Credits |
|---|---|---|---|---|
| 1 | Managerial Economics and Financial Analysis | 4 | -- | 3 |
| 2 | Object Oriented Programming through C++ | 4 | -- | 3 |
| 3 | Mathematical Foundations of Computer Science | 4 | -- | 3 |
| 4 | Digital Logic Design | 4 | -- | 3 |
| 5 | Data Structures | 4 | -- | 3 |
| 6 | Object Oriented Programming Lab | -- | 3 | 2 |
| 7 | Data Structures Lab | -- | 3 | 2 |
| 8 | Digital Logic Design Lab | -- | 3 | 2 |
| 9 | Seminar | -- | -- | 1 |
| **Total Credits** | | | | **22** |

**II Year – II SEMESTER**

| S. No. | Subject | T | P | Credits |
|---|---|---|---|---|
| 1 | Probability and statistics | 4 | -- | 3 |
| 2 | Java Programming | 4 | -- | 3 |
| 3 | Advanced Data Structures | 4 | -- | 3 |
| 4 | Computer Organization | 4 | -- | 3 |
| 5 | Language Processors ( 50% FLAT + 50% CD) | 4 | -- | 3 |
| 6 | Advanced Data Structures Lab | -- | 3 | 2 |
| 7 | Java Programming Lab | -- | 3 | 2 |
| 8 | Free Open Source Software(FOSS) Lab | -- | 3 | 2 |
| **Total Credits** | | | | **21** |

**III Year – I SEMESTER**

| S. No. | Subject | T | P | Credits |
|---|---|---|---|---|
| 1 | Software Engineering | 4 | - | 3 |
| 2 | Data Communication | 4 | - | 3t |
| 3 | Advanced JAVA | 4 | - | 3 |
| 4 | Database Management Systems | 4 | - | 3 |
| 5 | Operating Systems | 4 | - | 3 |
| 6 | Advanced JAVA Lab | - | 3 | 2 |
| 7 | Operating System Lab | - | 3 | 2 |
| 8 | Database Management Systems Lab | | 3 | 2 |
| 9 | Linux Programming Lab | - | 3 | 2 |
| 10 | IPR and Patents- 1 | 2 | - | - |
| 11 | Seminar | -- | -- | 1 |
| **Total Credits** | | | | **24** |

**III Year – II SEMESTER**

| S. No. | Subject | T | P | Credits |
|---|---|---|---|---|
| 1 | Computer Networks | 4 | - | 3 |
| 2 | Data Ware housing and Mining | 4 | - | 3 |
| 3 | Design and Analysis of Algorithms | 4 | - | 3 |
| 4 | Software Testing | 4 | - | 3 |
| 5 | Web Technologies | 4 | - | 3 |
| 6 | Computer Networks Lab | - | 3 | 2 |
| 7 | Software Testing Lab | - | 3 | 2 |
| 8 | Web Technologies Lab | - | 3 | 2 |
| 10 | IPR and Patents-II | 2 | -- | -- |
| **Total Credits** | | | | **21** |

**IV Year – I SEMESTER**

| S. No. | Subject | T | P | Credits |
|---|---|---|---|---|
| 1 | Cryptography and Network Security | 4 | - | 3 |
| 2 | UML & Design Patterns | 4 | - | 3 |
| 3 | Mobile Computing | 4 | - | 3 |
| 4 | **Elective –I** | 4 | - | 3 |
| 5 | **Elective – II** | 4 | - | 3 |
| 6 | UML & Design Patterns Lab | - | 3 | 2 |
| 7 | Mobile Application Development Lab | - | 3 | 2 |
| 8 | Software Testing Lab | - | 3 | 2 |
| 9 | Hadoop & BigData Lab | - | 3 | 2 |
| **Total Credits** | | | | **23** |

**IV Year – II SEMESTER**

| S. No. | Subject | T | P | Credits |
|---|---|---|---|---|
| 1 | **Elective – III** | 4 | - | 3 |
| 2 | Distributed Systems | 4 | - | 3 |
| 3 | Mathematical Opimization ( LP, Scheduling, Simulation, QT, Markov analysis, NLP, PERT CPM Network related problems etc) | 4 | - | 3 |
| 4 | Management Science | 4 | - | 3 |
| 5 | Project | - | - | 9 |
| **Total Credits** | | | | **21** |

Elective – I:
i) Embedded and Real Time Systems
ii) Information Retrieval Systems
iii) Multimedia Computing

Elective – II:
i. Hadoop and Big Data
ii. Software Project Management
iii. Computer Vision
iv. Advanced Databases

Elective – III:
i) Human Computer Interaction
ii) Advanced Operating Systems
iii)Mobile Adhoc & Sensor Networks
iv)Pattern Recognition

# SYLLABUS

| I Year – I SEMESTER | T | P | C |
|---|---|---|---|
| | 3+1 | 0 | 3 |

## ENGLISH –I
## (Common to All Branches)

**DETAILED TEXT-I English Essentials : Recommended Topics :**

1. **IN LONDON: M.K.GANDHI**
   **OBJECTIVE:** To apprise the learner how Gandhi spent a period of three years in London as a student.
   **OUTCOME**: The learner will understand how Gandhi grew in introspection and maturity.
2. **THE KNOWLEDGE SOCIETY- APJ KALAM**
   **OBJECTIVE**: To make the learners rediscover India as a land of Knowledge.
   **OUTCOME:** The learners will achieve a higher quality of life, strength and sovereignty of a developed nation.
3. **THE SCIENTIFIC POINT OF VIEW- J.B.S. HALDANE**
   **OBJECTIVE**: This essay discusses how scientific point of view seeks to arrive at the truth without being biased by emotion.
   **OUTCOME:** This develops in the student the scientific attitude to solve many problems which we find difficult to tackle.
4. **PRINCIPLES OF GOOD WRITING:**
   **OBJECTIVE**: To inform the learners how to write clearly and logically.
   **OUTCOME**: The learner will be able to think clearly and logically and write clearly and logically.
5. **MAN'S PERIL**
   **OBJECTIVE**: To inform the learner that all men are in peril.
   **OUTCOME:** The learner will understand that all men can come together and avert the peril.
6. **THE DYING SUN—SIR JAMES JEANS**
   **OBJECTIVE**: This excerpt from the book "The Mysterious Universe" presents the mysterious nature of the Universe and the stars which present numerous problems to the scientific mind. Sir James Jeans uses a poetic approach to discuss the scientific phenomena.

**OUTCOME**: This provides the students to think about the scientific phenomena from a different angle and also exposes the readers to poetic expressions.

7. **LUCK—MARK TWAIN**

**OBJECTIVE:** This is a short story about a man's public image and his true nature. The theme of the story is that luck can be a factor of life, so that even if one is incompetent but lucky, one can still succeed.

**OUTCOME**: The story is humourous in that it contains a lot of irony. Thus this develops in the learner understand humourous texts and use of words for irony.

**Text Book** : 'English Essentials' by Ravindra Publications

**NON-DETAILED TEXT:**

**(From Modern Trailblazers of Orient Blackswan)**
**(Common single Text book for two semesters)**
**(Semester I (1 to 4 lessons)/ Semester II (5 to 8 lessons)**

1. **G.D.Naidu**
   **OBJECTIVE:** To inspire the learners by G.D.Naidu's example of inventions and contributions.
   **OUTCOME:** The learner will be in a position to emulate G.D.Naidu and take to practical applications.
2. **G.R.Gopinath**
   **OBJECTIVE:** To inspire the learners by his example of inventions.
   **OUTCOME:** Like G.R.Gopinath, the learners will be able to achieve much at a low cost and help the common man.
3. **Sudhamurthy**
   **OBJECTIVE:** To inspire the learners by the unique interests and contributions of Sudha Murthy.
   **OUTCOME:** The learner will take interest in multiple fields of knowledge and make life worthwhile through social service.
4. **Vijay Bhatkar**
   **OBJECTIVE:** To inspire the learner by his work and studies in different fields of engineering and science.
   **OUTCOME:** The learner will emulate him and produce memorable things.

**Text Book** : 'Trail Blazers' by Orient Black Swan Pvt. Ltd. Publishers

**I Year – I SEMESTER**

| T | P | C |
|---|---|---|
| 3+1 | 0 | 3 |

## MATHEMATICS – I (DIFFERENTIAL EQUATIONS)
## (Common to All Branches)

**UNIT I: Differential equations of first order and first degree:**

Linear-Bernoulli-Exact-Reducible to exact.

Applications : Newton's Law of cooling-Law of natural growth and decay-orthogonal trajectories.

Subject Category
ABET Learning Objectives a d e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

**UNIT II: Linear differential equations of higher order:**

Non-homogeneous equations of higher order with constant coefficients with RHS term of the type $e^{ax}$ , Sin ax, cos ax, polynomials in x, $e^{ax}$ V(x), xV(x).

Applications: LCR circuit, Simple Harmonic motion

Subject Category
ABET Learning Objectives a d e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

**UNIT III Laplace transforms:**

Laplace transforms of standard functions-ShiftingTheorems, Transforms of derivatives and integrals – Unit step function –Dirac's delta function- Inverse Laplace transforms– Convolution theorem (with out proof).

Application: Solutions of ordinary differential equations using Laplace transforms.

Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

**UNIT IV Partial differentiation:**

Introduction- Total derivative-Chain rule-Generalized Mean Value theorem for single variable (without proof)-Taylors and Mc Laurent's series for two variables– Functional dependence- Jacobian.

Applications: Maxima and Minima of functions of two variables with constraints and without constraints.

Subject Category
ABET Learning Objectives a c e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

**UNIT V First order Partial differential equations:**

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions –solutions of first order linear (Lagrange) equation and nonlinear (standard type) equations

Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

**UNIT VI Higher order Partial differential equations:**

Solutions of Linear Partial differential equations with constant coefficients- Method of separation of Variables

Applications: One- dimensional Wave, Heat equations - two-dimensional Laplace Equation.

Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 6
JNTUK External Evaluation B E

**Books:**


1. **B.S.GREWAL,** Higher Engineering Mathematics, 42nd Edition, Khanna Publishers
2. **ERWIN KREYSZIG,** Advanced Engineering Mathematics, 9th Edition, Wiley-India
3. **GREENBERG,** Advanced Engineering Mathematics, 2nd edition, Pearson edn
4. **DEAN G. DUFFY,** Advanced engineering mathematics with MATLAB, CRC Press
5. **PETER O'NEIL,** advanced Engineering Mathematics, Cengage Learning.


| Subject Category | ABET Learning Objectives | ABET Internal Assessments | JNTUK External Evaluation | Remarks |
|---|---|---|---|---|
| Theory<br>Design<br>Analysis<br>Algorithms<br>Drawing<br>Others | a) Apply knowledge of math, science, & engineering<br>b) Design & conduct experiments, analyze & interpret data<br>c) Design a system/process to meet desired needs within economic, social, political, ethical, health/safety, manufacturability, & sustainability constraints<br>d) Function on multidisciplinary teams<br>e) Identify, formulate, & solve engineering problems<br>f) Understand professional & ethical responsibilities<br>g) Communicate effectively<br>h) Understand impact of engineering solutions in global, economic, environmental, & societal context<br>i) Recognize need for & be able to engage in lifelong learning<br>j) Know contemporary issues<br>k) Use techniques, skills, modern tools for engineering practices | 1. Objective tests<br>2. Essay questions tests<br>3. Peer tutoring based<br>4. Simulation based<br>5. Design oriented<br>6. Problem based<br>7. Experiential (project based) based<br>8. Lab work or field work based<br>9. Presentation based<br>10. Case Studies based<br>11. Role-play based<br>12. Portfolio based | A. Questions should have:<br>B. Definitions, Principle of operation or philosophy of concept.<br>C. Mathematical treatment, derivations, analysis, synthesis, numerical problems with inference.<br>D. Design oriented problems<br>E. Trouble shooting type of questions<br>F. Applications related questions<br>G. Brain storming questions | |

**I Year – I SEMESTER**

| T | P | C |
|---|---|---|
| 3+1 | 0 | 3 |

# ENGINEERING CHEMISTRY

## UNIT-I: WATER TECHNOLOGY

Hard Water – Estimation of hardness by EDTA method – Potable water- Sterilization and Disinfection – Boiler feed water – Boiler troubles – Priming and foaming , scale formation, corrosion, caustic embrittlement, turbine deposits – Softening of water – Lime soda, Zeolite processes – Reverse osmosis – Electro Dialysis, Ion exchange process

**Objectives :** For prospective engineers knowledge about water used in industries (boilers etc.) and for drinking purposes is useful; hence chemistry of hard water, boiler troubles and modern methods of softening hard water is introduced.

## UNIT-II : ELECTROCHEMISTRY

Concept of Ionic conductance – Ionic Mobilities – Applications of Kohlrausch law – Conductometric titrations – Galvanic cells – Electrode potentials – Nernst equation – Electrochemical series – Potentiometric titrations – Concentration cells – Ion selective electrode –Glass electrodes – Fluoride electrode; Batteries and Fuel cells

Objectives : Knowledge of galvanic cells, electrode potentials, concentration cells is necessary for engineers to understand corrosion problem and its control ; also this knowledge helps in understanding modern bio-sensors, fuel cells and improve them.

## UNIT-III : CORROSION

Causes and effects of corrosion – theories of corrosion (dry, chemical and electrochemical corrosion) – Factors affecting corrosion – Corrosion control methods – Cathodic protection –Sacrificial Anodic, Impressed current methods – Surface coatings – Methods of application on metals (Hot dipping, Galvanizing, tinning , Cladding, Electroplating, Electroless plating) – Organic surface coatings – Paints – Their constituents and their functions.

**Objectives :** the problems associated with corrosion are well known and the engineers must be aware of these problems and also how to counter them

## UNIT-IV : HIGH POLYMERS

Types of Polymerization – Stereo regular Polymers – Physical and Mechanical properties of polymers – Plastics –

Thermoplastics and thermo setting plastics – Compounding and Fabrication of plastics – Preparation and properties of Polyethylene, PVC and Bakelite – Elastomers – Rubber and Vulcanization – Synthetic rubbers – Styrene butadiene rubber – Thiokol – applications.

**Objectives :** Plastics are materials used very widely as engineering materials. An understanding of properties particularly physical and mechanical properties of polymers / plastics / elastomers helps in selecting suitable materials for different purposes.

**UNIT-V : FUELS**

Coal – Proximate and ultimate analysis – Numerical problems based on analysis – Calorific vaule – HCV and LCV – Problems based on calorific values; petroleum – Refining – Cracking – Petrol – Diesel knocking; Gaseous fuels – Natural gas – LPG, CNG – Combustion – Problems on air requirements.

**Objectives :** A board understanding of the more important fuels employed on a large scale is necessary for all engineer to understand energy – related problems and solve them.

**UNIT-VI : CHEMISTRY OF ADVANCED MATERIALS**

Nanometerials (Preparation of carbon nanotubes and fullerenes – Properties of nanomaterials – Engineering applications) – Liquid crystals (Types – Application in LCD and Engineering Applications) – Fiber reinforced plastics – Biodegradable polymers – Conducting polymers – Solar cells (Solar heaters – Photo voltaic cells – Solar reflectors – Green house concepts – Green chemistry (Methods for green synthesis and Applications) – Cement – Hardening and setting – Deterioration of cement concrete

**Objectives :** With the knowledge available now, future engineers should know at least some of the advanced materials that are becoming available. Hence some of them are introduced here.

**TEXT BOOKSS**


1. Jain and Jain (Latest Edition), Engineering Chemistry, Dhanpat Rai Publishing company Ltd,
2. N.Y.S.Murthy, V.Anuradha, KRamaRao "A Text Book of Engineering Chemistry", Maruthi Publications
3. C.Parameswara Murthy, C.V.Agarwal, Adhra Naidu (2006) Text Book of Engineering Chemistry, B.S.Publications
4. B.Sivasankar (2010), Engineering Chemistry, McGraw-Hill companies.
5. Ch.Venkata Ramana Reddy and Ramadevi (2013) , Engineering Chemistry, Cengage Learning


**REFERENCES**


1. S.S. Dara (2013) Text Book of Engineering Chemistry, S.Chand Technical Series
2. K.Sesha Maheswaramma and Mridula Chugh (2013), Engineering Chemistry, Pearson Publications.
3. R.Gopalan, D.Venkatappayya, Sulochana Nagarajan (2011), Text Book of Engineering Chemistry, Vikas Publications.
4. B.Viswanathan and M.Aulice Scibioh (2009), Fuel Cells, Principals and applications, University Press.

**I Year – I SEMESTER**

| T | P | C |
|---|---|---|
| 3+1 | 0 | 3 |

## ENGINEERING MECHANICS

**Objectives:** The students completing this course are expected to understand the concepts of forces and its resolution in different planes ,resultant of force system, Forces acting on a body, their free body diagrams using graphical methods. They are required to understand the concepts of centre of gravity and moments of inertia and their application, Analysis of frames and trusses, different types of motion, friction and application of work - energy method.

**UNIT – I**

**Objectives: The students are to be exposed to the concepts of force and friction , direction and its application.**

Introduction to Engg. Mechanics – Basic Concepts.

**Systems of Forces :** Coplanar Concurrent Forces – Components in Space – Resultant – Moment of Force and its Application – Couples and Resultant of Force Systems. Introduction **,** limiting friction and impending motion, coulomb's laws of dry friction , coefficient of friction, cone of friction

**UNIT II**

**Objectives: The students are to be exposed to application of free body diagrams. Solution to problems using graphical methods and law of triangle of forces.**

**Equilibrium of Systems of Forces :** Free Body Diagrams, Equations of Equilibrium of Coplanar Systems, Spatial Systems for concurrent forces. Lamis Theorm, Graphical method for the equilibrium of coplanar forces, Converse of the law of Triangle of forces, converse of the law of polygon of forces condition of equilibrium.

**UNIT – III**

**Objectives : The students are to be exposed to concepts of centre of gravity.**

**Centroid :** Centroids of simple figures (from basic principles ) – Centroids of Composite Figures

**Centre of Gravity :** Centre of gravity of simple body (from basis principles), centre of gravity of composite bodies, pappus theorem.

**UNIT IV**

**Objective: The students are to be exposed to concepts of moment of inertia and polar moment of inertia including transfer methods and their applications.**

**Area moments of Inertia :** Definition – Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia. **Mass Moment of Inertia :** Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, mass moment of inertia of composite bodies.

**UNIT – V**

**Objectives : The students are to be exposed to motion in straight line and in curvilinear paths, its velocity and acceleration computation and methods of representing plane motion.**

**Kinematics :** Rectilinear and Curvelinear motions – Velocity and Acceleration – Motion of Rigid Body – Types and their Analysis in Planar Motion. **Kinetics :** Analysis as a Particle and Analysis as a Rigid Body in Translation – Central Force Motion – Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies.

**...**

**UNIT – VI**

**Objectives: The students are to be exposed to concepts of work, energy and particle motion**

**Work – Energy Method :** Equations for Translation, Work-Energy Applications to Particle Motion, Connected System-Fixed Axis Rotation and Plane Motion. Impulse momentum method.

**TEXT BOOKS:**


1. Engg. Mechanics - S.Timoshenko & D.H.Young., 4th Edn - , Mc Graw Hill publications.
2. Engineering Mechanics: Statics and Dynamics 3rd edition, Andrew Pytel and Jaan Kiusalaas; Cengage Learning publishers.

**REFERENCES:**


1. Engineering Mechanics statics and dynamics – R.C.Hibbeler, 11th Edn – Pearson Publ.
2. Engineering Mechanics , statics – J.L.Meriam, 6th Edn – Wiley India Pvt Ltd.
3. Engineering Mechanics , dynamics – J.L.Meriam, 6th Edn – Wiley India Pvt Ltd.
4. Engineering Mechanics , statics and dynamics – I.H.Shames, – Pearson Publ.
5. Mechanics For Engineers , statics - F.P.Beer & E.R.Johnston – 5th Edn Mc Graw Hill Publ.
6. Mechanics For Engineers, dynamics - F.P.Beer & E.R.Johnston – 5th Edn Mc Graw Hill Publ.
7. Theory & Problems of engineering mechanics, statics & dynamics – E.W.Nelson, C.L.Best & W.G. McLean, 5th Edn – Schaum's outline series - Mc Graw Hill Publ.
8. Engineering Mechanics , Fedinand . L. Singer , Harper – Collins.
9. Engineering Mechanics statics and dynamics , A Nelson, Mc Graw Hill publications
10. Engineering Mechanics, Tayal. Umesh Publ.

**I Year – I SEMESTER**

| T | P | C |
|---|---|---|
| 3+1 | 0 | 3 |

## COMPUTER PROGRAMMING

**Objectives:** Formulating algorithmic solutions to problems and implementing algorithms in C

**UNIT I:**

**Unit objective: Notion of Operation of a CPU, Notion of an algorithm and computational procedure, editing and executing programs in Linux**

**Introduction:** Computer systems, Hardware and Software Concepts**,**

**Problem Solving:** Algorithm / Pseudo code, flowchart, program development steps, computer languages: machine, symbolic and highlevel languages, Creating and Running Programs: Writing, Editing(vi/emacs editor), Compiling( gcc), Linking and Executing in under Linux.

**BASICS OF C:** Structure of a C program, identifiers, basic data types and sizes. Constants, Variables, Arthmetic , relational and logical operators, increment and decrement operators, conditional operator, assignment operator, expressions, type conversions, Conditional Expressions, precedence and order of evaluation, Sample Programs.

**UNIT II:**

**Unit objective: understanding branching, iteration and data representation using arrays**

**SELECTION – MAKING DECISION: TWO WAY SELECTION**: if-else, null else, nested if, examples, Multi-way selection: switch, else-if, examples**.**

**ITERATIVE:** loops- while, do-while and for statements , break, continue, initialization and updating, event and counter controlled loops, Looping applications: Summation, powers, smallest and largest.

**ARRAYS**: Arrays- concepts, declaration, definition, accessing elements, storing elements, Strings and String Manipulations, 1-D arrays, 2-D arrays and character arrays, string manipulations, Multidimensional arrays, array applications: Matrix operations, checking the symmetricity of a Matrix**.**

**STRINGS: concepts, c strings.**

**UNIT III:**

**Objective: Modular programming and recursive solution formulation**

**FUNCTIONS- MODULAR PROGRAMMING**: functions, basics, parameter passing, storage classes extern, auto, register, static, scope rules, block structure, user defined functions, standard library functions, recursive functions, Recursive solutions for fibonacci series, towers of Hanoi, header files, C Preprocessor, example c programs, Passing 1-D arrays, 2-D arrays to functions.

**UNIT IV:**

**Objective: Understanding pointers and dynamic memory allocation**

**POINTERS:** pointers- concepts, initialization of pointer variables, pointers and function arguments, passing by address- dangling memory, address arithmetic, character pointers and functions, pointers to pointers, pointers and multi-dimensional arrays, dynamic memory management functions, command line arguments

**UNIT V:**

**Objective: Understanding miscellaneous aspects of C**

**ENUMERATED, STRUCTURE AND UNION TYPES:** Derived types- structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit-fields, program applications

**BIT-WISE OPERATORS: logical, shift, rotation, masks.**

**UNIT VI:**

**Objective: Comprehension of file operations**

**FILE HANDLING**: Input and output- concept of a file, text files and binary files, Formatted I/O, File I/O operations, example programs

**Text Books:**

1. Problem Solving and Program Design in C, Hanly, Koffman, 7th ed, PERSON
2. Programming in C, Second Edition Pradip Dey and Manas Ghosh, OXFORD Higher Education
3. Programming in C, A practical approach Ajay Mittal PEARSON
4. The C programming Language by Dennis Richie and Brian Kernighan
5. Programming in C, B. L. Juneja, Anith Seth, Cengage Learning.

**Reference Books and web links:**

1. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE
2. Programming with C, Bichkar, Universities Press
3. Programming in C, Reema Thareja, OXFORD
4. C by Example, Noel Kalicharan, Cambridge

**I Year – I SEMESTER**

| T | P | C |
|---|---|---|
| 3+1 | 0 | 3 |

# ENVIRONMENTAL STUDIES

**Course Learning Objectives:**

The objectives of the course is to impart

1. Overall understanding of the natural resources
2. Basic understanding of the ecosystem and its diversity
3. Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities
4. An understanding of the environmental impact of developmental activities
5. Awareness on the social issues, environmental legislation and global treaties

**Course Outcomes:**

The student should have knowledge on

1. The natural resources and their importance for the sustenance of the life and recognise the need to conserve the natural resources
2. The concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web
3. The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
4. Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices
5. Social issues both rural and urban environment and the possible means to combat the challenges
6. The environmental legislations of India and the first global initiatives towards sustainable development.
7. About environmental assessment and the stages involved in EIA and the environmental audit

**Syllabus:**

**UNIT - I**

**Multidisciplinary nature of Environmental Studies:** Definition, Scope and Importance –Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming and climate change, acid rains, ozone layer depletion, population growth and explosion, effects. Role of information Technology in Environment and human health.

**Ecosystems:** Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and

decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

**UNIT - II**

**Natural Resources:** Natural resources and associated problems

Forest resources – Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people

Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources

Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity

Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources.

Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

**UNIT - III**

**Biodiversity and its conservation:** Definition: genetic, species and ecosystem diversity- classification - Value of biodiversity: consumptive use, productive use, social- Biodiversity at national and local levels. India as a mega-diversity nation - Hot-sports of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts. - Endangered and endemic species of India – Conservation of biodiversity: conservation of biodiversity.

**UNIT - IV**

**Environmental Pollution:** Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies.

**Solid Waste Management:** Sources, classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products.

**UNIT - V**

**Social Issues and the Environment:** Urban problems related to energy -Water conservation, rain water harvesting- Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions. Environmental Protection Act -Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act-Issues involved in enforcement of environmental legislation. -Public awareness.

**UNIT - VI**

**Environmental Management**: Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. Ecotourism

The student should submit a report individually on any issues related to Environmental Studies course and make a power point presentation.

**Text Books:**

1. Environmental Studies by R. Rajagopalan, 2nd Edition, 2011, Oxford University Press.
2. A Textbook of Environmental Studies by Shaashi Chawla, TMH, New Delhi
3. Environmental Studies by P.N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai

**Reference:**


1. Text Book of Environmental Studies by Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.
2. Environmental Studies by K.V.S.G. Murali Krishna, VGS Publishers, Vijayawada
3. Environmental Studies by Benny Joseph, Tata McGraw Hill Co, New Delhi
4. Environmental Studies by Piyush Malaviya, Pratibha Singh, Anoop singh: Acme Learning, New Delhi


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**I Year – I SEMESTER**

| T | P | C |
|---|---|---|
| 0 | 3 | 2 |

## ENGINEERING CHEMISTRY LABORATORY

### List of Experiments

1. Introduction to chemistry laboratory – Molarity, Normality, Primary, Secondary standard solutions, Volumetric titrations, Quantitative analysis, Quantitative analysis etc.,
2. Trial experiment – Estimation of HCI using standard $Na_2co_3$ solutions
3. Estimation of $KMnO_4$ using standard Oxalic acid solution.
4. Estimation of Ferric iron using standard $K_2Cr_2O_7$ solution.
5. Estimation of Copper using standard $K_2Cr_2O_7$ solution.
6. Estimation of Total Hardness water using standard EDTA solution.
7. Estimation of Copper using standard EDTA solution.
8. Estimation of Copper using Colorimeter
9. Estimation of pH of the given sample solution using pH meter.
10. Conductometric Titrations between strong acid and strong base
11. Conductometric Titrations between strong acid and Weak base
12. Potentiometric Titrations between strong acid and strong base
13. Potentiometric Titrations between strong acid and Weak base

14. Estimatinog of Zinc using standard potassium ferrocyanide solution
15. Estimation of Vitamin – C

**TEXT BOOKSS**


1. Dr.Jyotsna Cherukuis(2012)Laboratory Manual of Engineering Chemistry-II, VGS Techno Series
2. Chemistry Practical Manual, Lorven Publications
3. K. Mukkanti (2009) Practical Engineering Chemistry, B.S.Publication

**I Year – I SEMESTER** **T P C**
**0 3 2**

## ENGLISH – COMMUNICATION SKILLS LAB – I

**Suggested Lab Manuals:**

**OBJECTIVE:** To impart to the learner the skills of grammar as well as communication through listening, speaking, reading, and writing including soft, that is life skills.

**BASIC COMMUNICATION SKILLS**

| | |
|---|---|
| UNIT 1 | A. Greeting and Introductions |
| | B. Pure Vowels |
| UNIT 2 | A. Asking for information and Requests |
| | B. Diphthongs |
| UNIT 3 | A. Invitations |
| | B. Consonants |
| UNIT 4 | A. Commands and Instructions |
| | B. Accent and Rhythm |
| UNIT 5 | A. Suggestions and Opinions |
| | B. Intonation |

**Text Book:**

'Strengthen your Communication Skills' Part-A by Maruthi Publications

**Reference Books:**

1. INFOTECH English (Maruthi Publications)
2. Personality Development and Soft Skills ( Oxford University Press, New Delhi)

**I Year – I SEMESTER** | **T** | **P** | **C**
**0** | **3** | **2**

# C PROGRAMMING LAB

**Exercise l**

a) Write a C Program to calculate the area of triangle using the formula

area = ( s (s-a) (s-b)(s-c))$^{1/2}$ where s= (a+b+c)/2

b) Write a C program to find the largest of three numbers using ternary operator.

c) Write a C Program to swap two numbers without using a temporary variable.

**Exercise 2**

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 find the roots of a quadratic equation.

c) Write a C program, which takes two integer operands and one operator form the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)

**Exercise 3**

**a)** Write a C program to find the sum of individual digits of a positive integer and find the reverse of the given number.

**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

**c)** Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

**Exercise 4**

a) Write a C Program to print the multiplication table of a given number n up to a given value, where n is entered by the user.

b) Write a C Program to enter a decimal number, and calculate and display the binary equivalent of that number.

c) Write a C Program to check whether the given number is Armstrong number or not.

**Exercise 5**

a) Write a C program to interchange the largest and smallest numbers in the array.

b) Write a C program to implement a liner search.

c) Write a C program to implement binary search

**Exercise 6**

**a)** Write a C program to implement sorting of an array of elements .

b) Write a C program to input two m x n matrices, check the compatibility and perform addition and multiplication of them

**Exercise 7**

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

i. To insert a sub-string in to given main string from given position.

ii. To delete n Characters from a given position in given string.

iii. To replace a character of string either fr beginning or ending or at a specified location

**Exercise 8**

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

i) Reading a complex number ii) Writing a complex number

iii) Addition of two complex numbers iv) Multiplication of two complex numbers

**Exercise 9**

Write C Programs for the following string operations without using the built in functions

- to concatenate two strings
- to append a string to another string
- to compare two strings

**Exercise 10**

Write C Programs for the following string operations without using the built in functions

- to find t he length of a string
- to find whether a given string is palindrome or not

**Exercise 11**

**a)** Write a C functions to find both the largest and smallest number of an array of integers.

b) Write C programs illustrating call by value and call by reference cncepts.

**Exercise 12**

Write C programs that use both recursive and non-recursive functions for the following

i) To find the factorial of a given integer.

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

iii) To find Fibonacci sequence

**Exercise 13**

a) Write C Program to reverse a string using pointers

b) Write a C Program to compare two arrays using pointers

**Exercise 14**

a) Write a C program consisting of Pointer based function to exchange value of two integers using passing by address.

b) Write a C program to swap two numbers using pointers

**Exercise 15**

Examples which explores the use of structures, union and other user defined variables

**Exercise 16**

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

**b)** Write a C program to count the number of characters and number of lines in a file.

c) Write a C Program to merge two files into a third file. The names of the files must be entered using command line arguments.

**I Year – II SEMESTER**

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## ENGLISH –II
## (Common to All Branches)

**DETAILED TEXT-II : Sure Outcomes**: English for Engineers and Technologists **Recommended Topics :**

1. **TECHNOLOGY WITH A HUMAN FACE**
   **OBJECTIVE:** To make the learner understand how modern life has been shaped by technology.
   **OUTCOME**: The proposed technology is people's technology. It serves the human person instead of making him the servant of machines.
2. **CLIMATE CHANGE AND HUMAN STRATEGY**
   **OBJECTIVE**: To make the learner understand how the unequal heating of earth's surface by the Sun, an atmospheric circulation pattern is developed and maintained.
   **OUTCOME**: The learner's understand that climate must be preserved.
3. **EMERGING TECHNOLOGIES**
   **OBJECTIVE**: To introduce the technologies of the 20th century and 21st centuries to the learners.
   **OUTCOME**: The learner will adopt the applications of modern technologies such as nanotechnology.
4. **WATER- THE ELIXIR OF LIFE**
   **OBJECTIVE**: To inform the learner of the various advantages and characteristics of water.
   **OUTCOME**: The learners will understand that water is the elixir of life.
5. **THE SECRET OF WORK**
   **OBJECTIVE:** In this lesson, Swami Vivekananda highlights the importance of work for any development.
   **OUTCOME**: The students will learn to work hard with devotion and dedication.
6. **WORK BRINGS SOLACE**
   **OBJECTIVE**: In this lesson Abdul Kalam highlights the advantage of work.
   **OUTCOME**: The students will understand the advantages of work. They will overcome their personal problems and address themselves to national and other problems.

**Text Book** : 'Sure Outcomes' by Orient Black Swan Pvt. Ltd. Publishers

**NON-DETAILED TEXT:**

**(From Modern Trailblazers of Orient Blackswan)**
**(Common single Text book for two semesters)**
**(Semester I (1 to 4 lessons)/ Semester II (5 to 8 lessons)**

5. **J.C. Bose**
   **OBJECTIVE:** To apprise of J.C.Bose's original contributions.
   **OUTCOME:** The learner will be inspired by Bose's achievements so that he may start his own original work.
6. **Homi Jehangir Bhaba**
   **OBJECTIVE:** To show Bhabha as the originator of nuclear experiments in India.
   **OUTCOME:** The learner will be inspired by Bhabha's achievements so as to make his own experiments.
7. **Vikram Sarabhai**
   **OBJECTIVE:** To inform the learner of the pioneering experiments conducted by Sarabhai in nuclear energy and relevance of space programmes.
   **OUTCOME:** The learner will realize that development is impossible without scientific research.
8. **A Shadow- R.K.Narayan**
   **OBJECTIVE:** To expose the reader to the pleasure of the humorous story
   **OUTCOME:** The learner will be in a position to appreciate the art of writing a short story and try his hand at it.

**Text Book :** 'Trail Blazers' by Orient Black Swan Pvt. Ltd. Publishers

**I Year – II SEMESTER**

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# MATHEMATICS – II
# (MATHEMATICAL METHODS)

(Common to All Branches)

**UNIT I Solution of Algebraic and Transcendental Equations:**

Introduction- Bisection Method – Method of False Position – Iteration Method – Newton-Raphson Method (One variable and Simultaneous Equestions)

Subject Category
ABET Learning Objectives a e k
ABET internal assessments 1 2 4 6
JNTUK External Evaluation A B E

**UNIT II Interpolation:**

Introduction- Errors in Polynomial Interpolation – Finite differences- Forward Differences- Backward differences –Central differences – Symbolic relations and separation of symbols-Differences of a polynomial-Newton's formulae for interpolation – Interpolation with unevenly spaced points - Lagrange's Interpolation formula

Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 4 6
JNTUK External Evaluation A B E

**UNIT III Numerical solution of Ordinary Differential equations:**

Solution by Taylor's series-Picard's Method of successive Approximations-Euler's Method-Runge-Kutta Methods

Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 4 6
JNTUK External Evaluation A B E

**UNIT IV Fourier Series:**

Introduction- Determination of Fourier coefficients – even and odd functions –change of interval– Half-range sine and cosine series

application: Amplitude, spectrum of a periodic function

Subject Category
ABET Learning Objectives a e d
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

**UNIT V Fourier Transforms:**

Fourier integral theorem (only statement) – Fourier sine and cosine integrals - sine and cosine transforms – properties – inverse transforms – Finite Fourier transforms

Subject Category
ABET Learning Objectives a d e k
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

**UNIT VI Z-transform:**

Introduction– properties – Damping rule – Shifting rule – Initial and final value theorems -Inverse z transform- - Convolution theorem – Solution of difference equation by Z - transforms.

Subject Category
ABET Learning Objectives a b e k
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

**BOOKS:**


1. **B.S. GREWAL,** Higher Engineering Mathematics, 42nd Edition, Khanna Publishers
2. **DEAN G. DUFFY,** Advanced Engineering Mathematics with MATLAB, CRC Press
3. **V.RAVINDRANATH and P. VIJAYALAXMI,** Mathematical Methods, Himalaya Publishing House
4. **ERWYN KREYSZIG,** Advanced Engineering Mathematics, 9th Edition, Wiley-India


| Subject Category | ABET Learning Objectives | ABET Internal Assessments | JNTUK External Evaluation | Remarks |
|---|---|---|---|---|
| Theory<br>Design<br>Analysis<br>Algorithms<br>Drawing<br>Others | a) Apply knowledge of math, science, & engineering<br>b) Design & conduct experiments, analyze & interpret data<br>c) Design a system/process to meet desired needs within economic, social, political, ethical, health/safety, manufacturability, & sustainability constraints<br>d) Function on multidisciplinary teams<br>e) Identify, formulate, & solve engineering problems<br>f) Understand professional & ethical responsibilities<br>g) Communicate effectively<br>h) Understand impact of engineering solutions in global, economic, environmental, & societal context<br>i) Recognize need for & be able to engage in lifelong learning<br>j) Know contemporary issues<br>k) Use techniques, skills, modern tools for engineering practices | 1. Objective tests<br>2. Essay questions tests<br>3. Peer tutoring based<br>4. Simulation based<br>5. Design oriented<br>6. Problem based<br>7. Experiential (project based) based<br>8. Lab work or field work based<br>9. Presentation based<br>10. Case Studies based<br>11. Role-play based<br>12. Portfolio based | A. Questions should have:<br>B. Definitions, Principle of operation or philosophy of concept.<br>C. Mathematical treatment, derivations, analysis, synthesis, numerical problems with inference.<br>D. Design oriented problems<br>E. Trouble shooting type of questions<br>F. Applications related questions<br>G. Brain storming questions | |

**I Year – II SEMESTER**

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# MATHEMATICS – III
## (LINEAR ALGEBRA & VECTOR CALCULUS)
## (Common to All Branches)

**UNIT I Linear systems of equations:**

Rank-Echelon form, Normal form – Solution of Linear Systems – Direct Methods- Gauss Elimination - Gauss Jordon and Gauss Seidal Methods.

Application: Finding the current in a electrical circuit.

Subject Category
ABET Learning Objectives a e k
ABET internal assessments 1 2 6 4
JNTUK External Evaluation A B E

**UNIT II Eigen values - Eigen vectors and Quadratic forms:**

Eigen values - Eigen vectors– Properties – Cayley-Hamilton Theorem - Inverse and powers of a matrix by using Cayley-Hamilton theorem- Quadratic forms- Reduction of quadratic form to canonical form – Rank - Positive, negative definite - semi definite - index – signature.

Application: Free vibration of a two-mass system.

Subject Category
ABET Learning Objectives a d e k
ABET internal assessments 1 2 4 6
JNTUK External Evaluation A B E

**UNIT III Multiple integrals:**

Review concepts of Curve tracing ( Cartesian - Polar and Parametric curves)-

Applications of Integration to Lengths, Volumes and Surface areas of revolution in Cartesian and Polar Coordinates.

Multiple integrals - double and triple integrals – change of variables – Change of order of Integration

Application: Moments of inertia

Subject Category
ABET Learning Objectives a e d
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

**UNIT IV Special functions:**

Beta and Gamma functions- Properties - Relation between Beta and Gamma functions- Evaluation of improper integrals

Application: Evaluation of integrals

Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

**UNIT V Vector Differentiation:**

Gradient- Divergence- Curl - Laplacian and second order operators -Vector identities

Application: Equation of continuity, potential surfaces

Subject Category

ABET Learning Objectives a e

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

**UNIT VI Vector Integration:**

Line integral – work done – Potential function – area- surface and volume integrals Vector integral theorems: Greens, Stokes and Gauss Divergence Theorems (Without proof) and related problems.

application: work done, Force

Subject Category

ABET Learning Objectives a e

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

**BOOKS:**


1. **GREENBERG,** Advanced Engineering Mathematics, 9th Edition, Wiley-India
2. **B.V. RAMANA,** Higher Engineering Mathematics, Tata McGrawhill
3. **ERWIN KREYSZIG,** Advanced Engineering Mathematics, 9th Edition, Wiley-India
4. **PETER O'NEIL,** Advanced Engineering Mathematics, Cengage Learning
5. **D.W. JORDAN AND T. SMITH,** Mathematical Techniques, Oxford University Press


| Subject Category | ABET Learning Objectives | ABET Internal Assessments | JNTUK External Evaluation | Remarks |
|---|---|---|---|---|
| Theory<br>Design<br>Analysis<br>Algorithms<br>Drawing<br>Others | a) Apply knowledge of math, science, & engineering<br>b) Design & conduct experiments, analyze & interpret data<br>c) Design a system/process to meet desired needs within economic, social, political, ethical, health/safety, manufacturability, & sustainability constraints<br>d) Function on multidisciplinary teams<br>e) Identify, formulate, & solve engineering problems<br>f) Understand professional & ethical responsibilities<br>g) Communicate effectively<br>h) Understand impact of engineering solutions in global, economic, environmental, & societal context<br>i) Recognize need for & be able to engage in lifelong learning<br>j) Know contemporary issues<br>k) Use techniques, skills, modern tools for engineering practices | 1. Objective tests<br>2. Essay questions tests<br>3. Peer tutoring based<br>4. Simulation based<br>5. Design oriented<br>6. Problem based<br>7. Experiential (project based) based<br>8. Lab work or field work based<br>9. Presentation based<br>10. Case Studies based<br>11. Role-play based<br>12. Portfolio based | A. Questions should have:<br>B. Definitions, Principle of operation or philosophy of concept.<br>C. Mathematical treatment, derivations, analysis, synthesis, numerical problems with inference.<br>D. Design oriented problems<br>E. Trouble shooting type of questions<br>F. Applications related questions<br>G. Brain storming questions | |

**I Year – II SEMESTER**

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# ENGINEERING PHYSICS

## UNIT-I
## PHYSICAL OPTICS FOR INSTRUMENTS

"Objective Designing an instrument and enhancing the resolution for its operation would be effective as achieved through study of applicational aspects of physical Optics"

**INTERFACE :** Introduction – Interference in thin films by reflection – Newton's rings.

**DIFFRACTION :** Introduction – Fraunhofer diffraction - Fraunhofer diffraction at double slit (qualitative) – Diffraction grating – Grating spectrum – Resolving power of a grating – Rayleigh's criterion for resolving power.

**POLARIZATION :** Introduction – Types of Polarization – Double refraction – Quarter wave plate ad Half Wave plate.

## UNIT-II
## COHERENT OPTICS – COMMUNICATIONS AND STRUCTURE OF MATERIALS

Objectives while lasers are trusted Non-linear coherent sources established for the fitness of instrumentation, establishing a structure property relationship for materials requires allotment of an equivalent footing in convening the physics knowledge base.

**LASERS:** Introduction – coherent sources – Characteristics of lasers – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion – Three and Four level pumping schemes – Ruby laser – Helium Neon laser.

**FIBER OPTICS :** Introduction – Principle of Optical Fiber – Acceptance angle and acceptance cone – Numerical aperture.

**CRYSTALLOGRAPHY :** Introduction – Space lattice – Basis – Unit Cell – Lattice parameters – Bravais lattices – Crystal systems – Structures and packing fractions of SC,BCC and FCC

**X-RAY DIFFRACTION TECHNIQUES** : Directions and planes in crystals – Miller indices – Separation between successive [h k l] planes – Bragg's law.

## UNIT-III
## MAGNETIC, ELECTRIC FIELD RESPONSE OF MATERIALS & SUPERCONDUCTIVITY

"Objective many of the Electrical or Electronic gadgets are designed basing on the response of naturally abundant and artificially made materials, while their response to E- or H- fields controls their performance.

**MAGNETIC PROPERTIES** : Magnetic permeability – Magnetization – Organ or magnetic moment – Classification of Magnetic materials – Dir, para, Ferro, anti ferro and ferri-magnetism – Hysteresis curve

**DIELECTRIC PROPERTIES** : Introduction – Dielectric constant – Electronic, ionic and orientational polarization – internal fields – Clausius – Mossotti equation – Dielectric loss, Breakdown and Strength.
**SUPERCONDUCTIVITY** : General properties – Meissner effect – Type I and Type II superconductors – BCS Theory Flux quantization London's equations – Penetration depth – DC and AC Josephson effects – SQUIDS.

**UNIT – IV**
**ACOUSTICS AND EM – FIELDS:**
**Objective:** The utility and nuances of ever pervading SHM and its consequences would be the first hand-on to as it clearly conveyed through the detailed studies of Acoustics of Buildings, while vectorial concepts of EM fields paves the student to gear – up for a deeper understanding.
**ACOUSTICS:_** Sound absorption, absorption coefficient and its measurements, Reverberations time – Sabine's formula, Eyring's formula.
**ELECTRO-MAGNETIC FIELDS**: Gauss and stokes theorems (qualitative) – Fundamental laws of electromagnetism – Maxwell's Electromagnetic Equations (Calculus approach).

**UNIT – V**
**QUANTUM MECHANICS FOR ELECTRONIC TRANSPORT**
Objective: The discrepancy between classical estimates and laboratory observations of physical properties exhibited by materials would be lifted out through the understanding quantum picture of sub-atomic world dominated by electron and its presence.
**QUANTUM MECHANICS**: Introduction to matter waves – Schrodinger Time Independent and Time Dependent wave equations – Particle in a box.
**FREE ELECTRON THEORY**: Classical free electron theory – electrical conductivity – Mean free path – Relaxation time and drifty velocity – Quantum free electron theory – Fermi – Dirac (analytical) and its dependence on temperature – Fermi energy – density of states – derivations for current density.
**BAND THEORY OF SOLIDS**: Bloch theorem (qualitative) – Kronig – Penney model – Origin of energy band formation in solids – Classification of materials into conductors, semi – conductors & insulators – Concepts of effective mass of electron - concept of hole.

**UNIT – VI**
**SEMICONDUCTOR PHYSICS:**
Objective: In the wake of ever increasing demand for the space and power the watch word "small is beautiful", understanding the physics of electronic transport as underlying mechanism for appliances would provide a knowledge base.
Introduction – Intrinsic semiconductor and carrier concentration – Equation for conductivity – Extrinsic semiconductor and carrier concentration – Drift and diffusion – Einstein's equation – Hall

Effect – direct & indirect band gap semiconductors – Electronic transport Mechanism for LEDs, Photo conductors and solar cells.

**TEXT BOOKS**

1. Solid state Physics by A.J. Dekker (Mc Millan India Ltd)
2. A text book of Engineering Physics by M.N. Avadhanulu & P.G. Kshirasagar (S. Chand publications)
3. Engineering Physics b;y M.R. Srinivasan (New Age international publishers )

**REFERENCE BOOKS**

1. 'Introduction to solid state physics' by Charles Kittle (Willey India Pvt.Ltd)
2. 'Applied Physics' by T. Bhimasenkaram (BSP BH Publications )
3. 'Applied Physics' by M.Arumugam (Anuradha Agencies)
4. 'Engineering Physics' by Palanisamy ( Scitech Publishers )
5. 'Engineering Physics' by D.K.Bhattacharya ( Oxford University press)
6. 'Engineering Physics' by Mani Naidu S (Pearson Publications)
7. 'Engineering Physics' by Sanjay D Jain and Girish G Sahasrabudhe (University Press)
8. 'Engineering Physics' by B.K.Pandey & S. Chaturvedi ( Cengage Learning )

**I Year – II SEMESTER**

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# Professional Ethics and Human Values

**UNIT I : Human Values**:

Morals, Values and Ethics – Integrity – Work Ethics – Service Learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty –Courage – Value time – Co-operation – Commitment – Empathy – Self-confidence – Spirituality- Character.

**UNIT II : Engineering Ethics:**

The History of Ethics-Purposes for Engineering Ethics-Engineering Ethics-Consensus and Controversy –Professional and Professionalism –Professional Roles to be played by an Engineer –Self Interest, Customs and Religion-Uses of Ethical Theories-Professional Ethics-Types of Inquiry – Engineering and Ethics-Kohlberg's Theory – Gilligan's Argument –Heinz's Dilemma.

**UNIT III : Engineering as Social Experimentation:**

Comparison with Standard Experiments – Knowledge gained – Conscientiousness – Relevant Information – Learning from the Past – Engineers as Managers, Consultants, and Leaders – Accountability – Role of Codes – Codes and Experimental Nature of Engineering.

**UNIT IV : Engineers' Responsibility for Safety and Risk:**

Safety and Risk, Concept of Safety – Types of Risks – Voluntary v/s Involuntary Risk- Short term v/s Long term Consequences- Expected Probability- Reversible Effects-Threshold Levels for Risk- Delayed v/s Immediate Risk-Safety and the Engineer – Designing for Safety – Risk-Benefit Analysis-Accidents.

**UNIT V : Engineers' Responsibilities and Rights:**

Collegiality-Techniques for Achieving Collegiality –Two Senses of Loyalty-obligations of Loyalty-misguided Loyalty – professionalism and Loyalty- Professional Rights –Professional Responsibilities – confidential and proprietary information-Conflict of Interest-solving conflict problems – Self-interest, Customs and Religion- Ethical egoism-Collective bargaining-Confidentiality-Acceptance of Bribes/Gifts-when is a Gift and a Bribe-examples of Gifts v/s Bribes-problem solving-interests in other companies-Occupational Crimes-industrial espionage-price fixing-

endangering lives- Whistle Blowing-types of whistle blowing-when should it be attempted-preventing whistle blowing.

**UNIT VI : Global Issues:**

Globalization- Cross-culture Issues-Environmental Ethics-Computer Ethics-computers as the instrument of Unethical behaviour-computers as the object of Unethical Acts-autonomous computers-computer codes of Ethics-Weapons Development-Ethics and Research-Analysing Ethical Problems in Research-Intellectual Property Rights.

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**Text Books:**


1. "Engineering Ethics and Human Values" by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd-2009
2. "Professional Ethics and Morals" by Prof.A.R.Aryasri, Dharanikota Suyodhana-Maruthi Publications
3. "Professional Ethics and Human Values" by A.Alavudeen, R.Kalil Rahman and M.Jayakumaran-Laxmi Publications
4. "Professional Ethics and Human Values" by Prof.D.R.Kiran-
5. "Indian Culture, Values and Professional Ethics" by PSR Murthy-BS Publication
6. "Ethics in Engineering" by Mike W. Martin and Roland Schinzinger – Tata McGraw-Hill – 2003.
7. "Engineering Ethics" by Harris, Pritchard and Rabins, CENGAGE Learning, India Edition, 2009.

**I Year – II SEMESTER**

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## ENGINEERING DRAWING

**Objective**: Engineering drawing being the principle method of communication for engineers, the objective to introduce the students, the techniques of constructing the various types of polygons, curves and scales. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc.

**UNIT I**

Objective: The objective is to introduce the use and the application of drawing instruments and to make the students construct the polygons, curves and various types of scales. The student will be able to understand the need to enlarge or reduce the size of objects in representing them.

Polygons, Construction of regular polygons using given length of a side; Ellipse, arcs of circles and Oblong methods; Scales – Vernier and Diagonal scales.

**UNIT II**

Objective: The objective is to introduce orthographic projections and to project the points and lines parallel to one plane and inclined to other.

Introduction to orthographic projections; projections of points; projections of straight lines parallel to both the planes; projections of straight lines – parallel to one plane and inclined to the other plane.

**UNIT III**

Objective: The objective is to make the students draw the projections of the lines inclined to both the planes.

Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclinations and traces.

**UNIT IV**

Objective: The objective is to make the students draw the projections of the plane inclined to both the planes.

Projections of planes: regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.

**UNIT V**

Objective: The objective is to make the students draw the projections of the various types of solids in different positions inclined to one of the planes.
Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.

**UNIT VI**

Objective: The objective is to represent the object in 3D view through isometric views. The student will be able to represent and convert the isometric view to orthographic view and vice versa.
Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

**TEXT BOOKS:**


1. Engineering Drawing by N.D. Butt, Chariot Publications
2. Engineering Drawing by K.L.Narayana & P. Kannaiah, Scitech Publishers.
3. Engineering Graphics by PI Varghese, McGrawHill Publishers


**REFERENCE BOOKS:**


1. Engineering Graphics for Degree by K.C. John, PHI Publishers
2. Engineering Drawing by Agarwal & Agarwal, Tata McGraw Hill Publishers
3. Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, New Age

**I Year – II SEMESTER**

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## ENGLISH – COMMUNICATION SKILLS LAB – II

**Suggested Lab Manuals:**

**OBJECTIVE:** To impart to the learner the skills of grammar as well as communication through listening, speaking, reading, and writing including soft, that is life skills.

**ADVANCED COMMUNICATION SKILLS**

| | |
|---|---|
| UNIT 6 | Body language |
| UNIT 7 | Dialogues |
| UNIT 8 | Interviews and Telephonic Interviews |
| UNIT 9 | Group Discussions |
| UNIT 10 | Presentation Skills |
| UNIT 11 | Debates |

**Text Book:**

'Strengthen your Communication Skills' Part-B by Maruthi Publications

**Reference Books:**

1. INFOTECH English (Maruthi Publications)
2. Personality Development and Soft Skills ( Oxford University Press, New Delhi)

**I Year – II SEMESTER**

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# ENGINEERING PHYSICS LAB

**List of Experiments**

1. Determination of wavelength of a source-Diffraction Grating-Normal incidence
2. Newton's rings –Radius of Curvature of Plano_Convex Lens.
3. Determination of thickness of a thin object using parallel interference fringes.
4. Determination of Rigidity modulus of a material- Torsional Pendulum.
5. Determination of Acceleration due to Gravity and Radius of Gyration- Compound Pendulum.
6. Melde's experiment – Transverse and Longitudinal modes.
7. Verification of laws of stretched string – Sonometer.
8. Determination of velocity of sound – Volume resonator.
9. L C R Senes Resonance Circuit
10. Study of I/V Characteristics of Semiconductor diode
11. I/V characteristics of Zener diode
12. Thermistor characteristics – Temperature Coefficient
13. Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus.
14. Energy Band gap of a Semiconductor p.n junction.
15. Hall Effect for semiconductor.

**REFERENCE:**


1. Engineering Physics Lab Manual by Dr.Y. Aparna & Dr.K.Venkateswarao (V.G.S.Book links)
2. Physics practical manual, Lorven Publications.

**I Year – II SEMESTER**

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# Engineering Physics
# Virtual Labs - Assignments

**List of Experiments**

1. Hall Effect
2. Crystal Structure
3. Hysteresis
4. Brewster's angle
5. Magnetic Levitation / SQUID
6. Numerical Aperture of Optical fiber
7. Photoelectric Effect
8. Simple Harmonic Motion
9. Damped Harmonic Motion
10. LASER – Beam Divergence and Spot size

URL : WWW.vlab.co.in

**I Year – II SEMESTER** **T P C**
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# ENGINEERING WORKSHOP & IT WORKSHOP

## ENGINEERING WORKSHOP:

**Course Objective:** To impart hands-on practice on basic engineering trades and skills.
Note: At least two exercises to be done from each trade.

**Trade:**

| | |
|---|---|
| **Carpentry** | 1. T-Lap Joint |
| | 2. Cross Lap Joint |
| | 3. Dovetail Joint |
| | 4. Mortise and Tennon Joint |
| **Fitting** | 1. Vee Fit |
| | 2. Square Fit |
| | 3. Half Round Fit |
| | 4. Dovetail Fit |
| **Black Smithy** | 1. Round rod to Square |
| | 2. S-Hook |
| | 3. Round Rod to Flat Ring |
| | 4. Round Rod to Square headed bolt |
| **House Wiring** | 1. Parallel / Series Connection of three bulbs |
| | 2. Stair Case wiring |
| | 3. Florescent Lamp Fitting |
| | 4. Measurement of Earth Resistance |
| **Tin Smithy** | 1. Taper Tray |
| | 2. Square Box without lid |
| | 3. Open Scoop |
| | 4. Funnel |

## IT WORKSHOP:

**Objectives:** Enabling the student to understand basic hardware and software tools through practical exposure

**PC Hardware:**
Identification of basic peripherals, assembling a PC, installation of system software like MS Windows, device drivers. Troubleshooting Hardware and software _ some tips and tricks.

**Internet & World Wide Web:**
Different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet, web browsers, email, newsgroups and discussion forums

.Awareness of cyber hygiene( protecting the personal computer from getting infected with the viruses), worms and other cyber attacks .

**Productivity tools** Crafting professional word documents; excel spread sheets, power point presentations and personal web sites using the Microsoft suite of office tools

**(Note: Student should be thoroughly exposed to minimum of 12 Tasks)**

**PC Hardware**

**Task 1: Identification of the peripherals of a computer.**

To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions. Description of various I/O Devices

**Task 2(Optional) :** A practice on disassembling the components of a PC and assembling them to back to working condition.

**Task 3:** Examples of Operating systems- DOS, MS Windows, Installation of MS windows on a PC.

**Task 4:** Introduction to Memory and Storage Devices , I/O Port, Device Drivers, Assemblers, Compilers, Interpreters , Linkers, Loaders.

**Task 5:**

**Hardware Troubleshooting (Demonstration):**

Identification of a problem and fixing a defective PC(improper assembly or defective peripherals).

**Software Troubleshooting (Demonstration):**. Identification of a problem and fixing the PC for any software issues

**Internet & Networking Infrastructure**

**Task 6**: Demonstrating Importance of Networking, Transmission Media, Networking Devices- Gateway, Routers, Hub, Bridge, NIC ,Bluetooth Technology, Wireless Technology, Modem, DSL, Dialup Connection.

**Orientation & Connectivity Boot Camp and web browsing:**

Students are trained to configure the network settings to connect to the Internet. They are trained to demonstrate the same through web browsing (including all tool bar options) and email access.

**Task 7**: **Search Engines & Netiquette:**

Students are enabled to use search engines for simple search, academic search and any other context based search (Bing, Google etc). Students are acquainted to the principles of micro-blogging, wiki, collaboration using social networks, participating in online technology forums

**Task 8: Cyber Hygiene (Demonstration):** Awareness of various threats on the internet. Importance of security patch updates and anti-virus solutions. Ethical Hacking, Firewalls, Multi-factor authentication techniques including Smartcard, Biometrics are also practiced

**Word**

**Task 9 : MS Word Orientation:**
Accessing, overview of toolbars, saving files, Using help and resources, rulers, formatting ,Drop Cap , Applying Text effects, Using Character Spacing, OLE in Word, using templates, Borders and Colors, Inserting Header and Footer, Using Date and Time option, security features in word, converting documents while saving
**Task 10: 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, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs.

**Excel**

**Task 11:** Using spread sheet features of EXCEL including the macros, formulae, pivot tables, graphical representations
**Creating a Scheduler -** Features to be covered:- Gridlines, Format Cells, Summation, auto fill, Formatting Text

**LOOKUP/VLOOKUP**

**Task 12: Performance Analysis** - Features to be covered:- Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

**Power Point**
**Task 13:** 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, Hyperlinks, Inserting –Images, Clip Art, Tables and Charts in Powerpoint.

**Task 14:** Focusing on the power and potential of Microsoft power point. 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, OLE in PPT.

**TEXT BOOK:**

**Faculty to consolidate the workshop manuals using the following references**


1. Computer Fundamentals, Anita Goel, Pearson
2. Scott Mueller's Upgrading and Repairing PCs, 18/e, Scott. Mueller, QUE, Pearson,2008
3. Information Technology Workshop,3e, G Praveen Babu, M V Narayana BS Publications.
4. Comdex Information Technology , Vikas Gupta, dreamtech.


**REFERENCE BOOK:**


**1.** Essential Computer and IT Fundamentals for Engineering and Science Students, Dr. N.B. Venkateswarlu

**II Year – I SEMESTER** **T P**
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## MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

**Unit – I: (*The Learning objective of this Unit is to understand the concept and nature of Managerial Economic s and its relationship with other disciplines, Concept of Demand and Demand forecasting)**

**Introduction to Managerial Economics and demand Analysis:**

Definition of Managerial Economics and Scope-Managerial Economics and its relation with other subjects-Concepts of Demand-Types-Determents-Law of Demand its Exception-Elasticity of Demand-Types and Measurement-Demand forecasting and its Methods.

(**The Learner is equipped with the knowledge of estimating the Demand for a product and the relationship between Price and Demand)

**Unit – II: (*The Learning objective of this Unit is to understand the concept of Production function, Input Output relationship, different Cost Concepts and Concept of Cost-Volume-Profit Analysis)**

**Production and Cost Analyses:**

Production function-Isoquants and Isocosts-Law of Variable proportions-Cobb-Douglas Production function-Economics of Sale-Cost Concepts-Opportunity Cost-Fixed vs Variable Costs-Explicit Costs vs Implicit Costs-Out of Pocket Costs vs Imputed Costs-Cost Volume Profit analysis-Determination of Break-Even Point (Simple Problem)

(**One should understand the Cost Concepts for decision making and to estimate the least cost combination of inputs).

**Unit – III: (*The Learning Objective of this Unit is t understand the Nature of Competition, Characteristics of Pricing in the different market structure and significance of various pricing methods)**

**Introduction to Markets, Theories of the Firm & Pricing Policies:**

Market Structures: Perfect Competition, Monopoly and Monopolistic and Oligopoly – Features – Price, Output Determination – Managerial Theories of firm: Maris and Williamson's models – Methods of Pricing: Limit Pricing, Market Skimming Pricing, Internet Pricing: Flat Rate Pricing, Usage sensitive, Transaction based pricing, Priority Pricing.

(** One has to understand the nature of different markets and Price Output determination under various market conditions)

**Unit – IV: (*The Learning objective of this Unit is to know the different forms of Business organization and their Merits and Demerits both public & private Enterprises and the concepts of Business Cycles)**

**Types of Business Organization and Business Cycles:**

Features and Evaluation of Sole Trader – Partnership – Joint Stock Company – State/Public Enterprises and their forms – Business Cycles – Meaning and Features – Phases of Business Cycle.

(**One should equipped with the knowledge of different Business Units)

**Unit – V: (*The Learning objective of this Unit is to understand the different Accounting Systems preparation of Financial Statements and uses of different tools for performance evaluation)**

**Introduction to Accounting & Financing Analysis:**

Introduction to Double Entry Systems – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis – Preparation of Funds flow cash flow statements (Simple Problems)

(**The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis)

**Unit – VI:** (*The Learning objective of this Unit is to understand the concept of Capital, Capitalization, Capital Budgeting and to know the techniques used to evaluate Capital Budgeting proposals by using different methods)

**Capital and Capital Budgeting:** Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Need for Capital Budgeting-Techniques of Capital Budgeting-Traditional and Modern Methods.

(**The Learner is able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making)

Note: *Learning Objective

** Learning Assessment

**Text Books**


1. Dr. N. Appa Rao, Dr. P. Vijay Kumar: 'Managerial Economics and Financial Analysis', Cengage Publications, New Delhi – 2011
2. Dr. A. R. Aryasri – Managerial Economics and Financial Analysis, TMH 2011

3. Prof. J.V.Prabhakara rao, Prof. P. Venkatarao. 'Managerial Economics and Financial Analysis', Ravindra Publication.

**References:**


1. V. Maheswari: Managerial Economics, Sultan Chand.
2. Suma Damodaran: Managerial Economics, Oxford 2011.
3. Dr. B. Kuberudu and Dr. T. V. Ramana: Managerial Economics & Financial Analysis, Himalaya Publishing House 2011.
4. Vanitha Agarwal: Managerial Economics, Pearson Publications 2011.
5. Sanjay Dhameja: Financial Accounting for Managers, Pearson.
6. Maheswari: Financial Accounting, Vikas Publications.
7. S. A. Siddiqui & A. S. Siddiqui: Managerial Economics and Financial Analysis, New Age International Publishers, 2012.

**II Year – I SEMESTER**

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## OBJECT-ORIENTED PROGRAMMING THROUGH C++

**Objectives: Expertise in object oriented principles and their implementation in C++**

**UNIT I :**

**Objectives: Exposure to basics of object oriented mode, C++ programming and I/O in C++**

**INTRODUCTION:** Differences Between C And C++, The Object Oriented Technology , Disadvantage of Conventional Programming, Concepts of Object Oriented Programming, Advantages of Oop. Structure of A C++ Program, Header Files and Libraries

**INPUT AND OUTPUT IN C++ :**

Introduction, Streams In C++ And Stream Classes, Pre-Defined Streams, Stream Classes, Formatted And Unformatted Data,Unformatted Console I/O Operations, Member Functions Of Istream Class, Formatted Console I/O Operations, Bit Fields, Flags Without Bit Field, Manipulators, User Defined Manipulators

**UNIT II :**

**Objectives: Focus on Basic concept in C++ programming, Operators, control structures , functions, overloading, recursion**

Tokens In C++, Variable Declaration and Initialization, Data Types, Operators In C and C++, Scope Access Operator, Namespace, Memory Management Operators, Comma Operator, Revision of Decision Statements, Control Loop Statements

**FUNCTIONS IN C++ :** Introduction, Structure of Function, Passing Arguments, Lvalues and Rvalues, Retrun By Reference, Returning More Values By Reference, Default Arguments, Const Arguments, Inputting Default Arguments, Inline Functions, Function Overloading, Principles of Function Overloading, Recursion

**UNIT III :**

**Objectives: Acquaintance with classes, objects and member functions**

**CLASSES AND OBJECTS :** Introduction, Classes In C++, Declaring Objects, Access Specifiers and Their Scope, Member Functions, Outside Member Function as Inline, Data Hiding or Encapsulation, Classes, Objects and Memory, Static Member Variables, Static Member Functions Static Object, Array of Objects, Objects as Function Arguments, Friend Functions, The Const Member Functions, The Volatile Member Function, Recursive Member Function, Local Classes, Empty, Static And Const Classes, Member Function And Non- Member Function, Overloading Member Functions, Nested Class

**UNIT IV :**

**Objectives: Focus on constructors, destructors, variants in them, operator overloading, type conversions**

**CONSTRUCTORS AND DESTRUCTORS :** Introduction, Characteristic of Constructors & Destructors, Applications With Constructors, Parameterized Constructor, Overloading Constructors (Multiple Constructors), Array of Objects Using Constructors, Constructors With Default Arguments, Copy Constructors, The Const Objects, Destructors, Calling Constructors and Destructors, Qualifier And Nested Classes, Anonymous Objects, Private Constructors and Destructors, Dynamic Initialization Using Constructrs, Dynamic Operators and Constructors, Recursive Constructor, Constructor And Destructor With Static Members, Local Vs. Global Object

**OPERATOR OVERLOADING AND TYPE CONVERSION :** Introduction, Overloading Unary Operators, Constraint on Increment and Decrement Operators, Overloading Binary Operators, Overloading With Friend Function, Overloading Assignment Operator (=), Type Conversion, Rules for Overloading Operators, One Argument Constructor and Operator Function, Overloading Stream Operators

**UNIT V :**

**Objective: Concentration on inheritance, types of inheritance, polymorphism, virtual functions**

**INHERITANCE :** Introduction, Reusability, Access Specifiers and Simple Inheritance, Protected Data With Private Inheritance, Types of Inheritances(Single Inheritance, Multilevel Inheritance, Multiple Inheritance, Hierarchical Inheritance, Hybrid Inheritance, Multipath Inheritance), Virtual Base Classes, Constructors, Destructors, and

Inheritance, Object as a Class Member, Abstract Classes, Qualifier Classes And Inheritance, Constructor in Derived Class, Pointers and Inheritance, Overloading Member Function, Advantages of Inheritance, Disadvantages of Inheritance.

**BINDING, POLYMORPHISM AND VIRTUAL FUNCTIONS:** Introduction, Binding In C++, Static (Early) Binding, Dynamic (Late) Binding, Pointer to Base and Derived Class Objects, Virtual Functions, Rules For Virtual Functions, Array of Pointers, Pure Virtual Functions, Abstract Classes, Working of Virtual Functions, Virtual Functions in Derived Classes, Object Slicing, Constructors and Virtual Functions, Virtual Destructors, Destructor and Virtual Functions.

**UNIT VI :**

**Objectives: Focus on Files, File operations, generic programming, templates, function templates, Exception handling**

**APPLICATIONS WITH FILES:** Introduction, File Stream Classes, File Opening Modes, File Pointers and Manipulators, Manipulators With Arguments, Sequential Access Files, Binary and Ascii Filesrandom Access Operation,

**GENERIC PROGRAMMING WITH TEMPLATES :** Introduction, Need of Template, Definition of Class Template, Normal Function Template, Working of Function Templates, Class Template With More Parameters, Functions Templates With More Arguments, Overloading of Template Functions, Member Function Templates,Recursion With Template Function, Class Template With Overloaded Operators, Class Template Revisited, Class Templates and Inheritance, Container Classes , Types of Containers, Container Adaptors, Iterators

**EXCEPTION HANDLING :** Introduction, Principles of Exception Handling,The Keywords Try, Throw and Catch , Exception Handling Mechanism, Multiple Catch Statements, Catching Multiple Exceptions, Re-Throwing Exception, Specifying Exception, Exceptions In Constructor and Destructors, Controlling Uncaught Exceptions, Class Template With Exception Handling.

**TEXT BOOKS :**

1. Programming In C++ , Ashok N Kamthane. Pearson 2nd Edition.

2. Object Oriented Programming C++ , Joyce Farrell, Cengage

3. Mastering C ++, Venugopal, Rajkumar, Ravi kumar TMH
4. Object Oriented Programming with C++, 2nd ed, Sourav Sahay, OXFORD

**REFERENCE BOOKS:**

1. The Complete Reference, C++, 4ed, Herbert Schildt, TMH

**II Year – I SEMESTER**

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## MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

**Objectives: Acquaintance with the basic mathematical implication for computer science, applications of mathematics in computer science**

**UNIT I:**

**Objective: Acquiring the relevance of statements, inferences and predicates in computer science**

**Mathematical Logic** :

Propositional Calculus: Statements and Notations, Connectives, Truth Tables, Tautologies, Equivalence of Formulas, Duality law, Tautological Implications, Normal Forms, Theory of Inference for Statement Calculus, **Consistency of Premises, Indirect Method of Proof.**

**Predicate calculus:** Predicative Logic, Statement Functions, Variables and Quantifiers, Free & Bound Variables, Inference theory for predicate calculus.

**UNIT II :**

**Objective: Overview of number theory, basic algorithms in number theory and mathematical induction**

**Number Theory & Induction:**

Properties of integers, Division Theorem, The Greatest Common Divisor, Euclidean Algorithm, Least Common Multiple, Testing for Prime Numbers, The Fundamental Theorem of Arithmetic, Modular Arithmetic ( Fermat's Theorem and Euler 's Theorem)

**Mathematical Induction: Principle of Mathematical Induction, exercises**

**UNIT III:**

**Objective: Focuses on sets and relations and their operations, relations and functions**

**Set Theory:**

Introduction, Operations on Binary Sets, Principle of Inclusion and Exclusion

Relations: Properties of Binary Relations, Relation Matrix and Digraph, Operations on Relations, Partition and Covering, Transitive Closure, Equivalence, Compatibility and Partial Ordering Relations, Hasse Diagrams.

**Functions**: Bijective Functions, Composition of Functions, Inverse Functions, Permutation Functions, Recursive Functions

**UNIT IV:**

**Objectives: Exposure of graphs, their representation, types, trees and tree variants**

**Graph Theory:**

Basic Concepts of Graphs, Sub graphs, Matrix Representation of Graphs: Adjacency Matrices, Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs, Multigraphs, (Problems and Theorems without proofs)

Planar Graphs, Euler's Formula, Graph Colouring and Covering, Chromatic Number,( Problems and Theorems without proofs)

Trees, Directed trees, Binary Trees, Decision Trees,

Spanning Trees: Properties, Algorithms for Spanning trees and Minimum Spanning Tree.

**UNIT V:**

**Objective: Overview of algebraic structures, Group theory, Binomial theorem, permutations and combinations**

**Algebraic Structures: Lattice:** Properties, Lattices as Algebraic Systems, Algebraic Systems with one Binary Operation, Properties of Binary operations, Semi groups and Monoids: Homomorphism of Semi groups and Monoids, Groups: Abelian Group, Cosets, Subgroups ( Definitions and Examples of all Structures) Algebraic Systems with two Binary Operations: Rings

**Combinatorics:** Basic of Counting, Permutations, Derangements, Permutations with Repetition of Objects, Circular Permutations, Restricted Permutations, Combinations, Restricted Combinations, Pigeonhole Principle and its Application.

**Binomial Theorem:** Binomial and Multinomial Coefficients, Generating Functions of Permutations and Combinations, The Principles of Inclusion – Exclusion.

**UNIT VI:**

**Objective: Overview of generating functions, recurrence relations and solving recurrence relations**

**Recurrence Relation:**

Generating Function of Sequences, Partial Fractions, Calculating Coefficient of Generating Functions

Recurrence Relations, Formulation as Recurrence Relations, Solving linear homogeneous recurrence Relations by substitution, generating functions and The Method of Characteristic Roots.

Solving Inhomogeneous Recurrence Relations

**TEXT BOOKS :**


1. Discrete Mathematical Structures with Applications to Computer Science, Tremblay, Manohar, TMH
2. Discrete Mathematics for Computer Scientists & Mathematicians, 2/e, Mott, Kandel, Baker, PHI
3. Discrete Mathematics, Swapan Kumar chakrborthy, Bikash kanti sarkar, OXFORD
4. Discrete Mathematics and its Applications with combinatorics and graph theory, 7th ed, Rosen, TMH
5. Discrete Mathematics, Theory and Applications, Malik sen, Cengage
6. Discrete mathematics and Graph theory, 3rd ed, Biswal, PHI


**REFERENCE BOOKS:**


1. Discrete Mathematics, Proofs, Structures and applications, 3rd ed, CRC Press
2. Discrete Mathematics, S.Santha, Cengage
3. Discrete Mathematics with Applications, Thomas Koshy, Elsevier
4. Discrete Mathematics,2/e, JK Sharma ,Macmillan

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## DIGITAL LOGIC DESIGN

**Unit I: Number Systems**

Binary, Octal, Decimal, Hexadecimal Number Systems. Conversion of Numbers From One Radix To Another Radix, r's Complement and (r-1)'s Complement Subtraction of Unsigned Numbers, Problems, Signed Binary Numbers, Weighted and Non weighted codes

**Unit II:Logic Gates And Boolean Algebra**

Basic Gates NOT, AND, OR, Boolean Theorms,Complement And Dual of Logical Expressions, Universal Gates, Ex-Or and Ex-Nor Gates, SOP,POS, Minimizations of Logic Functions Using Boolean Theorems, Two level Realization of Logic Functions Using Universal Gates

**Gate Level Minimization:** Karnaugh Map Method (K-Map): Minimization of Boolean Functions maximum upto Four Variables, POS and SOP, Simplifications With Don't Care Conditions Using K-Map.

**Unit III: Combinational Logic Circuits**

Design of Half Adder, Full Adder, Half Subtractor, Full Subtractor, Ripple Adders and Subtractors, Ripple Adder/Subtractor Using Ones and Twos Complement Method. Design of Decoders, Encoders, Multiplexers, Demultiplexers, Higher Order Demultiplexers and Multiplexers, Priority Encoder, Code Converters, Magnitude Comparator.

**Unit IV: Introduction to Sequential Logic Circuits**

Classification of Sequential Circuits, Basic Sequential Logic Circuits: Latch and Flip-Flop, RS- Latch Using NAND and NOR Gates, Truth Tables. RS,JK,T and D Flip Flops , Truth and Excitation Tables, Conversion of Flip Flops. Flip Flops With Asynchronous Inputs (Preset and Clear).

**Unit V: Registers and Counters**

Design of Registers, Buffer Register, Control Buffer Registers, Bidirectional Shift Registers, Universal Shift Register, Design of Ripple Counters, Synchronous Counters and Variable Modulus Counters, Ring Counter, Johnson Counter.

**Unit VI: Introduction to Programmable Logic Device**s (PLDs)

PLA, PAL, PROM. Realization of Switching Functions Using PROM, PAL and PLA. Comparison of PLA, PAL and PROM.

**TEXT BOOKS :**

1. Digital Design ,4/e, M.Morris Mano, Michael D Ciletti, PEA
2. Fundamentals of Logic Design, 5/e, Roth, Cengage

**REFERENCE BOOKS**

1. Switching and Finite Automata Theory,3/e,Kohavi, Jha, Cambridge.
2. Digital Logic Design, Leach, Malvino, Saha,TMH
3.Modern Digital Electronics, R.P. Jain, TMH

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## DATA STRUCTURES

**Objectives: Comprehensive knowledge of data structures and ability to implement the same in software applications**

**UNIT I:**

**Objective: exposure to algorithmic complexities, recursive algorithms, searching and sorting techniques**

Preliminaries of algorithm, Algorithm analysis and complexity,

**Data structure-** Definition , types of data structures

Recursion: Definition, Design Methodology and Implementation of recursive algorithms, Linear and binary recursion, recursive algorithms for factorial function, GCD computation, Fibonacci sequence, Towers of Hanoi, Tail recursion

List Searches using Linear Search, Binary Search, Fibonacci Search

**Sorting Techniques:** Basic concepts, Sorting by : insertion (Insertion sort), selection (heap sort), exchange (bubble sort, quick sort), distribution (radix sort )and merging (merge sort ) Algorithms.

**UNIT II:**

**Objectives: Applying stack and queue techniques for logical operations**

**Stacks and Queues:** Basic Stack Operations, Representation of a Stack using Arrays, Stack Applications: Reversing list, Factorial Calculation, Infix to postfix Transformation, Evaluating Arithmetic Expressions.

**Queues:** Basic Queues Operations, Representation of a Queue using array, Implementation of Queue Operations using Stack, Applications of Queues-Round robin Algorithm, Circular Queues, Priority Queues.

**UNIT III:**

**Objectives: Exposure to list representation models in various types of applications**

**Linked Lists:** Introduction, single linked list, representation of a linked list in memory, Operations on a single linked list, Reversing a single linked list, applications of single linked list to represent polynomial expressions and sparse matrix manipulation, Advantages and disadvantages of single linked list, Circular linked list, Double linked list

**UNIT IV:**

**Objectives: Implementation of tree implementation in various forms**

**Trees:** Basic tree concepts, Binary Trees: Properties, Representation of Binary Trees using arrays and linked lists, operations on a Binary tree , Binary Tree Traversals (recursive), Creation of binary tree from in, pre and post order traversals

**UNIT-V:**

**Objectives: Advanced understanding of other variants of trees and their operations**

**Advanced concepts of Trees:** Tree Travels using stack (non recursive), Threaded Binary Trees. Binary search tree, Basic concepts, BST operations: insertion, deletion, Balanced binary trees – need, basics and applications in computer science (No operations)

**UNIT VI:**

**Objectives: orientation on graphs, representation of graphs, graph traversals, spanning trees**

**Graphs:** Basic concepts, Representations of Graphs: using Linked list and adjacency matrix, Graph algorithms

Graph Traversals (BFS & DFS), applications: Dijkstra's shortest path, Transitive closure, Minimum Spanning Tree using Prim's Algorithm, warshall's Algorithm( **Algorithemic Concepts Only, No Programs required**).

**TEXT BOOKS:**


1. Data Structure with C, Seymour Lipschutz, TMH
2. Data Structures using C,Reema Thareja, Oxford
3. Data Structures, 2/e, Richard F, Gilberg , Forouzan, Cengage
4. Data Structure & Algorithm Analysis in C, 2nd Edition Mark Allen Weiss


**REFERENCE BOOKS:**


1.Data Structures and Algorithms, 2008,G.A.V.Pai, TMH

2.Classic Data Structures, 2/e, Debasis ,Samanta,PHI,2009

3. Fundamentals of DataStructure in C, 2/e, Horowitz,Sahni, Anderson Freed,University Prees

**II Year – I SEMESTER** **T P**
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## OBJECT ORIENTED PROGRAMMING LAB

1. Write a C++ program illustrating Variable Scope.
2. Write a C++ program illustrating Swap integer values by reference.
3. Write a C++ program illustrating Checking whether the number is even or odd using Ternary operator.
4. Write a C++ program illustrating a program to find the roots of a quadratic equation .Use switch statements to handle different values of the discriminant (b^2-4*a*c).
5. Write a C++ program illustrating interactive program to multiply 2 variables after checking the compatibility.
6. Write a C++ program illustrating interactive program for computing the roots of a quadratic equation by handling all possible cases.Use streams to perform I/O operations.
7. Write a C++ program illustrating to sort integer numbers.
8. Write a C++ program illustrating factorial using recursion.
9. Write a C++ program illustrating pass by value, pass by reference, pass by address.
10. Write a C++ program illustrating Function overloading.
11. Write a C++ program illustrating an interactive program for swapping integer, real, and character type variables without using function overloading .Write the same program by using function overloading features and compare the same with its C counterpart.
12. Write a C++ program illustrating inline functions.
13. Write a C++ program illustrating Friend function.
14. Write a C++ program illustrating Exception handling.
15. Write a C++ program illustrating Function template.
16. Write a C++ program illustrating Overloading increment, decrement, binary+&<< operator.
17. Write a C++ program illustrating Virtual function.
18. Write a C++ program illustrating an interactive program to process complex numbers .It has to Perform addition, subtraction, multiplication, and division of complex numbers. print results in x+iy form. Create a class for the complex number representation.
19. Write a C++ program illustrating user defined string processing functions using pointers (string length, string copy, string concatenation)
20. Write a C++ program illustrating Constructor overloading (Both parameterised and default).
21. Write a C++ program illustrating Copy constructor.

22. Write a C++ program illustrating access data members & member functions using 'THIS' pointer.
23. Write a C++ program illustrating for overloading ++ operator to increment data.
24. Write a C++ program illustrating overloading of new and delete operator.
25. Write a C++ program illustrating Abstract classes.
26. Write a C++ program illustrating Inheritance (Multiple, Multilevel, Hybrid).
27. Write a C++ program illustrating Virtual classes & virtual functions.
28. Write a C++ program illustrating overloading function template.
29. Write a C++ program illustrating Class template.

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## DATA STRUCTURES LAB

**Exercise 1:**

Write recursive program which computes the $n^{th}$ Fibonacci number, for appropriate values of n.

Analyze behavior of the program Obtain the frequency count of the statement for various values of n.

**Exercise 2:**

Write recursive program for the following

a) Write recursive and non recursive C program for calculation of Factorial of an integer
b) Write recursive and non recursive C program for calculation of GCD (n, m)
c) Write recursive and non recursive C program for Towers of Hanoi : N disks are to be transferred from peg S to peg D with Peg I as the intermediate peg.

**Exercise 3:**

a) Write C program that use both recursive and non recursive functions to perform Linear search for a Key value in a given list.
b) Write C program that use both recursive and non recursive functions to perform Binary search for a Key value in a given list.
c) Write C program that use both recursive and non recursive functions to perform Fibonacci search for a Key value in a given list.

**Exercise 4:**

a) Write C program that implement Bubble sort, to sort a given list of integers in ascending order
b) Write C program that implement Quick sort, to sort a given list of integers in ascending order
c) Write C program that implement Insertion sort,to sort a given list of integers in ascending order

**Exercise 5:**

a) Write C program that implement heap sort, to sort a given list of integers in ascending order
b) Write C program that implement radix sort, to sort a given list of integers in ascending order
c) Write C program that implement merge sort, to sort a given list of integers in ascending order

**Exercise 6:**

a) Write C program that implement stack (its operations) using arrays
b) Write C program that implement stack (its operations) using Linked list

**Exercise 7:**

a) Write a C program that uses Stack operations to Convert infix expression into postfix expression

a) Write C program that implement Queue (its operations) using arrays.

b) Write C program that implement Queue (its operations) using linked lists

**Exercise 8:**

a) Write a C program that uses functions to create a singly linked list

b) Write a C program that uses functions to perform insertion operation on a singly linked list

c) Write a C program that uses functions to perform deletion operation on a singly linked list

**Exercise 9:**

d) Adding two large integers which are represented in linked list fashion.

e) Write a C program to reverse elements of a single linked list.

f) Write a C program to store a polynomial expression in memory using linked list

g) Write a C program to representation the given Sparse matrix using arrays.

h) Write a C program to representation the given Sparse matrix using linked list

**Exercise10**:

a) Write a C program to Create a Binary Tree of integers

b) Write a recursive C program for Traversing a binary tree in preorder, inorder and postorder.

c) Write a non recursive C program for Traversing a binary tree in preorder, inorder and postorder.

d) Program to check balance property of a tree.

**Exercise 11:**

**a)** Write a C program to Create a BST

b) Write a C program to insert a node into a BST.

c) Write a C program to delete a node from a BST.

**II Year – I SEMESTER**

| T | P | C |
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## DIGITAL LOGIC DESIGN LAB

**List of Experiments:**

1) Verification of Basic Logic Gates.
2) Implementing all individual gates with Universal Gates NAND & NOR.
3) Design a circuit for the given Canonical form, draw the circuit diagram and verify the De-Morgan laws.
4) Design a Combinational Logic circuit for 4x1 MUX and verify the truth table.
5) Design a Combinational Logic circuit for 1x4 De-MUX and verify the truth table.
6) Verify the ***data read*** and ***data write*** operations for the IC 74189.
7) Design a Gray code encoder and interface it to SRAM IC 74189 for write operation display on 7-segment.
8) Design a Gray code De-coder and interface it to SRAM IC 74189 for read operation display it on 7-segment.
9) Construct Half Adder and Full Adder using Half Adder and verify the truth table.
10) Verification of truth tables of the basic Flip- Flops with ***Synchronous*** and ***Asynchronous*** modes.
11) Implementation of Master Slave Flip-Flop with J-K Flip- Flop and verify the truth table for ***race around*** condition**.**
12) Design a Decade Counter and verify the truth table.
13) Design the Mod 6 counter using D-Flip -Flop.
14) Construct 4-bit ring counter with T-Flip –Flop and verify the truth table.
15) Design a 8 – bit right Shift Register using D-Flip -Flop and verify the truth table.

**II Year – I SEMESTER** **Seminar**

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**II Year – II SEMESTER**

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## PROBABILITY AND STATISTICS

**(Common to CE, CSE, IT, Chemical, PE, PCE, Civil Branches)**

**UNIT I Random variables and Distributions:**

Introduction- Random variables- Distribution function- Discrete distributions ( Review of Binomial and Poisson distributions)- Continuous distributions: Normal, Normal approximation to Binomial distribution, Gamma and Weibull distributions

Subject Category
ABET Learning Objectives a b e k
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

**UNIT II Moments and Generating functions:**

Introduction-Mathematical expectation and properties - Moment generating function - Moments of standard distributions ( Binomial, Poisson and Normal distributions) – Properties

Subject Category
ABET Learning Objectives a e
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

**UNIT III Sampling Theory:**

Introduction - Population and samples- Sampling distribution of mean for large and small samples (with known and unknown variance) - Proportion sums and differences of means -Sampling distribution of variance -Point and interval estimators for means and proportions

Subject Category
ABET Learning Objectives a e k
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

**UNIT IV Tests of Hypothesis:**

Introduction - Type I and Type II errors - Maximum error - One tail, two-tail tests- Tests concerning one mean and proportion, two means- Proportions and their differences using Z-test, Student's t-test - F-test and Chi -square test - ANOVA for one-way and two-way classified data

Subject Category
ABET Learning Objectives a b d e h k
ABET internal assessments 1 2 6 7 10
JNTUK External Evaluation A B D E F

**UNIT V Curve fitting and Correlation:**

Introduction - Fitting a straight line –Second degree curve-exponential curve-power curve by method of least squares.

Simple Correlation and Regression - Rank correlation - Multiple regression

Subject Category
ABET Learning Objectives a d e h k

ABET internal assessments 1 2 6 10
JNTUK External Evaluation A B E

**UNIT VI Statistical Quality Control Methods:**
Introduction - Methods for preparing control charts – Problems using x-bar, p, R charts and attribute charts
Subject Category
ABET Learning Objectives a e k
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E F

**Books:**


1. Probability and Statistics for Engineers: Miller and John E. Freund, Prentice Hall of India
2. Probability and Statistics for Engineers and Scientists: Ronald E. Walpole, Sharon L. Mayers and Keying Ye: Pearson
3. Probability, Statistics and Random Processes, Murugesan, Anuradha Publishers, Chenai:


| Subject Category | ABET Learning Objectives | ABET Internal Assessments | JNTUK External Evaluation | Remarks |
|---|---|---|---|---|
| Theory<br>Design<br>Analysis<br>Algorithms<br>Drawing<br>Others | a) Apply knowledge of math, science, & engineering<br>b) Design & conduct experiments, analyze & interpret data<br>c) Design a system/process to meet desired needs within economic, social, political, ethical, health/safety, manufacturability, & sustainability constraints<br>d) Function on multidisciplinary teams<br>e) Identify, formulate, & solve engineering problems<br>f) Understand professional & ethical responsibilities<br>g) Communicate effectively<br>h) Understand impact of engineering solutions in global, economic, environmental, & societal context<br>i) Recognize need for & be able to engage in lifelong learning<br>j) Know contemporary issues<br>k) Use techniques, skills, modern tools for engineering practices | 1. Objective tests<br>2. Essay questions tests<br>3. Peer tutoring based<br>4. Simulation based<br>5. Design oriented<br>6. Problem based<br>7. Experiential (project based) based<br>8. Lab work or field work based<br>9. Presentation based<br>10. Case Studies based<br>11. Role-play based<br>12. Portfolio based | A. Questions should have:<br>B. Definitions, Principle of operation or philosophy of concept.<br>C. Mathematical treatment, derivations, analysis, synthesis, numerical problems with inference.<br>D. Design oriented problems<br>E. Trouble shooting type of questions<br>F. Applications related questions<br>G. Brain storming questions | |

**II Year – II SEMESTER** **T P**
**3+1 0**

## JAVA PROGRAMMING

**Objective: Implementing programs for user interface and application development using core java principles**

**UNIT I:**

**Objective: Focus on object oriented concepts and java program structure and its installation**

**Introduction to OOP**

Introduction, Need of Object Oriented Programming, Principles of Object Oriented Languages, Procedural languages Vs OOP, Applications of OOP, History of JAVA, Java Virtual Machine, Java Features, Program structures, Installation of JDK1.6

**UNIT II:**

**Objective: Comprehension of java programming constructs, control structures in Java**

**Programming Constructs**

Variables , Primitive Datatypes, Identifiers- Naming Coventions, Keywords, Literals, Operators-Binary,Unary and ternary, Expressions, Precedence rules and Associativity, Primitive TypeConversion and Casting, Flow of control-Branching,Conditional, loops.,

**Classes and Objects**- classes, Objects, Creating Objects, Methods, constructors-Constructor overloading, cleaning up unused objects-Garbage collector, Class variable and Methods-Static keyword, this keyword, Arrays, Command line arguments

**UNIT III:**

**Objective: Implementing Object oriented constructs such as various class hierarchies, interfaces and exception handling**

**Inheritance:** Types of Inheritance, Deriving classes using extends keyword, Method overloading, super keyword, final keyword, Abstract class

**Interfaces, Packages and Enumeration:** Interface-Extending interface, Interface Vs Abstract classes, Packages-Creating packages , using Packages, Access protection, java.lang package

**Exceptions & Assertions** - Introduction, Exception handling techniques-try...catch, throw, throws, finally block, user

defined exception, Exception Encapsulation and Enrichment, Assertions

**UNIT IV:**

**Objective: Understanding of Thread concepts and I/O in Java**

**MultiThreading :** java.lang.Thread, The main Thread, Creation of new threads, Thread priority, Multithreading-Using isAlive() and join(), Syncronization, suspending and Resuming threads, Communication between Threads

**Input/Output:** reading and writing data, java.io package

**UNIT V:**

**Objective: Being able to build dynamic user interfaces using applets and Event handling in java**

**Applets**- Applet class, Applet structure, An Example Applet Program, Applet Life Cycle, paint(),update() and repaint()

**Event Handling** -Introduction, Event Delegation Model, java.awt.event Description,Sources of Events, Event Listeners, Adapter classes, Inner classes

**UNIT VI:**

**Objective: Understanding of various components of Java AWT and Swings and writing code snippets using them**

**Abstract Window Toolkit**

Why AWT?, java.awt package, Components and Containers, Button, Label, Checkbox, Radio buttons, List boxes, Choice boxes, Text field and Text area, container classes, Layouts, Menu, Scroll bar

**Swing:**

Introduction , JFrame, JApplet, JPanel, Components in swings, Layout Managers, JList and JScroll Pane, Split Pane, JTabbedPane, Dialog Box

Pluggable Look and Feel

**Text Books:**


1. The Complete Refernce Java, 8ed, Herbert Schildt, TMH
2. Programming in JAVA, Sachin Malhotra, Saurabh choudhary, Oxford.
3. JAVA for Beginners, 4e, Joyce Farrell, Ankit R. Bhavsar, Cengage Learning.
4. Object oriented programming with JAVA, Essentials and Applications, Raj Kumar Bhuyya, Selvi, Chu TMH

5. Introduction to Java programming, 7th ed, Y Daniel Liang, Pearson

**Reference Books:**

1. JAVA Programming, K.Rajkumar.Pearson
2. Core JAVA, Black Book, Nageswara Rao, Wiley, Dream Tech
3. Core JAVA for Beginners, Rashmi Kanta Das, Vikas.
4. Object Oriented Programming Through Java, P. Radha Krishna, Universities Press

**II Year – II SEMESTER** **T P**
**3+1 0**

## ADVANCED DATA STRUCTURES
**(Note: C++ and Java implementation is not included in the syllabus)**

**Objectives: Exposed to hashing approaches, variants of trees , heaps, queues, implementation of graph algorithms, analysis of sorting algorithms with respect to bounds and file organizations and operations**

**Unit I :**

**Objectives: Comprehensive understanding of dictionaries, hashing mechanism which supports faster retrieval and skip lists**

**Dictionaries :** Sets, Dictionaries, Hash Tables, Open Hashing, Closed Hashing (Rehashing Methods), Hashing Functions( Division Method, Multiplication Method, Universal Hashing), Skip Lists, Analysis of Skip Lists. (Reference 1)

**Unit II :**

**Objectives: Illustartion of Balanced trees and their operations**

AVL Trees: Maximum Height of AVL Tree, Insertions and Deletions. 2-3 Trees : Insertion, Deletion.

**Unit III :**

**Objectives: Concentration on heaps, queues and their operations**

**Priority Queues :**

Binary Heaps : Implementation of Insert and Delete min, Creating Heap.

Binomial Queues : Binomial Queue Operations, Binomial Amortized Analysis, Lazy Binomial Queues

**Unit IV :**

**Objectives: Detailed knowledge of nonlinear data structures and various algorithms using them**

**Graph algorithms :** Minimum-Cost Spanning Trees- Prim's Algorithm, Kruskal's Algorithm Shortest Path Algorithms: Dijkstra's Algorithm, All Pairs Shortest Paths Problem: Floyd's Algorithm, Warshall's Algorithm,

**Unit V :**

**Objectives: Analysis of complexities for various sorting techniques along with their lower bounds**

**Sorting Methods :** Order Statistics: Lower Bound on Complexity for Sorting Methods: Lower Bound on Worst Case Complexity, Lower Bound on Average Case Complexity, Heap Sort, Quick Sort, Radix Sorting, Merge Sort.

**Unit VI :**

**Objectives: Illustration of tries which share some properties of table look up, various issues related to the design of file structures**

**Pattern matching and Tries :** Pattern matching algorithms- the Boyer –Moore algorithm, the Knuth-Morris-Pratt algorithm

Tries: Definitions and concepts of digital search tree, Binary trie, Patricia , Multi-way trie

**File Structures:** Fundamental File Processing Operations- opening files, closing files, Reading and Writing file contents, Special characters in files.

Fundamental File Structure Concepts- Field and record organization, Managing fixed-length, fixed-field buffers.

( Reference 5)

**Text Books :**


1. Data Structures, A Pseudocode Approach, Richard F Gilberg, Behrouz A Forouzan, Cengage.
2. Fundamentals of DATA STRUCTURES in C: 2nd ed, , Horowitz , Sahani, Anderson-freed, Universities Press
3. Data structures and Algorithm Analysis in C, 2nd edition, Mark Allen Weiss, Pearson


**Reference Books:**


1. Web : http://lcm.csa.iisc.ernet.in/dsa/dsa.html
2. http://utubersity.com/?page_id=878
3. http://freevideolectures.com/Course/2519/C-Programming-and-Data-Structures
4. http://freevideolectures.com/Course/2279/Data-Structures-And-Algorithms
5. File Structures :An Object oriented approach with C++, 3rd ed, Michel J Folk, Greg Riccardi, Bill Zoellick
6. C and Data Structures: A Snap Shot oriented Treatise with Live examples from Science and Engineering, NB Venkateswarlu & EV Prasad, S Chand, 2010.

**II Year – II SEMESTER** **T P**
**3+1 0**

## COMPUTER ORGANIZATION

**Objectives: Comprehensive knowledge of computer system including the analysis and design of components of the system**

**UNIT I :**

**Objectives: Gives a view of computer system from user's perspective, representation of data**

**BASIC STRUCTURE OF COMPUTERS :** Computer Types, Functional unit, Basic Operational concepts, Bus structures,

Data Representation: Data types, Complements, Fixed Point Representation. Floating – Point Representation. Other Binary Codes, Error Detection codes.

**UNIT II :**

**Objectives: Understanding RTL, Micro operations, ALU, Organization of stored program computer, types of instructions and design of basic components of the system**

**REGISTER TRANSFER LANGUAGE AND MICROOPERATIONS:** Register Transfer language. Register Transfer Bus and memory transfers, Arithmetic Micro operations, logic micro operations, shift micro operations, Arithmetic logic shift unit.

**BASIC COMPUTER ORGANIZATION AND DESIGN :** Instruction codes, Computer Register Computer instructions, Timing and control, Instruction cycle, Memory – Reference Instructions. Input – Output and Interrupt, Design of basic computer, Design of Accumulator Logic.

**UNIT III :**

**Objectives: Illustration of data paths and control flow for sequencing in CPUs, Microprogramming of control unit of CPU**

**CENTRAL PROCESSING UNIT :** General Register Organization, STACK organization. Instruction formats. Addressing modes. DATA Transfer and manipulation. Program control. Reduced Instruction set computer.

**MICRO PROGRAMMED CONTROL :** Control memory, Address sequencing, micro program example, design of control unit

**UNIT IV :**

**Objectives: Illustration of algorithms for basic arithmetic operations using binary and decimal representation**

**COMPUTER ARITHMETIC :** Addition and subtraction, multiplication Algorithms, Division Algorithms, Floating –

point Arithmetic operations. Decimal Arithmetic unit, Decimal Arithmetic operations.

**UNIT V :**

**Objectives: Description of different parameters of a memory system, organization and mapping of various types of memories**

**THE MEMORY SYSTEM :** Memory Hierarchy, Main memory, Auxiliary memory, Associative Memory, Cache Memory, Virtual Memory.

**UNIT-VI**

**Objectives: Describes the means of interaction devices with CPU, their characteristics, modes and introduction multiprocessors.**

**INPUT-OUTPUT ORGANIZATION :** Peripheral Devices, Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupts, Direct memory Access.

**MULTI PROCESSORS :** Introduction, Characteristics or Multiprocessors, Interconnection Structures, Inter processor Arbitration.

**TEXT BOOKS :**

1. Computer System Architecture, M.Moris Mano, 3rd Edition, Pearson/PHI

2. Computer Organization , Carl Hamacher, Zvonks Vranesic, SafeaZaky, 5th Edition, McGraw Hill.

3. Computer Architecture a quantitative approach, John L. Hennessy and David A. Patterson, Fourth Edition Elsevier

**REFERENCES :**

1. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI

2. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition PHI/Pearson

3. Fundamentals or Computer Organization and Design, - Sivaraama Dandamudi Springer Int. Edition.

**II Year – II SEMESTER** **T P**
**3+1 0**

## LANGUAGE PROCESSORS (50%FLAT+50%CD)

***Objectives: Describes how a programming language works, how input is converted into output from the machine hardware level and various phases of compiler***

**UNIT I:**

***Objectives: Delineation of various components of formal languages and grammars, regular expressions and equivalence of finite automata and regular expressions.***

**Formal Language and Regular Expressions:**

Languages, operations on languages, regular expressions (re), languages associated with (re), operations on (re), Identity rules for (re), Finite Automata: DFA, NFA, Conversion of regular expression to NFA, NFA to DFA. Applications of Finite Automata to lexical analysis

**UNIT II:**

***Objectives: Illustration of grammars and their role in compilers and various parsing techniques***

**Context Free grammars and parsing:**

Context free Grammars, Leftmost Derivations, Rightmost Derivations, Parse Trees, Ambiguity Grammars,

Top-Down Parsing, Recursive Descent Parsers: LL(1) Parsers.

Rightmost Parsers: Shift Reduce Parser, LR (0) Parser, SLR (1) Parser, LR (1) & LALR (1) Parsers, Ambiguous Grammars

**UNIT III:**

***Objectives: Description of Syntax trees, its variants, language classifications***

**Syntax Directed Translation:**

Definitions, construction of Syntax Trees, S-attributed and L-attributed grammars, Intermediate code generation, abstract syntax tree, translation of simple statements and control flow statements.

**Semantic Analysis:**

Semantic Errors, Chomsky hierarchy of languages and recognizers, Type checking, type conversions, equivalence of type expressions.

**UNIT IV:**

***Objectives: Focus on various storage allocation schemes***

**Storage Organization:**
Storage language Issues, Storage Allocation, Storage Allocation Strategies, Scope, Access to Nonlocal Names, Parameter Passing, Dynamics Storage Allocation Techniques.

**UNIT V:**
***Objectives: Enforces various schemes for optimizing code***
**Code Optimization:**
Issues in the design of code optimization, Principal sources of optimization, optimization of basic blocks, Loop optimization, peephole optimization

**UNIT VI:**
***Objectives: Describes the role of code generator and its*** **design issues**
**Code Generation:**
Issues in the design of code Generation, Machine Dependent Code Generation, object code forms, Register allocation and assignment, DAG representation of basic Blocks, Generating code from DAGs.

**Text Books:**
1. A Text Book on Automata Theory, Nasir S.F.B, P.K. Srimani, Cambridge university Press
2. Introduction to Automata Theory, Formal languages and computation, Shamalendu kandar,
3. Compilers Principles, Techniques and Tools, Aho, Ullman, Ravi Sethi, PEA
4. Introduction to theory of computation, 2nd ed, Michel sipser, CENGAGE
5. Principles of Compiler Design, A.V. Aho . J.D.Ullman; PEA

**Reference Books:**
1. Theory of Computer Science, Automata languages and computation , 2/e, Mishra, Chandra Shekaran, PHI

2. Theory of Computation , aproblem solving approach, kavi Mahesh, Wiley

**II Year – II SEMESTER** **T P**
**- 3**

## ADVANCED DATA STRUCTURES LAB

1. To implement functions of Dictionary using Hashing ( division method, Multiplication method, Universal hashing)
2. To perform various operations i.e, insertions and deletions on AVL trees
3. To perform various operations i.e., insertions and deletions on 2-3 trees.
4. To implement operations on binary heap.
5. To implement operations on graphs
   i) vertex insertion
   ii) Vertex deletion
   iii) finding vertex
   iv)Edge addition and deletion
6. To implement Depth First Search for a graph non recursively.
7. To implement Breadth First Search for a graph non recursively.
8. To implement Prim's algorithm to generate a min-cost spanning tree.
9. To implement Krushkal's algorithm to generate a min-cost spanning tree.
10. To implement Dijkstra's algorithm to find shortest path in the graph.
11. To implement pattern matching using Boyer-Moore algorithm.
12. To implement Knuth-Morris-Pratt algorithm for pattern matching.

**II Year – II SEMESTER** **T P**
**- 3**

## JAVA PROGRAMMING LAB

1. Write a JAVA program to display default value of all primitive data types of JAVA
2. Write a JAVA program that displays the roots of a quadratic equation ax2+bx+c=0. Calculate the discriminent D and basing on the value of D, describe the nature of roots.
3. Write a JAVA program to display the Fibonacci sequence
4. Write a JAVA program give example for command line arguments.
5. Write a JAVA program to sort given list of numbers.
6. Write a JAVA program to search for an element in a given list of elements (linear search).
7. Write a JAVA program to search for an element in a given list of elements using binary search mechanism.
8. Write a JAVA program to determine the addition of two matrices.
9. Write a JAVA program to determine multiplication of two matrices.
10. Write a JAVA program to sort an array of strings
11. Write a JAVA program to check whether given string is palindrome or not.
12. Write a JAVA program for the following
    - 1. Example for call by value. 2. Example for call by reference.
13. Write a JAVA program to give the example for 'this' operator. And also use the'this' keyword as return statement.
14. Write a JAVA program to demonstrate static variables, methods, and blocks.
15. Write a JAVA program to give the example for 'super' keyword.
16. Write a JAVA program that illustrates simple inheritance.
17. Write a JAVA program that illustrates multi-level inheritance
18. Write a JAVA program demonstrating the difference between method overloading and method overriding.
19. Write a JAVA program demonstrating the difference between method overloading and constructor overloading.

20. Write a JAVA program that describes exception handling mechanism.
21. Write a JAVA program for example of try and catch block. In this check whether the given array size is negative or not.
22. Write a JAVA program to illustrate sub class exception precedence over base class.
23. Write a JAVA program for creation of user defined exception.
24. Write a JAVA program to illustrate creation of threads using runnable class.(start method start each of the newly created thread. Inside the run method there is sleep() for suspend the thread for 500 milliseconds).
25. Write a JAVA program to create a class MyThread in this class a constructor, call the base class constructor, using super and starts the thread. The run method of the class starts after this. It can be observed that both main thread and created child thread are executed concurrently
26. Write a JAVA program illustrating multiple inheritance using interfaces.
27. Write a JAVA program to create a package named pl, and implement this package in ex1 class.
28. Write a JAVA program to create a package named mypack and import it in circle class.
29. Write a JAVA program to give a simple example for abstract class.
30. Write a JAVA program that describes the life cycle of an applet.
    - Write a JAVA program to create a dialogbox and menu.
    - Write a JAVA program to create a grid layout control.
31. Write a JAVA program to create a border layout control.
32. Write a JAVA program to create a padding layout control.
33. Write a JAVA program to create a simple calculator.
34. Write a JAVA program that displays the x and y position of the cursor movement using Mouse.
35. Write a JAVA program that displays number of characters, lines and words in a text file.

# FREE OPEN SOURCE SOFTWARE (FOSS) LAB

**Objectives:**

- To teach students various unix utilities and shell scripting

**Programs:**

**1.**

Session-1

a)Log into the system

b)Use vi editor to create a file called myfile.txt which contains some text.

c)correct typing errors during creation.

d)Save the file

e)logout of the system

Session-2

a)Log into the system

b)open the file created in session 1

c)Add some text

d)Change some text

e)Delete some text

f)Save the Changes

g)Logout of the system

**2.**

a)Log into the system

b)Use the cat command to create a file containing the following data. Call it mytable use tabs to separate the fields.

| | | |
|---|---|---|
| 1425 | Ravi | 15.65 |
| 4320 | Ramu | 26.27 |
| 6830 | Sita | 36.15 |
| 1450 | Raju | 21.86 |

c)Use the cat command to display the file, mytable.

d)Use the vi command to correct any errors in the file, mytable.

e)Use the sort command to sort the file mytable according to the first field. Call the sorted file my table (same name)

f)Print the file mytable

g)Use the cut and paste commands to swap fields 2 and 3 of mytable. Call it my table (same name)

h)Print the new file, mytable

i)Logout of the system.

**3.**

1) a)Login to the system

b)Use the appropriate command to determine your login shell

c)Use the /etc/passwd file to verify the result of step b.

d)Use the who command and redirect the result to a file called myfile1. Use the more command to see the contents of myfile1.

e)Use the date and who commands in sequence (in one line) such that the output of date will display on the screen and the output of who will be redirected to a file called myfile2. Use the more command to check the contents of myfile2.

2) a)Write a sed command that deletes the first character in each line in a file.

b)Write a sed command that deletes the character before the last character in each line in a file.

c)Write a sed command that swaps the first and second words in each line in a file.

**4.** a)Pipe your /etc/passwd file to awk, and print out the home directory of each user.

b)Develop an interactive grep script that asks for a word and a file name and then tells how many lines contain that word.

c)Repeat

d)Part using awk

**5.** a)Write a shell script that takes a command –line argument and reports on whether it is directory, a file, or something else.

b)Write a shell script that accepts one or more file name as arguments and converts all of them to uppercase, provided they exist in the current directory.

c)Write a shell script that determines the period for which a specified user is working on the system.

**6.** a)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.

b)Write a shell script that deletes all lines containing a specified word in one or more files supplied as arguments to it.

**7.** a)Write a shell script that computes the gross salary of a employee according to the following rules:

i)If basic salary is < 1500 then HRA =10% of the basic and DA =90% of the basic.

ii)If basic salary is >=1500 then HRA =Rs500 and DA=98% of the basic
The basic salary is entered interactively through the key board.
b)Write a shell script that accepts two integers as its arguments and computers the value of first number raised to the power of the second number.

**8.** a)Write an interactive file-handling shell program. Let it offer the user the choice of copying, removing, renaming, or linking files. Once the user has made a choice, have the program ask the user for the necessary information, such as the file name, new name and so on.
b)Write shell script that takes a login name as command – line argument and reports when that person logs in
c)Write a shell script which receives two file names as arguments. It should check whether the two file contents are same or not. If they are same then second file should be deleted.

**9.** a)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.
b)Develop an interactive script that ask for a word and a file name and then tells how many times that word occurred in the file.
c)Write a shell script to perform the following string operations:
i)To extract a sub-string from a given string.
ii)To find the length of a given string.

**10 .**Write a C program that takes one or more file or directory names as command line input and reports the following information on the file:
i)File type ii)Number of links iii)Read, write and execute permissions
iv)Time of last access
(Note : Use stat/fstat system calls)

**11.** Write C programs that simulate the following unix commands:
a)mv b)cp (Use system calls)

**12.** Write a C program that simulates ls Command
(Use system calls / directory API)

13. Do the following Shell programs also

1) Write a shell script to check whether a particular user has logged in or not. If he has logged in, also check whether he has eligibility to receive a message or not

2) Write a shell script to accept the name of the file from standard input and perform the following tests on it

a) File executable b) File readable c) File writable d) Both readable & writable

3) Write a shell script which will display the username and terminal name who login recently in to the unix system

4) Write a shell script to find no. of files in a directory

5) Write a shell script to check whether a given number is perfect or not

6) Write a menu driven shell script to copy, edit, rename and delete a file

7) Write a shell script for concatenation of two strings

3) Write a shell script which will display Fibonacci series up to a given number of argument

9) Write a shell script to accept student number, name, marks in 5 subjects. Find total, average and grade. Display the result of student and store in a file called stu.dat

Rules: avg>=80 then grade A
Avg<80&&Avg>=70 then grade B
Avg<70&&Avg>=60 then grade C
Avg<60&&Avg>=50 then grade D
Avg<50&&Avg>=40 then grade E
Else grade F

10) Write a shell script to accept empno,empname,basic. Find DA,HRA,TA,PF using following rules. Display empno, empname, basic, DA,HRA,PF,TA,GROSS SAL and NETSAL. Also store all details in a file called emp.dat

Rules: HRA is 18% of basic if basic > 5000 otherwise 550
DA is 35% of basic
PF is 13% of basic
IT is 14% of basic
TA is 10% of basic

11) Write a shell script to demonstrate break and continue statements

12) Write a shell script to satisfy the following menu options

a. Display current directory path
b. Display todays date
c. Display users who are connected to the unix system
d. Quit

13) Write a shell script to delete all files whose size is zero bytes from current directory

14) Write a shell script to display string palindrome from given arguments
15) Write a shell script which will display Armstrong numbers from given arguments
16) Write a shell script to display reverse numbers from given argument list
17) Write a shell script to display factorial value from given argument list
18) Write a shell script which will find maximum file size in the given argument list
19) Write a shell script which will greet you “Good Morning”, ”Good Afternoon”, “Good Evening’ and “Good Night” according to current time
20) Write a shell script to sort the elements in a array using bubble sort technique
21) Write a shell script to find largest element in a array
22) Write an awk program to print sum, avg of students marks list
23) Write an awk program to display students pass/fail report
24) Write an awk program to count the no. of vowels in a given file
25) Write an awk program which will find maximum word and its length in the given input File
26) Write a shell script to generate the mathematical tables.
27) Write a shell script to sort elements of given array by using selection sort.
28) Write a shell script to search given number using binary search.
29) Write a shell script to find number of vowels, consonants, numbers, white spaces and special characters in a given string.
30) Write a shell script to lock the terminal.

**III Year – I SEMESTER** **Software Engineering** **T 4**

**Course Objectives:**
The students will have a broad understanding of the discipline of software engineering and its application to the development of and management of software systems.

**Course Outcomes:**
1. knowledge of basic SW engineering methods and practices, and their appropriate application;
2. general understanding of software process models such as the waterfall and evolutionary models.
3. understanding of the role of project management including planning, scheduling, risk management, etc.
4. understanding of software requirements and the SRS document
5. understanding of different software architectural styles.
6. understanding of implementation issues such as modularity and coding standards.
7. understanding of approaches to verification and validation including static analysis, and reviews.
8. understanding of software testing approachs such as unit testing and integration testing.
9. understanding of software evolution and related issues such as version management.
10. understanding on quality control and how to ensure good quality software.
11. understanding of some ethical and professional issues that are important for software engineers.
12. development of significant teamwork and project based experience

## Syllabus:

**UNIT I:**
**Introduction to Software Engineering:** Software, Software Crisis, Software Engineering definition, Evolution of Software Engineering Methodologies, Software Engineering Challenges.
**Software Processes:** Software Process, Process Classification, Phased development life cycle, Software Development Process Models- Process, use, applicability and Advantages/limitations

**UNIT II:**
**Requirements Engineering:** Software Requirements, Requirements engineering Process, Requirements elicitation, Requirements

Analysis, Structured Analysis, Data Oriented Analysis, Object oriented Analysis, Prototyping Analysis, Requirements Specification, Requirements Validation, requirement Management.

**UNIT III:**
**Software Design:** Software Design Process, Characteristics of Good Software Design, Design Principles, Modular Design, Design Methodologies, Structured Design, Structured Design Methodology, Transform Vs Transaction Analysis.
**Object-Oriented Design:** Object oriented Analysis and Design Principles

**UNIT IV:**
**Implementation:** Coding Principles, Coding Process, Code verification, Code documentation
**Software Testing:** Testing Fundamentals, Test Planning, Black Box Testing, White Box Testing, Levels of Testing, Usability Testing, Regression testing, Debugging approaches

**UNIT V:**
**Software Project Management**: Project Management Essentials, What is Project management, Software Configuration Management.
**Project Planning and Estimation**: Project Planning activities, Software Metrics and measurements, Project Size Estimation, Effort Estimation Techniques.

**UNIT VI:**
**Software Quality:** Software Quality Factors, Verification & Validation, Software Quality Assurance, The Capability Maturity Model
**Software Maintenance:** Software maintenance, Maintenance Process Models, Maintenance Cost, Reengineering, Reengineering activities, Software Reuse.

**TEXT BOOKS:**


1. Software Engineering, concepts and practices, Ugrasen Suman, Cengage learning
2. Software Engineering, 8/e, Sommerville, Pearson.
3. Software Engineering, 7/e , Roger S.Pressman , TMH


**REFERENCE BOOKS:**


1. Software Engineering, A Precise approach, Pankaj Jalote, Wiley
2. Software Engineering principles and practice, W S Jawadekar, TMH
3. Software Engineering concepts, R Fairley, TMH

**III Year – I SEMESTER** **Data Communication** **T 4**

**Course Objectives:**

1. To have a detailed study of various analog and digital modulation and demodulation techniques
2. To have a thorough knowledge of various multiplexing schemes and Data communication protocols
3. To know about the standards and mechanisms of television systems

**Course Outcomes:**

1. Knowledge of working of basic communication systems
2. Ability to evaluate alternative models of communication system design

**Syllabus:**

**Unit I:**

**INTRODUCTION TO DATA COMMUNICATIONS AND NETWORKING**: Standards Organizations for Data Communications, Layered Network Architecture, Open Systems Interconnection, Data Communications Circuits, Serial and parallel Data Transmission, Data communications Networks, Alternate Protocol Suites.

**SIGNALS, NOISE, MODULATION, AND DEMODULATION**:Signal Analysis, Electrical Noise and Signal-to-Noise Ratio, Analog Modulation Systems, Information Capacity, Bits, Bit Rate, Baud, and *M*-ary Encoding, Digital Modulation.

**Unit II :**

**METALLIC CABLE TRANSMISSION MEDIA:** Metallic Transmission Lines, Transverse Electromagnetic Waves, Characteristics of Electromagnetic Waves

**OPTICAL FIBER TRANSMISSION MEDIA:** Advantages of Optical Fiber cables, Disadvantages of Optical Fiber Cables, Electromagnetic spectrum, Optical Fiber Communications System Block Diagram, Optical Fiber construction, Propagation of Light Through an Optical fiber Cable, Optical Fiber Modes and Classifications, Optical Fiber Comparison, Losses in Optical Fiber Cables, Light sources, Light Detectors, Lasers.

**Unit III :**

**DIGITAL TRANSMISSION:** Pulse Modulation, Pulse code Modulation, Dynamic Range, Signal Voltage –to-Quantization Noise Voltage Ratio, Linear Versus Nonlinear PCM Codes, Companding, PCM Line Speed, Delta Modulation PCM and Differential PCM.

**MULTIPLEXING AND T CARRIERS:** Time- Division Multiplexing, T1 Digital Carrier System, Digital Line Encoding, T Carrier systems, Frequency- Division Multiplexing, Wavelength-Division Multiplexing, Synchronous Optical Network

**Unit IV:**

**WIRELESS COMMUNICATIONS SYSTEMS:** Electromagnetic Polarization, Electromagnetic Radiation, Optical Properties of Radio Waves, Terrestrial Propagation of Electromagnetic Waves, Skip Distance, Free-Space Path Loss, Microwave Communications Systems, Satellite Communications Systems.

**Unit V:**

**TELEPHONE INSTRUMENTS AND SIGNALS:** The Subscriber Loop, Standard Telephone Set, Basic Telephone Call Procedures, Call Progress Tones and Signals, Cordless Telephones, Caller ID, Electronic Telephones, Paging systems.

**CELLULAR TELEPHONE SYSTEMS:** First- Generation Analog Cellular Telephone, Personal Communications system, Second-Generation Cellular Telephone Systems, N-AMPS, Digital Cellular Telephone, Interim Standard, Global system for Mobile Communications.

**Unit VI:**

**DATA COMMUNICATIONS CODES, ERROR CONTROL, AND DATA FORMATS:**

Data Communications Character Codes, Bar Codes, Error Control, Error Detection and Correction, Character Synchronization.

**DATA COMMUNICATIONS EQUIPMENT:** Digital Service Unit and Channel Service Unit, Voice- Band Data Communication Modems, Bell Systems-Compatible Voice- Band Modems, Voice-Band Modem Block Diagram, Voice- Band Modem Classifications, Asynchronous Voice-Band Modems, Synchronous Voice-Band Modems, Modem Synchronization, 56K Modems, Modem Control: The AT Command Set, Cable Modems.

**TEXT BOOKS:**

1. Introduction to Data Communications and Networking, Wayne Tomasi, Pearson Education.

**Reference Books :**

1. Data Communications and Networking, Behrouz A Forouzan, Fourth Edition.TMH.
2. Data and Computer communications, 8/e, William Stallings, PHI.
3. Computer Communications and Networking Technologies, Gallow, Second Edition Thomson
4. Computer Networking and Internet, Fred Halsll, Lingana

Gouda Kulkarni, Fifth Edition, Pearson Education

**III Year – I SEMESTER** **Advanced JAVA** **T**

**4**

**Course Objectives:**
Getting the student to be well trained in Advanced Java Programming skills for an easy entry in the IT Industry.

**Course Outcomes:**

1. Construct a Web Application using Servlets
2. Construct a Web application using Java Server Pages
3. Construct an enterprise application using Session Beans
4. Construct an enterprise application using Entity Beans linked with Database
5. Construct an asynchronous enterprise application using Message-Driven Beans
6. Map java inheritance hierarchy with database tables using various mapping techniques.
7. Persist different types of collections.

## Syllabus:

**UNIT –I:**
Recapitulation of XTML, XTML5, Java Swing package – use of System class – Applet Context – signed applet – object serialization-shallow and deep copying – Java collections –Iterators – Array Lists – sets –hashset-hash table- queue- priority queue class-vector class-comparable interface.

**UNIT – II:**
Java Beans Introduction to Java Beans, Advantages of Java Beans, BDK Introspection, Using Bound properties, Bean Info Interface, Constrained properties Persistence, Customizers, Java Beans API

**UNIT - III:**
Introduction to Servelets: Lifecycle of a Serverlet, JSDK The Servelet API, The javax.servelet Package, Reading Servelet parameters, Reading Initialization parameters. The javax.servelet HTTP package, Handling Http Request & Responses, Using Cookies-Session Tracking, servlet chaining-Security Issues.

**UNIT -IV:**
Introduction to JSP The Problem with Servelet. The Anatomy of a JSP Page, JSP Processing. JSP Application Design with MVC Setting Up and JSP Environment: Installing the Java Software Development Kit, Tomcat Server & Testing Tomcat

**UNIT - V:**

JSP Application Development: Generating Dynamic Content, Using Scripting Elements Implicit JSP Objects, Conditional Processing – Displaying Values Using an Expression to Set an Attribute, Declaring Variables and Methods Error Handling and Debugging Sharing Data Between JSP pages, Requests, and Users Passing Control and Date between Pages – Sharing Session and Application Data – Memory Usage Considerations

**UNIT - VI:**

Database Access Database Programming using JDBC Studying Javax.sql. package. Accessing MySql database- Accessing MS Access database- Accessing a Database from a JSP Page Application – Specific Database Actions Deploying JAVA Beans in a JSP Page. Introduction to struts framework.

**TEXT BOOKS:**


1. Internet and World wide web- How to program , Dietel and Nieto , Pearson. (Chapters: 3, 4, 8, 9, 10, 11, 12 to 18)
2. The Complete Reference, Java 2 , 3ed, Patrik Naughton, Herbert Schildt, TMH. (Chapters: 19, 20, 21, 22, 25, 27)
3. Java Server Pages , Hans Bergstan, Oreilly ( Chapters: 1-9)


**REFERENCE BOOKS:**


1. Jakarta Struts cook book, Bill Siggelkow, SPD, Oreilly ( Chapter 8)
2. Murach's , Beginning Java JDK5, Murach, SPD.
3. An introduction to Web Design and Programming, Wang Thomson
4. Web application technologies concepts, Knuckles, John Wiley.
5. Programming world wide web, Sebesta, Pearson
6. Building Web Applications, NIIT, PHI
7. Web Warrior Guide to Web Programing, Bai, Ekedaw, Thomas, Wiley
8. Beginneing Web Programming, Jon Duckett ,Wrox, Wiley
9. Java server pages, Pekowsky, Pearson

**III Year – I SEMESTER** **Database Management Systems** **T**

**4**

**Course Objectives:**
Provides students with theoretical knowledge and practical skills in the use of databases and database management systems in information technology applications. The logical design, physical design and implementation of relational databases are covered.

**Course Outcomes:**

1. define a Database Management System
2. give a description of the Database Management structure
3. understand the applications of Databases
4. know the advantages and disadvantages of the different models
5. compare relational model with the Structured Query Language (SQL)
6. know the constraints and controversies associated with relational database model.
7. know the rules guiding transaction ACID
8. understand the concept of data planning and Database design
9. identify the various functions of Database Administrator

## Syllabus:

**Unit – I: INTRODUCTION**
Database system, Characteristics (Database Vs File System), Database Users(Actors on Scene, Workers behind the scene), Advantages of Data base systems, Database applications.
Brief introduction of different Data Models; Concepts of Schema, Instance and data independence; Three tier schema architecture for data independence; Database system structure, environment, Centralized and Client Server architecture for the database.

**Unit – II:**
**RELATIONAL MODEL :** Introduction to relational model, concepts of domain, attribute, tuple, relation, importance of null values, constraints (Domain, Key constraints, integrity constraints) and their importance
**BASIC SQL :** Simple Database schema, data types, table definitions (create, alter), different DML operations (insert, delete, update), basic SQL querying (select and project) using where clause, arithmetic & logical operations, SQL functions(Date and Time, Numeric, String conversion).

**Unit – III:**

**Entity Relationship Model:** Introduction, Representation of entities, attributes, entity set, relationship, relationship set, constraints, sub classes, super class, inheritance, specialization, generalization using ER Diagrams.
**SQL :** Creating tables with relationship, implementation of key and integrity constraints, nested queries, sub queries, grouping, aggregation, ordering, implementation of different types of joins, view(updatable and non-updatable), relational set operations.

**Unit – IV:**
**SCHEMA REFINEMENT (NORMALIZATION) :** Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency(1NF, 2NF and 3 NF), concept of surrogate key, Boyce-codd normal form(BCNF), Lossless join and dependency preserving decomposition, Fourth normal form(4NF).

**Unit – V:**
**TRANSACTION MANAGEMENT AND CONCURRENCY CONTROL :** Transaction, properties of transactions, transaction log, and transaction management with SQL using commit rollback and savepoint.
Concurrency control for lost updates, uncommitted data, inconsistent retrievals and the Scheduler. Concurrency control with locking methods : lock granularity, lock types, two phase locking for ensuring serializability, deadlocks, Concurrency control with time stamp ordering : Wait/Die and Wound/Wait Schemes, Database Recovery management : Transaction recovery.
SQL constructs that grant access or revoke access from user or user groups. Basic PL/SQL procedures, functions and triggers.

**UNIT – VI:**
**STORAGE AND INDEXING :** Database file organization, file organization on disk, heap files and sorted files, hashing, single and multi-level indexes, dynamic multilevel indexing using B-Tree and B+ tree, index on multiple keys.

**Text Books :**


1. Database Management Systems, 3/e Raghuram Krishnan, Johannes Gehrke, TMH
2. Database Management System, 6/e Ramez Elmasri, Shamkant B. Navathe, PEA
3. Database Principles Fundamentals of Design Implementation and Management, Corlos Coronel, Steven Morris, Peter Robb, Cengage Learning.


**Reference Books :**


1. Database System Concepts. 5/e Silberschatz, Korth, TMH
2. Introduction to Database Systems, 8/e C J Date, PEA

3. The Database book principles & practice using Oracle/MySql Narain Gehani, University Press.

**III Year – I SEMESTER** **Operating Systems** **T 4**

**Course Objectives:**
To gain knowledge about the Operating Systems concepts such as process, main memory management, secondary memory management, CPU and disk scheduling etc

**Course Outcomes:**
By the end of the course student will be able to

- describe the general architecture of computers
- describe, contrast and compare differing structures for operating Systems
- understand and analyse theory and implementation of: processes, resource control (concurrency etc.), physical and virtual memory, scheduling, I/O and files

## Syllabus:

**UNIT-I:**
**Computer System and Operating System Overview:** Overview of computer operating systems, operating systems functions, protection and security, distributed systems, special purpose systems, operating systems structures and systems calls, operating systems generation.

**UNIT-II:**
**Process Management** – Process concept- process scheduling, operations, Inter process communication. Multi Thread programming models. Process scheduling criteria and algorithms, and their evaluation.

**UNIT-III:**
**Concurrency:** Process synchronization, the critical- section problem, Peterson's Solution, synchronization Hardware, semaphores, classic problems of synchronization, monitors, Synchronization examples

**UNIT-IV:**
**Memory Management:** Swapping, contiguous memory allocation, paging, structure of the page table, segmentation
**Virtual Memory Management:**
virtual memory, demand paging, page-Replacement, algorithms, Allocation of Frames, Thrashing

**UNIT-V:**

**Principles of deadlock** – system model, deadlock characterization, deadlock prevention, detection and avoidance, recovery form deadlock,

**UNIT-VI:**

**File system Interface-** the concept of a file, Access Methods, Directory structure, File system mounting, file sharing, protection.

**File System implementation-** File system structure, allocation methods, free-space management

**Mass-storage structure** overview of Mass-storage structure, Disk structure, disk attachment, disk scheduling

**TEXT BOOKS:**


1. Operating System Concepts- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley.
2. Operating Systems' – Internal and Design Principles Stallings, Sixth Edition–2005, Pearson education


**REFERENCE BOOKS:**


1. http://nptel.iitm.ac.in/courses/Webcourse-contents/IISc-BANG/ Operating%20Systems/New_index1.html
2. Operating systems- A Concept based Approach- D.M.Dhamdhere, 2nd Edition, TMH
3. Operating System A Design Approach-Crowley, TMH.
4. Modern Operating Systems, Andrew S Tanenbaum 3rd edition PHI.

**III Year – I SEMESTER** **Advanced JAVA Lab** **T 0**

**Objective :**
To give the student about the practical orientation of advanced programming in JAVA

**PROGRAMS LIST:**

1. Write a program to prompt the user for a hostname and then looks up the IP address for the hostname and displays the results.

2. Write a program to read the webpage from a website and display the contents of the webpage.

3. Write programs for TCP server and Client interaction as per given below.
   i. A program to create TCP server to send a message to client.
   ii. A program to create TCP client to receive the message sent by the server.

4. Write programs for Datagram server and Client interaction as per given below.
   i. A program to create Datagram server to send a message to client.
   ii. A program to create Datagram client to receive the message sent by the server.

5. Write a program by using JDBC to execute a SQL query for a database and display the results.

6. Write a program by using JDBC to execute an update query without using PreparedStatement and display the results.

7. Write a program by using JDBC to execute an update query by using PreparedStatement and display the results.

8. Write a program to execute a stored procedure in the database by using CallableStatement and display the results.

9. Write a program to display a greeting message in the browser by using HttpServlet.

10. Write a program to receive two numbers from a HTML form and display their sum in the browser by using HttpServlet.

11. Write a program to display a list of five websites in a HTML form and visit to the selected website by using Response redirection.

12. Write a program to store the user information into Cookies. Write another program to display the above stored information by retrieving from Cookies.

13. Write a program in Java Beans to add a Button to the Bean and display the number of times the button has been clicked.

14. Write a program for Java Bean with Simple property by using SimpleBeanInfo class.

15. Write a program for Java Bean with Indexed Property by using SimpleBeanInfo class.

16. Write a program to develop a Enterprise Java Bean of "Session Bean" type.

17. Write a program to develop a Enterprise Java Bean of "Entity Session Bean" type.

18. Write a program to develop a Enterprise Java Bean of "Message Driven Bean" type

**III Year – I SEMESTER** **Operating System Lab** **T 0**

**Objective :**

· To provide an understanding of the design aspects of operating system

**Recommended Systems/Software Requirements:**

· Intel based desktop PC with minimum of 166 MHZ or faster processor

with atleast 64 MB RAM and 100 MB free disk space

**Lab Experiments:**

1. Simulate the following CPU scheduling algorithms
   a) Round Robin b) SJF c) FCFS d) Priority

2. **.** Loading executable programs into memory and execute System Call implementation-read(), write(), open () and close()

3. . Multiprogramming-Memory management- Implementation of Fork(), Wait(), Exec() and Exit() System calls

4**.** Simulate all File allocation strategies

   a) Sequenced b) Indexed c) Linked

5. Simulate MVT and MFT

6. Simulate all File Organization Techniques

   a) Single level directory b) Two level c) **Hierarchical** d) DAG

7. Simulate Bankers Algorithm for Dead Lock Avoidance

8. Simulate Bankers Algorithm for Dead Lock Prevention.

9. Simulate all page replacement algorithms.
   a) FIFO b) LRU c) LFU etc….

10**.** Simulate Paging Technique of memory management.

**III Year – I SEMESTER** **Database Management Systems Lab** **T 0**

**Objectives:**

· To teach the student database design and query and PL/SQL.

**System/Software Requirements:**

· Intel based desktop PC
· Mysql /Oracle latest version Recommended

**PROGRAMS LIST:**

1) Creation, altering and droping of tables and inserting rows into a table (use constraints while creating tables) examples using SELECT command.

2) Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints.
Example:- Select the roll number and name of the student who secured fourth rank in the class.

3) Queries using Aggregate functions (COUNT, SUM, AVG, MAX and
MIN), GROUP BY, HAVING and Creation and dropping of Views.

4) Queries using Conversion functions (to_char, to_number and to_date), string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), date functions (Sysdate, next_day, add_months, last_day, months_between, least, greatest, trunc, round, to_char, to_date)

5)
i)Creation of simple PL/SQL program which includes declaration section, executable section and exception –Handling section (Ex. Student marks can be selected from the table and printed for those who secured first class and an exception can be raised if no records were found)

ii)Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.

6) Develop a program that includes the features NESTED IF, CASE and CASE expression. The program can be extended using the NULLIF and COALESCE functions.

7) Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT –IN Exceptions, USE defined Exceptions, RAISE- APPLICATION ERROR.

8) Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES.
9) Program development using creation of stored functions, invoke functions in SQL Statements and write complex functions.

10) Program development using creation of package specification, package bodies, private objects, package variables and cursors and calling stored packages.

11) Develop programs using features parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of clause and CURSOR variables.

12) Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers

**TEXT BOOKS :**


1) ORACLE PL/SQL by example. Benjamin Rosenzweig, Elena Silvestrova, Pearson Education 3rd Edition
2) ORACLE DATA BASE LOG PL/SQL Programming SCOTT URMAN, Tata Mc-Graw Hill.
3) SQL & PL/SQL for Oracle 10g, Black Book, Dr.P.S. Deshpande.
4) Data Base Management System, Oracle SQL and PL/SQL, Pranab kumar Das Gupta, P Radha Krishna, PHI

**III Year – I SEMESTER** **Linux Programming Lab** **T 0**

**Objectives:**
To give a practical orientation of programming in Linux environment using system calls and advanced concepts in unix programming

**PROGRAMS LIST:**

1. Write C programs that uses open, read, write system calls.
2. Write C programs that differentiates FILE *( file stream pointers in C standard library) and file descriptors by using functions such as fdopen, fileno.
3. Write a C program which displays a given files meta data by using stat system call and st_mode structure.
4. Write a C program which lists all the files of current working directory whose size is more than given number of data blocks.
5. Write a C program which lists all the files of current working directory which contains hard link files.
6. Write a C program to emulates file system checking utility (fsck command) using system calls.
7. Example C program which supports that child process inherits environment variables, command line arguments, opened' files.
8. Simple C programs to have process trees and process chains.
9. Simple C program that demonstrates the failure of fork system call because of crossing system limits.
10. Simple C programs to demonstrate the use of pipe system call for inter process communication and also emulating piping in shell.
11. Simple C programs to demonstrate the use of popen standard library function call for inter process communication and also emulating piping in shell.
12. Simple C program to use named pipes for inter process communication.
13. Simple C programs to illustrate the use of exec family of functions.
14. Write a C program which emulates simple shell.
15. Write C program to create a thread using pthreads library and let it run its function.
16. Write a C program to illustrate concurrent execution of threads using pthreads library.
17. Write a C program to simulate ptrhead_create function failure by repeatedly calling the same.

18. Write a C program which creates a thread using pthread and passes arguments to the thread function.
19. Write C programs which uses sigset, sifillset, sigprocmask, related system calls and structures.
20. Write a C program to simulate memory segment violation run time error and implement a signal handler (both reliable and unreliable) which handles situation.
21. Write a C program to illustrate the use of sbrk system call.
22. Write a C program to illustrate inter process communication via message queues.
23. Write a C program to illustrate inter process communication via shared memory.
24. Write a C program to simulate producer and consumer problem using semaphores, shared memory, and fork.
25. Write a C program to simulate producer and consumer problem using semaphores, shared memory, and pthread_create.
26. Write a C program to simulate producer and consumer problem using muexes, shared memory, and threads.
27. Write socket Programs in C for Echo/Ping/Talk Commands.
28. Create a Socket (TCP) between two computers and enable file transfer between them.
29. Write a Program to implement Remote Command Execution.
30. Write a code simulating ARP/RARP.

**III Year – I SEMESTER**

| T | P | C |
|---|---|---|
| 2 | 0 | 0 |

## INTELLECTUAL PROPERTY RIGHTS AND PATENTS – 1

**Unit 1**

Introduction to Intellectual Property Law – The Evolutionary Past - The IPR Tool Kit- Para -Legal Tasks in Intellectual Property Law – Ethical obligations in Para Legal Tasks in Intellectual Property Law - Introduction to Cyber Law

– Innovations and Inventions Trade related Intellectual Property Right

**Unit 2**

Introduction to Trade mark – Trade mark Registration Process – Post registration procedures – Trade mark maintenance - Transfer of Rights - Inter partes Proceeding – Infringement - Dilution Ownership of Trade mark

– Likelihood of confusion - Trademarks claims – Trade marks Litigations – International Trade mark Law –

**Unit 3**

Introduction to Copyrights – – Principles of Copyright Principles -The subjects Matter of Copy right – The Rights Afforded by Copyright Law – Copy right Ownership, Transfer and duration – Right to prepare Derivative works – Rights of Distribution – Rights of Perform the work Publicity Copyright Formalities and Registrations - Limitions - Copyright disputes and International Copyright Law – Semiconductor Chip Protection Act

**Unit 4**

Introduction to Trade Secret – Maintaining Trade Secret – Physical Secrurity –Employee Limitation - Employee confidentiality agreement - Trade Secret Law - Unfair Competation – Trade Secret Letigation – Breach of Contract – Applying State Law

**Books:**


1. Deborah E.Bouchoux: “Intellectual Property”. Cengage learning , New Delhi
2. Kompal Bansal & Parishit Bansal "Fundamentals of IPR for Engineers", BS Publications (Press)
3. Cyber Law. Texts & Cases, South-Western’s Special Topics Collections
4. Prabhuddha Ganguli: ‘ Intellectual Property Rights” Tata Mc-Graw – Hill, New Delhi
5. Richard Stim: "Intellectual Property", Cengage Learning, New Delhi.
6. R. Radha Krishnan, S. Balasubramanian: "Intellectual Property Rights", Excel Books. New Delhi.
7. M.Ashok Kumar and Mohd.Iqbal Ali: “Intellectual Property Right” Serials Pub.

**III Year – I SEMESTER**

| T | P | C |
|---|---|---|
| 0 | 0 | 1 |

## Seminar

**III Year – II SEMESTER**

| T | P | C |
|---|---|---|
| 4 | 0 | 3 |

# Computer Networks

## Course Objectives:

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

1. Build an understanding of the fundamental concepts of computer networking.
2. Familiarize the student with the basic taxonomy and terminology of the computer networking area.
3. Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.

## Course Outcomes:

After completing this course the student must demonstrate the knowledge and ability to:

1. Independently understand basic computer network technology.
2. Identify the different types of network topologies and protocols.
3. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.

## Syllabus:

**UNIT – I :**

**Introduction**: OSI overview, TCP/IP and other networks models, Examples of Networks: Novell Networks, Arpanet, Internet, Network Topologies WAN, LAN, MAN.

**UNIT – II :**

**Physical Layer and overview of PL Switching**: Multiplexing: frequency division multiplexing, wave length division multiplexing, synchronous time division multiplexing, statistical time division multiplexing, introduction to switching: Circuit Switched Networks, Datagram Networks, Virtual Circuit Networks.

**UNIT – III:**

**Data link layer**: Design issues, **Framing**: fixed size framing, variable size framing, flow control, error control, error detection and correction, CRC, Checksum: idea, one's complement internet checksum, services provided to Network Layer, **Elementary Data Link Layer protocols**: simplex protocol, Simplex stop and wait, Simplex protocol for Noisy Channel.

**Sliding window protocol**: One bit, Go back N, Selective repeat-Stop and wait protocol, Data link layer in HDLC: configuration and transfer modes, frames, control field, point to point protocol (PPP): framing transition phase, multiplexing, multi link PPP.

**UNIT – IV :**

**Random Access**: ALOHA, MAC addresses, Carrier sense multiple access (CSMA), CSMA with Collision Detection, CSMA with Collision Avoidance, Controlled Access: Reservation, Polling, Token Passing, Channelization: frequency division multiple access(FDMA), time division multiple access(TDMA), code division multiple access(CDMA).

**Network Layer**: Virtual circuit and Datagram subnets-Routing algorithm shortest path routing, Flooding, Hierarchical routing, Broad cast, Multi cast, distance vector routing.

**UNIT –V :**

**IEEE Standards**: – data link layer, physical layer, Manchester encoding, Standard Ethernet: MAC sub layer, physical layer, Fast Ethernet: MAC sub layer, physical layer, IEEE-802.11: Architecture, MAC sub layer, addressing mechanism, frame structure.

**UNIT –VI :**

**Application layer (WWW and HTTP):** ARCHITECTURE : Client (Browser) ,Server ,Uniform Resource Locator HTTP: HTTP Transaction, HTTP Operational Model and Client/Server Communication, HTTP Generic Message Format, HTTP Request Message Format, HTTP Response Message Format

**The wireless web :** WAP—The Wireless Application Protocol

**TEXT BOOKS :**

1. Data Communications and Networks – Behrouz A. Forouzan.Third Edition TMH.
2. Computer Networks, 5ed, David Patterson, Elsevier
3. Computer Networks — Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI
4. Computer Networks, Mayank Dave, CENGAGE

**REFERENCES :**

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education
2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson

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# Data Ware housing and Mining

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

**Course Outcomes:**
1. understand why there is a need for data warehouse in addition to traditional operational database systems;
2. identify components in typical data warehouse architectures;
3. design a data warehouse and understand the process required to construct one;
4. understand why there is a need for data mining and in what ways it is different from traditional statistical techniques;
5. understand the details of different algorithms made available by popular commercial data mining software;
6. solve real data mining problems by using the right tools to find interesting patterns

**Syllabus:**

**UNIT –I:**
**Introduction :** What Motivated Data Mining? Why Is It Important, Data Mining—On What Kind of Data, Data Mining Functionalities—What Kinds of Patterns Can Be Mined? Are All of the Patterns Interesting? Classification of Data Mining Systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or Data Warehouse System, Major Issues in Data Mining. **(Han & Kamber)**

**UNIT –II:**
**Data Pre-processing :** Why Pre-process the Data? Descriptive Data Summarization, Data Cleaning, Data Integration and Transformation, Data Reduction, Data Discretization and Concept Hierarchy Generation. **(Han & Kamber)**

**UNIT –III:**
**Data Warehouse and OLAP Technology: An Overview :** What Is a Data Warehouse? A Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, From Data Warehousing to Data Mining. **(Han & Kamber)**

**UNIT –IV:**
**Classification :** Basic Concepts, General Approach to solving a classification problem, Decision Tree Induction: Working of Decision Tree, building a decision tree, methods for expressing an attribute test conditions, measures for selecting the best split, Algorithm for decision tree induction.
**Model Over fitting:** Due to presence of noise, due to lack of representation samples, evaluating the performance of classifier: holdout method, random sub sampling, cross-validation, bootstrap. **(Tan & Vipin)**

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

**UNIT –VI**
**Cluster Analysis: Basic Concepts and Algorithms :** What Is Cluster Analysis? Different Types of Clustering, Different Types of Clusters, K-means, The Basic K-means Algorithm, K-means: Additional Issues, Bisecting K-means, K-means and Different Types of Clusters, Strengths and Weaknesses, K-means as an Optimization Problem, Agglomerative Hierarchical Clustering, Basic Agglomerative Hierarchical Clustering Algorithm, Specific Techniques, DBSCAN, Traditional Density: Center-Based Approach, The DBSCAN Algorithm, Strengths and Weaknesses. **(Tan & Vipin)**

**Text Books :**

1. Introduction to Data Mining : Pang-Ning Tan & Michael Steinbach, Vipin Kumar, Pearson.
2. Data Mining concepts and Techniques, 3/e, Jiawei Han, Michel Kamber, Elsevier.

**Reference Books :**

1. Data Mining Techniques and Applications: An Introduction, Hongbo Du, Cengage Learning.
2. Data Mining : Introductory and Advanced topics : Dunham, Pearson.
3. Data Warehousing Data Mining & OLAP, Alex Berson, Stephen Smith, TMH.
4. Data Mining Techniques, Arun K Pujari, Universities Press.

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# Design and Analysis of Algorithms

**Course Objectives:**

Upon completion of this course, students will be able to do the following:

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

**Course Outcomes:**

Students who complete the course will have demonstrated the ability to do the following:

- Analyze worst-case running times of algorithms using asymptotic analysis.
- Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it.
- Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it.
- Describe the greedy paradigm and explain when an algorithmic design situation calls for it.
- Explain the major graph algorithms and their analyses. Employ graphs to model engineering problems, when appropriate. Synthesize new graph algorithms and algorithms that employ graph computations as key components, and analyze them.
- Explain the different ways to analyze randomized algorithms (expected running time, probability of error). Recite algorithms that employ randomization. Explain the difference between a randomized algorithm and an algorithm with probabilistic inputs.
- Analyze randomized algorithms. Employ indicator random variables and linearity of expectation to perform the analyses. Recite analyses of algorithms that employ this method of analysis.

**Syllabus:**

**UNIT-I:**
Introduction: Algorithm, Psuedo 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 analysis.

**UNIT-II:**
Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort

**UNIT-III:**

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

**UNIT-IV:**
Dynamic Programming: General method, applications-Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Travelling sales person problem, Reliability design.

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

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

**TEXT BOOKS:**


1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharam, Universities Press.
2. Design and Analysis of Algorithms , S Sridhar, Oxford
3. Design and Analysis of Algorithms, Parag Himanshu Dave, Himansu BAlachandra Dave, 2ed,Pearson Education.


**REFERENCE BOOKS:**


1. Design and Analysis of algorithms, Aho, Ullman and Hopcroft,Pearson education.
2. Introduction to the Design and Analysis of Algorithms, Anany Levitin, PEA
3. Introduction to Algorithms, second edition, T.H.Cormen, C.E.Leiserson, R.L.Rivest and C.Stein,PHI Pvt. Ltd.
4. Algorithm Design, Foundation, Analysis and internet Examples, Michel T Goodrich, Roberto Tamassia, Wiley

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# Software Testing

**Course Objectives:**

1. To study fundamental concepts in software testing, including software testing objectives, process, criteria, strategies, and methods.
2. To discuss various software testing issues and solutions in software unit test; integration, regression, and system testing.
3. To learn how to planning a test project, design test cases and data, conduct testing operations, manage software problems and defects, generate a testing report.
4. To expose the advanced software testing topics, such as object-oriented software testing methods, and component-based software testing issues, challenges, and solutions.
5. To gain software testing experience by applying software testing knowledge and methods to practice-oriented software testing projects.
6. To understand software test automation problems and solutions.
7. To learn how to write software testing documents, and communicate with engineers in various forms.
8. To gain the techniques and skills on how to use modern software testing tools to support software testing projects.

**Course Outcomes:**

By the end of the course, the student should:

1. Have an ability to apply software testing knowledge and engineering methods.
2. Have an ability to design and conduct a software test process for a software testing project.
3. Have an ability to identify the needs of software test automation, and define and develop a test tool to support test automation.
4. Have an ability understand and identify various software testing problems, and solve these problems by designing and selecting software test models, criteria, strategies, and methods.
5. Have an ability to use various communication methods and skills to communicate with their teammates to conduct their practice-oriented software testing projects.
6. Have basic understanding and knowledge of contemporary issues in software testing, such as component-based software testing problems
7. Have an ability to use software testing methods and modern software testing tools for their testing projects.

## Syllabus:

**UNIT I:**

**Software Testing:** Introduction, Evolution, Myths & Facts, Goals, Psychology, Definition, Model for testing, Effective Vs Exhaustive Software Testing.

**Software Testing Terminology and Methodology:** Software Testing Terminology, Software Testing Life Cycle, relating test life cycle to development life cycle, Software Testing Methodology.

**UNIT II:**

**Verification and Validation:** Verification & Validation Activities, Verification, Verification of Requirements, High level and low level designs, How to verify code, Validation

**Dynamic Testing I: Black Box testing techniques:** Boundary Value Analysis, Equivalence class Testing, State Table based testing, Decision table based testing, Cause-Effect Graphing based testing, Error guessing

**UNIT III:**

**Dynamic Testing II: White-Box Testing:** need, Logic coverage criteria, Basis path testing, Graph matrices, Loop testing, data flow testing, mutation testing

**Static Testing:** inspections, Structured Walkthroughs, Technical reviews

**UNIT IV:**

**Validation activities:** Unit testing, Integration Testing,. Function testing, system testing, acceptance testing

**Regression testing:** Progressives Vs regressive testing, Regression testability, Objectives of regression testing, When regression testing done?, Regression testing types, Regression testing techniques

**UNIT V:**

**Efficient Test Suite Management:** Test case deisgnWhy does a test suite grow, Minimizing the test suite and its benefits, test suite prioritization, Types of test case prioritization, prioritization techniques, measuring the effectiveness of a prioritized test suite

**Software Quality Management:** Software Quality metrics, SQA models

Debugging: process, techniques, correcting bugs, Basics of testing management tools, test link and Jira

**UNIT VI:**

**Automation and Testing Tools:** need for automation, categorization of testing tools, selection of testing tools, Cost incurred, Guidelines for automated testing, overview of some commercial testing tools.

**Testing Object Oriented Software:** basics, Object oriented testing

**Testing Web based Systems:** Challenges in testing for web based software, quality aspects, web engineering, testing of web based systems, Testing mobile systems

**Text Books:**


1. Software Testing, Principles and Practices, Naresh Chauhan, Oxford
2. Foundations of Software testing, Aditya P Mathur, 2ed, Pearson
3. Software Testing- Yogesh Singh, CAMBRIDGE


**Reference books:**


1. *Software testing techniques - Baris Beizer, International Thomson computer press, second edition.*
2. Software Testing, Principles, techniques and Tools, M G Limaye, TMH
3. Effective Methods for Software testing, Willian E Perry, 3ed, Wiley

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# Web Technologies

**Course Objectives:**

This course is designed to introduce students with no programming experience to the programming languages and techniques associated with the World Wide Web. The course will introduce web-based media-rich programming tools for creating interactive web pages.

**Course Outcomes:**

1. Analyze a web page and identify its elements and attributes.
2. Create web pages using XHTML and Cascading Styles sheets.
3. Build dynamic web pages .
4. Build web applications using PHP.
5. Programming through PERL and Ruby
6. write simple client-side scripts using AJAX

**Syllabus:**

**UNIT-I:**

HTML tags, Lists, Tables, Images, forms, Frames. Cascading style sheets. Introduction to Java script. Objects in Java Script. Dynamic HTML with Java Script

**UNIT-II:**

**Working with XML:** Document type Definition, XML schemas, Document object model, XSLT, DOM and SAX.

**UNIT-III:**

**AJAX A New Approach:** Introduction to AJAX, Integrating PHP and AJAX. Consuming WEB services in AJAX**:** (SOAP, WSDL,UDDI)

**UNIT-IV:**

**PHP Programming: Introducing PHP:** Creating PHP script, Running PHP script. **Working with variables and constants:** Using variables,Using constants,Data types,Operators.**Controlling program flow:** Conditional statements,Control statements,Arrays,functions.Working with forms and Databases such as mySql, Oracle, SQL Sever.

**UNIT-V:**

Introduction to PERL, Perl language elements, Interface with CGI- A form to mail program, Simple page search

**UNIT-VI:**

Introduction to Ruby, variables, types, simple I/O, Control, Arrays, Hashes, Methods, Classes, Iterators, Pattern Matching, Practical Web Applications

**Text Books:**


1. Programming the World Wide Web, Robet W Sebesta, 7ed, Pearson.
2. Web Technologies, Uttam K Roy, Oxford
3. The Web Warrior Guide to Web Programming, Bai, Ekedahl, Farrelll, Gosselin, Zak, Karparhi, Maclntyre, Morrissey, Cengage


**Reference Books:**


1. Ruby on Rails Up and Running, Lightning fast Web development, Bruce Tate, Curt Hibbs, Oreilly ( 2006)
2. Programming Perl, 4ed, Tom Christiansen, Jonathan Orwant, Oreilly (2012)
3. Web Technologies, HTML< JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech.
4. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage

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# Computer Networks & Network Programming Lab

**Objectives:**
· To teach students practicle orientation of f networking concepts
· To teach students various forms of IPC through Unix and socket Programming

## PART – A

1. **I**mplement the data link layer framing methods such as 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 art each node using distance vector routing algorithm
5. Take an example subnet of hosts. Obtain broadcast tree for it.

## PART – B

1. Implement the following forms of IPC.
   a)Pipes b)FIFO
2. Implement file transfer using Message Queue form of IPC
3. Write a programme to create an integer variable using shared memory concept and increment the variable
4. simultaneously by two processes. Use senphores to avoid race conditions
5. Design TCP iterative Client and server application to reverse the given input sentence
6. Design TCP iterative Client and server application to reverse the given input sentence
7. Design TCP client and server application to transfer file
8. Design a TCP concurrent server to convert a given text into upper case using multiplexing system call "select"
9. Design a TCP concurrent server to echo given set of sentences using poll functions
10. Design UDP Client and server application to reverse the given input sentence
11. Design UDP Client server to transfer a file
12. Design using poll client server application to multiplex TCP and UDP requests for converting a given text into upper case.
13. Design a RPC application to add and subtract a given pair of integers

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# Software Testing Lab

## Lab Assignments

**Problem Statement 01**
Consider an automated banking application. The user can dial the bank from a personal computer, provide a six-digit password, and follow with a series of keyword commands that activate the banking function. The software for the application accepts data in the following form:

| | |
|---|---|
| Area Code | Blank or three-digit number |
| Prefix | Three-digit number, not beginning with 0 or 1 |
| Suffix | Four-digit number |
| Password | Six-character alphanumeric |
| Commands | "Check status", "Deposit", "Withdrawal" |

Design adhoc test cases to test the system

**Problem Statement 02**
Consider an automated banking application. The user can dial the bank from a personal computer, provide a six-digit password, and follow with a series of keyword commands that activate the banking function. The software for the application accepts data in the following form:

| | |
|---|---|
| Area Code | Blank or three-digit number |
| Prefix | Three-digit number, not beginning with 0 or 1 |
| Suffix | Four-digit number |
| Password | Six-character alphanumeric |
| Commands | "Check status", "Deposit", "Withdrawal" |

Design the test cases to test the system using following Black Box testing technique:
BVA, Worst BVA, Robust BVA, Robust Worst BVA
Equivalence class testing (Input/Output domain)

**Problem Statement 03**
Consider an application that is required to validate a number according to the following simple rules:
1. A number can start with an optional sign.
2. The optional sign can be followed by any number of digits.
3. The digits can be optionally followed by a decimal point, represented by a period.
4. If there is a decimal point, then there should be two digits after the decimal.
5. Any number-whether or not it has a decimal point, should be terminated a blank.
6. A number can start with an optional sign.
7. The optional sign can be followed by any number of digits.
8. The digits can be optionally followed by a decimal point, represented by a period.
9. If there is a decimal point, then there should be two digits after the decimal.

10. Any number-whether or not it has a decimal point, should be terminated a blank. Generate test cases to test valid and invalid numbers.
**(HINT)** Use Decision table and cause-effect graph to generate test cases.

**Problem Statement 04**
Generate test cases using Black box testing technique to Calculate Standard Deduction on
Taxable Income. The standard deduction is higher for tax payers who are 65 or older or blind. Use the method given below to calculate tax.

1. The first factor that determines the standard deduction is the filing status. The basic standard deduction for the various filing status are:

| | |
|---|---|
| Single | $4,750 |
| Married, filing a joint return | $9,500 |
| Married, filing a separate return | $7,000 |

2. If a married couple is filing separate returns and one spouse is not taking standard
Deduction, the other spouse also is not eligible for standard deduction.

3. An additional $1,000 is allowed as standard deduction, if either the filer is 65 yrs or the spouse is 65 yrs or older (the latter case applicable when the filing status is "Married" and filing "joint").

4. An additional $1,000 is allowed as standard deduction, if either the filer is blind or the spouse is blind (the latter case applicable when the filing status is
"married" and filing "joint").

**(HINT):**
From the above description, it is clear that the calculation of standard deduction depends on the following 3 factors:
1. Status of filing of the filer
2. Age of the filer
3. Whether the filer is blind or not

In addition, in certain cases, the following additional factors also come into play in calculating the standard deduction.
1. Whether spouse has claimed standard deduction
2. Whether spouse is blind
3. Whether the spouse is more than 65 years old

**Problem Statement 05**
Consider the following program segment:

```
1. int max (int i, int j, int k)
2. {
3. int max;
4. if (i>j) then
5. if (i>k) then max=i;
6. else max=k;
7. else if (j > k) max=j
8. else max=k
9. return (max);
10. }
```

a) Draw the control flow graph for this program segment
b) Determine the cyclomatic complexity for this program
c) Determine the independent paths

**Problem Statement 06**
Source code of simple insertion sort implementation using array in ascending order in c programming language

```
#include<stdio.h>
int main(){
int i,j,s,temp,a[20];
Printf ("Enter total elements: "); Scanf ("%d",&s);
printf("Enter %d elements: ",s); for(i=0;i<s;i++) scanf("%d",&a[i]); for(i=1;i<s;i++){
temp=a[i]; j=i-1; while((temp<a[j])&&(j>=0)){ a[j+1]=a[j];
j=j-1;
}
a[j+1]=temp;
}
printf("After sorting: ");
for(i=0;i<s;i++)
printf(" %d",a[i]);
return 0;
}
```

HINT: for loop is represented as while loop

a) Draw the program graph for given program segment b) Determine the DD path graph
c) Determine the independent paths
d) Generate the test cases for each independent path

**Problem Statement 07**

Consider a system having an FSM for a stack having the following states and transitions:

**States**

Initial: Before creation
Empty: Number of elements = 0
Holding: Number of elements > 0, but less than the maximum capacity
Full: Number elements = maximum
Final: After destruction
Initial to Empty: Create
Empty to Holding, Empty to Full, Holding to Holding, Holding to Full: Add
Empty to Final, Full to Final, Holding to Final: Destroy
Holding to Empty, Full to Holding, Full to Empty: Delete

Design test cases for this FSM using state table-based testing.

**Problem Statement 08**

Given the following fragment of code, how many tests are required for 100% decision coverage? Give the test cases**.**

```
if width > length
then biggest_dimension = width if height > width
then biggest dimension = height end_if
else if biggest dimension = length then if height > length
then biggest_dimension = height end_if
end_if end_if
```

**Hint** 04 test cases

**Problem Statement 09**

Given the following code, how much minimum number of test cases is required for full statement and branch coverage?

```
read p read q
if p+q> 100
then print "Large" endif
```

```
if p > 50
then print "p Large" endif
```

**Hint** 1 test for statement coverage, 2 for branch coverage

**Problem Statement 10**
Consider a program to input two numbers and print them in ascending order given below. Find all du paths and identify those du-paths that are not feasible. Also find all dc paths and generate the test cases for all paths (dc paths and non dc paths).

```
#include<stdio.h>
#include<conio.h>
1. void main ()
2. {
3 int a, b, t;
4. Clrscr ();
5. Printf ("Enter first number");
6. scanf ("%d",&a);
7. printf("Enter second number");
8. scanf("%d",&b);
9. if (a<b){
10. t=a;
11a=b;
12 b=t;
13}
14. printf ("%d %d", a, b);
15 getch ();
}
```

**Problem Statement 11**
Consider the above program and generate possible program slices for all variables. Design at least one test case from every slice.

**Problem Statement 12**
Consider the code to arrange the nos. in ascending order. Generate the test cases for relational coverage, loop coverage and path testing. Check the adequacy of the test cases through mutation testing and also compute the mutation score for each.

```
i = 0;
n=4; //N-Number of nodes present in the graph
While (i<n-1) do j = i + 1;
While (j<n) do
if A[i]<A[j] then swap (A[i], A[j]); end do;
i=i+1;
end do
```

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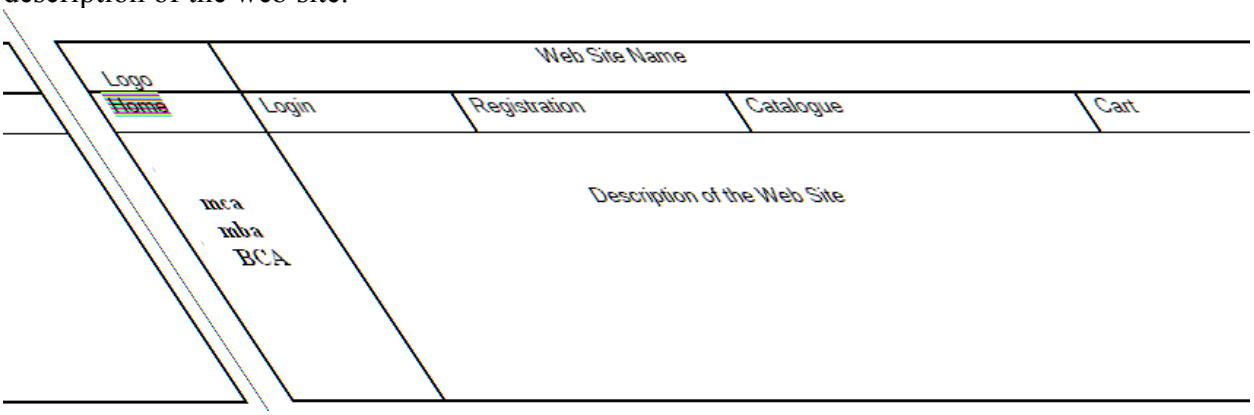
## Web Technologies Lab

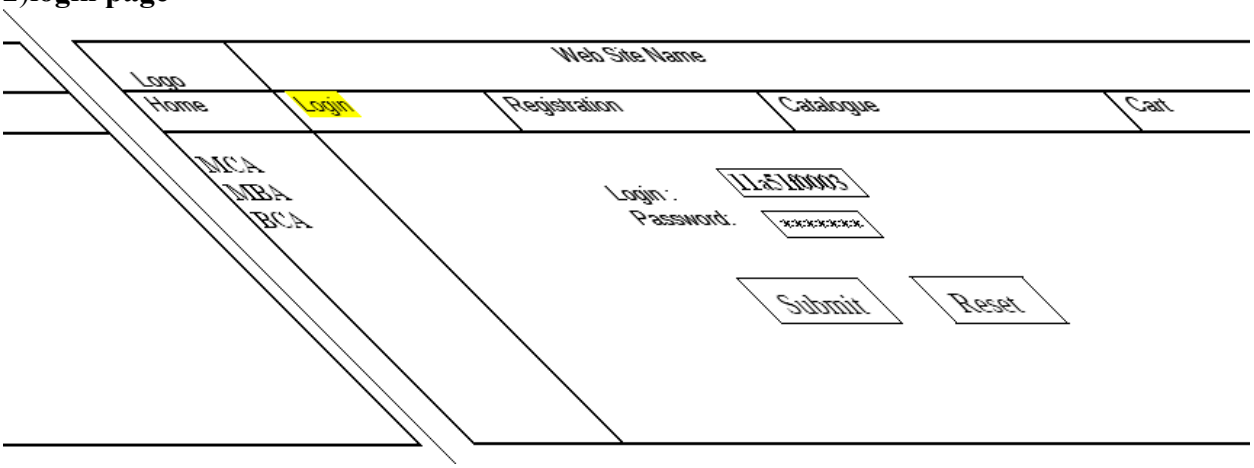
1. Design the following static web pages required for an online book store web site.

1) **HOME PAGE:**

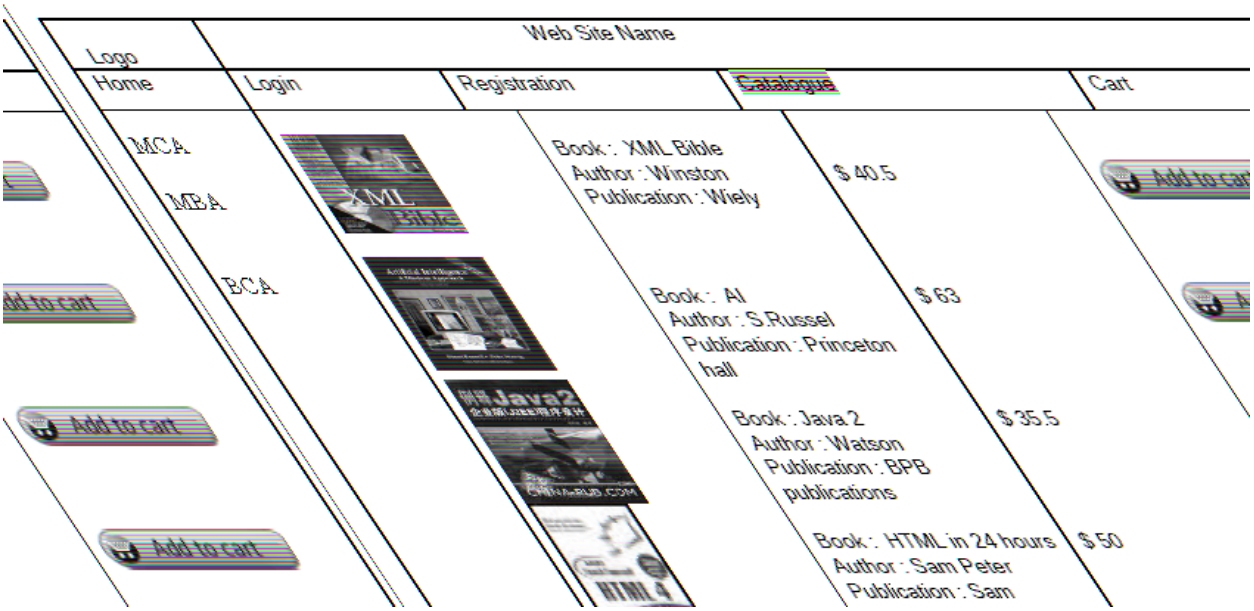
The static home page must contain three **frames**.
Top frame : Logo and the college name and links to Home page, Login page, Registration page, Catalogue page and Cart page (the description of these pages will be given below).
Left frame : At least four links for navigation, which will display the catalogue of respective links.
For e.g.: When you click the link **"MCA"** the catalogue for MCA Books should be displayed in the Right frame.
Right frame: The *pages to the links in the left frame must be loaded here*. Initially this page contains description of the web site.




2)**login page**




3) **CATOLOGUE PAGE:**
The catalogue page should contain the details of all the books available in the web site in a table.
The details should contain the following:
1. Snap shot of Cover Page.
2. Author Name.
3. Publisher.
4. Price.
5. Add to cart button.




4. **REGISTRATION PAGE:**
Create a "*registration form* "with the following fields
1) Name (Text field)
2) Password (password field)
3) E-mail id (text field)
4) Phone number (text field)
5) Sex (radio button)
6) Date of birth (3 select boxes)
7) Languages known (check boxes – English, Telugu, Hindi, Tamil)
8) Address (text area)

5. Design a web page using **CSS (C**ascading **S**tyle **S**heets**)** which includes the following:
1) Use different font, styles:
In the style definition you define how each selector should work (font, color etc.).
Then, in the body of your pages, you refer to these selectors to activate the styles

6. Write an XML file which will display the Book information which includes the following:
1) Title of the book
2) Author Name
3) ISBN number
4) Publisher name
5) Edition
6) Price
Write a Document Type Definition (DTD) to validate the above XML file.

7. Write Ruby program reads a number and calculates the factorial value of it and prints the same.

8. Write a Ruby program which counts number of lines in a text file using its regular expressions facility.

9. Write a Ruby program that uses iterator to find out the length of a string.

10. Write simple Ruby programs that uses arrays in Ruby.

11. Write programs which uses associative arrays concept of Ruby.

12. Write Ruby program which uses Math module to find area of a triangle.

13. Write Ruby program which uses tk module to display a window

14. Define complex class in Ruby and do write methods to carry operations on complex objects.

15. Write a program which illustrates the use of associative arrays in perl.

16. Write perl program takes a set names along the command line and prints whether they are regular files or special files

17. Write a perl program to implement UNIX `passwd' program

18. An example perl program to connect to a MySQl database table and executing simple commands.

19. Example PHP program for cotactus page.

**20. User Authentication :**
Assume four users user1,user2,user3 and user4 having the passwords pwd1,pwd2,pwd3 and pwd4 respectively. Write a PHP for doing the following.
1. Create a Cookie and add these four user id's and passwords to this Cookie.
2. Read the user id and passwords entered in the Login form (week1) and authenticate with the values (user id and passwords ) available in the cookies.
If he is a valid user(i.e., user-name and password match) you should welcome him by name(user-name) else you should display " You are not an authenticated user ''.
Use init-parameters to do this.

21. Example PHP program for registering users of a website and login.

22. Install a database(Mysql or Oracle).
Create a table which should contain at least the following fields: name, password, email-id, phone number(these should hold the data from the registration form).
Write a PHP program to connect to that database and extract data from the tables and display them. Experiment with various SQL queries.
Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration page (week2).

**23.** Write a PHP which does the following job:
Insert the details of the 3 or 4 users who register with the web site (week9) by using registration form. Authenticate the user when he submits the login form using the user name and password from the database ( similar to week8 instead of cookies).

**24.** Create tables in the database which contain the details of items (books in our case like Book name , Price, Quantity, Amount ) of each category. Modify your catalogue page (week 2)in such a way that you should connect to the database and extract data from the tables and display them in the catalogue page using PHP

**25. HTTP** is a stateless protocol. Session is required to maintain the state.
The user may add some items to cart from the catalog page. He can check the cart page for the selected items. He may visit the catalogue again and select some more items. Here our interest is the selected items should be added to the old cart rather than a new cart. Multiple users can do the same thing at a time(i.e., from different systems in the LAN using the ip-address instead of localhost). This can be achieved through the use of sessions. Every user will have his own session which will be created after his successful login to the website. When the user logs out his session should get invalidated (by using the method session.invalidate() ).
Modify your catalogue and cart PHP pages to achieve the above mentioned functionality using sessions.

**III Year – II SEMESTER** **T P C**

**2 0 0**

# INTELLECTUAL PROPERTY RIGHTS AND PATENTS - II

**UNIT - I**

Intellectual Property Law Basics – Types of Intellectual Property – Agencies responsible for Intellectual Property Regristration - Cyber crime and E-commerce – International Aspects of Computer and Online Crime

**UNIT - II**

Introduction to Patent Law – Rights and Limitations – Rights under Patent Law –Patent requirements - Ownership - Transfer - Patents Application Process – Patent Infringement - Patent Litigation - International Patent Law – Double Patenting – Patent Searching – Patent Law Treaty - New developments in Patent Law - Invention Developers and Promoters

**UNIT - III**

Introduction to Transactional Law: Creating Wealth and Managing Risk – The Employment Relationship in the Internet and Tech Sector – Contact for the Internet and Tech Sector - Business Assets in Information Age – Symbol and Trademark – Trolls and Landmines and other Metaphors

**UNIT - IV**

Regulatory , Compliance and Liability Issues – State Privacy Law - Date Security – Privacy issues - Controlling Over use or Misuse of 1 Intellectual Property Rights

**BOOKS:**


1. Deborah E.Bouchoux: “Intellectual Property”. Cengage learning , New Delhi
2. Kompal Bansal & Parishit Bansal "Fundamentals of IPR for Engineers", BS Publications (Press)
3. Cyber Law. Texts & Cases, South-Western’s Special Topics Collections
4. Prabhuddha Ganguli: ‘ Intellectual Property Rights” Tata Mc-Graw – Hill, New Delhi
5. Richard Stim: "Intellectual Property", Cengage Learning, New Delhi.
6. R. Radha Krishnan, S. Balasubramanian: "Intellectual Property Rights", Excel Books. New Delhi.
7. M.Ashok Kumar and Mohd.Iqbal Ali: “Intellectual Property Right” Serials Pub.

**IV Year – I SEMESTER** **T P C**

**4 0 3**

# Cryptography and Network Security

**Course objectives:**

The main objective of this course is to teach students to understand and how to address various software security problems in a secure and controlled environment. During this course the students will gain knowledge (both theoretical and practical) in various kinds of software security problems, and techniques that could be used to protect the software from security threats. The students will also learn to understand the "modus operandi" of adversaries; which could be used for increasing software dependability.

**Course outcomes:**

1. be able to individually reason about software security problems and protection techniques on both an abstract and a more technically advanced level.
2. be able to individually explain how software exploitation techniques, used by adversaries, function and how to protect against them.

## Syllabus:

**UNIT I : Classical Encryption Techniques**

**Objectives:** *The Objectives of this unit is to present an overview of the main concepts of cryptography, understand the threats & attacks, understand ethical hacking.*

**Introduction:** Security attacks, services & mechanisms, Symmetric Cipher Model, Substitution Techniques, Transportation Techniques, Cyber threats and their defense( Phishing Defensive measures, web based attacks, SQL injection & Defense techniques)(TEXT BOOK 2), Buffer overflow & format string vulnerabilities, TCP session hijacking(ARP attacks, route table modification) UDP hijacking ( man-in-the-middle attacks)(TEXT BOOK 3).

**UNIT II: Block Ciphers & Symmetric Key Cryptography**

**Objectives:** *The Objectives of this unit is to understand the difference between stream ciphers & block ciphers, present an overview of the Feistel Cipher and explain the encryption and decryption, present an overview of DES, Triple DES, Blowfish, IDEA.*

Traditional Block Cipher Structure, DES, Block Cipher Design Principles, AES-Structure, Transformation functions, Key Expansion, Blowfish, CAST-128, IDEA, Block Cipher Modes of Operations

**UNIT III: Number Theory & Asymmetric Key Cryptography**

**Objectives:** *Presents the basic principles of public key cryptography, Distinct uses of public key cryptosystems*

**Number Theory:** Prime and Relatively Prime Numbers, Modular Arithmetic, Fermat's and Euler's Theorems, The Chinese Remainder theorem, Discrete logarithms.

**Public Key Cryptography**: Principles, public key cryptography algorithms, RSA Algorithms, Diffie Hellman Key Exchange, Elgamal encryption & decryption, Elliptic Curve Cryptography.

**UNIT IV : Cryptographic Hash Functions & Digital Signatures**

**Objectives:** *Present overview of the basic structure of cryptographic functions, Message Authentication Codes, Understand the operation of SHA-512, HMAC, Digital Signature*

Application of Cryptographic hash Functions, Requirements & Security, Secure Hash Algorithm, Message Authentication Functions, Requirements & Security, HMAC & CMAC. Digital Signatures, NIST Digital Signature Algorithm. Key management & distribution.

**UNIT V: User Authentication, Transport Layer Security & Email Security**

**Objectives:** *Present an overview of techniques for remote user authentication, Kerberos, Summarize Web Security threats and Web traffic security approaches, overview of SSL & TLS. Present an overview of electronic mail security.*

**User Authentication:** Remote user authentication principles, Kerberos
**Transport Level Security:** Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Shell(SSH)
**Electronic Mail Security:** Pretty Good Privacy (PGP) and S/MIME.

**UNIT VI: IP Security & Intrusion Detection Systems**
**Objectives:** *Provide an overview of IP Security, concept of security association, Intrusion Detection Techniques*

**IP Security:** IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.
**Intrusion detection**: Overview, Approaches for IDS/IPS, Signature based IDS, Host based IDS/IPS. (TEXT BOOK 2)

**TEXT BOOKS:**

1. Cryptography & Network Security: Principles and Practices, William Stallings, PEA, Sixth edition.
2. Introduction to Computer Networks & Cyber Security, Chwan Hwa Wu, J.David Irwin, CRC press
3. Hack Proofing your Network, Russell, Kaminsky, Forest Puppy, Wiley Dreamtech.

**REFERENCE BOOKS:**

1.Everyday Cryptography, Fundamental Principles & Applications, Keith Martin, Oxford
2. Network Security & Cryptography, Bernard Menezes, Cengage,2010

**IV Year – I SEMESTER** **T P C**

**4 0 3**

# UML and Design Patterns

## Course Objectives:

The focus of this course is on design rather than implementation.

1. Introducing the Unified Process and showing how UML can be used within the process.
2. Presenting a comparison of the major UML tools for industrial-strength development.
3. introduction to design patterns, practical experience with a selection of central patterns.

## Course Outcomes:

Students successfully completing this course will be able to:

1. identify the purpose and methods of use of common object-oriented design patterns
2. select and apply these patterns in their own designs for simple programs
3. represent the data dependencies of a simple program using UML
4. represent user and programmatic interactions using UML
5. create design documentation outlining the testable and complete design of a simple program
6. produce and present documents for the purpose of capturing software requirements and specification
7. produce plans to limit risks specific to software designed for use in a particular social context

### Syllabus:

**Unit I: Introduction :** Introduction to OOAD; typical activities / workflows / disciplines in OOAD, Introduction to iterative development and the Unified Process, Introduction to UML; mapping disciplines to UML artifacts, Introduction to Design Patterns - goals of a good design, Introducing a case study & MVC architecture

**Unit II: Inception:** Artifacts in inception, Understanding requirements - the FURPS model, Understanding Use case model - introduction, use case types and formats, Writing use cases - goals and scope of a use case, elements / sections of a use case, Use case diagrams, Use cases in the UP context and UP artifacts, Identifying additional requirements, Writing requirements for the case study in the use case model

**Unit III: Elaboration:** System sequence diagrams for use case model, Domain model : identifying concepts, adding associations, adding attributes, Interaction Diagrams, Introduction to GRASP design Patterns ,Design Model: Use case realizations with GRASP patterns, Design Class diagrams in each MVC layer
Mapping Design to Code, Design class diagrams for case study and skeleton code

**Unit 4: More Design Patterns:** Fabrication, Indirection, Singleton, Factory, Facade, Publish-Subscribe

**Unit 5: More UML diagrams :** State-Chart diagrams, Activity diagrams, Component Diagrams, Deployment diagrams, Object diagrams

**Unit 6: Advanced concepts in OOAD :** Use case relationships, Generalizations
Domain Model refinements, Architecture, Packaging model elements

**Textbooks:**

1. 'Applying UML and patterns' by Craig Larman, Pearson
2. Object-Oriented Analysis & Design with the Unified Process by Satzinger, Jackson & Burd Cengage Learning
3. 'UML distilled' by Martin Fowler , Addison Wesley, 2003

**Reference:**

1. O'reilly ' s 'Head-First Design Patterns' by Eric Freeman et al, Oreillly
2. UML 2 Toolkit, by Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: WILE\'-Dreamtech lndia Pvt. Lid.

**IV Year – I SEMESTER** | **T** | **P** | **C**
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# Mobile Computing

**Course Objective:**

1) To make the student understand the concept of mobile computing paradigm, its novel applications and limitations.
2) To understand the typical mobile networking infrastructure through a popular GSM protocol
3) To understand the issues and solutions of various layers of mobile networks, namely MAC layer, Network Layer & Transport Layer
4) To understand the database issues in mobile environments & data delivery models.
5) To understand the ad hoc networks and related concepts.
6) To understand the platforms and protocols used in mobile environment.

**Course Outcomes:**

1) Able to think and develop new mobile application.
2) Able to take any new technical issue related to this new paradigm and come up with a solution(s).
3) Able to develop new ad hoc network applications and/or algorithms/protocols.
4) Able to understand & develop any existing or new protocol related to mobile environment

**Syllabus:**

**UNIT I**

**Introduction:** Mobile Communications, Mobile Computing – Paradigm, Promises/Novel Applications and Impediments and Architecture; Mobile and Handheld Devices, Limitations of Mobile and Handheld Devices.

GSM – Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Handover, Security, New Data Services, GPRS.

**UNIT –II**

**(Wireless) Medium Access Control (MAC) :** Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA, Wireless LAN/(IEEE 802.11)

**UNIT –III**

**Mobile Network Layer :** IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, DHCP.

**UNIT –IV**

**Mobile Transport Layer :** Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Transport Layer Protocols for Mobile Networks.

**Database Issues :** Database Hoarding & Caching Techniques, Client-Server Computing & Adaptation, Transactional Models, Query processing, Data Recovery Process & QoS Issues.

**UNIT V**

**Data Dissemination and Synchronization :** Communications Asymmetry, Classification of Data Delivery Mechanisms, Data Dissemination, Broadcast Models, Selective Tuning and Indexing Methods, Data Synchronization – Introduction, Software, and Protocols.

**UNIT VI**

**Mobile Ad hoc Networks (MANETs) :** Introduction, Applications & Challenges of a MANET, Routing, Classification of

Routing Algorithms, Algorithms such as DSR, AODV, DSDV, etc. , Mobile Agents, Service Discovery.

**Protocols and Platforms for Mobile Computing :** WAP, Bluetooth, XML, J2ME, JavaCard, PalmOS, Windows CE, SymbianOS, Linux for Mobile Devices,Android.

**Text Books:**

1. Jochen Schiller, “Mobile Communications”, Addison-Wesley, Second Edition, 2009.

2. Raj Kamal, “Mobile Computing”, Oxford University Press, 2007, ISBN: 0195686772

**Reference Book:**

1. ASOKE K TALUKDER, HASAN AHMED, ROOPA R YAVAGAL, “Mobile Computing, Technology Applications and Service Creation” Second Edition, Mc Graw Hill.
2. UWE Hansmann, Lother Merk, Martin S. Nocklous, Thomas Stober, “Principles of Mobile Computing,” Second Edition, Springer.

**IV Year – I SEMESTER**

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# Elective - 1

# Embedded ad Real Time Systems

## Course Objectives:

Develop an understanding of the technologies behind the embedded computing systems

1. technology capabilities and limitations of the hardware, software components
2. methods to evaluate design tradeoffs between different technology choices.
3. design methodologies

## Course Outcomes:

Understand the basics of an embedded system

1. Program an embedded system
2. Design, implement and test an embedded system.

Identify the unique characteristics of real-time systems

1. Explain the general structure of a real-time system
2. Define the unique design problems and challenges of real-time systems

## Syllabus:

### Unit-I:

**Introduction to Embedded systems:** What is an embedded system Vs. General computing system, history, classification, major application areas, and purpose of embedded systems. Core of embedded system, memory, sensors and actuators, communication interface, embedded firmware, other system components, PCB and passive components.

### UNIT-II:

**8—bit microcontrollers architecture:** Characteristics, quality attributes application specific, domain specific, embedded systems. Factors to be considered in selecting a controller, 8051 architecture, memory organization, registers, oscillator unit, ports, source current, sinking current, design examples.

### UNIT-III:

RTOS and Scheduling, Operating basics, types, RTOS, tasks, process and threads, multiprocessing and multitasking, types of multitasking, non preemptive, preemptive scheduling.

### UNIT-IV:

Task communication of RTOS, Shared memory, pipes, memory mapped objects, message passing, message queue, mailbox, signaling, RPC and sockets, task communication/synchronization issues, racing, deadlock, live lock, the dining philosopher's problem.

### UNIT-V:

The producer-consumer problem, Reader writers problem, Priority Inversion, Priority ceiling, Task Synchronization techniques, busy waiting, sleep and wakery, semaphore, mutex, critical section objects, events, device, device drivers, how to clause an RTOS, Integration and testing of embedded hardware and fire ware.

### UNIT-VI:

Simulators, emulators, Debuggers, Embedded Product Development life cycle (EDLC), Trends in embedded Industry, Introduction to ARM family of processor.

## TEXT BOOK:

1. Introduction to embedded systems Shibu. K.V, TMH, 2009.

## REFERENCE BOOKS:

1. Ayala & Gadre: The 8051 Microcontroller & Embedded Systems using Assembly and C, CENGAGE
2. Embedded Systems, Rajkamal, TMH, 2009.
3. Embedded Software Primer, David Simon, Pearson.
4. The 8051 Microcontroller and Embedded Systems, Mazidi, Mazidi, Pearson,.

# Information Retrieval Systems

**COURSE OBJECTIVES**

- To provide the foundation knowledge in information retrieval.
- To equip students with sound skills to solve computational search problems.
- To appreciate how to evaluate search engines.
- To appreciate the different applications of information retrieval techniques in the Internet or Web environment.
- To provide hands-on experience in building search engines and/or hands-on experience in evaluating search engines.

**COURSE OUTCOMES**

After completing the course student will be able to:

- Identify basic theories in information retrieval systems
- Identify the analysis tools as they apply to information retrieval systems
- Understands the problems solved in current IR systems
- Describes the advantages of current IR systems
- Understand the difficulty of representing and retrieving documents.
- Understand the latest technologies for linking, describing and searching the web.
- Explain the concepts of indexing, vocabulary, normalization and dictionary in information retrieval.
- Evaluate information retrieval algorithms, and give an account of the difficulties of evaluation
- Use different information retrieval techniques in various application areas
- Apply IR principles to locate relevant information large collections of data
- Analyze performance of retrieval systems when dealing with unmanaged data sources
- Implement retrieval systems for web search tasks.
- Understand and apply the basic concepts of information retrieval;
- Appreciate the limitations of different information retrieval techniques;
- Write programs to implement search engines;
- Evaluate search engines;
- Develop skills in problem solving using systematic approaches;
- Solve complex problems in groups and develop group work.

**SYLLLABUS:**

**Unit I:**
**Introduction to Information Storage and Retrieval System:** Introduction, Domain Analysis of IR systems and other types of Information Systems, IR System Evaluation.
Introduction to Data Structures and Algorithms related to Information Retrieval: Basic Concepts, Data structures, Algorithms

**Unit II:**
**Inverted files:** Introduction, Structures used in Inverted Files, Building Inverted file using a sorted array, Modifications to Basic Techniques.

**Unit III:**
**Signature Files:** Introduction, Concepts of Signature Files, Compression, Vertical Partitioning, Horizontal Partitioning.

**Unit IV:**
**New Indices for Text:** PAT Trees and PAT Arrays: Introduction, PAT Tree structure, algorithms on the PAT Trees, Building PAT trees as PATRICA Trees, PAT representation as arrays.

**Unit V:**

**Stemming Algorithms:** Introduction, Types of Stemming Algorithms, Experimental Evaluations of Stemming to Compress Inverted Files

**Unit VI:**

**Thesaurus Construction:** Introduction, Features of Thesauri, Thesaurus Construction, Thesaurus construction from Texts, Merging existing Thesauri

**TEXT BOOK :**

1. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall, 1992.
2. Modern Information Retrival By Yates Pearson Education.
3. Information Storage & Retieval By Robert Korfhage – John Wiley & Sons.

**REFERENCES :**


1. Kowalski, Gerald, Mark T Maybury: Information Retrieval Systems: Theory and Implementation, Kluwer Academic Press, 1997.
2. Information retrieval Algorithms and Heuristics, 2ed, Springer

# Multimedia Computing

**Course objectives:**
To provide the foundation knowledge of multimedia computing, e.g. media
characteristics, compression standards, multimedia representation, data formats, multimedia technology development.

**Course outcomes:**
1. understand the characteristics of different media; understand the representations of different multimedia data; understand different data formats; be able to take into considerations in multimedia system designs;
2. understand the characteristics of human's visual system; understand the characteristics of human's audio system; be able to take into considerations in multimedia techniques design and implementation;
3. understand different compression principles; understand different compression techniques; understand different multimedia compression standards; be able to design and develop multimedia systems according to the requirements of multimedia applications.
4. program multimedia data and be able to design and implement media applications; □

**Syllabus:**

**UNIT–I:**
Fundamental concepts in Text and Image: Multimedia and hypermedia, World Wide Web, overview of multimedia software tools. Graphics and image data representation graphics/image data types, file formats, Color in image and video: color science, color models in images, color models in video.

**UNIT–II:**
Fundamental concepts in video and digital audio: Types of video signals, analog video, digital video, digitization of sound, MIDI, quantization and transmission of audio.

**UNIT–III:**
**Multimedia data compression I:** Lossless compression algorithm: Run-Length Coding, Variable Length Coding, Dictionary Based Coding, Arithmetic Coding, Lossless Image Compression,

**UNIT–IV:**
**Multimedia data compression II:** Lossy compression algorithm: Quantization, Transform Coding, Wavelet-Based Coding, Embedded Zerotree of Wavelet Coefficients Set Partitioning in Hierarchical Trees (SPIHT).

**UNIT–V:**
**Basic** Video Compression Techniques: Introduction to video compression, video compression based on motion compensation, search for motion vectors, MPEG, Basic Audio Compression Techniques.

**UNIT–VI:**
Multimedia Networks: Basics of Multimedia Networks, Multimedia Network Communications and Applications: Quality of Multimedia Data Transmission, Multimedia over IP, Multimedia over ATM Networks, Transport of MPEG-4, Media-on-Demand (MOD).

**TEXT BOOKS:**

1. Fudamentals of Multimedia by Ze-Nian Li and Mark S. Drew Pearson Education.

**REFERENCE BOOKS:**

1. Digital Multimedia, Nigel chapman and jenny chapman, Wiley-Dreamtech
2. Macromedia Flash MX Professional 2004 Unleashed, Pearson.
3. Multimedia and communications Technology, Steve Heath, Elsevier (Focal Press).
4. Multimedia Applications, Steinmetz, Nahrstedt, Springer.
5. Multimedia Basics by Weixel Thomson
6. Multimedia Technology and Applications, David Hilman , Galgotia

**IV Year – I SEMESTER**

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# Elective - II
# Hadoop and Big Data

**Course Objectives:**

- Optimize business decisions and create competitive advantage with Big Data analytics
- Introducing Java concepts required for developing map reduce programs
- Derive business benefit from unstructured data
- Imparting the architectural concepts of Hadoop and introducing map reduce paradigm
- To introduce programming tools PIG & HIVE in Hadoop echo system.

**Course Outcomes:**

- Preparing for data summarization, query, and analysis.
- Applying data modelling techniques to large data sets
- Creating applications for Big Data analytics
- Building a complete business data analytic solution

**Unit 1:**
Data structures in Java: Linked List, Stacks, Queues, Sets, Maps; Generics: Generic classes and Type parameters, Implementing Generic Types, Generic Methods, Wrapper Classes, Concept of Serialization

Reference:
Big Java 4th Edition, Cay Horstmann, Wiley John Wiley & Sons, INC

**Unit 2:**
Working with Big Data: Google File System, Hadoop Distributed File System (HDFS) – Building blocks of Hadoop (Namenode, Datanode, Secondary Namenode, JobTracker, TaskTracker), Introducing and Configuring Hadoop cluster (Local, Pseudo-distributed mode, Fully Distributed mode), Configuring XML files.

References:
Hadoop: The Definitive Guide by Tom White, 3rd Edition, O'reilly
Hadoop in Action by Chuck Lam, MANNING Publ.

**Unit 3:**
Writing MapReduce Programs: A Weather Dataset, Understanding Hadoop API for MapReduce Framework (Old and New), Basic programs of Hadoop MapReduce: Driver code, Mapper code, Reducer code, RecordReader, Combiner, Partitioner

Reference:
Hadoop: The Definitive Guide by Tom White, 3rd Edition, O'reilly

**Unit 4:**
Hadoop I/O: The Writable Interface, WritableComparable and comparators, Writable Classes: Writable wrappers for Java primitives, Text, BytesWritable, NullWritable, ObjectWritable and GenericWritable, Writable collections, Implementing a Custom Writable: Implementing a RawComparator for speed, Custom comparators

Reference:
Hadoop: The Definitive Guide by Tom White, 3rd Edition, O'reilly

**Unit 5:**

Pig: Hadoop Programming Made Easier
Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin

Reference:
Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk,Bruce Brown, Rafael Coss

**Unit 6:**

Applying Structure to Hadoop Data with Hive:
Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data

References:
Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk,Bruce Brown, Rafael Coss

**Text Books:**

1. Big Java 4th Edition, Cay Horstmann, Wiley John Wiley & Sons, INC
2. Hadoop: The Definitive Guide by Tom White, 3rd Edition, O'reilly
3. Hadoop in Action by Chuck Lam, MANNING Publ.
4. Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk,Bruce Brown, Rafael Coss

**References:**

1. Hadoop in Practice by Alex Holmes, MANNING Publ.
2. Hadoop MapReduce Cookbook,Srinath Perera, Thilina Gunarathne

**Software Links:**

1. Hadoop:http://hadoop.apache.org/
2. Hive: https://cwiki.apache.org/confluence/display/Hive/Home

Piglatin: http://pig.apache.org/docs/r0.7.0/tutorial.html

# Software Project Management

**Course Objectives:**

1. To study how to plan and manage projects at each stage of the software development life cycle (SDLC)
2. To train software project managers and other individuals involved in software project planning and tracking and oversight in the implementation of the software project management process.
3. To understand successful software projects that support organization's strategic goals

**Course Outcomes:**

1. To match organizational needs to the most effective software development model
2. To understand the basic concepts and issues of software project management
3. To effectively Planning the software projects
4. To implement the project plans through managing people, communications and change
5. To select and employ mechanisms for tracking the software projects
6. To conduct activities necessary to successfully complete and close the Software projects
7. To develop the skills for tracking and controlling software deliverables
8. To create project plans that address real-world management challenges

## Syllabus:

**Unit I: Introduction**

Project, Management, Software Project Management activities, Challenges in software projects, Stakeholders, Objectives & goals

Project Planning: Step-wise planning, Project Scope, Project Products & deliverables, Project activities, Effort estimation, Infrastructure

**Unit II: Project Approach**

Lifecycle models, Choosing Technology, Protoyping

Iterative & incremental Process Framework: Lifecycle phases, Process Artifacts, Process workflows (Book 2)

**Unit III: Effort estimation & activity Planning**

Estimation techniques, Function Point analysis, SLOC, COCOMO, Usecase-based estimation , Activity Identification Approaches, Network planning models, Critical path analysis

**Unit IV: Risk Management**

Risk categories, Identification, Assessment, Planning and management, PERT technique, Monte Carlo approach

**Unit V: Project Monitoring & Control , Resource Allocation**

Creating a framework for monitoring & control, Progress monitoring, Cost monitoring, Earned value Analysis, Defects Tracking, Issues Tracking, Status reports, Types of Resources, Identifying resource requirements, Resource scheduling

**Unit VI: Software Quality**

Planning Quality, Defining Quality - ISO 9016, Quality Measures, Quantitative Quality Management Planning, Product Quality & Process Quality

Metrics, Statistical Process Control Capability Maturity Model, Enhancing software Quality ( Book3)

**Text Books:**


1. Software Project Management, Bob Hughes & Mike Cotterell, TATA Mcgraw-Hill
2. Software Project Management, Walker Royce: Pearson Education, 2005.
3. Software Project Management in practice, Pankaj Jalote, Pearson.


**Reference Book:**


1. Software Project Management, Joel Henry, Pearson Education.

# Computer Vision

**Course Objectives:**
To make the students to understand

1. The fundamentals of Computer Graphics and Image Processing
2. The concepts related edge detection, segmentation, morphology and image compression methods.

**Course Outcomes:**

1. understanding of digital image processing fundamentals: hardware and software, digitization, enhancement and restoration, encoding, segmentation, feature detection
2. ability to apply image processing techniques in both the spatial and frequency (Fourier) domains
3. Ability To understand (i.e., be able to describe, analyse and reason about) how digital images are represented, manipulated, encoded and processed, with emphasis on algorithm design, implementation and performance evaluation

**SYLLABUS:**

**UNIT I:**
**Introduction:** Applications of Computer Graphics and Image Processing, Fundamentals on Pixel concepts, effect of Aliasing and Jaggles, Advantages of high resolution systems
**DDA line algorithms:** Bresenhams line and circle derivations and algorithms

**UNIT II:**
**2-D Transformations:** Translations, Scaling, rotation, reflection and shear transformations, Homogeneous coordinates, **Composite Transformations**- Reflection about an arbitrary line; Windowing and clipping, viewing transformations, Cohen- Sutherland clipping algorithm

**UNIT III:**
**Digital Image Properties:** Metric and topological properties of Digital Images, Histogram, entropy, Visual Perception, Image Quality, Color perceived by humans, Color Spaces, Palette Images, color Constancy
**Color Images:** Pixel brightness transformations, Local Preprocessing, image smoothing, Edge detectors, Robert Operators, Laplace, Prewitt, Sobel, Fri-chen, Canny Edge detection

**UNIT IV:**
**Mathematical Morphology:** Basic Mathematical Concepts, Binary dilation and Erosion, Opening and closing, Gray Scale dilation and erosion, Skeleton, Thinning , Thickening Ultimate erosion, Geodesic transformations, Morphology and reconstruction, Morphological Segmentation

**UNIT V:**
**SEGMENTATION:** Threshold detection methods, Optimal Thresholding, Edge based Segmentation-Edge image thresholding, Edge relaxation, Border tracing, Hough Transforms, Region based segmentation: Region Mergingm Region Splitting, Splitting and Merging, Watershed Segmentation.

**UNIT VI:**
**Image Data Compression:** Image data Properties, Discrete Image Transformations in data compression, Discrete Cosine and Wavelet Transforms, Types of DWT and merits; Predicative Compression methods, Hierarchical and Progressive Compression methods, Comparison of Compression methods, JPEG- MPEG Image Compression methods.

**Text Books:**

1. Computer Graphics C Version, Donald Hearn, M Paulli Baker , Pearson ( Uniit I and Unit II)
2. Image Processing, Analysis and Machine Vision, Millan Sonka, Vaclov Halvoc, Roger Boyle, Cengage Learning, 3ed, ( Unit III, Unit IV, Unit V and Unit VI)

**References:**

1. Computer & Machine Vision, Theory , Algorithms , Practicles, E R Davies, Elsevier, 4ed
2. Digital Image Processing with MATLAB and LABVIEW, Vipul Singh, Elsevier
3. Digital Image Processing, R C Gonzalez &R E woods, Addison Pearson, 3ed.

# Advanced Databases

## Course Objectives:

1. Be able to design high-quality relational databases and database applications.
2. Have developed skills in advanced visual& conceptual modeling and database design.
3. Be able to translate complex conceptual data models into logical and physical data
4. Base designs.
5. Have developed an appreciation of emergingdatabase trends as theyapplyto semi-structured data, the internet,andobject-oriented databases

## Course Outcomes:

1. Identify, describe, and categorize database objects
2. Design and implement advanced queries using Structured Query Language
3. Design, construct and maintain a database and various database objects using procedural language constructs, forms and reports to solve problems
4. Administer a database by recommending and implementing procedures including database tuning, backup and recovery
5. Propose, implement and maintain database security mechanisms
6. Explore non-relational database systems and structures

## Syllabus:

**UNIT – I :**

**Algorithms for Query Processing and Optimization:**Translating SQL queries into relational algebra-algorithms for external sorting-algorithms for select and join operations-algorithms for project and set operations-implementing aggregate operations and outer joins-combining operations using pipelining-using heuristics in query optimization.

**UNIT –II:**

**Data base systems architecture and the system Catalog:**System architectures for DBMSs, Catalogs for Relational DBMSs, System catalog information in oracle.

**Practical database design and tuning:**Physical Database Design in Relational Databases-an overview of Database Tuning in Relational systems.

**UNIT – III:**

**Distributed DBMS Concepts and Design:**Introduction-function and architecture of a Distributed DBMS-Distributed Relational Database Design-

transparencies in a Distributed DBMS-Date's Twelve Rules for Distributed DBMS.

**Distributed DBMS-Advanced Concepts:**Distributed Transaction Management-Distributed Concurrency Control-Distributed Deadlock Management-Distributed Database Recovery-The X/Open Distributed Transaction processing model-Replication Servers.

**UNIT – IV:**

**Introduction to Object DBMSs:**Advanced Database Applications-Weaknesses of RDBMSs-Object oriented Concepts-Storing objects in a Relational Database-Next generation Database systems.

**Object-Oriented DBMSs-Concepts and Design :**Introduction to Object-Oriented Data Models and DBMSs-OODBMS perspectives-Persistence-Issues in OODBMSs-The object Oriented Database System Manifesto-Advantages and Disadvantages of OODBMSs-Object oriented Database Design.

**UNIT V:**

**Object-Oriented DBMSs-Standards and Systems:**Object management group-Object Database Standard ODMG3.0, 1999-Object store.

**Object relational DBMSs:**Introduction to Object-relational Database systems- third generation Database manifesto-Postgres-an early ORDBMS-SQL3.

**UNIT – VI :**

**Emerging database technologies and applications:** Hadoop, BIg Data characteristics, NO SQL databases, BASE, Brewer's theorem, Relationship between CAP, ACID and No SQL databases, comparison with Relational databases, No SQL databases types, Comparative study of NoSQL products, Case studies using MangoDB and Cassandra

**TEXT BOOK**:

1. "Fundamentals of Database Systems", ElmasriNavate, 5/e, Pearson Education.
2. Principles of distributed databases S Ceri and Palgettgi TMH
3. Getting started with No SQL Databases , Gaurav Vaish

**REFERENCES BOOKS:**

**1.** "Principles of Distributed Database Systems", Ozsu, 2/e, PHI.

**IV Year – I SEMESTER** **T P C**

**0 3 2**

# UML and Design Patterns Lab

**(Textbook no.2 i.e.** Object-Oriented Analysis & Design with the Unified Process by Satzinger, Jackson & Burd Cengage Learning will be the primary source for finding templates for developing different artifacts / diagrams)

**Take three case studies:**

- **Customer Support System (in the** Object-Oriented Analysis & Design with the Unified Process by Satzinger, Jackson & Burd Cengage Learning )
- **Point-Of-Sale Terminal (in Larman textbook)**
- **Library Management System (in the reference book no. 2 i.e. UML toolkit)**

**Week 1:**

**Familiarization with Rational Rose or Umbrello**

**For each case study:**

**Week 2, 3 & 4:**

**For each case study:**

a) Identify and analyze events
b) Identify Use cases
c) Develop event table
d) Identify & analyze domain classes
e) Represent use cases and a domain class diagram using Rational Rose
f) Develop CRUD matrix to represent relationships between use cases and problem domain classes

**Week 5 & 6:**

**For each case study:**

a) Develop Use case diagrams
b) Develop elaborate Use case descriptions & scenarios
c) Develop prototypes (without functionality)
d) Develop system sequence diagrams

**Week 7, 8, 9 & 10:**

**For each case study:**

a) Develop high-level sequence diagrams for each use case
b) Identify MVC classes / objects for each use case
c) Develop Detailed Sequence Diagrams / Communication diagrams for each use case showing interactions among all the three-layer objects
d) Develop detailed design class model (use GRASP patterns for responsibility assignment)
e) Develop three-layer package diagrams for each case study

**Week 11 & 12:**

**For each case study:**

a) Develop Use case Packages
b) Develop component diagrams
c) Identify relationships between use cases and represent them
d) Refine domain class model by showing all the associations among classes

**Week 13 onwards:**

**For each case study:**

a) Develop sample diagrams for other UML diagrams - state chart diagrams, activity diagrams and deployment diagrams

# Mobile Application Development Lab

1. Write a J2ME program to show how to change the font size and colour.
2. Write a J2ME program which creates the following kind of menu.
    * cut
    * copy
    * past
    * delete
    * select all
    * unselect all
3. Create a J2ME menu which has the following options (Event Handling):
    - cut - can be on/off
    - copy - can be on/off
    - paste - can be on/off
    - delete - can be on/off
    - select all - put all 4 options on
    - unselect all - put all

4. Create a MIDP application, which draws a bar graph to the display. Data values can be given at int[] array. You can enter four data (integer) values to the input text field.

5. Create an MIDP application which examine, that a phone number, which a user has entered is in the given format (Input checking):
* Area code should be one of the following: 040, 041, 050, 0400, 044
* There should 6-8 numbers in telephone number (+ area code)

6. Write a sample program to show how to make a SOCKET Connection from J2ME phone. This J2ME sample program shows how to how to make a SOCKET Connection from a J2ME Phone. Many a times there is a need to connect backend HTTP server from the J2ME application. Show how to make a SOCKET connection from the phone to port 80.

7. Login to HTTP Server from a J2ME Program. This J2ME sample program shows how to display a simple LOGIN SCREEN on the J2ME phone and how to authenticate to a HTTP server. Many J2ME applications for security reasons require the authentication of the user. This free J2ME sample program, shows how a J2ME application can do authentication to the backend server. Note: Use Apache Tomcat Server as Web Server and MySQL as Database Server.
8. The following should be carried out with respect to the given set of application domains: (Assume that the Server is connected to the well-maintained database of the given domain. Mobile Client is to be connected to the Server and fetch the required data value/information)
    • Students Marks Enquiry
    • Town/City Movie Enquiry
    • Railway/Road/Air (For example PNR) Enquiry/Status
    • Sports (say, Cricket) Update
    • Town/City Weather Update
    • Public Exams (say Intermediate or SSC)/ Entrance (Say EAMCET) Results Enquiry

Divide Student into Batches and suggest them to design database according to their domains and render information according the requests.

9. Write an Android application program that displays Hello World using Terminal.

10. Write an Android application program that displays Hello World using Eclipse.

11. Write an Android application program that accepts a name from the user and displays the hello name to the user in response as output using Eclipse.

12. Write an Android application program that demonstrates the following:
    (i) LinearLayout
    (ii) RelativeLayout
    (iii) TableLayout
    (iv) GridView layout

13. Write an Android application program that converts the temperature in Celsius to Fahrenheit.

14. Write an Android application program that demonstrates intent in mobile application development.

**IV Year – I SEMESTER** **T P C**

**0 3 2**

# Software Engineering Lab

**Objective:**

- The Software Engineering lab will facilitate the students to develop a preliminary yet practical understanding of software development process and tools

**Experiments:**

Take any real time problem and do the following experiments

1. Do the Requirement Analysis and Prepare SRS
2. Using COCOMO model estimate effort.
3. Calculate effort using FP oriented estimation model.
4. Analyze the Risk related to the project and prepare RMMM plan.
5. Develop Time-line chart and project table using PERT or CPM project scheduling methods.
6. Draw E-R diagrams, DFD, CFD and structured charts for the project.
7. Design of Test cases based on requirements and design.
8. Prepare FTR
9. Prepare Version control and change control for software configuration items.

**IV Year – I SEMESTER** **T P C**

**0 3 2**

# Hadoop & BigData Lab

*Week 1,2:*

**1. Implement the following Data structures in Java**
**a)Linked Lists b) Stacks c) Queues d) Set e) Map**

*Week 3, 4:*

**2. (i)Perform setting up and Installing Hadoop in its three operating modes:**
**Standalone,**
**Pseudo distributed,**
**Fully distributed**

**(ii)Use web based tools to monitor your Hadoop setup.**

*Week 5:*

**3. Implement the following file management tasks in Hadoop:**

- **Adding files and directories**
- **Retrieving files**
- **Deleting files**

**Hint:** A typical Hadoop workflow creates data files (such as log files) elsewhere and copies them into HDFS using one of the above command line utilities.

*Week 6:*

**4. Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm.**

*Week 7:*

**5. Write a Map Reduce program that mines weather data.**

Weather sensors collecting data every hour at many locations across the globe gather a large volume of log data, which is a good candidate for analysis with MapReduce, since it is semi structured and record-oriented.

*Week 8:*

**6. Implement Matrix Multiplication with Hadoop Map Reduce**

*Week 9,10:*

**7. Install and Run Pig then write Pig Latin scripts to sort, group, join, project, and filter your data.**

*Week 11,12:*

**8. Install and Run Hive then use Hive to create, alter, and drop databases, tables, views, functions, and indexes**

**IV Year – II SEMESTER**

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## Elective - III

# Human Computer Interaction

**Course Objectives:**

The main objective is to get student to think constructively and analytically about how to design and evaluate interactive technologies.

**Course Outcomes:**

1. Explain the capabilities of both humans and computers from the viewpoint of human information processing.
2. Describe typical human–computer interaction (HCI) models, styles, and various historic HCI paradigms.
3. Apply an interactive design process and universal design principles to designing HCI systems.
4. Describe and use HCI design principles, standards and guidelines.
5. Analyze and identify user models, user support, socio-organizational issues, and stakeholder requirements of HCI systems.
6. Discuss tasks and dialogs of relevant HCI systems based on task analysis and dialog design.

**Syllabus:**

**UNIT I:**

**Introduction:** Usability of Interactive Systems- introduction, usability goals and measures, usability motivations, universal usability, goals for our profession

**Managing Design Processes:** Introduction, Organizational design to support usability, Four pillars of design, development methodologies, Ethnographic observation, Participatory design, Scenario Development, Social impact statement for early design review, legal issues, Usability Testing and Laboratories

**UNIT II:**

**Menu Selection, Form Fill-In and Dialog Boxes:** Introduction, Task- Related Menu Organization, Single menus, Combinations of Multiple Menus, Content Organization, Fast Movement Through Menus, Data entry with Menus: Form Fill-in, dialog Boxes, and alternatives, Audio Menus and menus for Small Displays

**UNIT III:**

**Command and Natural Languages:** Introduction, Command organization Functionality, Strategies and Structure, Naming and Abbreviations, Natural Language in Computing

**Interaction Devices:** Introduction, Keyboards and Keypads, Pointing Devices, Speech and Auditory Interfaces, Displays- Small and large

**UNIT IV:**

**Quality of Service:** Introduction, Models of Response-Time impacts, Expectations and attitudes, User Productivity, Variability in Response Time, Frustrating Experiences

**Balancing Function and Fashion:** Introduction, Error Messages, Nonanthropomorphic Design, Display Design, Web Page Design, Window Design, Color

**UNIT V:**

**User Documentation and Online Help**: Introduction, Online Vs Paper Documentation, Reading from paper Vs from Displays, Shaping the content of the Documentation, Accessing the Documentation, Online tutorials and animated documentation, Online communities for User Assistance, The Development Process

**UNIT VI:**

**Information Search:** Introduction, Searching in Textual Documents and Database Querying, Multimedia Document Searches, Advanced Filtering and Searching Interfaces

**Information Visualization:** Introduction, Data Type by Task Taxonomy, Challenges for Information Visualization

**Text Books:**

1. Designing the User Interface, Strategies for Effective Human Computer Interaction, 5ed, Ben Shneiderman, Catherine Plaisant, Maxine Cohen, Steven M Jacobs, Pearson

2. The Essential guide to user interface design,2/e, Wilbert O Galitz, Wiley DreamaTech.

**Reference Books:**

1. Human Computer, Interaction Dan R.Olsan, Cengage ,2010.
2. Designing the user interface. 4/e, Ben Shneidermann , PEA.
3. User Interface Design, Soren Lauesen , PEA.
4. Interaction Design PRECE, ROGERS, SHARPS, Wiley.

# Advanced Operating Systems

**Course Objectives:**
The aim of this module is to study, learn, and understand the main concepts of advanced operating systems (parallel processing systems, distributed systems, real time systems, network operating systems, and open source operating systems); Hardware and software features that support these systems.

**Course Outcomes:**
1. Outline the potential benefits of distributed systems
2. Summarize the major security issues associated with distributed systems along with the
3. range of techniques available for increasing system security

**Syllabus:**

**UNIT–I:**
**Introduction to Distributed systems:** Goals of distributed system, hardware and software concepts, design issues.
**Communication in Distributed systems**: Layered protocols, ATM networks, the Client - Server model, remote procedure call and group communication.

**UNIT–II:**
**Synchronization in Distributed systems**: Clock synchronization, Mutual exclusion, E-tech algorithms, the Bully algorithm, a ring algorithm, atomic transactions,

**UNIT-III:**
**Deadlocks:** deadlock in distributed systems, Distributed deadlock prevention, and distributed dead lock detection.

**UNIT–IV:**
**Processes:** Processes and Processors in distributed systems: Threads, system models, Processor allocation, Scheduling in distributed system, Fault tolerance and real time distributed systems.

**UNIT-V:**

**Distributed file systems:** Distributed file systems design, distributed file system implementation, trends in distributed file systems**.**

**Distributed shared memory** : What is shared memory, consistency models, page based distributed shared memory, shared variable distributed shared memory, object based DSM.

**UNIT-VI:**

**Case study MACH :** Introduction to MACH, process management in MACH, memory management in MACH, communication in MACH, UNIX emulation in MACH. Case study DCE : Introduction to DCE threads, RPC's, Time service, Directory service, security service, Distributed file system.
**TEXT BOOKS**:

1. Distributed Operating System - Andrew. S. Tanenbaum, PHI
2. Operating Systems' – Internal and Design Principles Stallings, Fifth Edition–2005, Pearson education/PHI

**REFERENCE BOOKS:**

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne
   7th Edition, John Wiley.
2. Modern Operating Systems, Andrew S Tanenbaum 2nd edition Pearson/PHI

# Mobile Adhoc & Sensor Networks

**Course Objectives:**

1) To make the student understand the concepts of MOBILE AD HOC NETWORKS (Manets) as well as Wireless Sensor Networks (WSN), their characteristics, novel applications, and technical challenges.
2) To understand the issues and solutions of various layers of Manets, namely MAC layer, Network Layer & Transport Layer in Manets and WSN.
3) To understand the platforms and protocols used in Manets and WSN.
4) To make the student take up further research as part of his higher studies

**Course Outcomes:**

1) Able to think and develop new applications in Manets and WSN.
2) Able to take any new technical issue related to these new thrust areas and come up with a solution(s).
3) Able to develop algorithms/protocols for Manets and WSN.

**Syllabus:**

**UNIT I :**

*Introduction to Ad Hoc Networks:* Characteristics of MANETs, applications of MANETs, and challenges of MANETs.

*Routing in MANETs:* Criteria for classification, Taxonomy of MANET routing algorithms, Topology based routing algorithms, Position based routing algorithms,

**UNIT II:**

*Data Transmission*: Broadcast storm problem, Broadcasting, Multicasting and Geocasting

**UNIT III:**

*TCP over Ad Hoc:* TCP protocol overview, TCP and MANETs, and Solutions for TCP over Ad hoc

**UNIT IV:**

*Basics of Wireless Sensors and Applications*: Applications, Classification of sensor networks, Architecture of sensor networks, Physical layer, MAC layer, Link layer

**UNIT V :**

*Data Retrieval in Sensor Networks:* Routing layer, Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs, and Sensor Networks and mobile robots.

**UNIT VI :**

*Security:* Security in ad hoc networks, Key management, Secure routing, Cooperation in MANETs, and Intrusion detection systems.

*Sensor Network Platforms and Tools*: Sensor Network Hardware, Berkeley motes, Sensor Network Programming Challenges, Node-Level Software Platforms, TinyOS, NS-2 and TOSSIM.

**Textbook:**

1. *Ad hoc and Sensor Networks* - Theory and Applications, by Carlos Cordeiro and Dharma P. Agrawal, World Scientific Publications, March 2006, ISBN 981-256-681-3.
2. Wireless Sensor Networks: An Information Processing Approach, Feng Zhao, Leonidas Guibas, Elsevier Science ISBN: 978-1-55860-914-3,
   (Morgan Kauffman)

# Pattern Recognition

**Course Objectives:**
The course is designed to introduce students to theoretical concepts and practical issues associated with pattern recognition

**Course Outcomes:**

1. Design systems and algorithms for pattern recognition (signal classification), with focus on sequences of patterns that are analyzed using, e.g., hidden Markov models (HMM),
2. Analyse classification problems probabilistically and estimate classifier performance,
3. Understand and analyse methods for automatic training of classification systems,
4. Apply Maximum-likelihood parameter estimation in relatively complex probabilistic models, such as mixture density models and hidden Markov models,
5. Understand the principles of Bayesian parameter estimation and apply them in relatively simple probabilistic models

## Syllabus:

**UNIT-I:**
**Introduction**: Machine perception, pattern recognition example, pattern recognition systems, the Design cycle, learning and adaptation
**Bayesian Decision Theory**: Introduction, continuous features – two categories classifications, minimum error-rate classification-zero–one loss function, classifiers, discriminant functions, and decision surfaces

**UNIT-II:**
**Normal density**: Univariate and multivariate density, discriminant functions for the normal Density different cases, Bayes decision theory – discrete features, compound Bayesian decision theory and context

**UNIT-III :**
**Maximum likelihood and Bayesian parameter estimation:** Introduction, maximum likelihood Estimation, Bayesian estimation, Bayesian parameter estimation–Gaussian case

**UNIT-IV :**
**Un-supervised learning and clustering:** Introduction, mixture densities and identifiability, maximum likelihood estimates, application to normal mixtures, K-means clustering. Date description and clustering – similarity measures, criteria function for clustering

**UNIT-V :**
**Pattern recognition using discrete hidden Markov models:** Discrete-time Markov process, Extensions to hidden Markov models, three basic problems of HMMs, types of HMMs

**UNIT-VI :**
**Continuous hidden Markov models :**
Continuous observation densities, multiple mixtures per state, speech recognition applications.

**Text Books:**
1. Pattern classifications, Richard O. Duda, Peter E. Hart, David G. Stroke. Wiley student edition, Second Edition.
2. Pattern Recognition, An Introduction, V Susheela Devi, M Narsimha Murthy, Universiy Press

**Reference Books:**
1. R.C Gonzalez and R.E. Woods, “Digital Image Processing”, Addison Wesley, 1992.
2.Pattern Recognition and Image Analysis – Earl Gose, Richard John baugh, Steve Jost PHI 2004
3. Fundamentals of speech Recognition, Lawerence Rabiner, Biing – Hwang Juang Pearson education.
4. Pattern Recognition, Sergios Theodoridis, Konstantinos Koutroumbas, Academic Press, Elsevier, 4ed,

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# Distributed Systems

**Course Objectives:**

1. provides an introduction to the fundamentals of distributed computer systems, assuming the availability of facilities for data transmission, IPC mechanisms in distributed systems, Remote procedure calls.
2. Expose students to current technology used to build architectures to enhance distributed computing infrastructures with various computing principles

**Course Outcomes:**

1. Develop a familiarity with distributed file systems.
2. Describe important characteristics of distributed systems and the salient architectural features of such systems.
3. Describe the features and applications of important standard protocols which are used in distributed systems.
4. Gaining practical experience of inter-process communication in a distributed environment

**Syllabus:**

**UNIT-I:**

**Characterization of Distributed Systems:** Introduction, Examples of Distributed Systems, Resource Sharing and the Web, Challenges.

**System Models:** Introduction, Architectural Models- Software Layers, System Architecture, Variations, Interface and Objects, Design Requirements for Distributed Architectures, Fundamental Models- Interaction Model, Failure Model, Security Model.

**UNIT-II:**

**Interprocess Communication:** Introduction, The API for the Internet Protocols- The Characteristics of Interprocess communication, Sockets, UDP Datagram Communication, TCP Stream Communication; External Data Representation and Marshalling; Client Server Communication; Group Communication- IP Multicast- an implementation of group communication, Reliability and Ordering of Multicast.

**UNIT-III:**

**Distributed Objects and Remote Invocation:** Introduction, Communication between Distributed Objects- Object Model, Distributed Object Modal, Design Issues for RMI, Implementation of RMI, Distributed Garbage Collection; Remote Procedure Call, Events and Notifications, Case Study: JAVA RMI

**UNIT-IV:**

**Operating System Support:** Introduction, The Operating System Layer, Protection, Processes and Threads –Address Space, Creation of a New Process, Threads.

**UNIT-V:**

**Distributed File Systems:** Introduction, File Service Architecture; Peer-to-Peer Systems: Introduction, Napster and its Legacy, Peer-to-Peer Middleware, Routing Overlays.

**Coordination and Agreement:** Introduction, Distributed Mutual Exclusion, Elections, Multicast Communication.

**UNIT-VI:**

**Transactions & Replications:** Introduction, System Model and Group Communication, Concurrency Control in Distributed Transactions, Distributed Dead Locks, Transaction Recovery; Replication- Introduction, Passive (Primary) Replication, Active Replication.

**TEXT BOOKS:**


1. Ajay D Kshemkalyani, Mukesh Sighal, “Distributed Computing, Principles, Algorithms and Systems”, Cambridge
2. George Coulouris, Jean Dollimore, Tim Kindberg, “Distributed Systems- Concepts and Design”, Fourth Edition, Pearson Publication

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# Mathematical Optimization

## Course Objectives:

The student will learn about the mathematical modeling, Linear Programming, Simplex method, Transportation problem, assignment problems, processing jobs through several machines, queuing, Inventory management and management decision making, Project management techniques, simulation techniques, probability distributions and markov analysis.

## Course Outcomes:

1. Concept of mathematical modeling and development of a model.
2. Use of graphical solution in solving LPP.
3. Determining minimum transportation costs.
4. Use of assignment models in business and industry.
5. Processing of jobs through different number of machines.
6. Solving queuing problems in single-channel and multiple-channel situations
7. Inventory management and management decision making
8. Project management and simulation techniques
9. Understand application of probability distributions and markov process in different situations.

**Syllabus:**

**UNIT I:**

**Introduction to Operations Research:** Definition, Features, types of OR models, Methodology, Tools, Limitations and applications of Linear Programming.

**Linear Programming I:** Introduction, Formulation of LPP, Assumptions for solving LPP, Applications of LPP, Graphical method of solving LPP.

**UNIT II:**

**Linear Programming II:** Introduction, steps in solving problems using simplex method, Principle of simplex method- Maximization and minimization problems, solution by simplex method, limitations of LPP simplex method.

**Linear Programming III:** Introduction, concept of primal dual relationship, formulation of the dual of the primal problem, solution of LP problems using duality.

**UNIT III:**

**The Transportation Problem:** Basics, Solution of Transportation problem with several methods, performing optimality test, degeneracy in transportation problem.

**Assignment model:** Definition, Formulation, Different methods of solutions, Hungarian assignment method, unbalanced assignment problems

**UNIT IV:**

**The Sequencing problems:** introduction, basics, types of sequencing problems, priority sequencing, sequencing n jobs through two machines, n jobs and m machines, two jobs 3 machines case.

**Waiting Line(Queuing) Theory:** introduction, objectives and models, benefits and limitations, single channel and multi-channel queuing models.

**UNIT V:**

**Inventory Management:** introduction, objectives, developing the model, EOQ, Selective inventory management.

**Project management PERT & CPM**: introduction, construction of networks, calculation of EST, LST, EFT and LFT, drawing of networks and calculation of timings

**UNIT VI:**

**Simulation:** introduction, applications, advantages and limitations, Monte Carlo simulation technique, steps involved in use of simulation, generating and using random system, simulation of queuing system, investment decisions using simulation.

**Probability theory and markov analysis:** Basics, law of probability, discre and continuous random variables, cumulative distribution function, frequency and probability distributions, mean and standard deviation, Binomial

probability distribution, Normal probability distribution. Markovian process- applications, Markovian decision problems.

**TEXT BOOKS:**


1. Operations research, 2ed, Col D S Cheema, University Science Press, Lakshmi Publications.
2. Hamdy H. Taha, "Operations Research -An Introduction" Pearson Education,2003
3. Taha Hamdy- Operations Research- An Introduction ,Prentice-Hall, 7th edition


**REFERNCE BOOKS:**


1. Operations Research, Panneer Selvan, Prentice Hall of India.
2. Banks, J, Carson II J. S., Nelson B.L., and Nicol D.M. Discrete – Event System Simulation. Pearson Education Asia, 3rd edition,
3. Principles of Operation Research ( with applications to managerial decisions) – H.M Wagher, PHI, New Delhi


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## Management Science

**Unit I**

**Introduction to Management**: Concept –nature and importance of

Management – Functions of Management – Evaluation of Management thought- Theories of Motivation – Decision making process-Designing organization structure- Principles of organization - Types of organization structure

**Unit II**

**Operations Management**: Principles and Types of Management – Work study- Statistical Quality Control- Control charts (P-chart, R-chart, and Cchart) Simple problems- Material Management: Need for Inventory control- EOQ, ABC analysis (simple problems) and Types of ABC analysis (HML, SDE, VED, and FSN analysis)

**Unit III**

**Functional Management**: Concept of HRM, HRD and PMIR- Functions of HR Manager- Wage payment plans(Simple Problems) – Job Evaluation and Merit Rating - Marketing Management- Functions of Marketing – Marketing strategies based on product Life Cycle, Channels of distributions.

**Unit IV**

**Project Management**: (PERT/CPM): Development of Network – Difference between PERT and CPM Identifying Critical Path- Probability- Project Crashing (Simple Problems)

**Unit V**

**Strategic Management**: Vision, Mission, Goals, Strategy – Elements of Corporate Planning Process – Environmental Scanning – SWOT analysis- Steps in Strategy Formulation and Implementation, Generic Strategy alternatives

**Unit VI**

**Contemporary Management Practice**: Basic concepts of MIS, MRP, Justin-Time(JIT) system, Total Quality Management(TQM), Six sigma and Capability Maturity Model(CMM) Levies, Supply Chain Management , Enterprise Resource Planning (ERP), Business Process outsourcing (BPO), Business process Re-engineering and Bench Marking, Balanced Score Card.

**Text Books**

1. Dr. P. Vijaya Kumar & Dr. N. Appa Rao, '*Management Science'* Cengage, Delhi, 2012.
2. Dr. A. R. Aryasri, *Management Science'* TMH 2011.

**References**

1. Koontz & Weihrich: 'Essentials *of management'* TMH 2011
2. Seth & Rastogi: Global Management Systems, Cengage learning , Delhi, 2011
3. Robbins: Organizational Behaviour, Pearson publications, 2011
4. Kanishka Bedi: Production & Operations Management, Oxford Publications, 2011
5. Philip Kotler & Armstrong: Principles of Marketing, Pearson publications
6. Biswajit Patnaik: Human Resource Management, PHI, 2011
7. Hitt and Vijaya Kumar: Starategic Management, Cengage learning

**Objective**: To familiarize with the process of management and to provide basic insights into select contemporary management practices.

**Codes/ Tables**: Normal Distribution Function Tables need to be permitted into the examination Halls

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# Project

# ACADEMIC REGULATIONS
# COURSE STRUCTURE
# AND
# DETAILED SYLLABUS

# ELECTRICAL AND ELECTRONICS ENGINEERING

**For**

## B.Tech., FOUR YEAR DEGREE COURSE

(Applicable for the batches admitted from 2013-14)

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**

KAKINADA – 533003, ANDHRA PRADESH, INDIA.

# Academic Regulations (R13) for B. Tech. (Regular)

**Applicable for the students of B. Tech. (Regular) from the Academic Year 2013-14 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. A student shall be declared eligible for the award of the B. Tech Degree, if he pursues a course of study in not less than four and not more than eight academic years.
2. The candidate shall register for 180 credits and secure all the 180 credits.

2. **Courses of study**

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

| S.No. | Branch |
|---|---|
| **01** | Electronics and Communication Engineering |
| **02** | Electrical and Electronics Engineering |
| **03** | Civil Engineering |
| **04** | Mechanical Engineering |
| **05** | Computer Science and Engineering |
| **06** | Petro Chemical Engineering |
| **07** | Information Technology |
| **08** | Chemical Engineering |
| **09** | Electronics and Instrumentation Engineering |
| **10** | Bio-Medical Engineering |
| **11** | Aeronautical Engineering |
| **12** | Automobile Engineering |
| **13** | Bio Technology |
| **14** | Electronics and Computer Engineering |
| **15** | Mining Engineering |
| **16** | Petroleum Engineering |
| **17** | Metallurgical Engineering |
| **18** | Agricultural Engineering |

3. **Distribution and Weightage of Marks**

(i) The performance of a student in each semester shall be evaluated subject – wise with a maximum of 100 marks for theory subject and 75 marks for practical subject. The project work shall be evaluated for 200 marks.

(ii) For theory subjects the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End - Examinations.

(iii) For theory subjects, during the semester there shall be 2 tests. The weightage of Internal marks for 30 consists of Descriptive – 15, Assignment - 05 (Theory, Design, Analysis, Simulation, Algorithms, Drawing, etc. as the case may be) Objective -10 (Conducted at College level with 20 Multiple choice question with a weightage of ½ Mark each). The objective examination is for 20 minutes duration. The subjective examination is for 90 minutes duration conducted for 15 marks. Each subjective type test question paper shall contain **3 questions** and all questions need to be answered. The Objective examination conducted for 10 marks and subjective examination conducted for 15 marks are to be added to the assignment marks of 5 for finalizing internal marks for 30. The best of the two tests will be taken for internal marks. As the syllabus is framed for 6 units, the 1st mid examination (both Objective and Subjective) is conducted in 1-3 units and second test in 4-6 units of each subject in a semester.

(iv) The end semester examination is conducted covering the topics of all Units for 70 marks. Part – A contains a mandatory question (Brainstorming / Thought provoking / case study) for 22 marks. Part – B has 6 questions (One from each Unit). The student has to answer 3 out of 6 questions in Part – B and carries a weightage of 16 marks each.

(v) For practical subjects there shall be continuous evaluation during the semester for 25 internal marks and 50 end examination marks. The internal 25 marks shall be awarded as follows: day to day work - 10 marks, Record-5 marks and the remaining 10 marks to be awarded by conducting an internal laboratory test. The end examination shall be conducted by the teacher concerned and external examiner.

(vi) For the subject having design and / or drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing) and estimation, the distribution shall be 30 marks for internal evaluation ( 20 marks for day – to – day work, and 10 marks for internal tests) and 70 marks for end examination. There shall be two internal tests in a Semester and the better of the two shall be considered for the award of marks for internal tests.

(vii) For the seminar, the student shall collect the information on a specialized topic and prepare a technical report, showing his understanding over the topic, and submit to the department, which 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 seminar.

(viii) Out of a total of 200 marks for the project work, 60 marks shall be for Internal Evaluation and 140 marks for the End Semester Examination. The End Semester Examination (Viva – Voce) shall be conducted by the committee. The committee consists of an external examiner, Head of the Department and Supervisor of the Project. The evaluation of project work shall be conducted 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 and evaluated by an internal committee.

(ix) Laboratory marks and the internal marks awarded by the College are not final. The marks are subject to scrutiny and scaling by the University wherever felt desirable. The internal and laboratory marks awarded by the College will be referred to a Committee. The Committee shall arrive at a scaling factor and the marks will be scaled as per the scaling factor. The recommendations of the Committee are final and binding. The laboratory records and internal test papers shall be preserved in the respective departments as per the University norms and shall be produced to the Committees of the University as and when they ask for.

4. **Attendance Requirements**

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

6. A stipulated fee shall be payable towards condonation of shortage of attendance.
7. A student will be promoted to the next semester if he satisfies the (i)attendance requirement of the present semester and (ii) credits.
8. If any candidate fulfills the attendance requirement in the present semester, he shall not be eligible for readmission into the same class.

5. **Minimum Academic Requirements**

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no. 4.

5.1 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 internal marks and end semester examination marks.**

5.2 A student shall be promoted from first year to second year if he fulfills the minimum attendance requirement.

5.3 A student will be **promoted from II year to III year** if he fulfills the academic requirement **of 40% of the 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.**

5.4 A student shall be **promoted from III year to IV year** if he fulfils the academic requirements of **40% of the 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.**

5.5 A student shall register and put up minimum attendance in all 180 credits and earn all 180 credits. **Marks obtained in all the 180 credits shall be considered for the calculation of percentage of marks.**

**6. Course pattern**

1. The entire course of study is for four academic years, all the years are on semester pattern.
2. A student eligible to appear for the end semester examination in a subject, but absent from it or has failed in the end semester examination, may write the exam in that subject when conducted next.

3. When a student is detained for lack of credits / shortage of attendance, he may be re-admitted into the same semester / year in which he has been detained. However, the academic regulations under which he was first admitted shall continues to be applicable to him.

**7. 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:

| Class Awarded | % of marks to be secured | |
|---|---|---|
| First Class with Distinction | 70% and above | **From the aggregate marks secured from 180 Credits.** |
| 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 examination shall be shown separately in the memorandum of marks.

**8. Minimum Instruction Days**

The minimum instruction days for each semester shall be 90 working days.

9. There shall be no branch transfers after the completion of the admission process.

10. There shall be no transfer from one college/stream to another within the Constituent Colleges and Units of Jawaharlal Nehru Technological University Kakinada.

11. **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. His degree will be withheld in such cases.

12. **TRANSITORY REGULATIONS**

1. Discontinued or detained candidates are eligible for readmission as and when next offered.
2. In case of transferred students from other Universities, the credits shall be transferred to JNTUK as per the academic regulations and course structure of the JNTUK**.**

13. **General**

1. Wherever the words “he”, “him”, “his”, occur in the regulations, they include “she”, “her”, “hers”.
2. The academic regulation should be read as a whole for the purpose of any interpretation.
3. In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.
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.
5. The students seeking transfer to colleges affiliated to JNTUK from various other Universities/ Institutions have to pass the failed subjects which are equivalent to the subjects of JNTUK, and also pass the subjects of JNTUK on their own without the right to sessional marks which the candidates have not studied at the earlier Institution.

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## Academic Regulations (R13) for B. Tech. (Lateral entry Scheme)

Applicable for the students admitted into II year B. Tech. from the Academic Year 2014-15 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 A student shall be declared eligible for the award of the B. Tech Degree, if he pursues a course of study in not less than three academic years and not more than six academic years.

1.2 The candidate shall register for 132 credits and secure all the 132 credits.

2. The attendance regulations of B. Tech. (Regular) shall be applicable to B.Tech.

3. **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 if he fulfils the academic requirements of 40% of the 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.

4. **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 132 Credits from II year to IV year. |
|---|---|---|
| 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.

5. 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 / Improper conduct | Punishment |
|---|---|---|
| | *If the candidate:* | |
| 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 | 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 |

| | | |
|---|---|---|
| | 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 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. | semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them. |
| 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 examinations and project work of that semester/year examinations. |
| 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.

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# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

**KAKINADA-533003, Andhra Pradesh (India)**

**For Constituent Colleges and Affiliated Colleges of JNTUK**

# Ragging

## Prohibition of ragging in educational institutions Act 26 of 1997

**Salient Features**

- Ragging within or outside any educational institution is prohibited.
- Ragging means doing an act which causes or is likely to cause Insult or Annoyance of Fear or Apprehension or Threat or Intimidation or outrage of modesty or Injury to a student.

| | Imprisonment upto | | Fine Upto |
|---|---|---|---|
| Teasing, Embarrassing & Humiliation | 6 Months | + | Rs. 1,000/- |
| Assaulting or Using Criminal force or Criminal intimidation | 1 Year | + | Rs. 2,000/- |
| Wrongfully restraining or confining or causing hurt | 2 Years | + | Rs. 5,000/- |
| Causing grievous hurt, kidnapping or Abducts or rape or committing unnatural offence | 5 Years | + | Rs. 10,000/- |
| Causing death or abetting suicide | 10 Months | + | Rs. 50,000/- |

**In Case of Emergency CALL TOLL FREE No. : 1800 - 425 - 1288**

**LET US MAKE JNTUK A RAGGING FREE UNIVERSITY**

# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

**KAKINADA-533003, Andhra Pradesh (India)**
**For Constituent Colleges and Affiliated Colleges of JNTUK**

# Ragging

## ABSOLUTELY NOT TO RAGGING

1. **Ragging is prohibited as per Act 26 of A.P. Legislative Assembly, 1997.**
2. **Ragging entails heavy fines and/or imprisonment.**
3. **Ragging invokes suspension and dismissal from the College.**
4. **Outsiders are prohibited from entering the College and Hostel without permission.**
5. **Girl students must be in their hostel rooms by 7.00 p.m.**
6. **All the students must carry their Identity Cards and show them when demanded.**
7. **The Principal and the Wardens may visit the Hostels and inspect the rooms any time.**

**Jawaharlal Nehru Technological University Kakinada**
For Constituent Colleges and Affiliated Colleges of JNTUK

**In Case of Emergency CALL TOLL FREE No. : 1800 - 425 - 1288**

**LET US MAKE JNTUK A RAGGING FREE UNIVERSITY**

# COURSE STRUCTURE

**I Year – I SEMESTER**

| S. No. | Subject | T | P | Credits |
|---|---|---|---|---|
| 1 | English - I | 3+1 | -- | 3 |
| 2 | Mathematics - I | 3+1 | -- | 3 |
| 3 | Mathematics – II (Mathematical Methods) | 3+1 | -- | 3 |
| 4 | Engineering Physics | 3+1 | -- | 3 |
| 5 | Professional Ethics and Human Values | 3+1 | -- | 3 |
| 6 | Engineering Drawing | 3+1 | -- | 3 |
| 7 | English – Communication Skills Lab - I | -- | 3 | 2 |
| 8 | Engineering Physics Laboratory | -- | 3 | 2 |
| 9 | Engineering Physics – Virtual Labs - Assignments | -- | 2 | -- |
| 10 | Engineering Workshop & IT Workshop | -- | 3 | 2 |
| **Total Credits** | | | | **24** |

**I Year – II SEMESTER**

| S. No. | Subject | T | P | Credits |
|---|---|---|---|---|
| 1 | English – II | 3+1 | -- | 3 |
| 2 | Mathematics – III | 3+1 | -- | 3 |
| 3 | Engineering Chemistry | 3+1 | -- | 3 |
| 4 | Engineering Mechanics | 3+1 | -- | 3 |
| 5 | Electrical Circuit Analysis - I | 3+1 | -- | 3 |
| 6 | Computer Programming | 3+1 | -- | 3 |
| 7 | Engineering Chemistry Lab | -- | 3 | 2 |
| 8 | English – Communication Skills Lab - II | -- | 3 | 2 |
| 9 | C Programming lab | -- | 3 | 2 |
| **Total Credits** | | | | **24** |

**II Year – I SEMESTER**

| S. No. | Subject | T | P | Credits |
|---|---|---|---|---|
| 1 | Electrical Circuit Analysis-II | 3+1 | -- | 3 |
| 2 | Thermal and Hydro Prime movers | 3+1 | -- | 3 |
| 3 | Basic Electronics And Devices | 3+1 | -- | 3 |

| | | | | |
|---|---|---|---|---|
| 4 | Complex Variables and Statistical Methods | 3+1 | -- | 3 |
| 5 | Electro Magnetic Fields | 3+1 | -- | 3 |
| 6 | Electrical Machines-I | 3+1 | -- | 3 |
| 7 | Thermal and Hydro Lab | -- | 3 | 2 |
| 8 | Electrical Circuits Lab | -- | 3 | 2 |
| **Total Credits** | | | | **22** |

**II Year – II SEMESTER**

| S. No. | Subject | T | P | Credits |
|---|---|---|---|---|
| 1 | Environmental studies | 3+1 | -- | 3 |
| 2 | Switching Theory and Logic Design | 3+1 | -- | 3 |
| 3 | Pulse & Digital Circuits | 3+1 | -- | 3 |
| 4 | Power Systems-I | 3+1 | -- | 3 |
| 5 | Electrical Machines-II | 3+1 | -- | 3 |
| 6 | Control Systems | 3+1 | -- | 3 |
| 7 | Electrical Machines -I Lab | -- | 3 | 2 |
| 8 | Electronic Devices & Circuits Lab | -- | 3 | 2 |
| **Total Credits** | | | | **22** |

**III Year – I SEMESTER**

| S. No. | Subject | T | P | Credits |
|---|---|---|---|---|
| 1 | Managerial Economics and Financial Analysis | 3+1 | -- | 3 |
| 2 | Electrical Measurements | 3+1 | -- | 3 |
| 3 | Power Systems-II | 3+1 | -- | 3 |
| 4 | Electrical Machines-III | 3+1 | -- | 3 |
| 5 | Power Electronics | 3+1 | -- | 3 |
| 6 | Linear & Digital IC Applications | 3+1 | -- | 3 |
| 7 | Electrical Machines-II Lab | -- | 3 | 2 |
| 8 | Control Systems Lab | -- | 3 | 2 |
| 9 | IPR & Patents | 3+1 | | 2 |
| **Total Credits** | | | | **24** |

**III Year – II SEMESTER**

| S. No. | Subject | T | P | Credits |
|---|---|---|---|---|
| 1 | Switchgear and Protection | 3+1 | -- | 3 |

| | | | | |
|---|---|---|---|---|
| 2 | Microprocessors & Microcontrollers | 3+1 | -- | 3 |
| 3 | Utilization of Electrical Energy | 3+1 | -- | 3 |
| 4 | Power System Analysis | 3+1 | -- | 3 |
| 5 | Power Semiconductor Drives | 3+1 | -- | 3 |
| 6 | Management Science | 3+1 | -- | 3 |
| 7 | Power Electronics Lab | -- | 3 | 2 |
| 8 | Electrical Measurements Lab | -- | 3 | 2 |
| **Total Credits** | | | | **22** |

**IV Year – I SEMESTER**

| S. No. | Subject | T | P | Credits |
|---|---|---|---|---|
| 1 | Renewable Energy Sources and Systems | 3+1 | - | 3 |
| 2 | HVAC & DC Transmission | 3+1 | - | 3 |
| 3 | Power System Operation & Control | 3+1 | - | 3 |
| 4 | **Open Elective** | 3+1 | - | 3 |
| 5 | **Elective – I** | 3+1 | - | 3 |
| 6 | Microprocessors & Microcontrollers Lab | - | 3 | 2 |
| 7 | Electrical Simulation Lab | - | 3 | 2 |
| 8 | Power systems lab | | 3 | 2 |
| **Total Credits** | | | | **21** |

**IV Year – II SEMESTER**

| S. No. | Subject | T | P | Credits |
|---|---|---|---|---|
| 1 | Digital Control Systems | 3+1 | - | 3 |
| 2 | **Elective – II** | 3+1 | - | 3 |
| 3 | **Elective – III** | 3+1 | - | 3 |
| 4 | **Elective – IV** | 3+1 | - | 3 |
| 5 | Project | - | - | 9 |
| **Total Credits** | | | | **21** |

**Open Elective:**

1. Energy Audit, Conservation and Management
2. Instrumentation
3. Non Conventional Sources of Energy
4. Optimization Techniques

**Elective – I:**

1. VLSI Design
2. Electrical Distribution Systems
3. Optimization Techniques

**Elective – II:**

1. Advanced Control Systems
2. Extra High Voltage Transmission
3. Special Electrical Machines

**Elective – III:**

1. Electric Power Quality
2. Digital Signal Processing
3. FACTS: Flexible Alternating Current Transmission Systems.

**Elective-IV:**

1. OOPS Through Java
2. UNIX and Shell Programming
3. AI Techniques
4. Power System Reforms
5. Systems Engineering

## SYLLABUS

**I Year – I SEMESTER**

| T | P | C |
|---|---|---|
| 3+1 | 0 | 3 |

**ENGLISH –I**
**(Common to All Branches)**

**DETAILED TEXT-I English Essentials : Recommended Topics :**

1. **IN LONDON: M.K.GANDHI**

   **OBJECTIVE:** To apprise the learner how Gandhi spent a period of three years in London as a student.

   **OUTCOME**: The learner will understand how Gandhi grew in introspection and maturity.

2. **THE KNOWLEDGE SOCIETY- APJ KALAM**

   **OBJECTIVE**: To make the learners rediscover India as a land of Knowledge.

   **OUTCOME:** The learners will achieve a higher quality of life, strength and sovereignty of a developed nation.

3. **THE SCIENTIFIC POINT OF VIEW- J.B.S. HALDANE**

   **OBJECTIVE**: This essay discusses how scientific point of view seeks to arrive at the truth without being biased by emotion.

   **OUTCOME:** This develops in the student the scientific attitude to solve many problems which we find difficult to tackle.

4. **PRINCIPLES OF GOOD WRITING:**

   **OBJECTIVE**: To inform the learners how to write clearly and logically.

   **OUTCOME**: The learner will be able to think clearly and logically and write clearly and logically.

5. **MAN'S PERIL**

   **OBJECTIVE**: To inform the learner that all men are in peril.

   **OUTCOME:** The learner will understand that all men can come together and avert the peril.

6. **THE DYING SUN—SIR JAMES JEANS**

   **OBJECTIVE**: This excerpt from the book "The Mysterious Universe" presents the mysterious nature of the Universe and the stars which present numerous problems to the scientific mind. Sir James Jeans uses a poetic approach to discuss the scientific phenomena.

**OUTCOME**: This provides the students to think about the scientific phenomena from a different angle and also exposes the readers to poetic expressions.

7. **LUCK—MARK TWAIN**

**OBJECTIVE:** This is a short story about a man's public image and his true nature. The theme of the story is that luck can be a factor of life, so that even if one is incompetent but lucky, one can still succeed.

**OUTCOME**: The story is humourous in that it contains a lot of irony. Thus this develops in the learner understand humourous texts and use of words for irony.

**Text Book** : 'English Essentials' by Ravindra Publications

**NON-DETAILED TEXT:**

**(From Modern Trailblazers of Orient Blackswan)**
**(Common single Text book for two semesters)**

1. **G.D.Naidu**

**OBJECTIVE:** To inspire the learners by G.D.Naidu's example of inventions and contributions.

**OUTCOME:** The learner will be in a position to emulate G.D.Naidu and take to practical applications.

2. **G.R.Gopinath**

**OBJECTIVE:** To inspire the learners by his example of inventions.

**OUTCOME:** Like G.R.Gopinath, the learners will be able to achieve much at a low cost and help the common man.

3. **Sudhamurthy**

**OBJECTIVE:** To inspire the learners by the unique interests and contributions of Sudha Murthy.

**OUTCOME:** The learner will take interest in multiple fields of knowledge and make life worthwhile through social service.

4. **Vijay Bhatkar**

**OBJECTIVE:** To inspire the learner by his work and studies in different fields of engineering and science.

**OUTCOME:** The learner will emulate him and produce memorable things.

**Text Book** : 'Trail Blazers' by Orient Black Swan Pvt. Ltd. Publishers

**I Year – I SEMESTER**

| T | P | C |
|---|---|---|
| 3+1 | 0 | 3 |

**MATHEMATICS – I (DIFFERENTIAL EQUATIONS)**
**(Common to All Branches)**

**UNIT I: Differential equations of first order and first degree:**

Linear-Bernoulli-Exact-Reducible to exact.

Applications : Newton's Law of cooling-Law of natural growth and decay-orthogonal trajectories.

Subject Category

ABET Learning Objectives a d e

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

**UNIT II: Linear differential equations of higher order:**

Non-homogeneous equations of higher order with constant coefficients with RHS term of the type $e^{ax}$, Sin ax, cos ax, polynomials in x, $e^{ax}$ V(x), xV(x).

Applications: LCR circuit, Simple Harmonic motion

Subject Category

ABET Learning Objectives a d e

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

**UNIT III Laplace transforms:**

Laplace transforms of standard functions-ShiftingTheorems, Transforms of derivatives and integrals – Unit step function –Dirac's delta function- Inverse Laplace transforms– Convolution theorem (with out proof).

Application: Solutions of ordinary differential equations using Laplace transforms.

Subject Category

ABET Learning Objectives a e

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

**UNIT IV Partial differentiation:**

Introduction- Total derivative-Chain rule-Generalized Mean Value theorem for single variable (without proof)-Taylors and Mc Laurent's series for two variables– Functional dependence- Jacobian.

Applications: Maxima and Minima of functions of two variables with constraints and without constraints.

Subject Category

ABET Learning Objectives a c e

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

**UNIT V First order Partial differential equations:**

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions –solutions of first order linear (Lagrange) equation and nonlinear (standard type) equations

Subject Category

ABET Learning Objectives a e

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

**UNIT VI Higher order Partial differential equations:**

Solutions of Linear Partial differential equations with constant coefficients-Method of separation of Variables.

Applications: One- dimensional Wave, Heat equations - two-dimensional Laplace Equation.

Subject Category

ABET Learning Objectives a e

ABET internal assessments 1 2 6

JNTUK External Evaluation B E

**Books:**


1. **B.S.GREWAL,** Higher Engineering Mathematics, 42nd Edition, Khanna Publishers.
2. **ERWIN KREYSZIG,** Advanced Engineering Mathematics, 9th Edition, Wiley-India.
3. **GREENBERG,** Advanced Engineering Mathematics, 2nd edition, Pearson edn.
4. **DEAN G. DUFFY,** Advanced engineering mathematics with MATLAB, CRC Press.
5. **PETER O'NEIL,** advanced Engineering Mathematics, Cengage Learning.

| Subject Category | ABET Learning Objectives | ABET Internal Assessments | JNTUK External Evaluation | Rema -rks |
|---|---|---|---|---|
| Theory<br>Design<br>Analysis<br>Algorithms<br>Drawing<br>Others | a) Apply knowledge of math, science, & engineering<br>b) Design & conduct experiments, analyze & interpret data<br>c) Design a system/process to meet desired needs within economic, social, political, ethical, health/safety, manufacturability, & sustainability constraints<br>d) Function on multidisciplinary teams<br>e) Identify, formulate, & solve engineering problems<br>f) Understand professional & ethical responsibilities<br>g) Communicate effectively<br>h) Understand impact of engineering solutions in global, economic, environmental, & societal context<br>i) Recognize need for & be able to engage in lifelong learning<br>j) Know contemporary issues<br>k) Use techniques, skills, modern tools for engineering practices | 1. Objective tests<br>2. Essay questions tests<br>3. Peer tutoring based<br>4. Simulation based<br>5. Design oriented<br>6. Problem based<br>7. Experiential (project based) based<br>8. Lab work or field work based<br>9. Presentation based<br>10. Case Studies based<br>11. Role-play based<br>12. Portfolio based | A. Questions should have:<br>B. Definitions, Principle of operation or philosophy of concept.<br>C. Mathematical treatment, derivations, analysis, synthesis, numerical problems with inference.<br>D. Design oriented problems<br>E. Trouble shooting type of questions<br>F. Applications related questions<br>G. Brain storming questions | |

**I Year – I SEMESTER**

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**MATHEMATICS – II**
**(MATHEMATICAL METHODS)**
(Common to All Branches)

**UNIT I Solution of Algebraic and Transcendental Equations:**

Introduction- Bisection Method – Method of False Position – Iteration Method – Newton-Raphson Method (One variable and Simultaneous Equations).

Subject Category

ABET Learning Objectives a e k

ABET internal assessments 1 2 4 6

JNTUK External Evaluation A B E

**UNIT II Interpolation:**

Introduction- Errors in Polynomial Interpolation – Finite differences- Forward Differences- Backward differences –Central differences – Symbolic relations and separation of symbols-Differences of a polynomial-Newton's formulae for interpolation – Interpolation with unevenly spaced points – Lagrange's Interpolation formula.

Subject Category

ABET Learning Objectives a e

ABET internal assessments 1 2 4 6

JNTUK External Evaluation A B E

**UNIT III Numerical solution of Ordinary Differential equations:**

Solution by Taylor's series-Picard's Method of successive Approximations-Euler's Method-Runge-Kutta Methods.

Subject Category

ABET Learning Objectives a e

ABET internal assessments 1 2 4 6

JNTUK External Evaluation A B E

**UNIT IV Fourier Series:**

Introduction- Determination of Fourier coefficients – even and odd functions –change of interval– Half-range sine and cosine series.
Application: Amplitude, spectrum of a periodic function

Subject Category
ABET Learning Objectives a e d
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

**UNIT V Fourier Transforms:**

Fourier integral theorem (only statement) – Fourier sine and cosine integrals – sine and cosine transforms – properties – inverse transforms – Finite Fourier transforms.

Subject Category
ABET Learning Objectives a d e k
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

**UNIT VI Z-transform:**

Introduction– properties – Damping rule – Shifting rule – Initial and final value theorems –Inverse z transform- -Convolution theorem – Solution of difference equation by Z –transforms.

Subject Category
ABET Learning Objectives a b e k
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

**BOOKS:**


1. **B.S. GREWAL,** Higher Engineering Mathematics, 42nd Edition, Khanna Publishers.
2. **DEAN G. DUFFY,** Advanced Engineering Mathematics with MATLAB, CRC Press.
3. **V. RAVINDRANATH and P. VIJAYALAXMI,** Mathematical Methods, Himalaya Publishing House.
4. **ERWYN KREYSZIG,** Advanced Engineering Mathematics, 9th Edition, Wiley-India.


| Subject Category | ABET Learning Objectives | ABET Internal Assessments | JNTUK External Evaluation | Rema -rks |
|---|---|---|---|---|
| | a) Apply knowledge of math, science, & engineering<br>b) Design & conduct | 1. Objective tests<br>2. Essay questions | A. Questions should have:<br>B. Definitions, | |

| | | | | |
|---|---|---|---|---|
| Theory<br>Design<br>Analysis<br>Algorithms<br>Drawing<br>Others | experiments, analyze & interpret data<br>c) Design a system/process to meet desired needs within economic, social, political, ethical, health/safety, manufacturability, & sustainability constraints<br>d) Function on multidisciplinary teams<br>e) Identify, formulate, & solve engineering problems<br>f) Understand professional & ethical responsibilities<br>g) Communicate effectively<br>h) Understand impact of engineering solutions in global, economic, environmental, & societal context<br>i) Recognize need for & be able to engage in lifelong learning<br>j) Know contemporary issues<br>k) Use techniques, skills, modern tools for engineering practices | tests<br>3. Peer tutoring based<br>4. Simulation based<br>5. Design oriented<br>6. Problem based<br>7. Experiential (project based) based<br>8. Lab work or field work based<br>9. Presentation based<br>10. Case Studies based<br>11. Role-play based<br>12. Portfolio based | Principle of operation or philosophy of concept.<br>C. Mathematical treatment, derivations, analysis, synthesis, numerical problems with inference.<br>D. Design oriented problems<br>E. Trouble shooting type of questions<br>F. Applications related questions<br>G. Brain storming questions | |

**I Year – I SEMESTER**

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## ENGINEERING PHYSICS

### UNIT-I

### PHYSICAL OPTICS FOR INSTRUMENTS

"Objective Designing an instrument and enhancing the resolution for its operation would be effective as achieved through study of applicational aspects of physical Optics".

**INTERFACE :** Introduction – Interference in thin films by reflection – Newton's rings.

**DIFFRACTION :** Introduction – Fraunhofer diffraction - Fraunhofer diffraction at double slit (qualitative) – Diffraction grating – Grating spectrum – Resolving power of a grating – Rayleigh's criterion for resolving power.

**POLARIZATION :** Introduction – Types of Polarization – Double refraction – Quarter wave plate ad Half Wave plate.

### UNIT-II

### COHERENT OPTICS – COMMUNICATIONS AND STRUCTURE OF MATERIALS

Objectives while lasers are trusted Non-linear coherent sources established for the fitness of instrumentation, establishing a structure property relationship for materials requires allotment of an equivalent footing in convening the physics knowledge base.

**LASERS:** Introduction – coherent sources – Characteristics of lasers – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion – Three and Four level pumping schemes – Ruby laser – Helium Neon laser.

**FIBER OPTICS :** Introduction – Principle of Optical Fiber – Acceptance angle and acceptance cone – Numerical aperture.

**CRYSTALLOGRAPHY :** Introduction – Space lattice – Basis – Unit Cell – Lattice parameters – Bravais lattices – Crystal systems – Structures and packing fractions of SC, BCC and FCC.

**X-RAY DIFFRACTION TECHNIQUES** : Directions and planes in crystals – Miller indices – Separation between successive [h k l] planes – Bragg's law.

**UNIT-III**

**MAGNETIC, ELECTRIC FIELD RESPONSE OF MATERIALS & SUPERCONDUCTIVITY**

"Objective many of the Electrical or Electronic gadgets are designed basing on the response of naturally abundant and artificially made materials, while their response to E- or H- fields controls their performance.

**MAGNETIC PROPERTIES** : Magnetic permeability – Magnetization – Organ or magnetic moment – Classification of Magnetic materials – Dir, para, Ferro, anti ferro and ferri-magnetism – Hysteresis curve.

**DIELECTRIC PROPERTIES** : Introduction – Dielectric constant – Electronic, ionic and orientational polarization – internal fields – Clausius – Mossotti equation – Dielectric loss, Breakdown and Strength.

**SUPERCONDUCTIVITY** : General properties – Meissner effect – Type I and Type II superconductors – BCS Theory Flux quantization London's equations – Penetration depth – DC and AC Josephson effects – SQUIDS.

**UNIT – IV**

**ACOUSTICS AND EM – FIELDS:**

**Objective:** The utility and nuances of ever pervading SHM and its consequences would be the first hand-on to as it clearly conveyed through the detailed studies of Acoustics of Buildings, while vectorial concepts of EM fields paves the student to gear – up for a deeper understanding.

**ACOUSTICS:** Sound absorption, absorption coefficient and its measurements, Reverberations time – Sabine's formula, Eyring's formula.

**ELECTRO-MAGNETIC FIELDS**: Gauss and stokes theorems (qualitative) – Fundamental laws of electromagnetism – Maxwell's Electromagnetic Equations (Calculus approach).

**UNIT – V**

**QUANTUM MECHANICS FOR ELECTRONIC TRANSPORT**

Objective: The discrepancy between classical estimates and laboratory observations of physical properties exhibited by materials would be lifted out through the understanding quantum picture of sub-atomic world dominated by electron and its presence.

**QUANTUM MECHANICS**: Introduction to matter waves – Schrodinger Time Independent and Time Dependent wave equations – Particle in a box.

**FREE ELECTRON THEORY**: Classical free electron theory – electrical conductivity – Mean free path – Relaxation time and drifty velocity – Quantum free electron theory – Fermi – Dirac (analytical) and its dependence on temperature – Fermi energy – density of states – derivations for current density.

**BAND THEORY OF SOLIDS**: Bloch theorem (qualitative) – Kronig – Penney model – Origin of energy band formation in solids – Classification of materials into conductors, semi – conductors & insulators – Concepts of effective mass of electron - concept of hole.

**UNIT – VI**

**SEMICONDUCTOR PHYSICS:**

Objective: In the wake of ever increasing demand for the space and power the watch word "small is beautiful", understanding the physics of electronic transport as underlying mechanism for appliances would provide a knowledge base.

Introduction – Intrinsic semiconductor and carrier concentration – Equation for conductivity – Extrinsic semiconductor and carrier concentration – Drift and diffusion – Einstein's equation – Hall Effect – direct & indirect band gap semiconductors – Electronic transport Mechanism for LEDs, Photo conductors and solar cells.

**TEXT BOOKS**

1. Solid state Physics by A.J. Dekker (Mc Millan India Ltd.) .
2. A text book of Engineering Physics by M.N. Avadhanulu & P.G. Kshirasagar (S. Chand publications).
3. Engineering Physics b;y M.R. Srinivasan (New Age international publishers).

**REFERENCE BOOKS**

1. 'Introduction to solid state physics' by Charles Kittle (Willey India Pvt. Ltd).
2. 'Applied Physics' by T. Bhimasenkaram (BSP BH Publications )
3. 'Applied Physics' by M.Arumugam (Anuradha Agencies).
4. 'Engineering Physics' by Palanisamy (Scitech Publishers).
5. 'Engineering Physics' by D.K.Bhattacharya (Oxford University press).
6. 'Engineering Physics' by Mani Naidu S (Pearson Publications)
7. 'Engineering Physics' by Sanjay D Jain and Girish G Sahasrabudhe (University Press).
8. 'Engineering Physics' by B.K.Pandey & S. Chaturvedi (Cengage Learning).

**I Year – I SEMESTER**

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**Professional Ethics and Human Values**

**UNIT I : Human Values**:

Morals, Values and Ethics – Integrity – Work Ethics – Service Learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty –Courage – Value time – Co-operation – Commitment – Empathy – Self-confidence – Spirituality- Character.

**UNIT II : Engineering Ethics:**

The History of Ethics-Purposes for Engineering Ethics-Engineering Ethics-Consensus and Controversy –Professional and Professionalism –Professional Roles to be played by an Engineer –Self Interest, Customs and Religion-Uses of Ethical Theories-Professional Ethics-Types of Inquiry – Engineering and Ethics-Kohlberg's Theory – Gilligan's Argument –Heinz's Dilemma.

**UNIT III : Engineering as Social Experimentation:**

Comparison with Standard Experiments – Knowledge gained – Conscientiousness – Relevant Information – Learning from the Past – Engineers as Managers, Consultants, and Leaders – Accountability – Role of Codes – Codes and Experimental Nature of Engineering.

**UNIT IV : Engineers' Responsibility for Safety and Risk:**

Safety and Risk, Concept of Safety – Types of Risks – Voluntary v/s Involuntary Risk- Short term v/s Long term Consequences- Expected Probability- Reversible Effects- Threshold Levels for Risk- Delayed v/s Immediate Risk- Safety and the Engineer – Designing for Safety – Risk-Benefit Analysis-Accidents.

**UNIT V : Engineers' Responsibilities and Rights:**

Collegiality-Techniques for Achieving Collegiality –Two Senses of Loyalty-obligations of Loyalty-misguided Loyalty – professionalism and Loyalty-Professional Rights –Professional Responsibilities – confidential and proprietary information-Conflict of Interest-solving conflict problems – Self-interest, Customs and Religion- Ethical egoism-Collective bargaining-Confidentiality-Acceptance of Bribes/Gifts-when is a Gift and a Bribe-examples of Gifts v/s Bribes-problem solving-interests in other companies-Occupational Crimes-industrial espionage-price fixing-endangering lives-

Whistle Blowing-types of whistle blowing-when should it be attempted-preventing whistle blowing.

**UNIT VI : Global Issues:**

Globalization- Cross-culture Issues-Environmental Ethics-Computer Ethics-computers as the instrument of Unethical behaviour-computers as the object of Unethical Acts-autonomous computers-computer codes of Ethics-Weapons Development-Ethics and Research-Analysing Ethical Problems in Research-Intellectual Property Rights.

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**Text Books:**

1. "Engineering Ethics & Human Values" by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd-2009.
2. "Professional Ethics and Morals" by Prof.A.R.Aryasri, Dharanikota Suyodhana-Maruthi Publications.
3. "Professional Ethics and Human Values" by A.Alavudeen, R.Kalil Rahman and M. Jayakumaran- Laxmi Publications
4. "Professional Ethics and Human Values" by Prof. D.R. Kiran.
5. "Indian Culture, Values and Professional Ethics" by PSR Murthy-BS Publication.
6. "Ethics in Engineering" by Mike W. Martin and Roland Schinzinger – Tata McGraw-Hill – 2003.
7. "Engineering Ethics" by Harris, Pritchard and Rabins, CENGAGE Learning, India Edition, 2009.

**I Year – I SEMESTER**

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## ENGINEERING DRAWING

**Objective**:

Engineering drawing being the principle method of communication for engineers, the objective to introduce the students, the techniques of constructing the various types of polygons, curves and scales. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc.

### UNIT I

Objective: The objective is to introduce the use and the application of drawing instruments and to make the students construct the polygons, curves and various types of scales. The student will be able to understand the need to enlarge or reduce the size of objects in representing them.

Polygons, Construction of regular polygons using given length of a side; Ellipse, arcs of circles and Oblong methods; Scales – Vernier and Diagonal scales.

### UNIT II

Objective: The objective is to introduce orthographic projections and to project the points and lines parallel to one plane and inclined to other.

Introduction to orthographic projections; projections of points; projections of straight lines parallel to both the planes; projections of straight lines – parallel to one plane and inclined to the other plane.

### UNIT III

Objective: The objective is to make the students draw the projections of the lines inclined to both the planes.

Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclinations and traces.

### UNIT IV

Objective: The objective is to make the students draw the projections of the plane inclined to both the planes.

Projections of planes: regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.

**UNIT V**

Objective: The objective is to make the students draw the projections of the various types of solids in different positions inclined to one of the planes.
Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.

**UNIT VI**

Objective: The objective is to represent the object in 3D view through isometric views. The student will be able to represent and convert the isometric view to orthographic view and vice versa.

Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

**TEXT BOOKS:**

1. Engineering Drawing by N.D. Butt, Chariot Publications.
2. Engineering Drawing by K.L.Narayana & P. Kannaiah, Scitech Publishers.
3. Engineering Graphics by PI Varghese, McGrawHill Publishers.

**REFERENCE BOOKS:**

1. Engineering Graphics for Degree by K.C. John, PHI Publishers.
2. Engineering Drawing by Agarwal & Agarwal, Tata McGraw Hill Publishers.
3. Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, New Age.

**I Year – I SEMESTER**

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## ENGLISH – COMMUNICATION SKILLS LAB – I

**Suggested Lab Manuals:**

**OBJECTIVE:** To impart to the learner the skills of grammar as well as communication through listening, speaking, reading, and writing including soft, that is life skills.

**BASIC COMMUNICATION SKILLS**

| | |
|---|---|
| UNIT 1 | A. Greeting and Introductions |
| | B. Pure Vowels |
| UNIT 2 | A. Asking for information and Requests |
| | B. Diphthongs |
| UNIT 3 | A. Invitations |
| | B. Consonants |
| UNIT 4 | A. Commands and Instructions |
| | B. Accent and Rhythm |
| UNIT 5 | A. Suggestions and Opinions |
| | B. Intonation |

**Text Book:**

'Strengthen your Communication Skills' Part-A by Maruthi Publications.

**Reference Books:**

1. INFOTECH English (Maruthi Publications).
2. Personality Development and Soft Skills (Oxford University Press, New Delhi).

**I Year – I SEMESTER**

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## ENGINEERING PHYSICS LAB

**List of Experiments**

1. Determination of wavelength of a source-Diffraction Grating-Normal incidence.
2. Newton's rings –Radius of Curvature of Plano_Convex Lens.
3. Determination of thickness of a thin object using parallel interference fringes.
4. Determination of Rigidity modulus of a material- Torsional Pendulum.
5. Determination of Acceleration due to Gravity and Radius of Gyration- Compound Pendulum.
6. Melde's experiment – Transverse and Longitudinal modes.
7. Verification of laws of stretched string – Sonometer.
8. Determination of velocity of sound – Volume resonator.
9. L C R Senes Resonance Circuit
10. Study of I/V Characteristics of Semiconductor diode.
11. I/V characteristics of Zener diode.
12. Thermistor characteristics – Temperature Coefficient.
13. Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus.
14. Energy Band gap of a Semiconductor p.n junction.
15. Hall Effect for semiconductor.

**REFERENCE:**

1. Engineering Physics Lab Manual by Dr.Y. Aparna & Dr.K.Venkateswarao (V.G.S.Book links).
2. Physics practical manual, Lorven Publications.

**I Year – I SEMESTER**

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**Engineering Physics**
**Virtual Labs - Assignments**

**List of Experiments**

1. Hall Effect
2. Crystal Structure
3. Hysteresis
4. Brewster's angle
5. Magnetic Levitation / SQUID
6. Numerical Aperture of Optical fiber
7. Photoelectric Effect
8. Simple Harmonic Motion
9. Damped Harmonic Motion
10. LASER – Beam Divergence and Spot size

URL: WWW.vlab.co.in

**I Year – I SEMESTER**

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**ENGINEERING WORKSHOP & IT WORKSHOP**

## ENGINEERING WORKSHOP:

**Course Objective:** To impart hands-on practice on basic engineering trades and skills.

**Note:** At least two exercises to be done from each trade.

**Trade:**

| | |
|---|---|
| **Carpentry** | 1. T-Lap Joint<br>2. Cross Lap Joint<br>3. Dovetail Joint<br>4. Mortise and Tennon Joint |
| **Fitting** | 1. Vee Fit<br>2. Square Fit<br>3. Half Round Fit<br>4. Dovetail Fit |
| **Black Smithy** | 1. Round rod to Square<br>2. S-Hook<br>3. Round Rod to Flat Ring<br>4. Round Rod to Square headed bolt |
| **House Wiring** | 1. Parallel / Series Connection of three bulbs<br>2. Stair Case wiring<br>3. Florescent Lamp Fitting<br>4. Measurement of Earth Resistance |
| **Tin Smithy** | 1. Taper Tray<br>2. Square Box without lid<br>3. Open Scoop<br>4. Funnel |

## IT WORKSHOP:

**Objectives:** Enabling the student to understand basic hardware and software tools through practical exposure.

**PC Hardware:**

Identification of basic peripherals, assembling a PC, installation of system software like MS Windows, device drivers. Troubleshooting Hardware and software _ some tips and tricks.

**Internet & World Wide Web:**

Different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet, web browsers, email, newsgroups and discussion forums .Awareness of cyber hygiene( protecting the personal computer from getting infected with the viruses), worms and other cyber attacks .

**Productivity tools** Crafting professional word documents; excel spread sheets, power point presentations and personal web sites using the Microsoft suite of office tools

**(Note: Student should be thoroughly exposed to minimum of 12 Tasks)**

**PC Hardware**

**Task 1: Identification of the peripherals of a computer.**

To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions. Description of various I/O Devices.

**Task 2 (Optional) :** A practice on disassembling the components of a PC and assembling them to back to working condition.

**Task 3:** Examples of Operating systems- DOS, MS Windows, Installation of MS windows on a PC.

**Task 4:** Introduction to Memory and Storage Devices , I/O Port, Device Drivers, Assemblers, Compilers, Interpreters , Linkers, Loaders.

**Task 5:**

**Hardware Troubleshooting (Demonstration):**

Identification of a problem and fixing a defective PC(improper assembly or defective peripherals).

**Software Troubleshooting (Demonstration):**. Identification of a problem and fixing the PC for any software issues.

**Internet & Networking Infrastructure**

**Task 6**: Demonstrating Importance of Networking, Transmission Media, Networking Devices- Gateway, Routers, Hub, Bridge, NIC ,Bluetooth Technology, Wireless Technology, Modem, DSL, Dialup Connection.

**Orientation & Connectivity Boot Camp and web browsing:** Students are trained to configure the network settings to connect to the Internet. They are

trained to demonstrate the same through web browsing (including all tool bar options) and email access.

**Task 7**: **Search Engines & Netiquette:**

Students are enabled to use search engines for simple search, academic search and any other context based search (Bing, Google etc). Students are acquainted to the principles of micro-blogging, wiki, collaboration using social networks, participating in online technology forums.

**Task 8: Cyber Hygiene (Demonstration):** Awareness of various threats on the internet. Importance of security patch updates and anti-virus solutions. Ethical Hacking, Firewalls, Multi-factor authentication techniques including Smartcard, Biometrics are also practiced.

**Word**

**Task 9 : MS Word Orientation:**

Accessing, overview of toolbars, saving files, Using help and resources, rulers, formatting ,Drop Cap , Applying Text effects, Using Character Spacing, OLE in Word, using templates, Borders and Colors, Inserting Header and Footer, Using Date and Time option, security features in word, converting documents while saving.

**Task 10: 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, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs.

**Excel**

**Task 11:** Using spread sheet features of EXCEL including the macros, formulae, pivot tables, graphical representations.

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

**LOOKUP/VLOOKUP**

**Task 12: Performance Analysis** - Features to be covered:- Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting.

**Power Point**

**Task 13:** 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, Hyperlinks, Inserting –Images, Clip Art, Tables and Charts in Powerpoint.

**Task 14:** Focusing on the power and potential of Microsoft power point. 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, OLE in PPT.

**TEXT BOOK:**

**Faculty to consolidate the workshop manuals using the following references**

1. Computer Fundamentals, Anita Goel, Pearson.
2. Scott Mueller's Upgrading and Repairing PCs, 18/e, Scott. Mueller, QUE, Pearson, 2008.
3. Information Technology Workshop, 3e, G Praveen Babu, MV Narayana BS Publications.
4. Comdex Information Technology, Vikas Gupta, dreamtech.

**REFERENCE BOOK:**

1. Essential Computer and IT Fundamentals for Engineering and Science Students, Dr. N.B. Venkateswarlu.

**I Year – II SEMESTER**

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**ENGLISH –II**
**(Common to All Branches)**

**DETAILED TEXT-II :**

**Sure Outcomes**: English for Engineers and Technologists

**Recommended Topics :**

1. **TECHNOLOGY WITH A HUMAN FACE**
   **OBJECTIVE:** To make the learner understand how modern life has been shaped by technology.
   **OUTCOME**: The proposed technology is people's technology. It serves the human person instead of making him the servant of machines.

2. **CLIMATE CHANGE AND HUMAN STRATEGY**
   **OBJECTIVE**: To make the learner understand how the unequal heating of earth's surface by the Sun, an atmospheric circulation pattern is developed and maintained.
   **OUTCOME**: The learner's understand that climate must be preserved.

3. **EMERGING TECHNOLOGIES**
   **OBJECTIVE**: To introduce the technologies of the 20$^{th}$ century and 21$^{st}$ centuries to the learners.
   **OUTCOME**: The learner will adopt the applications of modern technologies such as nanotechnology.

4. **WATER- THE ELIXIR OF LIFE**
   **OBJECTIVE**: To inform the learner of the various advantages and characteristics of water.
   **OUTCOME**: The learners will understand that water is the elixir of life.

5. **THE SECRET OF WORK**
   **OBJECTIVE:**: In this lesson, Swami Vivekananda highlights the importance of work for any development.
   **OUTCOME**: The students will learn to work hard with devotion and dedication.

**6. WORK BRINGS SOLACE**

**OBJECTIVE**: In this lesson Abdul Kalam highlights the advantage of work.

**OUTCOME**: The students will understand the advantages of work. They will overcome their personal problems and address themselves to national and other problems.

**Text Book** : 'Sure Outcomes' by Orient Black Swan Pvt. Ltd. Publishers

**NON-DETAILED TEXT:**

**(From Modern Trailblazers of Orient Blackswan)**
**(Common single Text book for two semesters)**

**1. J.C. Bose**

**OBJECTIVE:** To apprise of J.C.Bose's original contributions.

**OUTCOME:** The learner will be inspired by Bose's achievements so that he may start his own original work.

**2. Homi Jehangir Bhaba**

**OBJECTIVE:** To show Bhabha as the originator of nuclear experiments in India.

**OUTCOME:** The learner will be inspired by Bhabha's achievements so as to make his own experiments.

**3. Vikram Sarabhai**

**OBJECTIVE:** To inform the learner of the pioneering experiments conducted by Sarabhai in nuclear energy and relevance of space programmes.

**OUTCOME:** The learner will realize that development is impossible without scientific research.

**4. A Shadow- R.K.Narayan**

**OBJECTIVE:** To expose the reader to the pleasure of the humorous story.

**OUTCOME:** The learner will be in a position to appreciate the art of writing a short story and try his hand at it.

**Text Book :** 'Trail Blazers' by Orient Black Swan Pvt. Ltd. Publishers

**I Year – II SEMESTER**

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## MATHEMATICS – III
## (LINEAR ALGEBRA & VECTOR CALCULUS)
## (Common to All Branches)

**UNIT I Linear systems of equations:**

Rank-Echelon form, Normal form – Solution of Linear Systems – Direct Methods- Gauss Elimination - Gauss Jordon and Gauss Seidal Methods.

Application: Finding the current in a electrical circuit.

Subject Category

ABET Learning Objectives a e k

ABET internal assessments 1 2 6 4

JNTUK External Evaluation A B E

**UNIT II Eigen values - Eigen vectors and Quadratic forms:**

Eigen values - Eigen vectors– Properties – Cayley-Hamilton Theorem - Inverse and powers of a matrix by using Cayley-Hamilton theorem- Quadratic forms- Reduction of quadratic form to canonical form – Rank - Positive, negative definite - semi definite - index – signature.

Application: Free vibration of a two-mass system.

Subject Category

ABET Learning Objectives a d e k

ABET internal assessments 1 2 4 6

JNTUK External Evaluation A B E

**UNIT III Multiple integrals:**

Review concepts of Curve tracing (Cartesian - Polar and Parametric curves)-

Applications of Integration to Lengths, Volumes and Surface areas of revolution in Cartesian and Polar Coordinates.

Multiple integrals - double and triple integrals – change of variables – Change of order of Integration

Application: Moments of inertia

Subject Category

ABET Learning Objectives a e d

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

**UNIT IV Special functions:**

Beta and Gamma functions- Properties - Relation between Beta and Gamma functions- Evaluation of improper integrals.

Application: Evaluation of integrals

Subject Category

ABET Learning Objectives a e

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

**UNIT V Vector Differentiation:**

Gradient- Divergence- Curl - Laplacian and second order operators -Vector identities.

Application: Equation of continuity, potential surfaces

Subject Category

ABET Learning Objectives a e

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

**UNIT VI Vector Integration:**

Line integral – work done – Potential function – area- surface and volume integrals Vector integral theorems: Greens, Stokes and Gauss Divergence Theorems (Without proof) and related problems.

Application : work done, Force

Subject Category

ABET Learning Objectives a e

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

**BOOKS:**

1. **GREENBERG,** Advanced Engineering Mathematics, 9th Edition, Wiley-India.
2. **B.V. RAMANA,** Higher Engineering Mathematics, Tata Mc Grawhill.
3. **ERWIN KREYSZIG,** Advanced Engineering Mathematics, 9th Edition, Wiley-India.
4. **PETER O'NEIL,** Advanced Engineering Mathematics, Cengage Learning.
5. **D.W. JORDAN AND T. SMITH,** Mathematical Techniques, Oxford University Press.

| Subject Category | ABET Learning Objectives | ABET Internal Assessments | JNTUK External Evaluation | Rema-rks |
|---|---|---|---|---|
| Theory<br>Design<br>Analysis<br>Algorithms<br>Drawing<br>Others | a) Apply knowledge of math, science, & engineering<br>b) Design & conduct experiments, analyze & interpret data<br>c) Design a system/process to meet desired needs within economic, social, political, ethical, health/safety, manufacturability, & sustainability constraints<br>d) Function on multidisciplinary teams<br>e) Identify, formulate, & solve engineering problems<br>f) Understand professional & ethical responsibilities<br>g) Communicate effectively<br>h) Understand impact of engineering solutions in global, economic, environmental, & societal context<br>i) Recognize need for & be able to engage in lifelong learning<br>j) Know contemporary issues<br>k) Use techniques, skills, modern tools for engineering practices | 1. Objective tests<br>2. Essay questions tests<br>3. Peer tutoring based<br>4. Simulation based<br>5. Design oriented<br>6. Problem based<br>7. Experiential (project based) based<br>8. Lab work or field work based<br>9. Presentation based<br>10. Case Studies based<br>11. Role-play based<br>12. Portfolio based | A. Questions should have:<br>B. Definitions, Principle of operation or philosophy of concept.<br>C. Mathematical treatment, derivations, analysis, synthesis, numerical problems with inference.<br>D. Design oriented problems<br>E. Trouble shooting type of questions<br>F. Applications related questions<br>G. Brain storming questions | |

**I Year – II SEMESTER**

| T | P | C |
|---|---|---|
| 3+1 | 0 | 3 |

## ENGINEERING CHEMISTRY

### UNIT-I: WATER TECHNOLOGY

Hard Water – Estimation of hardness by EDTA method – Potable water- Sterilization and Disinfection – Boiler feed water – Boiler troubles – Priming and foaming, scale formation, corrosion, caustic embrittlement, turbine deposits – Softening of water – Lime soda, Zeolite processes – Reverse osmosis – Electro Dialysis, Ion exchange process.

**Objectives :** For prospective engineers knowledge about water used in industries (boilers etc.) and for drinking purposes is useful; hence chemistry of hard water, boiler troubles and modern methods of softening hard water is introduced.

### UNIT-II : ELECTROCHEMISTRY

Concept of Ionic conductance – Ionic Mobilities – Applications of Kohlrausch law – Conductometric titrations – Galvanic cells – Electrode potentials – Nernst equation – Electrochemical series – Potentiometric titrations – Concentration cells – Ion selective electrode –Glass electrodes – Fluoride electrode; Batteries and Fuel cells.

**Objectives :** Knowledge of galvanic cells, electrode potentials, concentration cells is necessary for engineers to understand corrosion problem and its control ; also this knowledge helps in understanding modern bio-sensors, fuel cells and improve them.

### UNIT-III : CORROSION

Causes and effects of corrosion – theories of corrosion (dry, chemical and electrochemical corrosion) – Factors affecting corrosion – Corrosion control methods – Cathodic protection –Sacrificial Anodic, Impressed current methods – Surface coatings – Methods of application on metals (Hot dipping, Galvanizing, tinning, Cladding, Electroplating, Electroless plating) – Organic surface coatings – Paints – Their constituents and their functions.

**Objectives :** the problems associated with corrosion are well known and the engineers must be aware of these problems and also how to counter them.

### UNIT-IV : HIGH POLYMERS

Types of Polymerization – Stereo regular Polymers – Physical and Mechanical properties of polymers – Plastics – Thermoplastics and thermo

setting plastics – Compounding and Fabrication of plastics – Preparation and properties of Polyethylene, PVC and Bakelite – Elastomers – Rubber and Vulcanization – Synthetic rubbers – Styrene butadiene rubber – Thiokol – applications.

**Objectives :** Plastics are materials used very widely as engineering materials. An understanding of properties particularly physical and mechanical properties of polymers / plastics / elastomers helps in selecting suitable materials for different purposes.

**UNIT-V : FUELS**

Coal – Proximate and ultimate analysis – Numerical problems based on analysis – Calorific vaule – HCV and LCV – Problems based on calorific values; petroleum – Refining – Cracking – Petrol – Diesel knocking; Gaseous fuels – Natural gas – LPG, CNG – Combustion – Problems on air requirements.

**Objectives :** A board understanding of the more important fuels employed on a large scale is necessary for all engineer to understand energy – related problems and solve them.

**UNIT-VI : CHEMISTRY OF ADVANCED MATERIALS**

Nanometerials (Preparation of carbon nanotubes and fullerenes – Properties of nanomaterials – Engineering applications) – Liquid crystals (Types – Application in LCD and Engineering Applications) – Fiber reinforced plastics – Biodegradable polymers – Conducting polymers – Solar cells (Solar heaters – Photo voltaic cells – Solar reflectors – Green house concepts – Green chemistry (Methods for green synthesis and Applications) – Cement – Hardening and setting – Deterioration of cement concrete.

**Objectives :** With the knowledge available now, future engineers should know at least some of the advanced materials that are becoming available. Hence some of them are introduced here.

**TEXT BOOKSS**

1. Jain and Jain (Latest Edition), Engineering Chemistry, Dhanpat Rai Publishing company Ltd.
2. N.Y.S.Murthy, V.Anuradha, KRamaRao “A Text Book of Engineering Chemistry”, Maruthi Publications.
3. C.Parameswara Murthy, C.V.Agarwal, Adhra Naidu (2006) Text Book of Engineering Chemistry, B.S.Publications.
4. B.Sivasankar (2010), Engineering Chemistry, McGraw-Hill companies.

5. Ch.Venkata Ramana Reddy and Ramadevi (2013), Engineering Chemistry, Cengage Learning.

**REFERENCES**

1. S.S. Dara (2013) Text Book of Engineering Chemistry, S.Chand Technical Series.
2. K.Sesha Maheswaramma and Mridula Chugh (2013), Engineering Chemistry, Pearson Publications.
3. R.Gopalan, D.Venkatappayya, Sulochana Nagarajan (2011), Text Book of Engineering Chemistry, Vikas Publications.
4. B.Viswanathan and M.Aulice Scibioh (2009), Fuel Cells, Principals and applications, University Press.

**I Year – II SEMESTER**

| T | P | C |
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| 3+1 | 0 | 3 |

## ENGINEERING MECHANICS

**Objectives:**

The students completing this course are expected to understand the concepts of forces and its resolution in different planes ,resultant of force system, Forces acting on a body, their free body diagrams using graphical methods. They are required to understand the concepts of centre of gravity and moments of inertia and their application, Analysis of frames and trusses, different types of motion, friction and application of work - energy method.

**UNIT – I**

**Objectives: The students are to be exposed to the concepts of force and friction , direction and its application.**

Introduction to Engg. Mechanics – Basic Concepts.

**Systems of Forces :** Coplanar Concurrent Forces – Components in Space – Resultant – Moment of Force and its Application – Couples and Resultant of Force Systems. Introduction**,** limiting friction and impending motion, coulomb's laws of dry friction , coefficient of friction, cone of friction.

**UNIT II**

**Objectives: The students are to be exposed to application of free body diagrams. Solution to problems using graphical methods and law of triangle of forces.**

**Equilibrium of Systems of Forces :** Free Body Diagrams, Equations of Equilibrium of Coplanar Systems, Spatial Systems for concurrent forces. Lamis Theorm, Graphical method for the equilibrium of coplanar forces, Converse of the law of Triangle of forces, converse of the law of polygon of forces condition of equilibrium.

**UNIT – III**

**Objectives : The students are to be exposed to concepts of centre of gravity.**

**Centroid :** Centroids of simple figures (from basic principles) – Centroids of Composite Figures.

**Centre of Gravity :** Centre of gravity of simple body (from basis principles), centre of gravity of composite bodies, pappus theorem.

**UNIT IV**

**Objective: The students are to be exposed to concepts of moment of inertia and polar moment of inertia including transfer methods and their applications.**

**Area moments of Inertia :** Definition – Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia. **Mass Moment of Inertia :** Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, mass moment of inertia of composite bodies.

**UNIT – V**

**Objectives : The students are to be exposed to motion in straight line and in curvilinear paths, its velocity and acceleration computation and methods of representing plane motion.**

**Kinematics :** Rectilinear and Curvelinear motions – Velocity and Acceleration – Motion of Rigid Body – Types and their Analysis in Planar Motion. **Kinetics :** Analysis as a Particle and Analysis as a Rigid Body in Translation – Central Force Motion – Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies.

**UNIT – VI**

**Objectives: The students are to be exposed to concepts of work, energy and particle motion**

**Work – Energy Method :** Equations for Translation, Work-Energy Applications to Particle Motion, Connected System-Fixed Axis Rotation and Plane Motion. Impulse momentum method.

**TEXT BOOKS:**

1. Engg. Mechanics - S.Timoshenko & D.H.Young., 4th Edn - , Mc Graw Hill publications.
2. Engineering Mechanics: Statics and Dynamics 3rd edition, Andrew Pytel and Jaan Kiusalaas; Cengage Learning publishers.

**REFERENCES:**

1. Engineering Mechanics statics and dynamics – R.C.Hibbeler, 11th Edn – Pearson Publ.
2. Engineering Mechanics , statics – J.L.Meriam, 6th Edn – Wiley India Pvt. Ltd.

3. Engineering Mechanics, dynamics – J.L.Meriam, 6th Edn – Wiley India Pvt. Ltd.
4. Engineering Mechanics, statics and dynamics – I.H.Shames, – Pearson Publ.
5. Mechanics For Engineers, statics - F.P.Beer & E.R.Johnston – 5th Edn Mc Graw Hill Publ.
6. Mechanics For Engineers, dynamics - F.P.Beer & E.R.Johnston – 5th Edn Mc Graw Hill Publ.
7. Theory & Problems of engineering mechanics, statics & dynamics – E.W.Nelson, C.L.Best & W.G. McLean, 5th Edn – Schaum's outline series - Mc Graw Hill Publ.
8. Engineering Mechanics, Fedinand. L. Singer, Harper – Collins.
9. Engineering Mechanics statics and dynamics, A Nelson, Mc Graw Hill publications.
10. Engineering Mechanics, Tayal. Umesh Publ.

| I Year – II SEMESTER | T | P | C |
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## ELECTRICAL CIRCUIT ANALYSIS – I

**Preamble**:

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, network theorems, transient analysis and network topology.

**Objectives:**

i. To study the concepts of passive elements, types of sources and various network reduction techniques.
ii. To understand the behaviour of RLC networks for sinusoidal excitations.
iii. To study the performance of R-L, R-C and R-L-C circuits with variation of one of the parameters and to understand the concept of resonance.
iv. To study the concept of magnetic coupled circuit.
v. To understand the applications of network topology to electrical circuits.
vi. To understand the applications of network theorems for analysis of electrical networks.

**UNIT-I**

**Introduction to Electrical Circuits**

Passive components and their V-I relations. Sources (dependent and independent) - Kirchoff's laws, Network reduction techniques(series, parallel, series - parallel, star-to-delta and delta-to-star transformation). source transformation technique, nodal analysis and mesh analysis.

**UNIT-II**

**Single Phase A.C Systems**

Periodic waveforms (determination of rms, average value and form factor). Concept of phase angle and phase difference.

Complex and polar forms of representations, steady state analysis of R, L and C circuits.

Power Factor and its significance – Real, Reactive power and apparent Power.

**UNIT-III**

**Resonance**

Locus diagrams for various combination of R, L and C. Resonance, concept of band width and Quality factor.

**UNIT-IV**

**Magnetic Circuit**

Basic definition of MMF, flux and reluctance. Analogy between electrical and magnetic circuits.

Faraday's laws of electromagnetic induction Concept of self and mutual inductance.

Dot convention-coefficient of coupling and composite magnetic circuit. Analysis of series and parallel magnetic circuits.

**UNIT-V**

**Network topology**

Definitions of Graph and Tree. Basic cutset and tieset matrices for planar networks. Loop and nodal methods of analysis of networks with dependent and independent voltage and current sources. Duality and Dual networks.

**UNIT-VI**

**Network** theorems (DC & AC Excitations)

Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem, Reciprocity theorem, Millman's theorem and compensation theorem.

**Outcomes:**

Students are able to solve

i. Various electrical networks in presence of active and passive elements.
ii. Any R, L, C network with sinusoidal excitation.
iii. Any R, L, C network with variation of any one of the parameters i.e R, L, C. and f.
iv. Any magnetic circuit with various dot conventions.
v. Electrical networks with network topology concepts.
vi. Electrical networks by using principles of network theorems.

**TEXT BOOKS**:

1. Engineering Circuit Analysis by William Hayt and Jack E.Kemmerley,Mc Graw Hill Company,6 th edition.
2. Network Analysis: Van Valkenburg; Prentice-Hall of India Private Ltd.

**REFERENCE BOOKS**:

1. Introduction to Circuit Analysis and Design by Tildon Glisson. Jr, Springer Publications.
2. Electric Circuit Analysis by K.S. Suresh Kumar, Pearson publications
3. Electric Circuits by David A. Bell, Oxford publications.
4. Introductory Circuit Analysis by Robert L Boylestad, Pearson Publications.
5. Circuit Theory(Analysis and Synthesis) by A.chakrabarthi,Dhanpat Rai&co.

**I Year – II SEMESTER**

| T | P | C |
|---|---|---|
| 3+1 | 0 | 3 |

## COMPUTER PROGRAMMING

**Objectives:** Formulating algorithmic solutions to problems and implementing algorithms in C.

**UNIT I:**

**Unit objective: Notion of Operation of a CPU, Notion of an algorithm and computational procedure, editing and executing programs in Linux**

**Introduction:** Computer systems, Hardware and Software Concepts**,**

**Problem Solving:** Algorithm / Pseudo code, flowchart, program development steps, computer languages: machine, symbolic and highlevel languages, Creating and Running Programs: Writing, Editing (vi/emacs editor), Compiling (gcc), Linking and Executing in under Linux.

**BASICS OF C:** Structure of a C program, identifiers, basic data types and sizes. Constants, Variables, Arthmetic, relational and logical operators, increment and decrement operators, conditional operator, assignment operator, expressions, type conversions, Conditional Expressions, precedence and order of evaluation, Sample Programs.

**UNIT II:**

**Unit objective: understanding branching, iteration and data representation using arrays**

**SELECTION – MAKING DECISION: TWO WAY SELECTION**: if-else, null else, nested if, examples, Multi-way selection: switch, else-if, examples**.**

**ITERATIVE:** loops- while, do-while and for statements , break, continue, initialization and updating, event and counter controlled loops, Looping applications: Summation, powers, smallest and largest.

**ARRAYS**: Arrays- concepts, declaration, definition, accessing elements, storing elements, Strings and String Manipulations, 1-D arrays, 2-D arrays and character arrays, string manipulations, Multidimensional arrays, array applications: Matrix operations, checking the symmetricity of a Matrix**.**

**STRINGS: concepts, c strings.**

**UNIT III:**

**Objective: Modular programming and recursive solution formulation**

**FUNCTIONS- MODULAR PROGRAMMING**: functions, basics, parameter passing, storage classes extern, auto, register, static, scope rules,

block structure, user defined functions, standard library functions, recursive functions, Recursive solutions for fibonacci series, towers of Hanoi, header files, C Preprocessor, example c programs, Passing 1-D arrays, 2-D arrays to functions.

**UNIT IV:**
**Objective: Understanding pointers and dynamic memory allocation**

**POINTERS:** pointers- concepts, initialization of pointer variables, pointers and function arguments, passing by address- dangling memory, address arithmetic, character pointers and functions, pointers to pointers, pointers and multi-dimensional arrays, dynamic memory management functions, command line arguments.

**UNIT V:**
**Objective: Understanding miscellaneous aspects of C**

**ENUMERATED, STRUCTURE AND UNION TYPES:** Derived types- structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit-fields, program applications.

**BIT-WISE OPERATORS: logical, shift, rotation, masks.**

**UNIT VI:**
**Objective: Comprehension of file operations**

**FILE HANDLING**: Input and output- concept of a file, text files and binary files, Formatted I/O, File I/O operations, example programs.

**Text Books:**

1. Problem Solving and Program Design in C, Hanly, Koffman, 7th ed, PEARSON.
2. Programming in C, Second Edition Pradip Dey and Manas Ghosh, OXFORD Higher Education.
3. Programming in C, A practical approach Ajay Mittal PEARSON.
4. The C programming Language by Dennis Richie and Brian Kernighan
5. Programming in C, B. L. Juneja, Anith Seth, Cengage Learning.

**Reference Books and web links:**

1. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE.
2. Programming with C, Bichkar, Universities Press.
3. Programming in C, Reema Thareja, OXFORD.
4. C by Example, Noel Kalicharan, Cambridge.

**I Year – II SEMESTER**

| T | P | C |
|---|---|---|
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## ENGINEERING CHEMISTRY LABORATORY

**List of Experiments**

1. Introduction to chemistry laboratory – Molarity, Normality, Primary, Secondary standard solutions, Volumetric titrations, Quantitative analysis, Quantitative analysis etc.
2. Trial experiment – Estimation of HCI using standard $Na_2co_3$ solutions
3. Estimation of $KMnO_4$ using standard Oxalic acid solution.
4. Estimation of Ferric iron using standard $K_2Cr_2O_7$ solution.
5. Estimation of Copper using standard $K_2Cr_2O_7$ solution.
6. Estimation of Total Hardness water using standard EDTA solution.
7. Estimation of Copper using standard EDTA solution.
8. Estimation of Copper using Colorimeter
9. Estimation of pH of the given sample solution using pH meter.
10. Conductometric Titrations between strong acid and strong base
11. Conductometric Titrations between strong acid and Weak base
12. Potentiometric Titrations between strong acid and strong base
13. Potentiometric Titrations between strong acid and Weak base
14. Estimatinog of Zinc using standard potassium ferrocyanide solution
15. Estimation of Vitamin – C

**TEXT BOOKSS**

1. Dr.Jyotsna Cherukuis(2012)Laboratory Manual of Engineering Chemistry-II, VGS Techno Series.
2. Chemistry Practical Manual, Lorven Publications.
3. K. Mukkanti (2009) Practical Engineering Chemistry, B.S.Publication.

**I Year – II SEMESTER**

| T | P | C |
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| 0 | 3 | 2 |

## ENGLISH – COMMUNICATION SKILLS LAB – II

**Suggested Lab Manuals:**

**OBJECTIVE:** To impart to the learner the skills of grammar as well as communication through listening, speaking, reading, and writing including soft, that is life skills.

**ADVANCED COMMUNICATION SKILLS**

| | |
|---|---|
| UNIT 6 | Body language |
| UNIT 7 | Dialogues |
| UNIT 8 | Interviews and Telephonic Interviews |
| UNIT 9 | Group Discussions |
| UNIT 10 | Presentation Skills |
| UNIT 11 | Debates |

**Text Book:**

'Strengthen your Communication Skills' Part-B by Maruthi Publications

**Reference Books:**

1. INFOTECH English (Maruthi Publications).
2. Personality Development and Soft Skills (Oxford University Press, New Delhi).

**I Year – II SEMESTER**

| T | P | C |
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## C PROGRAMMING LAB

**Exercise l**

a) Write a C Program to calculate the area of triangle using the formula area = ( s (s-a) (s-b)(s-c))$^{1/2}$ where s= (a+b+c)/2

b) Write a C program to find the largest of three numbers using ternary operator.

c) Write a C Program to swap two numbers without using a temporary variable.

**Exercise 2**

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 find the roots of a quadratic equation.

c) Write a C program, which takes two integer operands and one operator form the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement).

**Exercise 3**

a) Write a C program to find the sum of individual digits of a positive integer and find the reverse of the given number.

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.

**Exercise 4**

a) Write a C Program to print the multiplication table of a given number n up to a given value, where n is entered by the user.

b) Write a C Program to enter a decimal number, and calculate and display the binary equivalent of that number.

c) Write a C Program to check whether the given number is Armstrong number or not.

**Exercise 5**

a) Write a C program to interchange the largest and smallest numbers in the array.

b) Write a C program to implement a liner search.

c) Write a C program to implement binary search

**Exercise 6**

a) Write a C program to implement sorting of an array of elements .

b) Write a C program to input two m x n matrices, check the compatibility and perform addition and multiplication of them.

**Exercise 7**

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

i. To insert a sub-string in to given main string from a given position.

ii. To delete n Characters from a given position in a given string.

iii. To replace a character of string either from beginning or ending or at a specified location.

**Exercise 8**

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

i) Reading a complex number

ii) Writing a complex number

iii) Addition of two complex numbers

iv) Multiplication of two complex numbers

**Exercise 9**

Write C Programs for the following string operations without using the built in functions.

- to concatenate two strings
- to append a string to another string
- to compare two strings

**Exercise 10**

Write C Programs for the following string operations without using the built in functions.

- to find t he length of a string
- to find whether a given string is palindrome or not

**Exercise 11**

a) Write a C functions to find both the largest and smallest number of an array of integers.

b) Write C programs illustrating call by value and call by reference cncepts.

**Exercise 12**

Write C programs that use both recursive and non-recursive functions for the following

i) To find the factorial of a given integer.

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

iii) To find Fibonacci sequence

**Exercise 13**

a) Write C Program to reverse a string using pointers

b) Write a C Program to compare two arrays using pointers

**Exercise 14**

a) Write a C program consisting of Pointer based function to exchange value of two integers using passing by address.

b) Write a C program to swap two numbers using pointers.

**Exercise 15**

Examples which explores the use of structures, union and other user defined variables.

**Exercise 16**

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

b) Write a C program to count the number of characters and number of lines in a file.

c) Write a C Program to merge two files into a third file. The names of the files must be entered using command line arguments.

**II Year – I SEMESTER**

| T | P | C |
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## ELECTRICAL CIRCUIT ANALYSIS-II

**Preamble :**

This course aims at study of three phase systems, transient analysis, network synthesis and fourier analysis for the future study and analysis of power systems.

**Objectives:**

i. To study the concepts of balanced three-phase circuits.
ii. To study the concepts of unbalanced three-phase circuits.
iii. To study the transient behaviour of electrical networks with DC, pulse and AC excitations.
iv. To study the performance of a network based on input and output excitation/response.
v. To understand the realization of electrical network function into electrical equivalent passive elements.
vi. To understand the application of fourier series and fourier transforms for analysis of electrical circuits.

**UNIT-I Balanced Three phase circuits**

Phase sequence- star and delta connection - relation between line and phase voltages and currents in balanced systems - analysis of balanced three phase circuits - measurement of active and reactive power in balanced three phase systems.

**UNIT-II Unbalanced Three phase circuits**

Analysis of three phase unbalanced circuits: Loop method – Star-Delta transformation technique, Two wattmeter methods for measurement of three phase power.

**UNIT-III Transient Analysis in DC and AC circuits**

Transient response of R-L, R-C, R-L-C circuits for DC and AC excitations, Solution using differential equations and Laplace transforms.

**UNIT-IV Two Port Networks**

Two port network parameters – Z, Y, ABCD and hybrid parameters and their relations, Cascaded networks - poles and zeros of network functions.

**UNIT-V Network synthesis**

Positive real function - basic synthesis procedure - LC immittance functions - RC impedance functions and RL admittance function - RL impedance function and RC admittance function - Foster and Cauer methods.

**UNIT-VI Fourier analysis and Transforms**

Fourier theorem- Trigonometric form and exponential form of Fourier series, Conditions of symmetry- line spectra and phase angle spectra, Analysis of electrical circuits to non sinusoidal periodic waveforms.

Fourier integrals and Fourier transforms – properties of Fourier transforms and application to electrical circuits.

**Outcomes:**

i. Students are able to solve three- phase circuits under balanced condition.

ii. Students are able to solve three- phase circuits under unbalanced condition.

iii. Students are able find out transient response of electrical networks with different types of excitations.

iv. Students are able to estimate the different types of two port network parameters.

v. Students are able to represent electrical equivalent network for a given network transfer function.

vi. Students are able to extract different harmonics components from the response of a electrical network.

**Text Books**:

1. Engineering Circuit Analysis by William Hayt and Jack E.Kemmerley, Mc Graw Hill Company, 6th edition.
2. Network synthesis: Van Valkenburg; Prentice-Hall of India Private Ltd.

**Reference Books**:

1. Introduction to circuit analysis and design by Tildon Glisson. Jr, Springer Publications.
2. Circuits by A.Bruce Carlson , Cengage Learning Publications.
3. Network Theory Analysis and Synthesis by Smarajit Ghosh, PHI publications.
4. Networks and Systems by D. Roy Choudhury, New Age International publishers.
5. Electric Circuits by David A. Bell, Oxford publications.
6. Circuit Theory (Analysis and Synthesis) by A.chakrabarthi, Dhanpat Rai&co.

**II Year – I SEMESTER**

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## THERMAL AND HYDRO PRIME MOVERS

**Part-A: Thermal prime movers**

**Course Objectives:** To make the student understand the types of prime movers, which can be connected to generators for power production and should obtain the skills of performing the necessary calculations with respect to the functioning of the prime movers.

**UNIT I:**

**Objectives:** To make the student learn about the constructional features, operational details of various types of internal combustion engines through the details of several engine systems and the basic air standard cycles, that govern the engines. Further, the student shall be able to calculate the performance of different types of internal combustion engines.

**I.C Engines:** Classification, working principles – valve and port timing diagrams – air standard cycles – Engine systems line fuel injection, carburetion, ignition, cooling and lubrication – Engine performance evaluation.

**UNIT II:**

**Objectives**: To train the student in the aspects of steam formation and its utilities through the standard steam data tables and charts. To make the student correlate between the air standard cycles and the actual cycles that govern the steam turbines. To train the student to calculate the performance of steam turbines using velocity diagrams.

Properties of Steam and use of Steam Tables- T-S and H-S Diagrams. Analysis of Various Thermodynamic Processes under gone by Steam.
Vapor Power Cycles: Carnot Cycle-Rankine Cycle- Thermodynamic Variables Effecting Efficiency and output of Rankine Cycle-. Analysis of simple Rankine Cycle and Re-heat cycle.

Steam Turbines: Schematic layout of steam power plant Classification of Steam Turbines- Impulse Turbine and Reaction Turbine- Compounding in Turbines- Velocity Diagrams for simple Impulse and Reaction Turbines- Work done & efficiency.

**UNIT III:**

**Objectives:** To impart the knowledge of gas turbine fundamentals, the governing cycles and the methods to improve the efficiency of gas turbines.

**Gas Turbines:** Simple gas turbine plant-ideal cycle, closed cycle -open cycle-. Efficiency, Work ratio and optimum pressure ratio for simple gas turbine cycle. Actual cycle, analysis of simple cycles & cycles with inter cooling, reheating and Regeneration.

**Part-B: Hydro prime movers**

**UNIT IV:**

**Objectives:** To teach the student about the fundamental of fluid dynamic equations and its applications fluid jets. To impart the knowledge of various types of pumps, their constructional features, working and performance.

**IMPACT OF JETS AND PUMPS:** Impulse momentum equation, Impact of Jet on stationary and moving vanes (flat and curved). Pumps: Types of pumps, Centrifugal pumps: Main components, Working principle, Multi stage pumps, Performance and characteristic curves.

**UNIT V:**

**Objectives:** To make the student learn about the constructional features, operational details of various types of hydraulic turbines. Further, the student shall be able to calculate the performance of hydraulic turbines.

**HYDRAULIC TURBINES:** Classification of turbines; Working principle, Efficiency calculation and Design principles for Pelton Wheel, Francis and for Kaplan turbines; Governing of turbines; Performance and characteristic curves.

**UNIT VI:**

**Objectives:** To train the student in the areas of types of hydro electric power plants, estimation and calculation of different loads by considering various factors.

**HYDRO POWER:** Components of Hydro electric power plant: pumped storage systems, Estimation of water power potential; Estimation of load on turbines: load curve, load factor, capacity factor, utilization factor, diversity factor, load – duration curve, firm power, secondary power, prediction of load.

**Text Books:**

1. Thermal Engineering by Rajput, Lakshmi publications
2. Thermal engineering by M.L.Mathur and F.S.Mehta, Jain Brothers.
3. “Hydraulics & Fluid Mechanics”, P.N. Modi and S.M. Seth, TEXT BOOKS House, Delhi
4. “Fluid Mechanics & Hydraulic Machinery” A.K.Jain, , Khanna Publishers, Delhi.

**Reference Books:**

1. “Fluid Mechanics” by Victor. L. Streeter.
2. “Introduction to Fluid Mechanics” Edward .J. Shaughnessy Jr.
3. “Fluid Mechanics & Its Applications”, Vijay Gupta, Santhosh. K.Gupta.
4. “Fluid Mechanics & Fluid power Engineering, Dr D.S. Kumar.
5. “Water Power Engineering” M.M Desumukh.

| II Year – I SEMESTER | T | P | C |
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## BASIC ELECTRONICS AND DEVICES

**Preamble:** This course introduces the concepts of semi-conductor physics and operation of various semi-conductor devices. Realization of rectifiers, amplifiers and oscillators using semi-conductor devices and their analysis is also introduced in this course.

**Unit-I:**

**Objective:** To learn the basics of semiconductor physics.

**Review of Semi Conductor Physics:** Insulators, Semi conductors, and Metals classification using Energy Band Diagrams, Mobility and Conductivity, Electrons and holes in Intrinsic Semi conductors, Extrinsic Semi Conductor, (P and N Type semiconductor) Hall effect, Generation and Recombination of Charges, Diffusion, Continuity Equation, Injected Minority Carriers, Law of Junction, Introduction to fermi level in Intrinsic, Extrinsic semi conductors with necessary mathematics.

**Outcome:**

Students are able to understand the basic concepts of semiconductor physics, which are useful to understand the operation of diodes and transistors.

**Unit-II:**

**Objective:**

To study the construction details, operation and characteristics of various semiconductor diodes.

**Junction Diode Characteristics**

Operation and characteristics of p-n junction diode. Current components in p-n diode, diode equation. Temperature dependence on V–I characteristic, diffusion capacitance and diode resistance (static and dynamic), energy band diagram of p-n diode.

**Special Diodes:** Avalanche and Zener break down, Zener characteristics, tunnel diode, characteristics with the help of energy band diagrams, Varactor diode, LED, PIN diode, Photo diode.

**Outcome:**

Students are able to explain the operation and characteristics of PN junction diode and special diodes.

**Unit-III:**

**Objective:**

To understand the operation and analysis of rectifiers with and without filters. Further study the operation of series and shunt regulators using zener diodes.

**Rectifiers and Regulators**

Half wave rectifier, ripple factor, full wave rectifier (with and without transformer), harmonic components in a rectifier circuit, inductor filter, capacitor filter, L-section filter, Π- section filter, and comparison of various filter circuits in terms of ripple factors. Simple circuit of a regulator using Zener diode. Types of regulators-series and shunt voltage regulators, over load voltage protection.

**Outcome:**

Ability to understand operation and design aspects of rectifiers and regulators.

**Unit-IV:**

**Objective:**

To study the characteristics of different bipolar junction transistors and their biasing stabilization and compensation techniques. To analyze transistor amplifiers using h-parameters.

**Transistors**

Junction transistor, transistor current components, transistor as an amplifier and switch. Characteristics of transistor (CE, CB and CC configurations). Transistor biasing and thermal stabilization (to fixed bias, collector to base bias, self bias). Compensation against variation in base emitter voltage and collector current. Thermal runaway. Hybrid model of transistor. Analysis of transistor amplifier using h-parameters

**Outcome:**

Students are able to understand the characteristics of various transistor configurations. They become familiar with different biasing, stabilization and compensation techniques used in transistor circuits.

**Unit- V:**

**Objective:**

To understand the basics of FET,Thyristors, Power IGBTs and Power MOSFETs.

**Power semiconductor devices**

Principle of operation and characteristics of Thyristors, Silicon control

rectifiers, power IGBT and power MOSFET their ratings. Comparison of power devices.

**FET:** JFET Characteristics (Qualitative explanation), MOFET Characteristics–static and Transfer (enhancement and depletion mode), low frequency model of FET, FET as an amplifier.

**Outcome:**
Students are able to understand the operation and characteristics of FET, Thyristors, Power IGBTs and Power MOSFETs.

**Unit VI :**

**Objective:**
To understand the concepts of positive and negative feedbacks and their role in amplifiers and oscillators.

**Amplifiers and oscillators**

Feedback Amplifiers -classification, feedback concept, transfer gain and general characteristics of negative feedback amplifiers, effect of feedback on input and output resistances. Methods of analysis of feedback amplifiers.

Power Amplifiers – Classification, push-pull amplifiers, Introduction to harmonics (distortion factor.

Oscillators – Condition for oscillation, RC-phase shift oscillator. Wein bridge oscillator, Crystal oscillator. Frequency and amplitude stability of oscillators.

**Outcome:**
Students are able to understand the merits and demerits of positive and negative feedback and the role of feedback in oscillators and amplifiers.

**TEXT BOOKS:**

1. Electronic Devices and Circuits – J. Millman, C.C. Halkias, Tata Mc-Graw Hill.
2. Electronics devices and circuits by Atul P. Godse, Uday, Bakshi, Technical Publication.

**REFERENCE BOOKS:**

1. Electronic Devices and Circuits by David A. Bell, Oxford University Press.
2. Electronic Devices and Circuits – Salivahanan, Kumar, Vallavaraj, TATA Mc Graw Hill, Second Edition.
3. Electronic Devices and Circuits – R.L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall, 9th Edition, 2006.

**II Year – I SEMESTER**

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## COMPLEX VARIABLE AND STATISTICAL METHODS

**UNIT-I Functions of a complex variable:**

Introduction – Continuity – Differentiability – Analyticity – Properties – Cauchy-Riemann equations in Cartesian and polar coordinates. Harmonic and conjugate harmonic functions – Milne – Thompson method.

Subject Category

ABET Learning Objectives a e

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

**UNIT-II Integration and Series Expansions**

Complex integration: Line integral – Cauchy's integral theorem , Cauchy's integral formula, Generalized integral formula (all without proofs)-

Radius of convergence – Expansion in Taylor's series, Maclaurin's series and Laurent series.

Subject Category

ABET Learning Objectives a e k

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

**UNIT III Integration using Residues:**

Types of Singularities: Isolated, pole of order m, essential - Residues – Residue theorem( without proof) - Evaluation of real integrals of type (a)

(b) (c)

Subject Category

ABET Learning Objectives a e

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

**UNIT IV Conformal Mapping:**

Transformation by exp z, lnz, z^2, z^n(n positive integer), Sin z, cos z, z + a/z- Translation, rotation, inversion and bilinear transformation – fixed point – cross ratio – properties – invariance of circles.

Subject Category
ABET Learning Objectives a e k
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

**UNIT V Sampling Distributions:**

Review of Normal distribution - Population and samples - Sampling distribution of mean (with known and unknown variance), proportion, variances - Sampling distribution of sums and differences -Point and interval estimators for means, variances, proportions.

Subject Category
ABET Learning Objectives a e k
ABET internal assessments 1 2 6
JNTUK External Evaluation A B E

**UNIT VI Tests of Hypothesis**

Type I and Type II errors -Maximum error- One tail, two-tail tests - Tests concerning one mean and proportion, two means- Proportions and their differences using Z-test, Student's t-test - F-test and Chi -square test.

Subject Category
ABET Learning Objectives a b d e h k
ABET internal assessments 1 2 6 7 10
JNTUK External Evaluation A B E F D

**Books:**

1. Advanced Engineering Mathematics: Erwin Kreyszig, Wiley India Edition.
2. Advanced Engineering Mathematics: Michael Greenberg, Pearson.
3. Advanced Engineering Mathematics: BS Grewal , Khanna Publishers (42nd Ed).
4. Probability and Statistics for Engineers: Miller and John E. Freund, Prentice Hall of India.
5. Probability and Statistics for Engineers and Scientists: Ronald E. Walpole, Sharon L. Mayers and Keying Ye: Pearson.

| Subject Category | ABET Learning Objectives | ABET Internal Assessments | JNTUK External Evaluation | Rem a-rks |
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| Theory<br>Design<br>Analysis<br>Algorithms<br>Drawing<br>Others | a) Apply knowledge of math, science, & engineering<br>b) Design & conduct experiments, analyze & interpret data<br>c) Design a system/process to meet desired needs within economic, social, political, ethical, health/safety, manufacturability, & sustainability constraints<br>d) Function on multidisciplinary teams<br>e) Identify, formulate, & solve engineering problems<br>f) Understand professional & ethical responsibilities<br>g) Communicate effectively<br>h) Understand impact of engineering solutions in global, economic, environmental, & societal context<br>i) Recognize need for & be able to engage in lifelong learning<br>j) Know contemporary issues<br>k) Use techniques, skills, modern tools for engineering practices | 1. Objective tests<br>2. Essay questions tests<br>3. Peer tutoring based<br>4. Simulation based<br>5. Design oriented<br>6. Problem based<br>7. Experiential (project based) based<br>8. Lab work or field work based<br>9. Presentation based<br>10. Case Studies based<br>11. Role-play based<br>12. Portfolio based | A. Questions should have:<br>B. Definitions, Principle of operation or philosophy of concept.<br>C. Mathematical treatment, derivations, analysis, synthesis, numerical problems with inference.<br>D. Design oriented problems<br>E. Trouble shooting type of questions<br>F. Applications related questions<br>G. Brain storming questions | |

**II Year – I SEMESTER**

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## ELECTROMAGNETIC FIELDS

Electromagnetic fields is the foremost pre-requisite course for most of the subjects in Electrical Engineering. Either in the enunciation of basics of electrical elements R, L and C that are the building blocks of any electrical device or in the illustration of Energy transfer from mechanical to electrical and vice versa its role is crucial. This course also includes the famous works of Coulomb, Ampere, Faraday, Maxwell etc. to the field of Electrical Engineering.

### UNIT – I Electrostatics:

**Objective:**
To study the production of electric field and potentials due to different configurations of static charges.

Electrostatic Fields – Coulomb's Law – Electric Field Intensity (EFI) – EFI due to a line and a surface charge – Work done in moving a point charge in an electrostatic field – Electric Potential – Properties of potential function – Potential gradient – Guass's law — Maxwell's first law, div ( D )=ρv Laplace's and Poison's equations and Solution of Laplace's equation in one variable.

**Outcome:** Ability to calculate electric field and potentials using guass's law or solving Laplace's or Possion's equations.

### UNIT – II Conductors – Dielectrics and Capacitance:

**Objective :**
To study the properties of conductors and dielectrics, calculate the capacitance of different configu-various and understand the concept of conduction and convection current densities.

Electric dipole – Dipole moment – potential and EFI due to an electric dipole – Torque on an Electric dipole in an electric field – Behaviour of conductors in an electric field – Conductors and Insulators
Polarization – Boundary conditions between conduction to Dielectric and dielectric to dielectrics capacitance – capacitance of parallel plates, spherical and coaxial cables with composite dielectrics –Energy stored and energy density in a static electric field – Current density – conduction and Convection current densities – Ohm's law in point form – Equation of continuity.

**Outcome:** Learn how to calculate capacitance, energy stored in dielectrics and get's the concept of conduction and convection currents.

**UNIT – III Magneto statics and Ampere's Law:**

**Objective:**

To study the magnetic fields produced by currents in different configurations, application of ampere's law and the Maxwell's second and third equations.

Static magnetic fields – Biot-Savart's law – Oesterd's experiment - Magnetic field intensity (MFI) – MFI due to a straight current carrying filament – MFI due to circular, square and solenoid current – Carrying wire – Relation between magnetic flux, magnetic flux density and MFI – Maxwell's second Equation, div(B)=0 –Ampere's circuital law and its applications viz. MFI due to an infinite sheet of current and a long filament carrying conductor – Point form of Ampere's circuital law –Field due to a circular loop, rectangular and square loops, Maxwell's third equation, Curl (H)=J.

**Outcome:**

Ability to find magnetic field intensity due to current, the application of ampere's law and the Maxwell's second and third equations.

**UNIT – IV Force in Magnetic fields:**

**Objective :**

To study the magnetic force and torque through Lorentz force equation in magnetic field environment like conductors and other current loops.

Magnetic force - Moving charges in a Magnetic field – Lorentz force equation – force on a current element in a magnetic field – Force on a straight and a long current carrying conductor in a magnetic field – Force between two straight long and parallel current carrying conductors – Magnetic dipole and dipole moment – a differential current loop as a magnetic dipole – Torque on a current loop placed in a magnetic field.

**Outcome:**

Students can calculate the magnetic forces and torque produced by currents in magnetic field.

**UNIT – V Self and Mutual inductance:**

**Objective :**

To develop the concept of self and mutual inductances and the energy stored.

Self and Mutual inductance – determination of self-inductance of a solenoid and toroid and mutual inductance between a straight long wire and a square loop wire in the same plane – energy stored and density in a magnetic field.

**Outcome:**
Will the able to calculate self and mutual inductances and the energy stored in the magnetic field.

**UNIT – VI Time Varying Fields:**

**Objective :**
To study time varying and Maxwell's equations in different forms and Maxwell's fourth equation for the induced Emf.

Time varying fields – Faraday's laws of electromagnetic induction – Its integral and point forms – Maxwell's fourth equation, Curl (E)=-∂B/∂t – Statically and Dynamically induced EMFs – Simple problems -Modification of Maxwell's equations for time varying fields – Displacement current – Poynting Theorem and Poynting vector.

**Outcome:**
Students will gain knowledge on time varying fields and get ability to calculate induced Emf. Concepts of displacement current and Poynting vector and associated problems are solved.

**TEXT BOOKS:**

1. "Engineering Electromagnetics" by William H. Hayt & John. A. Buck Mc. Graw-Hill Companies, 7th Editon. 2006.

**REFERENCE BOOKS**

1. "Principles of Electro Magnetics" by Sadiku, Oxford Publications,4th edition.
2. "Introduction to Electro Dynamics" by D J Griffiths, Prentice-Hall of India Pvt. Ltd., 2nd edition.
3. "Electromagnetic Field Theory" by Yaduvir Singh, Pearson.
4. Fundamentals of Engineering Electromagnetics by Sunil Bhooshan, Oxford higher education.
5. Electro magnetism : Problems with solutions by Ashutosh Pramanik, PHI Publications.

**II Year – I SEMESTER**

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## ELECTRICAL MACHINES – I

**Preamble:**

This is a basic course on rotating electrical machines. This course covers the topics related to principles, performance, applications and design considerations of dc machines.

**Learning objectives:**

i. Appreciate the principles of electromagnetic energy conversion and understand the construction details of DC machine.
ii. Understand the principle of operation and performance of DC generators.
iii. Learn the characteristics and performance of DC generators.
iv. Learn the characteristics and performance of DC motors.
v. Learn the speed control and testing methods of DC motors.
vi. Learn the basic ideas of design of DC machines.

**UNIT–I:**

**Electromechanical Energy Conversion**

Introduction to S.I Units - principles of electromechanical energy conversion – forces and torque in magnetic field systems – energy balance- singly excited machine- magnetic force - co-energy – multi excited magnetic field system-construction features of conventional and modern DC machines.

**UNIT–II:**

**D.C. Generators – I**

Principle of operation – E.M.F equation- armature windings – lap and wave windings – armature reaction –cross magnetizing and de-magnetizing AT/pole –commutation process – methods of improving commutation – compensating windings – Interpoles.

**UNIT–III:**

**D.C. Generators – II**

Methods of excitation- self excited and separately excited-types of generators build-up of emf - open circuit characteristics-critical field resistance-critical speed-causes for failure to self excitation-remedial measures – Internal and

external characteristics of separately excited, shunt, series, compound generators-applications, losses and efficiency.

**UNIT–IV:**

**D.C. Motors**

Principle of operation – back E.M.F - torque equation –characteristics of shunt, series and compound motors – armature reaction and commutation - losses and efficiency- speed torque characteristics-applications of dc motors.

Starting by 3 point and 4 point starters – protective devices.

**UNIT-V:**

**Speed Control and Testing of D.C. Machines**

Speed control by armature voltage and field flux control – testing of DC machines - brake test, Swinburne's method – principle of regenerative or Hopkinson's method - retardation test -- separation of losses – methods of electrical braking: plugging, dynamic and regenerative.

**UNIT–VI:**

**Design of D.C. Machines**

Design concept - output equation - choice of specific electric and magnetic loadings – separation of D and L - estimation of number of conductors/ turns - coils - armature slots – conductor dimension – slot dimension - choice of number of poles – length of air gap.

**Learning outcomes:**

i. Able to explain the concepts of electromagnetic energy conversion.
ii. Able to explain the operation of dc generator, armature reaction and commutation.
iii. Able to analyze the characteristics and performance of dc generators.
iv. Able to explain the torque developed and performance of dc motors.
v. Able to analyze the speed control and testing methods of dc motors.
vi. Able to propose design aspects of a dc machine.

**TEXT BOOKS:**

1 Electrical Machines – P.S. Bhimbra, Khanna Publishers

2. Electric Machinery by A.E.Fitzgerald,Charles kingsley,Stephen D.Umans, TMH

**REFERENCE BOOKS:**

1. Theory & Performance of Electrical Machines by J.B.Guptha. S.K.Kataria & Sons.
2. Electrical Machines by R.K. Rajput, Lakshmi publications, 5th edition.
3. The Performance and Design of DC machines - Albert E. Clayton.
4. Electrical Machine Design by A.K. Sawhney, Dhanpat Rai & Sons publications.
5. Electric Machines by Mulukutla S.Sarma&Mukesh K.Pathak, CENGAGE Learning.

**II Year – I SEMESTER**

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## THERMAL AND HYDRO LAB

**Course Objective:**

To impart practical knowledge on the performance evaluation methods of various internal combustion engines, flow measuring equipment and hydraulic turbines and pumps.

**NOTE:** To conduct a minimum of 12 experiments by conducting a minimum of six from each section.

### SECTION A - THERMAL ENGINEERING LAB

1. I.C. Engines valve / port timing diagrams.
2. I.C. Engines performance test on 4 -stroke Diesel engine.
3. I.C. Engines performance test on 2-stroke petrol engine.
4. Evaluation of engine friction by conducting Morse test on 4-stroke multi cylinder petrol engine
5. Determination of FHP by retardation and motoring test on IC engine
6. I.C. Engines heat balance on petrol / Diesel engines.
7. Economical speed test of an IC engine
8. Study of boilers

### SECTION B – HYDRAULIC MACHINES LAB

1. Impact of jets on Vanes.
2. Performance Test on Pelton Wheel.
3. Performance Test on Francis Turbine.
4. Performance Test on Kaplan Turbine.
5. Performance Test on Single Stage Centrifugal Pump.
6. Performance Test on Reciprocating Pump.
7. Calibration of Venturimeter.
8. Calibration of Orifice meter.
9. Determination of loss of head due to sudden contraction in a pipeline.

**II Year – I SEMESTER**

| T | P | C |
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## ELECTRICAL CIRCUITS LAB

Any 10 of the following experiments are to be conducted:

1) Verification of Thevenin's and Norton's Theorems.
2) Verification of Superposition theorem and Maximum Power Transfer Theorem.
3) Verification of Compensation Theorem.
4) Verification of Reciprocity, Millmann's Theorems.
5) Locus Diagrams of RL and RC Series Circuits.
6) Series and Parallel Resonance
7) Determination of Self, Mutual Inductances and Coefficient of coupling.
8) Z and Y Parameters
9) Transmission and hybrid parameters
10) Measurement of Active Power for Star and Delta connected balanced loads.
11) Measurement of Reactive Power for Star and Delta connected balanced loads.
12) Measurement of 3-phase Power by two Wattmeter Method for unbalanced loads.

**II Year – II SEMESTER**

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## ENVIRONMENTAL STUDIES

**Course Learning Objectives:**

The objectives of the course is to impart

1. Overall understanding of the natural resources.
2. Basic understanding of the ecosystem and its diversity.
3. Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities.
4. An understanding of the environmental impact of developmental activities.
5. Awareness on the social issues, environmental legislation and global treaties.

**Course Outcomes:**

The student should have knowledge on

1. The natural resources and their importance for the sustenance of the life and recognise the need to conserve the natural resources.
2. The concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web.
3. The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity.
4. Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices.
5. Social issues both rural and urban environment and the possible means to combat the challenges.
6. The environmental legislations of India and the first global initiatives towards sustainable development.
7. About environmental assessment and the stages involved in EIA and the environmental audit.

**Syllabus:**

**UNIT - I**

**Multidisciplinary nature of Environmental Studies:** Definition, Scope and Importance –Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming and climate change, acid rains, ozone layer depletion, population growth and explosion, effects. Role of information Technology in Environment and human health.

**Ecosystems:** Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

**UNIT - II**

**Natural Resources:** Natural resources and associated problems

Forest resources – Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people.

Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems.

**Mineral resources:** Use and exploitation, environmental effects of extracting and using mineral resources.

**Food resources:** World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.

**Energy resources:** Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources.

**Land resources:** Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

**UNIT - III**

**Biodiversity and its conservation:** Definition: genetic, species and ecosystem diversity- classification - Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega-diversity nation - Hot-sports of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts. - Endangered and endemic species of India – Conservation of biodiversity: conservation of biodiversity.

**UNIT - IV**

**Environmental Pollution:** Definition, Cause, effects and control measures

of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies.

**Solid Waste Management:** Sources, classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products.

**UNIT - V**

**Social Issues and the Environment:** Urban problems related to energy - Water conservation, rain water harvesting-Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions. Environmental Protection Act -Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act-Issues involved in enforcement of environmental legislation. - Public awareness.

**UNIT - VI**

**Environmental Management**: Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. Ecotourism

The student should submit a report individually on any issues related to Environmental Studies course and make a power point presentation.

**Text Books:**

1. Environmental Studies by R. Rajagopalan, 2nd Edition, 2011, Oxford University Press.
2. A Textbook of Environmental Studies by Shaashi Chawla, TMH, New Delhi.
3. Environmental Studies by P.N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai.

**Reference:**

1. Text Book of Environmental Studies by Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.
2. Environmental Studies by K.V.S.G. Murali Krishna, VGS Publishers, Vijayawada.
3. Environmental Studies by Benny Joseph, Tata McGraw Hill Co, New Delhi.
4. Environmental Studies by Piyush Malaviya, Pratibha Singh, Anoop singh: Acme Learning, New Delhi.

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**II Year – II SEMESTER**

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## SWITCHING THEORY AND LOGIC DESIGN

**UNIT – I**

**REVIEW OF NUMBER OF SYSTEMS & CODES:**

i) Representation of numbers of different radix, conversation from one radix to another radix, r-1's compliments and r's compliments of signed members, problem solving.

ii) 4 bit codes, BCD, Excess-3, 2421, 84-2-1 $9^{'s}$ compliment code etc.,

iii) Logic operations and error detection & correction codes; Basic logic operations -NOT, OR, AND, Universal building blocks, EX-OR, EX-NOR - Gates, Standard SOP and POS, Forms, Gray code, error detection, error correction codes (parity checking, even parity, odd parity, Hamming code) NAND-NAND and NOR-NOR realizations.

**UNIT – II**

**MINIMIZATION TECHNIQUES:**

Boolean theorems, principle of complementation & duality, De-morgan theorems, minimization of logic functions using Boolean theorems, minimization of switching functions using K-Map up to 6 variables, tabular minimization, problem solving (code-converters using K-Map etc..).

**UNIT – III**

**COMBINATIONAL LOGIC CIRCUITS DESIGN :**

Design of Half adder, full adder, half subtractor, full subtractor, applications of full adders, 4-bit binary subtractor, adder-subtractor circuit, BCD adder circuit, Excess 3 adder circuit, look-a-head adder circuit, Design of decoder, demultiplexer, 7 segment decoder, higher order demultiplexing, encoder, multiplexer, higher order multiplexing, realization of Boolean functions using decoders and multiplexers, priority encoder, 4-bit digital comparator.

**UNIT – IV**

**INTRODUCTION OF PLD's :**

PROM, PAL, PLA-Basics structures, realization of Boolean function with PLDs, programming tables of PLDs, merits & demerits of PROM, PAL, PLA comparison, realization of Boolean functions using PROM, PAL, PLA, programming tables of PROM, PAL, PLA.

**UNIT – V**

**SEQUENTIAL CIRCUITS I:**

Classification of sequential circuits (synchronous and asynchronous); basic flip-flops, truth tables and excitation tables (nand RS latch, nor RS latch, RS flip-flop, JK flip-flop, T flip-flop, D flip-flop with reset and clear terminals). Conversion from one flip-flop to flip-flop. Design of ripple counters, design of synchronous counters, Johnson counter, ring counter. Design of registers - Buffer register, control buffer register, shift register, bi-directional shift register, universal shift register.

**UNIT – VI**

**SEQUENTIAL CIRCUITS II :**

Finite state machine; Analysis of clocked sequential circuits, state diagrams, state tables, reduction of state tables and state assignment, design procedures. Realization of circuits using various flip-flops. Meelay to Moore conversion and vice-versa.

**TEXT BOOKS:**

1. Switching Theory and Logic Design by Hill and Peterson Mc-Graw Hill TMH edition.
2. Switching Theory and Logic Design by A. Anand Kumar.
3. Digital Design by Mano PHI.

**REFERENCE BOOKS:**

1. Modern Digital Electronics by RP Jain, TMH.
2. Fundamentals of Logic Design by Charles H. Roth Jr, Jaico Publishers.
3. Micro electronics by Milliman MH edition.

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## PULSE & DIGITAL CIRCUITS

**UNIT-I**

**Linear Wave Shaping:** High pass, low pass RC circuits-response to sinusoidal, step, pulse,square and ramp inputs. RC circuit as differentiator and integrator.

**Attenuators:** Basic attenuator circuit and compensated attenuator circuit.

**Switching characteristics of devices:** Diode as a switch, transistor as a switch-transistor at cutoff, the reverse collector saturation current $I_{CBO}$ , Its variation with the junction temperature. The transistor switch in saturation. Design of transistor switch.

**UNIT-II**

**Non linear wave shaping:** Diode clippers, Transistor clipper, clippers at two independent levels-transfer characteristics of clippers-emitter coupled clipper, clamping operation, diode clamping circuits with source resistance and diode resistance -transient and steady state response for a square wave input, clamping circuit theorem-practical clamping circuit.

**UNIT-III**

**Multi vibrators:**

**Bistable multi vibrators:**

A basic binary circtuit-explanation. Fixed-bias transistor binary,self-biased transistor binary, binary with commutating capacitors-analysis.Non saturated binary–symmetrical triggering, schmitttrigger circuit-emmitter coupled binary circuit.

**Monostable multi vibrator:**

Basic circuit-collector coupled monostable multivibrator- emitter coupled monostable multivibrator-triggering of monostable multivibrator.

**Astable multi vibrator:**

The Astable collector coupled multivibrator, the Astable emitter coupled multivibrator.

**UNIT-IV**

**Digital logic circuits:**Introduction, positive and negative logic, Diode OR gate, Diode AND gate, An inverter circuit with transistor, DTL, TTL, ECL,

AOI logic, NMOS logic, PMOS logic, CMOS logic-analysis and problem solving.

**NIT-V**

**Time base generators:**

**Voltage time base generators**-Introduction, definitions of sweep speed error, displacement error, transmission error, various methods of generating time- base waveforms, UJT time base generator, transistor constant current sweep.

**Miller time base generators:** General considerations, The miller sweep-general considerations of bootstrap time base generator-basic principles, transistor bootstrap time base generator.

**UNIT-VI**

**Synchronization and frequency division:**

Pulse synchronization of relaxation devices, frequency division of the sweep circuit-synchronization of Astable multi, Monostable multivibrator, synchronization of sweep circuit with symmetrical signals-sine wave frequency division with a sweep circuit.

**Sampling Gates:** Basic operating principle, Unidirectional diode gate circuits, bi-directional gates using transistors. A bidirectional diode gate, Four- diode gate.

**Text books:**


1. “Pulse, Digital and switching wave forms” by Milliman and Taub Mc Graw Hill.
2. Micro electronics by MilliMan –Mc Graw Hill .


**References:**


1. MS PrakashRao “Pulse and Digital Circuits” Tata McGraw Hill.
2. David J.Comer, ”Digital Logical State Machine Design”, Oxford university press, 2008, third edition.
3. Venkatrao, K.Ramasudha, K.Manmadharao. G, "Pulse and Digital Circuits", pearson education, 2010.
4. Pulse and digital circuitsby Anandkumar, PHI.

**II Year – II SEMESTER**

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## POWER SYSTEMS-I

**Preamble :**
Electrical Power plays significant role in day to day life of entire mankind. The aim of this course is to allow the students to understand the concepts of the generation and distribution of power along with economic aspects.

**Learning objectives :**

i. To study the principle of operation and function of different components of a thermal power station.
ii. To study the principle of operation and function of different components of a Nuclear power station.
iii. To study the concepts of DC and AC distribution systems along with voltage drop calculations.
iv. To study the constructional details, principle of operation and function of different components of an Air and Gas Insulated substations.
v. To study the constructional details and classification of cables with necessary numerical calculations.
vi. To study the concepts of different types of load curves and types of tariffs applicable to consumers.

**UNIT-I Thermal Power Stations**

Selection of site, general layout of a thermal power plant showing paths of coal, steam, water, air, ash and flue gasses, ash handling system, Brief description of components: Boilers, Super heaters, Economizers, electrostatic precipitators steam Turbines : Impulse and reaction turbines, Condensers, feed water circuit, Cooling towers and Chimney.

**UNIT-II Nuclear Power Stations**

Location of nuclear power plant, Working principle, Nuclear fission, Nuclear fuels, Nuclear chain reaction, nuclear reactor Components : Moderators, Control rods, Reflectors and Coolants.Types of Nuclear reactors and brief description of PWR, BWR and FBR. Radiation: Radiation hazards and Shielding, nuclear waste disposal.

**UNIT-III Distribution Systems**

Classification of distribution systems, design features of distribution systems, radial distribution, ring main distribution, voltage drop calculations: DC distributors for following cases - radial DC distributor fed at one end and at both ends (equal / unequal voltages), ring main distributor, stepped distributor and AC distribution, comparison of DC and AC distribution.

**UNIT-IV Substations**

Classification of substations: **Air Insulated Substations -** Indoor & Outdoor substations, Substations layouts of 33/11 kV showing the location of all the substation equipment.

Bus bar arrangements in the Sub-Stations: Simple arrangements like single bus bar, sectionalized single bus bar, double bus bar with one and two circuit breakers, main and transfer bus bar system with relevant diagrams.

**Gas Insulated Substations (GIS)** – Advantages of Gas insulated substations, different types of gas insulated substations, single line diagram of gas insulated substations, constructional aspects of GIS, Installation and maintenance of GIS, Comparison of Air insulated substations and Gas insulated substations.

**UNIT-V Underground Cables**

Types of Cables, Construction, Types of insulating materials, Calculation of insulation resistance, stress in insulation and power factor of cable, Numerical Problems.

Capacitance of single and 3-Core belted Cables, Numerical Problems. Grading of Cables-Capacitance grading and Intersheath grading, Numerical Problems.

**UNIT-VI Economic Aspects of Power Generation & Tariff**

**Economic Aspects -** Load curve, load duration and integrated load duration curves, discussion on economic aspects: connected load, maximum demand, demand factor, load factor, diversity factor, power capacity factor and plant use factor, Base and peak load plants, Numerical problems.

**Tariff Methods** - Costs of Generation and their division into Fixed, Semi-fixed and Running Costs, Desirable Characteristics of a Tariff Method, Tariff Methods: Simple rate, Flat Rate, Block-Rate, two-part, three–part, and power factor tariff methods, Numerical problems.

**Learning Outcomes:**

i. Students are able to identify the different components of thermal power plants.

ii. Students are able to identify the different components of nuclear Power plants.

iii. Students are able to distinguish between AC & DC distribution systems and also estimate voltage drops in both types of distribution systems.

iv. Students are able to locate the different components of an air and gas insulated substations.

v. Students are able to identify single core and multi core cables with different insulating materials.

vi. Students are able to analyse the effect of load factor, demand factor and diversity factor on the cost of generation of electrical power and also able to identify the types of tariff applicable to consumers based on their load demand.

**TEXT BOOKS**:

1. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co. Pvt. Ltd.
2. Generation, Distribution and Utilization of Electric Energy by C.L.Wadhawa New age International (P) Limited, Publishers.

**REFERENCE BOOKS:**

1. Electrical Power Distribution Systems by - V. Kamaraju, Tata Mc Graw Hill, New Delhi.
2. Elements of Electrical Power Station Design by – M V Deshpande, PHI, New Delhi.

**II Year – II SEMESTER**

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## ELECTRICAL MACHINES – II

**Preamble:**

This course covers the topics on single-phase transformers, three-phase transformers and 3-phase induction motor which have wide application in power systems. The main aim of the course is to provide detail concepts, operation and performance of transformers and 3-phase induction motors. A complete design procedure for the design of transformers and 3-phase induction motors can be developed based on basic concepts discussed in unit-VI.

**Learning objectives:**

i. Appreciate the concept of operation and performance of single-phase transformers.
ii. Understand the methods of testing of single-phase transformer.
iii. Distinguish between single-phase and three-phase transformers.
iv. Understand the concept of operation and performance of 3-phase induction motor.
v. Appreciate the relation between torque and slip, performance of induction motor and induction generator.
vi. Understand the basic concepts of design of transformers and 3-phase induction motors.

**UNIT-I**

**Single-phase Transformers**

Types and constructional details - principle of operation - emf equation - operation on no load and on load – lagging, leading and unity power factors loads - phasor diagrams of transformers – equivalent circuit – regulation – losses and efficiency – effect of variation of frequency and supply voltage on losses – All day efficiency.

**UNIT-II**

**Single-phase Transformers Testing**

Tests on single phase transformers – open circuit and short circuit tests – Sumpner's test – separation of losses – parallel operation with equal voltage

ratios – auto transformer - equivalent circuit – comparison with two winding transformers.

**UNIT-III**

**3-Phase Transformers**

Polyphase connections - Y/Y, Y/Δ, Δ/Y, Δ/Δ and open Δ -- Third harmonics in phase voltages - three winding transformers: determination of Zp, Zs and Zt -- transients in switching - off load and on load tap changers -- Scott connection.

**UNIT-IV**

**3-phase Induction Motors**

construction details of cage and wound rotor machines - production of a rotating magnetic field - principle of operation - rotor emf and rotor frequency - rotor current and pf at standstill and during running conditions - rotor power input, rotor copper loss and mechanical power developed and their inter relationship – equivalent circuit – phasor diagram.

**UNIT-V**

**Characteristics, starting and testing methods of Induction Motors**

Torque equation - expressions for maximum torque and starting torque - torque slip characteristic - double cage and deep bar rotors - crawling and cogging - no load and blocked rotor tests - circle diagram for predetermination of performance - methods of starting – starting current and torque calculations – induction generator operation.

**UNIT-VI**

**Design of transformer and 3-phase induction motor**

Transformer: Design concept – output equation – choice of windings – calculation of number of turns – length of mean turn of winding - calculation of resistance and leakage reactance.

Three phase induction motor: Design concept – choice of specific electric and magnetic loadings – output equation – stator design – number of slots – conductor dimensions – type of winding – number of rotor slots – conductor dimensions.

**Learning outcomes:**

i. Able to explain the operation and performance of single phase transformer.

ii. Able to explain the regulation losses and efficiency of single phase transformer.

iii. Able to explain types of three phase transformer connection, tap changing methods and 3-phase to 2-phase transformation.

iv. Able to explain the operation and performance of three phase induction motor.

v. Able to analyze the torque-speed relation, performance of induction motor and induction generator.

vi. Able to explain design procedure for transformers and three phase induction motors.

**TEXT BOOKS:**

1. The performance and design of alternating current machines – M.G. Say, CBS publishers & distributors, New Delhi.
2. Electrical Machines – P.S. Bimbra, Khanna Publishers.

**REFERENCE BOOKS:**

1. Electrical Machines by J.B.Guptha, S.K.Kataria & Sons.
2. Electrical Machines by D. P.Kothari, I. J. Nagarth, Mc Graw Hill Publications, $4^{th}$ edition.
3. Electrical Machines by R.K.Rajput, Lakshmi publications,Fifth edition.
4. Electrical Machine Design by Sawhney, Dhanpath Rai Publications.
5. Electrical Machines by Smarajit Ghosh, Pearson Publications.

**II Year – II SEMESTER**

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## CONTROL SYSTEMS

**Preamble :**

This course introduces the elements of linear control systems and their analysis. Classical methods of design using frequency response are included. The state space approach for modeling and analysis is the added feature of this course.

**UNIT – I:**

**Learning Objective:**

To learn the mathematical modeling of physical systems and to use block diagram algebra and signal flow graph to determine overall transfer function.

**MATHEMATICAL MODELING OF CONTROL SYSTEMS**

Open Loop and closed loop control systems and their differences, Classification of control systems, Feed-Back Characteristics, transfer function of linear system, Differential equations of electrical networks, Translational and Rotational mechanical systems, Transfer Function of DC Servo motor - AC Servo motor- Synchro-transmitter and Receiver, Block diagram algebra – Representation by Signal flow graph - Reduction using Mason's gain formula.

**Outcome:**

Ability to derive the transfer function of physical systems and determination of overall transfer function using block diagram algebra and signal flow graphs.

**UNIT-II:**

**Learning Objective:**

To analyze the time response of first and second order systems and improvement of performance by proportional plus derivative and proportional plus integral controllers.

**TIME RESPONSE ANALYSIS**

Standard test signals - Time response of first order systems –Time response of second order systems - Time domain specifications - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems.

**Outcome:**

Capability to determine time response specifications of second order systems and to determine error constants.

**UNIT – III:**

**Learning Objective :**

To investigate the stability of closed loop systems using Routh's stability criterion and the analysis by root locus method.

**STABILITY AND ROOTLOCUS TECHNIQUE**

The concept of stability – Routh's stability criterion –limitations of Routh's stability – The root locus concept - construction of root loci (Simple problems).

**Outcome:**

Acquires the skill to analyze absolute and relative stability of LTI systems using Routh's stability criterion and the root locus method.

**UNIT–IV:**

**Learning Objective :**

To present the Frequency Response approaches for the analysis of linear time invariant (LTI) systems using Bode plots, polar plots and Nyquist stability criterion.

**FREQUENCY RESPONSE ANALYSIS**

Introduction, Frequency domain specifications-Bode diagrams- transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots, Polar Plots, Nyquist Stability criterion.

**Outcome:**

Capable to analyze the stability of LTI systems using frequency response methods.

**UNIT–V:**

**Learning Objective :**

To discuss basic aspects of design and compensation of linear control systems using Bode plots.

**CLASSICAL CONTROL DESIGN TECHNIQUES**

Lag, Lead, Lag-Lead compensators, design of compensators – using Bode plots.

**Outcome:**

Able to design Lag, Lead, Lag-Lead compensators to improve system performance from Bode diagrams.

**UNIT–VI:**

**Learning Objective:**

Ability to formulate state models and analyze the systems. To present the concepts of Controllability and Observability.

**STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS**

Concepts of state, state variables and state model, state space representation of transfer function, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and it's Properties – Concepts of Controllability and Observability.

**Outcome:**

Ability to represent physical systems as state models and determine the response. Understanding the concepts of controllability and observability.

**TEXT BOOKS**:

1. Modern Control Engineering, Kotsuhiko Ogata, Prentice Hall of India.
2. Automatic control systems, Benjamin C.Kuo, Prentice Hall of India, 2nd Edition

**REFERENCE BOOKS:**

1. Control Systems, Manik Dhanesh N, Cengage publications .
2. Control Systems principles and design, M.Gopal, Tata Mc Graw Hill education Pvt Ltd., 4th Edition.
3. Control Systems Engineering, S.Palani, Tata Mc Graw Hill Publications.

**II Year – II SEMESTER**

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## ELECTRICAL MACHINES – I LAB

**Any 10 of the following experiments are to be conducted:**

1. Magnetization characteristics of DC shunt generator. Determination of critical field resistance and critical speed.
2. Load test on DC shunt generator. Determination of characteristics.
3. Brake test on DC shunt motor. Determination of performance curves.
4. Load test on DC compound generator. Determination of characteristics.
5. Hopkinson's test on DC shunt machines. Predetermination of efficiency.
6. Fields test on DC series machines. Determination of efficiency.
7. Swinburne's test and Predetermination of efficiencies as Generator and Motor.
8. Speed control of DC shunt motor by Field and armature Control.
9. Brake test on DC compound motor. Determination of performance curves.
10. Load test on DC series generator. Determination of characteristics.
11. Retardation test on DC shunt motor. Determination of losses at rated speed.
12. Separation of losses in DC shunt motor.

**II Year – II SEMESTER**

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## ELECTRONIC DEVICES & CIRCUITS LAB

**PART A: Electronic Workshop Practice**

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Coils, Gang Condensers, Relays, Bread Boards.
2. Identification, Specifications and Testing of active devices, Diodes, BJTs, JFETs, LEDs, LCDs, SCR, UJT.
3. Soldering Practice- Simple circuits using active and passive components.
4. Study and operation of Ammeters, Voltmeters, Transformers, Analog and Digital Multimeter, Function Generator, Regulated Power Supply and CRO.

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**PART B: List of Experiments**

**(For Laboratory Examination-Minimum of Ten Experiments)**

1. P-N Junction Diode Characteristics
   Part A: Germanium Diode (Forward bias& Reverse bias)
   Part B: Silicon Diode (Forward Bias only)
2. Zener Diode Characteristics
   Part A: V-I Characteristics
   Part B: Zener Diode as Voltage Regulator
3. Rectifiers (without and with c-filter)
   Part A: Half-wave Rectifier
   Part B: Full-wave Rectifier
4. BJT Characteristics(CE Configuration)
   Part A: Input Characteristics
   Part B: Output Characteristics
5. FET Characteristics(CS Configuration)
   Part A: Drain Characteristics
   Part B: Transfer Characteristics
6. SCR Characteristics
7. UJT Characteristics
8. Transistor Biasing

9. CRO Operation and its Measurements
10. BJT-CE Amplifier
11. Emitter Follower-CC Amplifier
12. FET-CS Amplifier

**PART C: Equipment required for Laboratory**

1. Boxes
2. Ammeters (Analog or Digital)
3. Voltmeters (Analog or Digital)
4. Active & Passive Electronic Components
5. Regulated Power supplies
6. Analog/Digital Storage Oscilloscopes
7. Analog/Digital Function Generators
8. Digital Multimeters
9. Decade Résistance Boxes/Rheostats
10. Decade Capacitance

**III Year – I SEMESTER**

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## MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

**Unit – I:**

**(*The Learning objective of this Unit is to understand the concept and nature of Managerial Economic s and its relationship with other disciplines, Concept of Demand and Demand forecasting)**

**Introduction to Managerial Economics and demand Analysis:**

Definition of Managerial Economics and Scope-Managerial Economics and its relation with other subjects-Concepts of Demand-Types-Determents-Law of Demand its Exception-Elasticity of Demand-Types and Measurement-Demand forecasting and its Methods.

(**The Learner is equipped with the knowledge of estimating the Demand for a product and the relationship between Price and Demand)

**Unit – II:**

**(*The Learning objective of this Unit is to understand the concept of Production function, Input Output relationship, different Cost Concepts and Concept of Cost-Volume-Profit Analysis)**

**Production and Cost Analyses:**

Production function-Isoquants and Isocosts-Law of Variable proportions-Cobb-Douglas Production function-Economics of Sale-Cost Concepts-Opportunity Cost-Fixed vs Variable Costs-Explicit Costs vs Implicit Costs-Out of Pocket Costs vs Imputed Costs-Cost Volume Profit analysis-Determination of Break-Even Point (Simple Problem).

(**One should understand the Cost Concepts for decision making and to estimate the least cost combination of inputs).

**Unit – III:**

**(*The Learning Objective of this Unit is t understand the Nature of Competition, Characteristics of Pricing in the different market structure and significance of various pricing methods)**

**Introduction to Markets, Theories of the Firm & Pricing Policies:**

Market Structures: Perfect Competition, Monopoly and Monopolistic and Oligopoly – Features – Price, Output Determination – Managerial Theories of firm: Maris and Williamson's models – Methods of Pricing: Limit Pricing, Market Skimming Pricing, Internet Pricing: Flat Rate Pricing, Usage sensitive, Transaction based pricing, Priority Pricing.

(** One has to understand the nature of different markets and Price Output determination under various market conditions)

**Unit – IV:**

**(*The Learning objective of this Unit is to know the different forms of Business organization and their Merits and Demerits both public & private Enterprises and the concepts of Business Cycles)**

**Types of Business Organization and Business Cycles:**

Features and Evaluation of Sole Trader – Partnership – Joint Stock Company – State/Public Enterprises and their forms – Business Cycles – Meaning and Features – Phases of Business Cycle.

(**One should equipped with the knowledge of different Business Units)

**Unit – V:**

**(*The Learning objective of this Unit is to understand the different Accounting Systems preparation of Financial Statements and uses of different tools for performance evaluation)**

**Introduction to Accounting & Financing Analysis:**

Introduction to Double Entry Systems – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis – Preparation of Funds flow cash flow statements (Simple Problems)

(**The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis)

**Unit – VI:**

(*The Learning objective of this Unit is to understand the concept of Capital, Capitalization, Capital Budgeting and to know the techniques used to evaluate Capital Budgeting proposals by using different methods)

**Capital and Capital Budgeting:** Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Need for Capital Budgeting-Techniques of Capital Budgeting-Traditional and Modern Methods.

(**The Learner is able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making)

Note: *Learning Objective

** Learning Assessment

**TEXT BOOKS**

1. Dr. N. Appa Rao, Dr. P. Vijay Kumar: 'Managerial Economics and Financial Analysis', Cengage Publications, New Delhi – 2011.

2. Dr. A. R. Aryasri – Managerial Economics and Financial Analysis, TMH 2011.
3. Prof. J.V.Prabhakara Rao, Prof. P. Venkatarao. 'Managerial Economics and Financial Analysis', Ravindra Publication.

**REFERENCES:**

1. V. Maheswari : Managerial Economics, Sultan Chand.
2. Suma Damodaran : Managerial Economics, Oxford 2011.
3. Dr. B. Kuberudu and Dr. T. V. Ramana : Managerial Economics & Financial Analysis, Himalaya Publishing House 2011.
4. Vanitha Agarwal : Managerial Economics, Pearson Publications 2011.
5. Sanjay Dhameja : Financial Accounting for Managers, Pearson.
6. Maheswari : Financial Accounting, Vikas Publications.
7. S. A. Siddiqui & A. S. Siddiqui : Managerial Economics and Financial Analysis, New Age International Publishers, 2012.

**III Year – I SEMESTER**

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## ELECTRICAL MEASUREMENTS

**Preamble:**

This course introduces principle of operation of basic analog and digital measuring instruments for measurement of current, voltage, power, energy etc. Measurement of resistance, inductance and capacitance by using bridge circuits will be discussed in detail. It is expected that student will be thorough with various measuring techniques that are required for an electrical engineer.

**Learning Objectives:**

- To study the principle of operation and working of different types of instruments. Measurement of voltage and current.
- To study the working principle of operation of different types of instruments for measurement of power and energy.
- To understand the principle of operation and working of dc and ac potentiometers.
- To understand the principle of operation and working of various types of bridges for measurement of parameters –resistance, inductance, capacitance and frequency.
- To study the principle of operation and working of various types of magnetic measuring instruments.
- To study the applications of CRO for measurement of frequency, phase difference and hysteresis loop using Lissajous patterns.

**UNIT–I:**

**Measuring Instruments**

Classification – Deflecting, control and damping torques – Ammeters and Voltmeters – PMMC, moving iron type, dynamometer and electrostatic instruments – Expression for the deflecting torque and control torque – Errors and compensations– Extension of range using shunts and series resistance – CT and PT**:** Ratio and phase angle errors – Design considerations.

**UNIT –II:**

**Measurement of Power and Energy**

Single phase and three phase dynamometer wattmeter – LPF and UPF – Expression for deflecting and control torques – Extension of range of wattmeter using instrument transformers – Measurement of active and reactive powers in balanced and unbalanced systems – Type of P.F. Meters – Single phase and three phase dynamometer and moving iron type Single phase induction type energy meter – Driving and braking.
torques – errors and compensations –Testing by phantom loading using R.S.S. meter– Three phase energy meter – Tri vector meter – Maximum demand meters– Electrical resonance type frequency meter and Weston type synchroscope.

**UNIT – III:**

**Potentiometers**

Principle and operation of D.C. Crompton's potentiometer – Standardization – Measurement of unknown resistance – Current – Voltage – AC Potentiometers**:** polar and coordinate types –Standardization – Applications.

**UNIT – IV:**

**Measurements of Parameters**

Method of measuring low, medium and high resistance – Sensitivity of Wheat stone's bridge – Carey Foster's bridge– Kelvin's double bridge for measuring low resistance– Loss of charge method for measurement of high resistance – Megger– Measurement of earth resistance – Measurement of inductance – Quality Factor – Maxwell's bridge–Hay's bridge – Anderson's bridge–Measurement of capacitance and loss angle – Desautybridge – Schering Bridge–Wagner's earthing device–Wien's bridge.

**UNIT – V:**

**Magnetic Measurements**

Ballistic galvanometer – Equation of motion – Flux meter – Constructional details–Determination of B–H Loop methods of reversals six point method – AC testing – Iron loss of bar samples– Core loss measurements by bridges and potentiometers.

**UNIT – VI:**

**Digital Meters**

Digital Voltmeter–Successive approximation – Measurement of phase difference – Frequency – Hysteresis loop using lissajious patterns in CRO –

Ramp and integrating type–Digital frequency meter–Digital multimeter–Digital Tachometer.

**Learning Outcomes:**

- Able to choose right type of instrument for measurement of voltage and current for ac and dc.
- Able to choose right type of instrument for measurement of power and energy – able to calibrate energy meter by suitable method
- Able to calibrate ammeter and potentiometer.
- Able to select suitable bridge for measurement of electrical parameters
- Able to use the ballistic galvanometer and flux meter for magnetic measuring instruments
- Able to measure frequency and phase difference between signals using CRO. Able to use digital instruments in electrical measurements.

**Text Books:**

1. Electrical Measurements and measuring Instruments – by E.W. Golding and F.C.Widdis, fifth Edition, Wheeler Publishing.
2. Modern Electronic Instrumentation and Measurement Techniques – A.D. Helfrick and W.D. Cooper, PHI, 5th Edition, 2002.
3. Electrical and Electronic Measurements and instrumentation by R.K.Rajput, S.Chand

**Reference Books:**

1. Electrical & Electronic Measurement & Instruments by A.K.Sawhney Dhanpat Rai & Co. Publications.
2. Electrical Measurements – by Buckingham and Price, Prentice – Hall
3. Electrical Measurements by Forest K. Harris. John Wiley and Sons
4. Electrical Measurements: Fundamentals, Concepts, Applications – by Reissland, M.U, New Age International (P) Limited, Publishers.
5. Electrical and Electronic Measurements –by G.K.Banerjee, PHI Learning Private Ltd., New Delhi–2012.

**III Year – I SEMESTER**

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## POWER SYSTEMS–II

**Preamble:**
This course is an extension of power systems–I course. It deals with basic theory of transmission lines modeling and their performance analysis. Transient in power system, improvement of power factor and voltage control are discussed in detail. It is important for the student to understand the mechanical design aspects of transmission lines, cables, insulators. These aspects are also covered in detail in this course.

**Learning Objectives:**

- To compute inductance and capacitance of transmission lines and to understand the concepts of GMD, GMR.
- To study short and medium length transmission lines, their models and performance computation.
- To study the performance and modeling of long transmission lines.
- To study the transient on transmission lines.
- To study the factors affecting the performance of transmission lines and power factor improvement methods.
- To discuss sag and tension computation of transmission lines as well as to study the over head insulators.

**UNIT–I:**

**Transmission Line Parameters**

Types of conductors – Calculation of resistance for solid conductors – Calculation of inductance for single phase and three phase– Single and double circuit lines– Concept of GMR and GMD–Symmetrical and asymmetrical conductor configuration with and without transposition– Numerical Problems–Calculation of capacitance for 2 wire and 3 wire systems – Effect of ground on capacitance – Capacitance calculations for symmetrical and asymmetrical single and three phase–Single and double circuit lines–Numerical Problems.

**UNIT–II:**

**Performance of Short and Medium Length Transmission Lines**

Classification of Transmission Lines – Short, medium, long line and their model representations –Nominal-T–Nominal-Pie and A, B, C, D Constants

for symmetrical and Asymmetrical Networks– Numerical Problems– Mathematical Solutions to estimate regulation and efficiency of all types of lines – Numerical Problems.

**UNIT–III:**

**Performance of Long Transmission Lines**

Long Transmission Line–Rigorous Solution – Evaluation of A,B,C,D Constants–Interpretation of the Long Line Equations – Incident, Reflected and Refracted Waves –Surge Impedance and SIL of Long Lines–Wave Length and Velocity of Propagation of Waves – Representation of Long Lines – Equivalent-T and Equivalent Pie network models (Numerical Problems).

**UNIT – IV:**

**Power System Transients**

Types of System Transients – Travelling or Propagation of Surges – Attenuation–Distortion – Reflection and Refraction Coefficients – Termination of lines with different types of conditions – Open Circuited Line–Short Circuited Line – T-Junction– Lumped Reactive Junctions (Numerical Problems).

**UNIT–V:**

**Various Factors Governing the Performance of Transmission line**

Skin and Proximity effects – Description and effect on Resistance of Solid Conductors –Ferranti effect – Charging Current – Effect on Regulation of the Transmission Line–Shunt Compensation –Corona – Description of the phenomenon–Factors affecting corona–Critical voltages and power loss – Radio Interference –Power factor improvement methods.

**UNIT–VI:**

**Sag and Tension Calculations and Overhead Line Insulators**

Sag and Tension calculations with equal and unequal heights of towers– Effect of Wind and Ice on weight of Conductor–Numerical Problems – Stringing chart and sag template and its applications–Types of Insulators – String efficiency and Methods for improvement–Numerical Problems – Voltage distribution–Calculation of string efficiency–Capacitance grading and Static Shielding.

**Learning Outcomes:**

- Able to understand parameters of various types of transmission lines for using calculation and behavior during different operating conditions.

- Able to understand the insight into specific transmission lines short and medium type which would have application in medium and high voltage power transmission systems.
- Student will be able to understand the surge propagation, reflection and refraction in transmission lines. such output will be useful in protecting transmission line insulators and designing level of insulation coordination at various high voltages.
- Will be able to utilize it for understanding the surge behaivour of transmission line for protection of connects equipments,viz.power transformer and system connected shunt reactors.
- Will be able to understand various phenomenon related to charged line transmitting different level of power.
- Will be able to understand physical and geometrical parameters of transmission line for safe and efficient performance during operating condition of voltage and power.

**Text Books:**

1. Electrical power systems – by C.L. Wadhwa, New Age International (P) Limited, Publishers, 1998.
2. Modern Power System Analysis by I.J. Nagarath and D.P.Kothari, Tata Mc Graw Hill, 2nd Edition.
3. Electrical Power Systems by P.S.R. Murthy, B.S. Publications.

**Reference Books:**

1. Power system Analysis–by John J Grainger William D Stevenson, TMC Companies, 4th edition
2. Power System Analysis and Design by B.R. Gupta, Wheeler Publishing.
3. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S. Bhatnagar A .Chakrabarthy, DhanpatRai& Co Pvt. Ltd.

**III Year – I SEMESTER**

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## ELECTRICAL MACHINES – III

**Preamble:**

This course essentially covers ac machines. It covers topics related to principle of operation, constructional features and starting of single phase induction motors and three phase synchronous motors. In addition, it also covers voltage regulation and parallel operation of synchronous generators.

**Learning Objectives:**

- To study the application of "Double revolving field" theory for single – phase induction motor and appreciate the function and application of a.c series motor.
- To discuss e.m.f generation principle of synchronous generator and armature reaction effect.
- To study the effect of load at different power factors, methods of predetermination of regulation for non– salient and salient pole generators.
- To study the parallel operation and the concepts of transfer of real and reactive powers.
- To understand the operation and performance of synchronous motor.
- To study the power circle diagrams and methods of starting of synchronous motor.

**UNIT – I:**

**Single Phase Motors**

Single phase induction motors – Constructional features and the problem of starting–Double revolving field theory–AC Series motor–Compensation.

**UNIT–II:**

**Synchronous generator construction and operation**

Constructional features of non–salient and salient pole type – Armature windings –Distributed and concentrated windings – Distribution– Pitch and winding factors –E.M.F equation–Improvements of waveform and armature reaction– Numerical problems.

**UNIT – III:**

**Voltage regulation of synchronous generator**

Voltage regulation by synchronous impedance method– MMFmethod and Potier triangle method–Phasor diagrams– Two reaction analysis of salient pole machines and phasor diagram– Numerical problems.

**UNIT –IV:**

**Parallel operation of synchronous generators**

Parallel operation with infinite bus and other alternators – Synchronizing power – Load sharing –Transfer of real and reactive power– Numerical problems.

**UNIT–V:**

**Synchronous motor – operation**

Synchronous Motor principle and theory of operation– Phasor diagram – Starting torque–Variation of current and power factor with excitation – Synchronous condenser – Mathematical analysis for power developed– Numerical problems.

**UNIT – VI:**

**Synchronous motor performance and starting**

Excitation and power circles – Hunting and its suppression – Methods of starting – Synchronous induction motor.

**Learning outcomes:**

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

- Analyze the performance of single phase induction and ac series motors.
- Explain the structure of synchronous machines and design the windings.
- Develop solutions for regulation of both non salient pole and salient pole synchronous generators.
- Explain the role of synchronous generators operation when connected to an infinite bus or when operating in parallel.
- Analyze the performance of synchronous motor for development of torque and power factor correction.
- Explain hunting phenomenon and methods of starting of synchronous motor.

**Text Books:**

1. Electrical Machines – by P.S. Bhimbra, Khanna Publishers.
2. The Performance and Design of AC Machines – by M.G.Say, ELBS and Ptiman & Sons.

**Reference Books:**

1. Electric Machinery – by A.E. Fitzgerald, C. Kingsley and S.Umans-by Mc Graw–Hill Companies, 5th edition, 1990.
2. Theory of Alternating Current Machinery by Langsdorf, Tata Mc Graw–Hill, 2nd edition.
3. Analysis of Electric Machinery and Drive systems – by Paul C. Krause, Oleg Wasynczuk and Scott D.Sudhoff, wiley publications, 2nd edition Publishers.

**III Year – I SEMESTER**

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## POWER ELECTRONICS

**Preamble:**

The usage of power electronics in day to day life has increased in recent years. It is important for student to understand the fundamental principles behind all these converters. This course covers characteristics of semi conductor devices, ac/dc, dc/dc, ac/ac and dc/ac converters. The importance of using pulse width modulated techniques to obtain high quality power supply (dc/ac converter) is also discussed in detail in this course.

**Learning Objectives:**

- To study the characteristics of various power semiconductor derive and analyze the operation of diode bridge rectifier.
- To design firing circuits for SCR. Analyze the operation of AC voltage controller and half–wave phase controlled rectifiers.
- To understand the operation of single phase full–wave converters and analyze harmonics in the input current.
- To study the operation of three phase full–wave converters and dual converter.
- To analyze the operation of single phase cyclo converters and high frequency dc–dc converters.
- To understand the working of inverters and application of PWM techniques for voltage control and harmonic mitigation.

**UNIT–I:**

**Power Semi Conductor Devices**

Thyristors–Silicon controlled rectifiers (SCR's) –Characteristics of power MOSFET and power IGBT– Basic theory of operation of SCR–Static characteristics– Turn on and turn off methods–Dynamic characteristics of SCR– Snubber circuit design–Numerical problems–Diode bridge rectifier with R–load and capacitive filter–Output voltage and input current waveforms.

**UNIT–II:**

**Phase Controlled Converters – Single Phase**

Firing circuits for SCR– Line commutation principle– Single phase AC voltage controller with R and RL load–Half wave converters with R,RL and RLE loads– Derivation of average load voltage and current–Effect of freewheeling diode for RL load.

**UNIT–III:**

**Single Phase Bridge Converter and Harmonic Analysis Fully controlled converters**

Operation with R, RL and RLE loads–Derivation of average voltage and current – Effect of source Inductance.

**Semi Converters (Half Controlled):**

Operation with R, RL and RLE loads – Harmonic analysis for input current waveform in a system with a large load inductance –Calculation of input power factor.

**UNIT–IV:**

**Three Phase AC–DC Bridge Converters**

Full converter with R and RL loads–Semi converter (Half Controlled) with R and RL loads– Derivation of load voltage–Line commutated Inverter operation–Dual converters with non–circulating and circulating currents.

**UNIT – V:**

**AC–AC and DC–DC Converters**

Single phase Bridge type cyclo converter with R and RL load (Principle of operation) –High frequency DC–DC converters**:** Buck Converter operation– Time ratio control and current limit control strategies–Voltage and current waveforms–Derivation of output voltage–Boost converter operation–Voltage and current waveforms–Derivation of output voltage – Buck-Boost converter operation –Voltage and current waveforms.

**UNIT – VI:**

**DC–AC Inverters**

**Inverters**

Single phase inverters–Unipolar and bipolar switching–Three phase Inverters ($120^0$ and $180^0$ modes of operation) –PWM techniques– Sine triangular PWM technique– amplitude and frequency modulation Indices –Harmonic analysis.

**Learning Outcomes:**

Student should be able to

- Explain the characteristics of various power semiconductor derive and analyze the operation of diode bridge rectifier.
- Design firing circuits for SCR. Analyze the operation of AC voltage controller and half–wave phase controlled rectifiers.
- Explain the operation of single phase full–wave converters and analyze harmonics in the input current.
- Explain the operation of three phase full–wave converters and dual converter.
- Analyze the operation of single phase cyclo converters and high frequency dc–dc converters.
- Explain the working of inverters and application of PWM techniques for voltage control and harmonic mitigation.

**Text Books:**

1. Power Electronics: Circuits, Devices and Applications – by M. H. Rashid, Prentice Hall of India, 2nd edition, 1998
2. Power Electronics: converters, applications & design -by Nedmohan, Tore M. Undeland, Robbins by Wiley India Pvt. Ltd.
3. Power Converter Circuits -by William Shepherd, Li zhang, CRC Taylor & Francis Group.

**Reference Books:**

**1.** Elements of Power Electronics–Philip T.Krein.oxford.
2. Power Electronics – by P.S.Bhimbra, Khanna Publishers.
3. Thyristorised Power Controllers – by G. K. Dubey, S. R. Doradla, A. Joshi and R. M. K.Sinha, New Age International (P) Limited Publishers, 1996.
4. Power Electronics handbook by Muhammad H. Rashid, Elsevier.

**III Year – I SEMESTER**

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## LINEAR & Digital IC APPLICATIONS

**Preamble:**

All Electronic devices developed in circuit Concepts. Thus all analog circuits developed on circuit Concept basis. But the advancement of Technology in Fabrication Field gain prominence and all discrete components are fabricated using I.C Technology. On a Single chip millions of transistors are fabricated using Very Large Scale IC. In This context Operational Amplifies which is an analog device plays an important role for Analog IC Design.

Operational Amplifies performs Algebraic operations, Logarithmic Operations, Trigonometric Operations etc. Therefore these Operational Amplifiers design goes into System design instead of circuit design. So Linear IC applications plays vital role in the electronic field Starting from home appliances to Super computers.

**Learning Objectives:**

After completion of this course, the reader should be able to

- Draw a block diagram representing a typical op-amp with various definitions.
- Draw and explain the open-loop configuration and feedback configuration and can determine Voltage gain, the input resistance, the output resistance.
- Differentiate between Ideal and Non-Ideal Op-Amp, Determination of closed loop voltage gain, the input resistance, the output resistance for Non-Ideal Op-Amp Circuits.
- Perform various mathematical Operations, Trigonometric & Logarithmic Operations, and Instrumentation Amplifier with relevant Circuits.
- Design waveform generators (Astable, Monostable, Schmitt Trigger) using Single Op-Amp.
- Study of 555 timer & its applications using Astable and Monostable Operations.
- Can design various types of Active Filters such as LPF, HPF, BPF, BRF, NBPF, Notch Filter, ALL pass filters.
- Study the operation & applications of PLA.
- Explain the operation of A/D and D/A Converters.

**UNIT–I:**

**Introduction To Operational Amplifier**

Block diagram of Typical Op–Amp With Various Stages– BJT Differential Amplifier With $R_E$ DC Analysis– AC Analysis –BJT differential amplifier with constant current source – Analysis Different input/output configurations dual input balanced output–Dual input unbalanced output–Signal input balanced output–Signal input unbalanced output–AC analysis with r–parameters –Current repeater circuits–Current mirror circuits–Analysis–Level translator – Cascade differential amplifier– FET differential amplifier.

**UNIT–II:**

**OP–AMP Parameter**

Input offset voltage – Input off–set current–Input bias current–Differential input resistance–Common mode rejection ratio–Slew ratio–PSRR–Large signal voltage gain–Output voltage swing transients response–definitions and explanations. Measurement of bias current–Measurement of offset currents–Measurement of offset voltage –Measurement of slew rate – Output offset voltage balancing circuits–Bias current compensations circuit–Dual power suppliers with shunt capacitance filter–Fix voltages Regulators 78XX–79XX sering and as currents sources– Dual power supply using 78XX and 79XX sering.

**UNIT–III**

**Ideal Operational Amplifier Theory and Basic Circuits**

Ideal operational amplifier properties–Ideal assumptions–Basic circuits such as non inverting type comparator–Inverting type comparator–Voltage follower– Inverting amplifier–Non–inverting amplifier–Summing amplifier–Non–inverting summing amplifier–sub-tractor– Differentiator–Integrator–Scale changer–Instrumentation amplifier– V to I and I to V convertors–Log and Anti–log amplifiers–Zero crossing detector–Schmitt-trigger peak detector– Half-wave and full-wave rectifiers– Precision diode– Non-ideal operational amplifier non–inverting amplifier– inverting amplifier– closed-loop gain–Input and output resistance equivalent circuits.

**UNIT–IV:**

**Wave form generator in angular waveform generator using op–amps and PLL** Design of Astable multivibrator –Monostable multivibrator using signal op-amp–Trigring waveform generator 555 timer**:**Introduction–Pindiagram–Functional diagram for 8pin DIP–Design of Astable and monostable multi– Astable applicatio–Monostable applications– PLL**:** Introduction,basic blockdiagram– Furctions of each block–566 VC0– 565 PLL block diagram –Function of each block–Applications of PLL–Frequency

multiplier role of each pin frequency transalation– AM–FM and FSK demodulators.

**UNIT–V:**

**Active filters**

Introduction– Merits and demerits of active filters–Over passive filters– First order low pass Butter–Worth filter –Design and frequency response–Second order LPF design and frequency response – First order HPF design and frequency response– Second order HPF design and frequency response– Higher-order filters– BPF wide band–pass and narrow band–pass filter–Wide band reject filter–Notch filter–All-pass filter.

**UNIT–VI:**

**D to A and A to D Convertors**

Digital to Analog Convertors(D to A) – Introduction–Specifications–Basic DAC techniques– Weighted resistor DAC– R–2R ladder DAC–Invested R–2R –Output expression for each type.

**Analog to Digital Convertors**

Introduction–Specifications–Parallel comparator type–Counter type–Dual slope–Successive approximation type ADCs– Merits and demerits of each type, Comparison of different types.

**Learning Outcomes**:

- After completion of this course student can able to differentiate “Analog Circuits & Digital Circuits”.
- The course content gives an insight in to the fundamentals so that one can design the “Linear Circuits” with their own innovative skills.
- Those who are taken this course can specialize in this subject in their Post Graduation. It is a challenging task for the individual to exhibit his logical skills & Analytical ability.
- They can design their own circuits which may be useful for current industry needs.

**Text Books**:

1. OP–AMPS and liner integrator circuits by Ramakanth A Gayakwad (PHI).
2. Linear Integrated Circuits by D.Roy chowdary, New age international.

3. Op–amp and linear integrated circuits by sanjay sharma, S.K.Kataria & son's New Delhi.

**Reference Books:**

1. Micro Electronics– Mclliman Mc Graw Hill.
2. Analog Electronics– L.K.Maheswari, PHI.
3. Linear Integrated circuits by S.Salivahan, TMH.

**III Year – I SEMESTER**

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## ELECTRICAL MACHINES – II LAB

**Learning objectives:**

- To predetermine the efficiency and regulation of transformers and asses their performance.
- To predetermine the regulation of three–phase alternator by various methods, find $X_d$ / $X_q$ ratio of alternator and asses the performance of three–phase synchronous motor.
- To perform various tests on Induction motor for assessing its performance.

**The following experiments are required to be conducted as compulsory experiments:**

1. O.C. & S.C. Tests on Single phase Transformer
2. Sumpner's test on single phase transformers
3. Scott connection of transformers
4. No–load & Blocked rotor tests on three phase Induction motor
5. Regulation of a three –phase alternator by synchronous impedance & M.M.F. Methods.
6. V and Inverted V curves of a three—phase synchronous motor.
7. Equivalent Circuit of a single phase induction motor
8. Determination of $X_d$ and $X_q$ of a salient pole synchronous machine

**In addition to the above eight experiments, at least any two of the following experiments are required to be conducted from the following list:**

1. Parallel operation of Single phase Transformers
2. Separation of core losses of a single phase transformer
3. Brake test on three phase Induction Motor
4. Regulation of three–phase alternator by Potier triangle method.
5. Efficiency of a three–phase alternator

6. Heat run test on a bank of 3 Nos. of single phase Delta connected transformers.
7. Measurement of sequence impedance of a three–phase alternator.

**Learning outcomes:**

- Able to predetermine the efficiency and regulation of transformers and asses their performance.
- Able to predetermine the regulation of three–phase alternator by various methods, find $X_d$ / $X_q$ ratio of alternator and asses the performance of three–phase synchronous motor.
- Able to perform various tests on Induction motor for assessing its performance.

**III Year – I SEMESTER**

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## CONTROL SYSTEMS LAB

**Learning Objectives:**

- To impart hands on experience to understand the performance of basic control system components such as magnetic amplifiers, D.C. servo motors, A.C. Servo motors, stepper motor and potentiometer.
- To understand time and frequency responses of control system with and without controllers and compensators.

**Any 10 of the following experiments are to be conducted:**

1. Time response of Second order system
2. Characteristics of Synchros
3. Programmable logic controller – characteristics of stepper motor
4. Effect of feedback on DC servo motor
5. Effect of P, PD, PI, PID Controller on a second order systems
6. Lag and lead compensation – Magnitude and phase plot
7. DC position control system
8. Transfer function of DC motor
9. Temperature controller using PID
10. Characteristics of magnetic amplifiers
11. Characteristics of AC servo motor
12. Characteristics of DC servo motor
13. Potentiometer as an error detector

**Learning Outcomes**

- Able to analyze the performance and working Magnetic amplifier, D.C. servo motors, A.C. Servo motors and synchronous motors.
- Able to design P,PI,PD and PID controllers
- Able to design lag, lead and lag–lead compensators
- Able to control the temperature using PID controller
- Able to determine the transfer function of D.C.motor
- Able to control the position of D.C servo motor performance

**III Year – I SEMESTER**

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## INTELLECTUAL PROPERTY RIGHTS AND PATENTS

### UNIT I

Introduction to Intellectual Property Law – Evolutionary past – Intellectual Property Law Basics - Types of Intellectual Property - Innovations and Inventions of Trade related Intellectual Property Rights – Agencies Responsible for Intellectual Property Registration – Infringement - Regulatory – Over use or Misuse of Intellectual Property Rights - Compliance and Liability Issues.

### UNIT II

Introduction to Copyrights – Principles of Copyright – Subject Matters of Copyright – Rights Afforded by Copyright Law –Copyright Ownership – Transfer and Duration – Right to Prepare Derivative Works –Rights of Distribution – Rights of performers **–** Copyright Formalities and Registration – Limitations – Infringement of Copyright – International Copyright Law- Semiconductor Chip Protection Act.

### UNIT III

Introduction to Patent Law – Rights and Limitations – Rights under Patent Law – Patent Requirements – Ownership and Transfer – Patent Application Process and Granting of Patent – Patent Infringement and Litigation – International Patent Law – Double Patenting – Patent Searching – Patent Cooperation Treaty – New developments in Patent Law- Invention Developers and Promoters.

### UNIT IV

Introduction to Trade Mark – Trade Mark Registration Process – Post registration procedures – Trade Mark maintenance – Transfer of rights – Inter parties Proceedings – Infringement – Dilution of Ownership of Trade Mark – Likelihood of confusion – Trade Mark claims – Trade Marks Litigation – International Trade Mark Law.

### UNIT V

Introduction to Trade Secrets – Maintaining Trade Secret – Physical Security – Employee Access Limitation – Employee Confidentiality Agreement –

Trade Secret Law – Unfair Competition – Trade Secret Litigation – Breach of Contract – Applying State Law.

**UNIT VI**

Introduction to Cyber Law – Information Technology Act - Cyber Crime and E-commerce – Data Security – Confidentiality – Privacy - International aspects of Computer and Online Crime.

**REFERENCE BOOKS:**


1. Deborah E.Bouchoux: “Intellectual Property”. Cengage learning , New Delhi
2. Kompal Bansal & Parishit Bansal "Fundamentals of IPR for Engineers", BS Publications (Press)
3. Cyber Law. Texts & Cases, South-Western’s Special Topics Collections
4. Prabhuddha Ganguli: ‘ Intellectual Property Rights” Tata Mc-Graw – Hill, New Delhi
5. Richard Stim: "Intellectual Property", Cengage Learning, New Delhi.
6. R. Radha Krishnan, S. Balasubramanian: "Intellectual Property Rights", Excel Books. New Delhi.
7. M. Ashok Kumar and Mohd. Iqbal Ali: “Intellectual Property Right” Serials Pub.

**III Year – II SEMESTER**

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## SWITCHGEAR AND PROTECTION

**Preamble:**

In order to supply power from generating end to receiving end several equipments are connected in to the system. In order to protect the equipments and components against various operating conditions and over voltages protective devices are required to be installed in the system. Topics specified in this subject deal with various types of protective equipments and their working principle including limitations etc.

**Learning objectives:**

- To provide the basic principles of arc interruption, circuit breaking principles, operation of various types of circuit breakers.
- To study the classification, operation, construction and application of different types of electromagnetic protective relays.
- To explain various types of faults in generators and transformers and different types of protective schemes.
- To impart knowledge of various protective schemes used for feeders and bus bars.
- To explain the principles and operations of different types of static relays.
- To study different types of over voltages in a power system and principles of different protective schemes for insulation co–ordination.

**UNIT–I:**

**Circuit Breakers**

Miniature Circuit Breaker(MCB)– Elementary principles of arc interruption– Restrike Voltage and Recovery voltages– Restrike phenomenon– Average and Max. RRRV– Current chopping and Resistance switching– Introduction to oil circuit breakers– Description and operation of Air Blast– Vacuum and SF6 circuit breakers– CB ratings and specifications– Auto reclosing.

**UNIT–II:**

**Electromagnetic Protection**

Principle of operation and construction of attracted armature– Balanced beam– induction disc and induction cup relays– Relays classification– Instantaneous– DMT and IDMT types– Applications of relays**:** Over current/under voltage relays– Directional relays– Differential relays and percentage differential relays– Universal torque equation– Distance relays**:** Impedance– Reactance– Mho and offset mho relays– Characteristics of distance relays and comparison.

**UNIT–III:**

**Generator Protection**

Protection of generators against stator faults– Rotor faults and abnormal conditions– restricted earth fault and inter turn fault protection– Numerical examples.

**Transformer Protection**

Protection of transformers**:** Percentage differential protection– Design of CT's ratio– Buchholz relay protection–Numerical examples.

**UNIT–IV:**

**Feeder and Bus bar Protection**

Protection of lines**:** Over current– Carrier current and three zone distance relay using impedance relays–Translay relay–Protection of bus bars– Differential protection.

**UNIT–V:**

**Static and Digital Relays**

Static relays**:** Static relay components– Static over current relay– Static distance relay– Micro processor based digital relays.

**UNIT–VI:**

**Protection against over voltage and grounding**

Generation of over voltages in power systems– Protection against lightning over voltages– Valve type and zinc–Oxide lighting arresters– Insulation coordination– BIL– impulse ratio– Standard impulse test wave– volt~time characteristics– Grounded and ungrounded neutral systems–Effects of ungrounded neutral on system performance– Methods of neutral grounding**:** Solid–resistance–Reactance–Arcing grounds and grounding Practices.

**Learning Outcomes:**

- To be able to understand the principles of arc interruption for application to high voltage circuit breakers of air, oil, vacuum, $SF_6$ gas type.
- Ability to understand the working principle and constructional features of different types of electromagnetic protective relays.
- Students acquire in depth knowledge of faults that is observed to occur in high power generator and transformers and protective schemes used for all protections.
- Improves the ability to understand various types of protective schemes used for feeders and bus bar protection.
- Generates understanding of different types of static relays with a view to application in the system.
- To be able to understand the different types of over voltages appearing in the system, including existing protective schemes required for insulation co–ordination.

**Text Books:**

1. Protection and SwitchGear by BhaveshBhalja, R.P. Maheshwari, NileshG. Chothani, Oxford University Press, 2013
2. Power system protection- Static Relays with microprocessor applications. by T.S. Madhava Rao, TMH
3. Electrical Power System Protection by C. CHRISTOPOULOS and A. Wright, Springer publications

**Reference Books:**

1. Power System Protection and Switchgear by Badari Ram, D.N Viswakarma, TMH Publications.
2. Fundamentals of Power System Protection by Paithankar and S.R. Bhide, PHI, 2003.
3. Art & Science of Protective Relaying – by C R Mason, Wiley Eastern Ltd.

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**III Year – II SEMESTER**

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## MICROPROCESSORS AND MICROCONTROLLERS

**Preamble:**

Microprocessor and microcontroller have become important building blocks in digital electronics design. It is important for student to understand the architecture of a microprocessor and its interfacing with various modules. 8086 microprocessor architecture, programming, and interfacing is dealt in detail in this course. Interfacing, assembly language programming and interfacing of 8051 microcontroller and its application in industry are also covered in this course.

**Learning objectives:**

- To understand the organization and architecture of Micro Processor
- To understand addressing modes to access memory
- To understand 8051 micro controller architecture
- To understand the programming principles for 8086 and 8051
- To understand the interfacing of MP with IO as well as other devices.
- To understand how to develop cyber physical systems

**UNIT–I:**

**Introduction to Microprocessor Architecture**

Introduction and evolution of Microprocessors– Architecture of 8086– Register Organization of 8086–Memory organization of 8086– General bus operation of 8086–Introduction to 80286–80386 and 80486 and Pentium.

**UNIT–II:**

**Minimum and Maximum Mode Operations**

Instruction set, Addressing modes– Minimum and Maximum mode operations of 8086–8086 Control signal interfacing–Read and write cycle timing diagrams.

**UNIT–III:**

**Assembly Language Programming**

Assembly Directives–Macro's– Algorithms for Implementation of FOR Loop–WHILE–REPEAT and IF-THEN-ELSE Features–Addressing modes and Instruction set of 8051–Assembly language programming of 8051–Development systems and tools.

**UNIT–IV:**

**I/O Interface**

8255 PPI– Architecture of 8255–Modes of operation– Interfacing I/O devices to 8086 using 8255–Interfacing A to D converters– Interfacing D to A converters– Stepper motor interfacing– Static memory interfacing with 8086–DMA controller (8257)–Architecture–Interfacing 8257 DMA controller–Programmable Interrupt Controller (8259)–Command words and operating modes of 8259– Interfacing of 8259–Keyboard/display controller (8279)–Architecture–Modes of operation–Command words of 8279– Interfacing of 8279.

**UNIT–V:**

**Introduction to 8051 Micro Controller**

Overview of 8051 Micro Controller– Architecture– Register set–I/O ports and Memory Organization– Interrupts–Timers and Counters–Serial Communication.

**UNIT– VI:**

**Cyber physical systems and industrial applications of 8051**

Applications of Micro Controllers– Interfacing 8051 to LED's–Push button–Relay's and Latch Connections– Keyboard Interfacing– Interfacing Seven Segment Display–ADC and DAC Interfacing.

**Learning Outcomes:**

- To be able to understand the microprocessor capability in general and explore the evalution of microprocessors.
- To be able to understand the addressing modes of microprocessors
- To be able to understand the micro controller capability

- To be able to program mp and mc
- To be able to interface mp and mc with other electronic devices
- To be able to develop cyber physical systems

**Text Books:**

1. Microprocessors and Interfacing, Douglas V Hall, Mc–Graw Hill, 2nd Edition.
2. Kenneth J Ayala, "The 8051 Micro Controller Architecture, Programming and Applications", Thomson Publishers, 2nd Edition.
3. Ray and Burchandi, "Advanced Micro Processors and Interfacing", Tata McGraw–Hill.

**Reference Books:**

1. R.S. Kaler, " A Text book of Microprocessors and Micro Controllers", I.K. International Publishing House Pvt. Ltd.
2. Ajay V. Deshmukh, "Microcontrollers – Theory and Applications", Tata McGraw–Hill Companies –2005.
3. Ajit Pal, "Microcontrollers – Principles and Applications", PHI Learning Pvt Ltd, 2011.

**III Year – II SEMESTER**

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## UTILIZATION OF ELECTRICAL ENERGY

**Preamble:**

This course primarily deals with utilization of electrical energy generated from various sources. It is important to understand the technical reasons behind selection of motors for electric drives based on the characteristics of loads. Electric heating, welding and illumination are some important loads in the industry in addition to motor/drives. Another major share of loads is taken by Electric Traction. Utilization of electrical energy in all the above loads is discussed in detail in this course. Demand side management concepts are also introduced as a part of this course.

**Learning objectives:**

- To understand the operating principles and characteristics of traction motors with respect to speed, temperature ,loading conditions.
- To acquaint with the different types of heating and welding techniques.
- To study the basic principles of illumination and its measurement.
- To understand different types of lightning system including design.
- To understand the basic principle of electric traction including speed–time curves of different traction services.
- To understand the method of calculation of various traction system for braking, acceleration and other related parameters, including demand side management of energy.

**UNIT – I:**

**Selection of Motors**

Choice of motor, type of electric drives, starting and running characteristics–Speed control–Temperature rise–Applications of electric drives–Types of industrial loads–continuous–Intermittent and variable loads–Load equalization.

**UNIT – II:**

**Electric Heating**

Advantages and methods of electric heating–Resistance heating induction heating and dielectric heating.

**Electric Welding**

Electric welding–Resistance and arc welding–Electric welding equipment–Comparison between AC and DC Welding

**UNIT – III:**

**Illumination fundamentals**

Introduction, terms used in illumination–Laws of illumination–Polar curves–Integrating sphere–Lux meter–Sources of light

**UNIT – IV:**

**Various Illumination Methods**

Discharge lamps, MV and SV lamps – Comparison between tungsten filament lamps and fluorescent tubes–Basic principles of light control– Types and design of lighting and flood lighting–LED lighting.

**UNIT – V:**

**Electric Traction – I**

System of electric traction and track electrification– Review of existing electric traction systems in India– Special features of traction motor–Mechanics of train movement–Speed–time curves for different services – Trapezoidal and quadrilateral speed time curves.

**UNIT – VI:**

**Electric Traction – II**

Calculations of tractive effort– power –Specific energy consumption for given run–Effect of varying acceleration and braking retardation–Adhesive weight and braking retardation adhesive weight and coefficient of adhesion–Principles of energy efficient motors.

**Learning Outcomes:**

- Able to identify a suitable motor for electric drives and industrial applications
- Able to identify most appropriate heating or welding techniques for suitable applications.
- Able to understand various level of illuminosity produced by different illuminating sources.
- Able to estimate the illumination levels produced by various sources and recommend the most efficient illuminating sources and should be able to design different lighting systems by taking inputs and constraints in view.

- Able to determine the speed/time characteristics of different types of traction motors.
- Able to estimate energy consumption levels at various modes of operation.

**Text Books:**

1. Utilization of Electric Energy – by E. Openshaw Taylor, Orient Longman.
2. Art & Science of Utilization of electrical Energy – by Partab, DhanpatRai & Sons.

**Reference Books:**

1. Utilization of Electrical Power including Electric drives and Electric traction – by N.V.Suryanarayana, New Age International (P) Limited, Publishers, 1996.
2. Generation, Distribution and Utilization of electrical Energy – by C.L. Wadhwa, New Age International (P) Limited, Publishers, 1997.

**III Year – II SEMESTER**

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## POWER SYSTEM ANALYSIS

**Preamble:**

The course is designed to give students the required knowledge for the design and analysis of electrical power grids. Calculation of power flow in a power system network using various techniques, formation of $Z_{bus}$ and its importance are covered in this course. It also deals with short circuit analysis and analysis of power system for steady state and transient stability.

**Learning Objectives:**

- To study the development of impedance diagram (p.u) and formation of $Y_{bus}$
- To study the Gauss Seidel, Newton raphson, decoupled and fast decoupled load flow methods.
- To study the concept of the $Z_{bus}$building algorithm.
- To study short circuit calculation for symmetrical faults$_s$
- To study the effect of unsymmetrical faults.
- To study the rotor angle stability analysis of power systems.

**UNIT –I:**

**Per Unit Representation & Topology**

Per Unit Quantities–Single line diagram– Impedance diagram of a power system – Graph theory definition – Formation of element node incidence and bus incidence matrices – Primitive network representation – Formation of Y–bus matrix by singular transformation and direct inspection methods.

**UNIT –II:**

**Power Flow Studies**

Necessity of power flow studies – Derivation of static power flow equations – Power flow solution using Gauss-Seidel Method – Newton Raphson Method (Rectangular and polar coordinates form) –Decoupled and Fast Decoupled methods (Algorithmic approach) – Problems on 3–bus system only.

**UNIT –III:**

**Z–Bus formulation**

Formation of Z–Bus**:** Partial network– Algorithm for the Modification of $Z_{bus}$ Matrix for addition element for the following cases**:** Addition of element from a new bus to reference– Addition of element from a new bus to an old bus– Addition of element between an old bus to reference and Addition of element between two old busses (Derivations and Numerical Problems).– Modification of Z–Bus for the changes in network (Problems).

**UNIT – IV:**

**Symmetrical Fault Analysis**

3–Phase short circuit currents and reactances of synchronous machine–Short circuit MVA calculations.

**UNIT –V:**

**Symmetrical Components & Fault analysis**

Synthesis of unsymmetrical phasor from their symmetrical components– Symmetrical components of unsymmetrical phasor–Phase - shift of symmetrical components in Y–Δ–Power in terms of symmetrical components – Sequence networks – Positive, negative and zero sequence networks– Various types of faults LG– LL– LLG and LLL on unloaded alternator– unsymmetrical faults on power system.

**UNIT – VI:**

**Power System Stability Analysis**

Elementary concepts of Steady state– Dynamic and Transient Stabilities– Description of Steady State Stability Power Limit–Transfer Reactance– Synchronizing Power Coefficient –Power Angle Curve and Determination of Steady State Stability –Derivation of Swing Equation–Determination of Transient Stability by Equal Area Criterion–Application of Equal Area Criterion–Methods to improve steady state and transient stability.

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- Able to draw an impedance diagram for a power system network.
- Able to form a $Y_{bus}$ matrix for a power system network with or without mutual couplings.
- Able to find out the load flow solution of a power system network using different types of load flow methods.
- Able to formulate the $Z_{bus}$ for a power system network.
- Able to find out the fault currents for all types faults with a view to provide data for the design of protective devices.

- Able to find out the sequence components of currents for any unbalanced power system network.
- Able to analyze the steady state, transient and dynamic stability concepts of a power system.

**Text Books:**

1. Power System Analysis by Grainger and Stevenson, Tata McGraw Hill.
2. Electrical Power Systems by P.S.R.Murthy, B.S.Publications
3. Modern Power system Analysis – by I.J.Nagrath&D.P.Kothari: Tata Mc Graw–Hill Publishing Company, 2nd edition.
4. Power System Analysis and Design by J.Duncan Glover, M.S.Sarma, T.J. Overbye – CengageLearning publications.

**Reference Books:**

1. Power System Analysis – by A.R.Bergen, Prentice Hall, Inc.
2. Power System Analysis by HadiSaadat – TMH Edition.
3. Power System Analysis by B.R.Gupta, Wheeler Publications.

**III Year – II SEMESTER**

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## POWER SEMICONDUCTOR DRIVES

**Preamble:**

This course is an extension of power electronics applications to electric drives. This course covers in detail the basic and advanced speed control techniques using power electronic converters that are used in industry. It is equally important to understand the four quadrant operation of electric drives and slip power recovery schemes in induction motors.

**Learning Objectives:**

- To learn the fundamentals of electric drive and different electric braking methods.
- To analyze the operation of three phase converter controlled dc motors and four quadrant operation of dc motors using dual converters.
- To discuss the converter control of dc motors in various quadrants.
- To understand the concept of speed control of induction motor by using AC voltage controllers and voltage source inverters.
- To learn the principles of static rotor resistance control and various slip power recovery schemes.
- To understand the speed control mechanism of synchronous motors

**UNIT–I:**

**Fundamentals of Electric Drives**

Electric drive – Fundamental torque equation – Load torque components – Nature and classification of load torques – Steady state stability – Load equalization– Four quadrant operation of drive (hoist control) – Braking methods**:** Dynamic – Plugging – Regenerative methods.

**UNIT–II:**

**Three phase converter controlled DC motors**

Revision of speed control techniques – Separately excited and series motors controlled by full converters – Output voltage and current waveforms – Speed-torque expressions – Speed-torque characteristics – Numerical problems – Four quadrant operation using dual converters.

**UNIT–III:**

**Control of DC motors by DC–DC converters (Type C & Type D)**

Single quadrant – Two quadrant and four quadrant chopper fed separately excited and series excited motors – Continuous current operation– Output voltage and current waveforms – Speed–torque expressions – Speed–torque characteristics –Four quadrant operations – Closed loop operation (Block diagrams only).

**UNIT–IV:**

**Induction motor control – Stator side**

Variable voltage characteristics–Control of Induction Motor by AC Voltage Controllers – Waveforms –Speed torque characteristics– Variable Voltage Variable Frequency control of induction motor by voltage source inverter – PWM control – Closed loop operation of induction motor drives (Block Diagram Only).

**UNIT–V:**

**Control of Induction motor – Rotor side**

Static rotor resistance control – Slip power recovery schemes – Static Scherbius drive – Static Kramer drive – Performance and speed torque characteristics – Advantages –Applications.

**UNIT–VI:**

**Control of Synchronous Motors**

Separate control &self control of synchronous motors – Operation of self controlled synchronous motors by VSI– Closed Loop control operation of synchronous motor drives (Block Diagram Only) –Variable frequency control–Pulse width modulation.

**Learning Outcomes:**

Student should be able to

- Explain the fundamentals of electric drive and different electric braking methods.
- Analyze the operation of three phase converter controlled dc motors and four quadrant operation of dc motors using dual converters.
- Explain the converter control of dc motors in various quadrants.
- Explain the concept of speed control of induction motor by using AC voltage controllers and voltage source inverters.
- Explain the principles of static rotor resistance control and various slip power recovery schemes.

- Explain the speed control mechanism of synchronous motors

**Text Books:**

1. Fundamentals of Electric Drives – by G K Dubey Narosa Publications
2. Power Semiconductor Drives, by S.B. Dewan, G.R.Slemon, A.Straughen, Wiley-India Edition.

**Reference Books:**

1. Electric Motors and Drives Fundamentals, Types and Apllications, by Austin Hughes and Bill Drury, Newnes.
2. Thyristor Control of Electric drives – Vedam Subramanyam Tata McGraw Hill Publications.
3. Power Electronic Circuits, Devices and applications by M.H. Rashid, PHI.
4. Power Electronics handbook by Muhammad H.Rashid, Elsevier.

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**III Year – II SEMESTER**

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## MANAGEMENT SCIENCE

**UNIT I**

**Introduction to Management**: Concept –nature and importance of Management – Functions of Management – Evaluation of Management thought- Theories of Motivation – Decision making process-Designing organization structure- Principles of organization - Types of organization structure.

**UNIT II**

**Operations Management**: Principles and Types of Management – Work study- Statistical Quality Control- Control charts (P-chart, R-chart, and Cchart).

Simple problems- Material Management: Need for Inventory control- EOQ, ABC analysis (simple problems) and Types of ABC analysis (HML, SDE, VED, and FSN analysis).

**UNIT III**

**Functional Management**: Concept of HRM, HRD and PMIR- Functions of HR Manager- Wage payment plans(Simple Problems) – Job Evaluation and Merit Rating - Marketing Management- Functions of Marketing – Marketing strategies based on product Life Cycle, Channels of distributions.

**UNIT IV**

**Project Management**: (PERT/CPM): Development of Network – Difference between PERT and CPM Identifying Critical Path- Probability- Project Crashing (Simple Problems).

**UNIT V**

**Strategic Management**: Vision, Mission, Goals, Strategy – Elements of Corporate Planning Process – Environmental Scanning – SWOT analysis- Steps in Strategy Formulation and Implementation, Generic Strategy alternatives.

**UNIT VI**

**Contemporary Management Practice**: Basic concepts of MIS, MRP, Justin- Time (JIT) system, Total Quality Management (TQM), Six sigma and Capability Maturity Model (CMM) Levies, Supply Chain Management,

Enterprise Resource Planning (ERP), Business Process outsourcing (BPO), Business process Re-engineering and Bench Marking, Balanced Score Card.

**Text Books**

1. Dr. P. Vijaya Kumar & Dr. N. Appa Rao, '*Management Science'* Cengage, Delhi, 2012.
2. Dr. A. R. Aryasri, *Management Science'* TMH 2011.

**References**

1. Koontz & Weihrich: 'Essentials *of management'* TMH 2011.
2. Seth & Rastogi: Global Management Systems, Cengage learning, Delhi, 2011.
3. Robbins: Organizational Behaviour, Pearson publications, 2011.
4. Kanishka Bedi: Production & Operations Management, Oxford Publications, 2011.
5. Philip Kotler & Armstrong: Principles of Marketing, Pearson publications.
6. Biswajit Patnaik: Human Resource Management, PHI, 2011.
7. Hitt and Vijaya Kumar: Starategic Management, Cengage learning.

**Objective**:

To familiarize with the process of management and to provide basic insights into select contemporary management practices.

**Codes/ Tables**:

Normal Distribution Function Tables need to be permitted into the examination Halls.

**III Year – II SEMESTER**

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## POWER ELECTRONICS LAB

**Learning objectives:**

- To study the characteristics of various power electronic devices and analyze firing circuits and commutation circuits of SCR.
- To analyze the performance of single–phase and three–phase full–wave bridge converters, single–phase dual converter with both resistive and inductive loads.
- To understand the operation of AC voltage controller and cyclo converter with resistive and inductive loads.
- To understand the working of Buck converter, Boost converter, single–phase bridge inverter and PWM inverter.

**Any 10 of the Following Experiments are to be conducted**

1. Study of Characteristics of SCR, MOSFET & IGBT
2. Gate firing circuits for SCR's
3. Single -Phase Half controlled converter with R and RL load
4. Single -Phase fully controlled bridge converter with R and RL loads
5. Single -Phase AC Voltage Controller with R and RL Loads
6. Single -Phase Cyclo–converter with R and RL loads
7. Single -Phase Bridge Inverter with R and RL Loads
8. Single -Phase dual converter with RL loads
9. Three -Phase half controlled bridge converter with RL load.
10. Three- Phase full converter with RL–load.
11. DC–DC buck converter.
12. DC–DC boost converter.
13. Single -phase PWM inverter.
14. Single -phase diode bridge rectifier with R load and capacitance filter.
15. Forced commutation circuits(Class A, Class B, Class C, Class D and Class E)

**Learning outcomes:**

- Able to study the characteristics of various power electronic devices and analyze firing circuits and commutation circuits of SCR.
- Able to analyze the performance of single–phase and three–phase full–wave bridge converters, single–phase dual converter with both resistive and inductive loads.
- Able to understand the operation of AC voltage controller and cyclo converter with resistive and inductive loads.
- Able to understand the working of Buck converter, Boost converter, single–phase bridge inverter and PWM inverter.

**III Year – II SEMESTER**

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## ELECTRICAL MEASUREMENTS LAB

**Learning Objectives:**

- To understand the correct function of electrical parameters and calibration of voltage, current, single phase and three phase power and energy, and measurement of electrical characteristics of resistance, inductance and capacitance of a circuits through appropriate methods.
- To understand measurement of illumination of electrical lamps.
- To understand testing of transformer oil.
- To measure the parameters of choke coil.

**Any 10 of the following experiments are to be conducted**

1. Calibration and Testing of single phase energy Meter.
2. Calibration of dynamometer wattmeter using phantom loading UPF
3. Crompton D.C. Potentiometer – Calibration of PMMC ammeter and PMMC voltmeter.
4. Kelvin's double Bridge – Measurement of resistance – Determination of Tolerance.
5. Capacitance Measurement using Schering bridge.
6. Inductance Measurement using Anderson bridge.
7. Measurement of 3 phase reactive power with single–phase wattmeter for balanced loading.
8. Measurement of complex power with Trivector meter and verification.
9. Optical bench – Determination of polar curve measurement of MHCP of electrical lamp.
10. Calibration of LPF wattmeter – by direct loading.
11. Measurement of 3 phase power with single watt meter and 2 No's of C.T.
12. C.T. testing using mutual Inductor – Measurement of % ratio error and phase angle of given C.T. by Null method.
13. P.T. testing by comparison – V.G. as Null detector – Measurement of % ratio error and phase angle of the given P.T.
14. Dielectric oil testing using H.T. testing Kit

15. LVDT and capacitance pickup – characteristics and Calibration
16. Resistance strain gauge – strain measurements and Calibration
17. Polar curve using Lux meter, Measurement of intensity of illumination of fluorescent lamp.
18. Transformer turns ratio measurement using AC. bridge.
19. A.C. Potentiometer – Polar form/Cartesian form – Calibration of AC Voltmeter, Parameters of Choke.
20. Measurement of Power by 3 Voltmeter and 3 Ammeter methods.
21. Parameters of choke coil.

**Learning Outcomes:**

- To be able to measure accurately the electrical parameters voltage, current, power, energy and electrical characteristics of resistance, inductance and capacitance.
- To be able to measure illumination of electrical lamps.
- To be able to test transformer oil for its effectiveness.
- To be able to measure the parameters of inductive coil.

**IV Year – I SEMESTER**

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## RENEWABLE ENERGY SOURCES AND SYSTEMS

**Preamble:**

This course gives a flavor of renewable sources and systems to the students. It introduces solar energy its radiation, collection, storage and its applications. This covers generation, design, efficiency and characteristics of various renewable energy sources including solar, wind, hydro, biomass, fuel cells and geothermal systems.

**Learning Objectives:**

- To study the solar radiation data, extra terrestrial radiation, radiation on earth's surface.
- To study solar thermal collections.
- To study solar photo voltaic systems.
- To study maximum power point techniques in solar pv and wind.
- To study wind energy conversion systems, Betz coefficient, tip speed ratio.
- To study basic principle and working of hydro, tidal, biomass, fuel cell and geothermal systems.

**UNIT–I:**

**Fundamentals of Energy Systems**

Energy conservation principle – Energy scenario (world and India) – Solar radiation**:** Outside earth's atmosphere – Earth surface – Analysis of solar radiation data – Geometry – Radiation on tilted surfaces – Numerical problems.

**UNIT–II:**

**Solar Thermal Systems**

Liquid flat plate collections**:** Performance analysis – Transmissivity – Absorptivity product collector efficiency factor – Collector heat removal factor – Numerical problems. Introduction to solar air heaters – Concentrating collectors and solar pond.

**UNIT–III:**

**Solar Photovoltaic Systems**

Balance of systems – IV characteristics – System design**:** storage sizing – PV system sizing – Maximum power point techniques**:** Perturb and observe (P&O) technique – Hill climbing technique.

**UNIT–IV:**

**Wind Energy**

Wind patterns – Types of turbines – Kinetic energy of wind – Betz coefficient – Tip–speed ratio – Efficiency – Power output of wind turbine – Selection of generator(synchronous, induction) – Maximum power point tracking.

**UNIT–V:**

**Hydro and Tidal power systems**

Basic working principle – Classification of hydro systems**:** Large, small, micro – measurement of head and flow – Energy equation – Types of turbines – Numerical problems.

Tidal power – Basics – Kinetic energy equation – Numerical problems – Wave power – Basics – Kinetic energy equation.

**UNIT–VI:**

**Biomass, fuel cells and geothermal systems**

Biomass Energy**:** Fuel classification – Pyrolysis – Direct combustion of heat – Different digesters and sizing.

Fuel cell**:** Classification – Efficiency – VI characteristics.
Geothermal**:** Classification – Dry rock and acquifer – Energy analysis.

**Learning Outcomes:**

Student should be able to

- Analyze solar radiation data, extraterrestrial radiation, radiation on earth's surface.
- Design solar thermal collections.
- Design solar photo voltaic systems.
- Develop maximum power point techniques in solar PV and wind.
- Explain wind energy conversion systems, Betz coefficient, tip speed ratio.
- Explain basic principle and working of hydro, tidal, biomass, fuel cell and geothermal systems.

**Text Books:**

1. Solar Energy**:** Principles of Thermal Collection and Storage, S. P. Sukhatme and J. K. Nayak, TMH, New Delhi, 3rd Edition.
2. Renewable Energy Resources, John Twidell and Tony Weir, Taylor and Francis -second edition, 2013.
3. Energy Science**:** Principles, Technologies and Impacts, John Andrews and Nick Jelly, Oxford.

**Reference Books:**

1. Renewable Energy- Edited by Godfrey Boyle-oxford university, press, 3rd edition, 2013.
2. Handbook of renewable technology Ahmed and Zobaa, Ramesh C Bansal, World scientific, Singapore.
3. Renewable Energy Technologies /Ramesh & Kumar /Narosa.
4. Renewable energy technologies – A practical guide for beginners – Chetong Singh Solanki, PHI.
5. Non conventional energy source –B.H. Khan- TMH-2nd edition.

**IV Year – I SEMESTER**

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## HVAC & DC TRANSMISSION

**Preamble:**

With the increasing power generation in the country and long distance power transmission, it is necessary that power should be transmitted at extra and ultra high voltage. The topics dealt in this subject relate to phenomena associated with transmission line at higher voltages, equipments generating high voltage and power control strategy.

**Learning Objectives:**

- To understand the phenomena associated with transmission line, operating at extra high voltages. The unit gives detail analysis of several phenomena viz. electrostatic field, charges, voltage gradient and conductor configuration.
- The objective is to discuss phenomena of corona, losses, audible noise, radio interference and measurement of these quantities.
- To understand the phenomena of HVDC, HVDC equipment comparison with AC and the latest state of art in HVDC transmission.
- To understand method of conversion of AC to DC, performance of various level of pulse conversion and control characteristics of conversion. It also provides knowledge of effect of source inductance as well as method of power control.
- To understand the requirements of reactive power control and filtering technique in HVDC system.
- To understand the harmonics in AC side of power line in a HVDC system and design of filters for various levels of pulse conversion.

**UNIT – I:**

**Introduction of EHV AC transmission**

Necessity of EHV AC transmission – Advantages and problems – Power handling capacity and line losses – Mechanical considerations – Resistance of conductors –Electrostatics – Field of sphere gap – Field of line charges and properties – Charge ~ potential relations for multi–conductors – Surface voltage gradient on conductors – Bundle spacing and bundle radius –

Examples – Distribution of voltage gradient on sub conductors of bundle – Examples.

**UNIT – II:**

**Corona effects**

Power loss and audible noise (AN) – Corona loss formulae – Charge voltage diagram – Generation – Characteristics – Limits and measurements of AN – Relation between 1–phase and 3–phase AN levels – Examples – Radio interference (RI) – Corona pulses generation – Properties and limits – Frequency spectrum – Modes of propagation – Excitation function – Measurement of RI, RIV and excitation functions – Examples.

**UNIT – III:**

**Basic Concepts of DC Transmission**

Economics & Terminal equipment of HVDC transmission systems**:** Types of HVDC Links – Apparatus required for HVDC Systems – Comparison of AC &DC transmission – Application of DC Transmission System – Planning & Modern trends in DC transmission.

**UNIT – IV:**

**Analysis of HVDC Converters and System Control**

Choice of Converter configuration – Analysis of Graetz – Characteristics of 6 Pulse & 12 Pulse converters – Cases of two 3 phase converters in star – Star mode and their performance – Principal of DC Link Control – Converters Control Characteristics – Firing angle control – Current and extinction angle control – Effect of source inductance on the system – Starting and stopping of DC link – Power Control.

**UNIT–V:**

**Reactive Power Control in HVDC**

Reactive Power Requirements in steady state – Conventional control strategies –Alternate control strategies sources of reactive power – AC Filters – Shunt capacitors – Synchronous condensers.

**UNIT – VI:**

**Harmonics and Filters**

Generation of Harmonics – Characteristics harmonics – Calculation of AC Harmonics – Non–Characteristics harmonics – Adverse effects of harmonics – Calculation of voltage & current harmonics – Effect of Pulse number on harmonics. Types of AC filters, Design of Single tuned filters – Design of High pass filters.

**Learning Outcomes:**

- To be able to acquaint with HV transmission system with regard to power handling capacity, losses, conductor resistance and electrostatic field associate with HV. Further knowledge is gained in area of bundle conductor system to improve electrical and mechanical performance.
- To develop ability for determining corona, radio interference, audible noise generation and frequency spectrum for single and three phase transmission lines.
- To be able to acquire knowledge in transmission of HVDC power with regard to terminal equipments, type of HVDC connectivity and planning of HVDC system.
- To be able to develop knowledge with regard to choice of pulse conversion, control characteristic, firing angle control and effect of source impedance.
- To develop knowledge of reactive power requirements of conventional control, filters and reactive power compensation in AC. side of HVDC system.
- Able to calculate voltage and current harmonics, and design of filters for six and twelve pulse conversion.

**Text Books:**

1. HVDC Power Transmission Systems: Technology and system Interactions – by K.R.Padiyar, New Age International (P) Limited, and Publishers.
2. Direct Current Transmission – by E.W.Kimbark, John Wiley & Sons.
3. EHVAC Transmission Engineering by R. D. Begamudre, New Age International (P) Ltd.

**Reference Books:**

1. EHVAC and HVDC Transmission Engineering and Practice – S.Rao.
2. Power Transmission by Direct Current – by E.Uhlmann, B.S.Publications
3. HVDC Transmission – J. Arrillaga.

| IV Year – I SEMESTER | T | P | C |
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## POWER SYSTEM OPERATION AND CONTROL

**Preamble:**

This subject deals with Economic operation of Power Systems, Hydrothermal scheduling and modeling of turbines, generators and automatic controllers. It emphasizes on single area and two area load frequency control and reactive power control.

**Learning Objectives:**

- To understand optimal dispatch of generation with and without losses.
- To study the optimal scheduling of hydro thermal systems.
- To study the optimal unit commitment problem.
- To study the load frequency control for single area system
- To study the PID controllers for single area system and two area system.
- To understand the reactive power control and compensation of transmission lines.

**UNIT–I:**

**Economic Operation of Power Systems**

Optimal operation of Generators in Thermal power stations, – Heat rate curve – Cost Curve – Incremental fuel and Production costs – Input–output characteristics – Optimum generation allocation with line losses neglected – Optimum generation allocation including the effect of transmission line losses – Loss Coefficients – General transmission line loss formula.

**UNIT–II:**

**Hydrothermal Scheduling**

Optimal scheduling of Hydrothermal System**:** Hydroelectric power plant models – Scheduling problems – Short term Hydrothermal scheduling problem.

**UNIT–III:**

**Unit Commitment**

Optimal unit commitment problem – Need for unit commitment – Constraints in unit commitment – Cost function formulation – Solution methods – Priority ordering – Dynamic programming.

**UNIT–IV:**

**Load Frequency Control**

Modeling of steam turbine – Generator – Mathematical modeling of speed governing system – Transfer function – Modeling of Hydro turbine – Necessity of keeping frequency constant – Definitions of Control area – Single area control – Block diagram representation of an isolated power system – Steady state analysis – Dynamic response – Uncontrolled case – Load frequency control of two area system – Uncontrolled case and controlled case – Tie–line bias control.

**UNIT–V:**

**Load Frequency Controllers**

Proportional plus Integral control of single area and its block diagram representation – Steady state response – Load Frequency Control and Economic dispatch control.

**UNIT–VI:**

**Reactive Power Control**

Overview of Reactive Power control – Reactive Power compensation in transmission systems – Advantages and disadvantages of different types of compensating equipment for transmission systems – Load compensation – Specifications of load compensator – Uncompensated and compensated transmission lines**:** Shunt and series compensation – Need for FACTS controllers.

**Learning Outcomes:**

- Able to compute optimal scheduling of Generators.
- Able to understand hydrothermal scheduling.
- Understand the unit commitment problem.
- Able to understand importance of the frequency.
- Understand importance of PID controllers in single area and two area systems.
- Will understand reactive power control and line power compensation.

**Text Books:**

1. Electric Energy systems Theory – by O.I.Elgerd, Tata McGraw–hill Publishing Company Ltd., Second edition.
2. Power System stability & control, Prabha Kundur,TMH
3. Modern Power System Analysis – by I.J.Nagrath & D.P.Kothari Tata Mc Graw – Hill Publishing Company Ltd, 2nd edition.

**Reference Books:**

1. Power System Analysis and Design by J.Duncan Glover and M.S.Sarma, THOMPSON, 3rd Edition.
2. Power System Analysis by Grainger and Stevenson, Tata McGraw Hill.
3. Power System Analysis by Hadi Saadat – TMH Edition.

| IV Year – I SEMESTER | T | P | C |
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**Open Elective**

## ENERGY AUDIT, CONSERVATION & MANAGEMENT

**Preamble:**

This is an open elective course developed to cater current needs of the industry. This course covers topics such as energy conservation act and energy conservation. It also covers energy efficient lighting design, student will learn power factor improvement techniques, energy efficiency in HVAC systems. In addition, economic aspects such as payback period calculations, life cycle costing analysis is covered in this course.

**Learning Objectives:**

- To understand energy efficiency, scope, conservation and technologies.
- To design energy efficient lighting systems.
- To estimate/calculate power factor of systems and propose suitable compensation techniques.
- To understand energy conservation in HVAC systems.
- To calculate life cycle costing analysis and return on investment on energy efficient technologies.

**Unit–I:**

**Basic Principles of Energy Audit and management**

Energy audit – Definitions – Concept – Types of audit – Energy index – Cost index – Pie charts – Sankey diagrams – Load profiles – Energy conservation schemes and energy saving potential – Numerical problems – Principles of energy management – Initiating, planning, controlling, promoting, monitoring, reporting – Energy manager – Qualities and functions – Language – Questionnaire – Check list for top management.

**Unit–II:**

**Lighting**

Modification of existing systems – Replacement of existing systems – Priorities**:** Definition of terms and units – Luminous efficiency – Polar curve – Calculation of illumination level – Illumination of inclined surface to beam

– Luminance or brightness – Types of lamps – Types of lighting – Electric lighting fittings (luminaries) – Flood lighting – White light LED and conducting Polymers – Energy conservation measures.

**Unit–III:**

**Power Factor and energy instruments**

Power factor – Methods of improvement – Location of capacitors – Power factor with non linear loads – Effect of harmonics on Power factor – Numerical problems. Energy Instruments – Watt–hour meter – Data loggers – Thermocouples – Pyrometers – Lux meters – Tong testers – Power analyzer.

**Unit–IV:**

**Space Heating and Ventilation**

Ventilation – Air–Conditioning (HVAC) and Water Heating**:** Introduction – Heating of buildings – Transfer of Heat–Space heating methods – Ventilation and air–conditioning – Insulation–Cooling load – Electric water heating systems – Energy conservation methods.

**Unit–V**

**Economic Aspects and Analysis**

Economics Analysis – Depreciation Methods – Time value of money – Rate of return – Present worth method – Replacement analysis – Life cycle costing analysis – Energy efficient motors (basic concepts).

**Unit–VI:**

**Computation of Economic Aspects**

Calculation of simple payback method – Net present worth method – Power factor correction – Lighting – Applications of life cycle costing analysis – Return on investment.

**Learning Outcomes:**

Student will be able to

- Explain energy efficiency, conservation and various technologies.
- Design energy efficient lighting systems.
- Calculate power factor of systems and propose suitable compensation techniques.
- Explain energy conservation in HVAC systems.
- Calculate life cycle costing analysis and return on investment on energy efficient technologies.

**Text Books:**

1. Energy management by W.R. Murphy & G. Mckay Butter worth, Elsevier publications. 2012
2. Energy efficient electric motors by John .C. Andreas, Marcel Dekker Inc Ltd–2nd edition, 1995

**Reference Books:**

1. Electric Energy Utilization and Conservation by S C Tripathy, Tata McGraw hill publishing company Ltd. New Delhi.
2. Energy management by Paul o' Callaghan, Mc–Graw Hill Book company–1st edition, 1998.
3. Energy management hand book by W.C.Turner, John wiley and sons.
4. Energy management and conservation –k v Sharma and pvenkata seshaiah-I K International Publishing House pvt.ltd,2011.
5. http://www.energymanagertraining.com/download/Gazette_of_IndiaPartIISecI-37_25-08-2010.pdf

**Note :** This Elective can be offered to Students of All Branches including EEE.

# INSTRUMENTATION
## (Open Elective)

**Preamble:**

Electrical and Electronic Instrumentation plays a key role in the industry. With the advancement of technology day to day manual maintenance is replaced by simply monitoring using various instruments. Thus this course plays very important role in overall maintenance of the industry.

**Learning Objectives:**

- To study various types of signals and their representation.
- To study various types of transducers: Electrical, Mechanical, Electromechanical, Optical etc.
- To study and measure the various types of Non–electrical quantities.
- To study various types of digital voltmeters
- To study the working principles of various types of oscilloscopes and their applications.
- To study various types of signal analyzers.

**UNIT–I:**

**Signals and their representation**

Measuring Systems, Performance Characteristics, – Static characteristics – Dynamic Characteristics – Errors in Measurement – Gross Errors – Systematic Errors – Statistical analysis of random errors – Signal and their representation – Standard test, periodic, aperiodic, modulated signal – Sampled data pulse modulation and pulse code modulation.

**UNIT–II:**

**Transducers**

Definition of transducers – Classification of transducers – Advantages of Electrical transducers – Characteristics and choice of transducers – Principle operation of resistor, inductor, LVDT and capacitor transducers – LVDT Applications – Strain gauge and its principle of operation – Guage factor – Thermistors – Thermocouples – Synchros – Piezo electric transducers – Photo diodes.

**UNIT–III:**

**Measurement of Non–Electrical Quantities**

Measurement of strain – Gauge Sensitivity – Displacement – Velocity – Angular Velocity – Acceleration – Force – Torque – Measurement of Temperature, Pressure, Vacuum, Flow, Liquid level.

**UNIT–IV:**

**Digital Voltmeters**

Digital voltmeters – Successive approximation, ramp, dual–Slope integration continuous balance type – Micro processor based ramp type – DVM digital frequency meter – Digital phase angle meter.

**UNIT–V:**

**Oscilloscope**

Cathode ray oscilloscope – Time base generator – Horizantal and vertical amplifiers – Measurement of phase and frequency – Lissajous patterns – Sampling oscilloscope – Analog and digital type data loger – Transient recorder.

**UNIT–VI:**

**Signal Analyzers**

Wave Analyzers – Frequency selective analyzers – Heterodyne – Application of Wave analyzers – Harmonic Analyzers – Total Harmonic distortion – Spectrum analyzers – Basic spectrum analyzers – Spectral displays – Vector impedance meter – Q meter – Peak reading and RMS voltmeters.

**Learning Outcomes:**

- Able to represent various types of signals .
- Acquire proper knowledge to use various types of Transducers.
- Able to monitor and measure various parameters such as strain, velocity, temperature, pressure etc.
- Acquire proper knowledge and working principle of various types of digital voltmeters.
- Able to measure various parameter like phase and frequency of a signal with the help of CRO.
- Acquire proper knowledge and able to handle various types of signal analyzers.

**Text Books:**

1. Electronic Instrumentation–by H.S.Kalsi Tata MCGraw–Hill Edition, 1995.
2. A course in Electrical and Electronic Measurements and Instrumentation, A.K. Sawhney, Dhanpatrai& Co.

**Reference Books:**

1. Measurement and Instrumentation theory and application, Alan S.Morris and Reza Langari, Elsevier
2. Measurements Systems, Applications and Design – by D O Doeblin
3. Principles of Measurement and Instrumentation – by A.S Morris, Pearson / Prentice Hall ofIndia
4. Modern Electronic Instrumentation and Measurement techniques – by A.D Helfrickand W.D. Cooper, Pearson/Prentice Hall of India.
4. Transducers and Instrumentation by D.V.S Murthy, Prentice Hall of India.

**Note :** This Elective can be offered to Students of All Branches including EEE.

## NON–CONVENTIONAL SOURCES OF ENERGY
## (Open Elective)

**Preamble:**

This course gives a flavor of non–conventional sources of energy to the students. It introduces solar energy its radiation, collection, storage and its applications. This covers generation, design, efficiency and characteristics of various non–conventional energy sources including solar, wind, hydro, biomass, fuel cells and geothermal systems.

**Learning Objectives**

- To study the solar radiation data, extraterrestrial radiation, radiation on earth's surface.
- To study solar thermal collections.
- To study solar photo voltaic systems.
- To study maximum power point techniques in solar pv and wind.
- To study wind energy conversion systems, Betz coefficient , tip speed ratio.
- To study basic principle and working of hydro, tidal, biomass, fuel cell and geothermal systems.

**UNIT–I:**

**Fundamentals of Energy Systems**

Energy conservation principle – Energy scenario (world and India) – Solar radiation**:** Outside earth's atmosphere – Earth surface – Analysis of solar radiation data – Geometry – Radiation on tilted surfaces – Numerical problems.

**UNIT–II:**

**Solar Thermal Systems**

Liquid flat plate collections**:** Performance analysis – Transmissivity – Absorptivity – Product collector efficiency factor – Collector heat removal factor – Numerical problems – Introduction to solar air heaters – Concentrating collectors and solar pond.

**UNIT–III:**

**Solar Photovoltaic Systems**

Balance of systems – IV characteristics – System design**:** Storage sizing, PV system sizing, Maximum power point techniques**:** Perturb and observe (P&O) technique – Hill climbing technique.

**UNIT–IV:**

**Wind Energy**

Wind patterns – Types of turbines – Kinetic energy of wind – Betz coefficient – Tip–speed ratio – efficiency – Power output of wind turbine – Selection of generator(synchronous, induction) – Maximum power point tracking.

**UNIT–V:**

**Hydro and Tidal power systems**

Basic working principle – Classification of hydro systems**:** large, small, micro – Measurement of head and flow – Energy equation – Types of turbines – Numerical problems.

Tidal power – Basics – Kinetic energy equation – Numerical problems – Wave power – Basics – Kinetic energy equation.

**UNIT–VI:**

**Biomass, fuel cells and geothermal systems**

Biomass Energy**:** Fuel classification – Pyrolysis – Direct combustion of heat – Different digesters and sizing.

Fuel cell**:** classification – Efficiency – VI characteristics.

Geothermal**:** classification – Dry rock and acquifer – Energy analysis.

**Learning Outcomes:**

Student should be able to

- Analyze solar radiation data, extraterrestrial radiation, radiation on earth's surface.
- Design solar thermal collections.
- Design solar photo voltaic systems.
- Develop maximum power point techniques in solar PV and wind.
- Explain wind energy conversion systems, Betz coefficient , tip speed ratio.
- Explain basic principle and working of hydro, tidal, biomass ,fuel cell and geothermal systems.

**Text Books:**

1. Solar Energy: Principles of Thermal Collection and Storage, S. P. Sukhatme and J. K. Nayak, TMH, New Delhi, 3rd Edition.
2. Renewable Energy Resources, John Twidell and Tony Weir, Taylor and Francis.

3. Energy Science: Principles, Technologies and Impacts, John Andrews and Nick Jelly, Oxford.

**Reference Books:**

1. Handbook of renewable technology Ahmed and Zobaa, Ramesh C Bansal,World scientific, Singapore.
2. Renewable Energy Technologies /Ramesh & Kumar /Narosa.
3. Renewable energy technologies – A practical guide for beginners – Chetong Singh Solanki, PHI.

**Note :** This Elective can be offered to Students of All Branches including EEE.

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## OPTIMIZATION TECHNIQUES
## (Open Elective)

**Preamble:**

Optimization techniques have gained importance to solve many engineering design problems by developing linear and nonlinear mathematical models. The aim of this course is to educate the student to develop a mathematical model by defining an objective function and constraints in terms of design variables and then apply a particular mathematical programming technique. This course covers classical optimization techniques, linear programming, nonlinear programming and dynamic programming techniques.

**Learning Objectives:**

1. To define an objective function and constraint functions in terms of design variables, and then state the optimization problem.
2. To state single variable and multi variable optimization problems, without and with constraints.
3. To explain linear programming technique to an optimization problem, define slack and surplus variables, by using Simplex method.
4. To state transportation and assignment problem as a linear programming problem to determine optimality conditions by using Simplex method.
5. To study and explain nonlinear programming techniques, unconstrained or constrained, and define exterior and interior penalty functions for optimization problems.
6. To explain Dynamic programming technique as a powerful tool for making a sequence of interrelated decisions.

**UNIT – I:**

**Introduction and Classical Optimization Techniques:**

Statement of an Optimization problem – design vector – design constraints – constraint surface – objective function – objective function surfaces – classification of Optimization problems.

**UNIT – II:**

**Classical Optimization Techniques**

Single variable Optimization – multi variable Optimization without constraints – necessary and sufficient conditions for minimum/maximum – multivariable Optimization with equality constraints. Solution by method of

Lagrange multipliers – multivariable Optimization with inequality constraints – Kuhn – Tucker conditions.

**UNIT – III:**

**Linear Programming**

Standard form of a linear programming problem – geometry of linear programming problems – definitions and theorems – solution of a system of linear simultaneous equations – pivotal reduction of a general system of equations – motivation to the simplex method – simplex algorithm - Duality in Linear Programming – Dual Simplex method.

**UNIT – IV:**

**Transportation Problem**

Finding initial basic feasible solution by north – west corner rule, least cost method and Vogel's approximation method – testing for optimality of balanced transportation problems – Special cases in transportation problem.

**UNIT – V:**

**Nonlinear Programming:**

**Unconstrained cases -** One – dimensional minimization methods: Classification, Fibonacci method and Quadratic interpolation method - Univariate method, Powell's method and steepest descent method.

**Constrained cases -** Characteristics of a constrained problem, Classification, Basic approach of Penalty Function method; Basic approaches of Interior and Exterior penalty function methods. Introduction to convex Programming Problem.

**UNIT – VI:**

**Dynamic Programming:**

Dynamic programming multistage decision processes – types – concept of sub optimization and the principle of optimality – computational procedure in dynamic programming – examples illustrating the calculus method of solution - examples illustrating the tabular method of solution.

**Learning Outcomes:**

The student should be able to:

1. State and formulate the optimization problem, without and with constraints, by using design variables from an engineering design problem.

2. Apply classical optimization techniques to minimize or maximize a multi-variable objective function, without or with constraints, and arrive at an optimal solution.
3. Formulate a mathematical model and apply linear programming technique by using Simplex method. Also extend the concept of dual Simplex method for optimal solutions.
4. Solve transportation and assignment problem by using Linear programming Simplex method.
5. Apply gradient and non-gradient methods to nonlinear optimization problems and use interior or exterior penalty functions for the constraints to derive the optimal solutions.
6. Formulate and apply Dynamic programming technique to inventory control, production planning, engineering design problems etc. to reach a final optimal solution from the current optimal solution.

**Text Books:**

1. "Engineering optimization: Theory and practice"-by S. S.Rao, New Age International (P) Limited, 3rd edition, 1998.
2. "Introductory Operations Research" by H.S. Kasene & K.D. Kumar, Springer (India), Pvt. LTd.

**Reference Books:**

1. "Optimization Methods in Operations Research and systems Analysis" – by K.V. Mital and C. Mohan, New Age International (P) Limited, Publishers, 3rd edition, 1996.
2. Operations Research – by Dr. S.D.Sharma, Kedarnath, Ramnath & Co
3. "Operations Research: An Introduction" – by H.A.Taha, PHI Pvt. Ltd., 6th edition
4. Linear Programming–by G.Hadley.

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**Note :** This Elective can be offered to Students of All Branches except EEE.

| IV Year – I SEMESTER | T | P | C |
|---|---|---|---|
| | 3+1 | 0 | 3 |

**Elective – I**

## VLSI DESIGN

**Preamble:**

In the recent times fabrication technology is revolutionized and especially LSI has become so dense that on a single IC tens and thousands of transistors are placed. Thus integrated circuits have become integrated systems and the development of fabrication technology VLSI plays very important role.

**Learning Objectives:**

- To provide the basic fundamentals of fabrication technology, generations of IC and speed, power consumptions of various fabrication technologies.
- To understand the knowledge of electrical properties of MOS circuits.
- To learn the design concepts of stick diagrams, layouts for various MOS technologies.
- To understand the concepts of design rules, scaling, subsystem design semiconductor IC design.
- To understand the synthesis, simulation design verification tools, CMOS testing.

**UNIT –I**

**Introduction**

Introduction to IC technology – The IC era – MOS and related VLSI technology – Basic MOS transistors – Enhancement and depletion modes of transistor action – IC production process – MOS and CMOS fabrication process – BiCMOS technology – Comparison b/w CMOS and bipolar technologies.

**UNIT – II**

**Basic electrical properties of MOS and BiCMOS circuits**

$I_{ds}$–$V_{ds}$ relationships – Aspects of MOS transistor threshold voltage – MOS Trans–conductance and output conductance – MOS Transistor – Figure of merit – The pMOS transistor – The nMOS inverter – Determination of pull–up to pull–down ratio for nMOS inverter driven by another nMOS inverter

for an nMOS inverter driven through one or more pass Transistors – Alternative forms of pull up – The CMOS Inverter MOS transistor Circuit model – Bi–CMOS Inverters.

**UNIT – III**

**MOS and BiCOMS circuit design processes**

MOS layers – Stick diagrams – Design rules and layout – General observation on the design rules, 2µm double metal, double poly – CMOS/BiCMOS rules, 1.2µm Double metal, Double poly CMOS rules – Layout diagrams of NAND and NOR gates and CMOS inverter – Symbolic Diagrams – Translation to Mask Form.

**UNIT – IV**

**Basic circuit concepts**

Sheet resistance – Sheet resistance concept applied to MOS transistor and inverters – Area capacitance of layers – Standard unit of capacitance – Some area capacitance calculations – The delay unit – Inverter delays – Driving large capacitive loads – Propagations Delays – Wiring Capacitance – Fan–in and Fan–out characteristics – Choice of layers – Transistor switches – Realization of gates using nMOS, pMOS and CMOS technologies.

**UNIT – V**

**Scaling of MOS circuit**

Scaling models and scaling factors – Scaling factors for device parameters – Limitations of scaling – Limits due to sub threshold currents – Limits on logic level and supply voltage due to noise – Limits due to current density – Some architectural Issues – Introduction to switch logic and gate logic.

**UNIT – VI**

**Digital design using HDL**

Digital system design process – VLSI Circuit Design Process – Hardware simulation – Hardware Synthesis – History of VHDL – VHDL requirements – Levels of abstraction – Elements of VHDL – Packages – Libraries and bindings – Objects and classes – Variable assignments – Sequential statements – Usage of subprograms – Comparison of VHDL and verilog HDL.

**VHDL MODELLING**

Simulation – Logic Synthesis – Inside a logic synthesizer – Constraints – Technology libraries – VHDL and logic synthesis – Functional gate – Level verification – Place and route – Post layout timing simulation – Static timing

– Major net list formats for design representation – VHDL synthesis – Programming approach.

**Learning Outcomes**

- Ability to demonstrate the fundamentals of IC technology such as various MOS fabrication technologies.
- Ability to calculate electrical properties of MOS circuits such as Ids – Vds relationship, Vt, gm, gds, figure of merit, sheet resistance, area capacitance.
- Ability to demonstrate semi conductor IC design such as PLA's, PAL, FPGA, CPLS's design.
- Ability to demonstrate VHDL synthesis, simulation, design capture tools design verification tools, CMOS testing.

**Text Books:**

1. Essentials of VLSI Circuits and Systems–Kamran Eshraghian, Douglas and A.Pucknell and Sholeh Eshraghian, Prentice–Hall of India Private Limited, 2005 Edition.
2. VLSI Design–K. Lal Kishor and V.S.V.Prabhakar, I.K. International Publishing House Private Limited, 2009 First Edition.
3. VLSI Design–A.Shanthi and A.Kavitha, New Age International Private Limited, 2006 First Edition.

**References Books:**

1. VLSI Design By Debaprasad Das, Oxford University Press,2010.
2. VLSI Design By A.Albert Raj & T. Latha, PHI Learning Private Limited, 2010.

# ELECTRICAL DISTRIBUTION SYSTEMS
# (ELECTIVE–I)

**Preamble:**

This subject deals with the general concept of distribution system, substations and feeders as well as discusses distribution system analysis, protection and coordination, voltage control and power factor improvement.

**Learning Objectives**

- To study different factors of Distribution system.
- To study and design the substations and distribution systems.
- To study the determination of voltage drop and power loss.
- To study the distribution system protection and its coordination.
- To study the effect of compensation on p.f improvement.
- To study the effect of voltage control on distribution system.

**UNIT – I:**

**General Concepts**

Introduction to distribution systems, Load modeling and characteristics – Coincidence factor – Contribution factor loss factor – Relationship between the load factor and loss factor – Classification of loads (Residential, commercial, Agricultural and Industrial) and their characteristics.

**UNIT – II:**

**Substations**

Location of substations**:** Rating of distribution substation – Service area within primary feeders – Benefits derived through optimal location of substations.

**Distribution Feeders**

Design Considerations of distribution feeders**:** Radial and loop types of primary feeders – Voltage levels – Feeder loading – Basic design practice of the secondary distribution system.

**UNIT – III:**

**System Analysis**

Voltage drop and power–loss calculations**:** Derivation for voltage drop and power loss in lines – Manual methods of solution for radial networks – Three phase balanced primary lines.

**UNIT – IV:**

**Protection**

Objectives of distribution system protection – Types of common faults and procedure for fault calculations – Protective devices**:** Principle of operation of fuses – Circuit reclosures – Line sectionalizes and circuit breakers.

**Coordination**

Coordination of protective devices**:** General coordination procedure – Residual current circuit breaker RCCB (Wikipedia).

**UNIT – V:**

**Compensation for Power Factor Improvement**

Capacitive compensation for power–factor control – Different types of power capacitors – shunt and series capacitors – Effect of shunt capacitors (Fixed and switched) – Power factor correction – Capacitor allocation – Economic justification – Procedure to determine the best capacitor location.

**UNIT – VI:**

**Voltage Control**

Voltage Control**:** Equipment for voltage control – Effect of series capacitors – Effect of AVB/AVR –Line drop compensation.

**Learning Outcomes:**

- Able to understand the various factors of distribution system.
- Able to design the substation and feeders.
- Able to determine the voltage drop and power loss
- Able to understand the protection and its coordination.
- Able to understand the effect of compensation on p.f improvement.
- Able to understand the effect of voltage, current distribution system performance.

**Text Book:**

1. "Electric Power Distribution system, Engineering" – by TuranGonen, McGraw–hill Book Company.

**Reference Books:**

1. Electrical Distribution Systems by Dale R.Patrick and Stephen W.Fardo, CRC press
2. Electric Power Distribution – by A.S. Pabla, Tata McGraw–hill Publishing company, 4th edition, 1997.
3. Electrical Power Distribution Systems by V.Kamaraju, Right Publishers.

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## OPTIMIZATION TECHNIQUES
## (Elective-I)

**Preamble:**

Optimization techniques have gained importance to solve many engineering design problems by developing linear and nonlinear mathematical models. The aim of this course is to educate the student to develop a mathematical model by defining an objective function and constraints in terms of design variables and then apply a particular mathematical programming technique. This course covers classical optimization techniques, linear programming, nonlinear programming and dynamic programming techniques.

**Learning Objectives:**

1. To define an objective function and constraint functions in terms of design variables, and then state the optimization problem.
2. To state single variable and multi variable optimization problems, without and with constraints.
3. To explain linear programming technique to an optimization problem, define slack and surplus variables, by using Simplex method.
4. To state transportation and assignment problem as a linear programming problem to determine optimality conditions by using Simplex method.
5. To study and explain nonlinear programming techniques, unconstrained or constrained, and define exterior and interior penalty functions for optimization problems.
6. To explain Dynamic programming technique as a powerful tool for making a sequence of interrelated decisions.

**UNIT – I:**

**Introduction and Classical Optimization Techniques:**

Statement of an Optimization problem – design vector – design constraints – constraint surface – objective function – objective function surfaces – classification of Optimization problems.

**UNIT – II:**

**Classical Optimization Techniques**

Single variable Optimization – multi variable Optimization without constraints – necessary and sufficient conditions for minimum/maximum – multivariable Optimization with equality constraints. Solution by method of

Lagrange multipliers – multivariable Optimization with inequality constraints – Kuhn – Tucker conditions.

**UNIT – III:**

**Linear Programming**

Standard form of a linear programming problem – geometry of linear programming problems – definitions and theorems – solution of a system of linear simultaneous equations – pivotal reduction of a general system of equations – motivation to the simplex method – simplex algorithm - Duality in Linear Programming – Dual Simplex method.

**UNIT – IV:**

**Transportation Problem**

Finding initial basic feasible solution by north – west corner rule, least cost method and Vogel's approximation method – testing for optimality of balanced transportation problems – Special cases in transportation problem.

**UNIT – V:**

**Nonlinear Programming:**

**Unconstrained cases -** One – dimensional minimization methods: Classification, Fibonacci method and Quadratic interpolation method - Univariate method, Powell's method and steepest descent method.

**Constrained cases -** Characteristics of a constrained problem, Classification, Basic approach of Penalty Function method; Basic approaches of Interior and Exterior penalty function methods. Introduction to convex Programming Problem.

**UNIT – VI:**

**Dynamic Programming:**

Dynamic programming multistage decision processes – types – concept of sub optimization and the principle of optimality – computational procedure in dynamic programming – examples illustrating the calculus method of solution - examples illustrating the tabular method of solution.

**Learning Outcomes:**

The student should be able to:

1. State and formulate the optimization problem, without and with constraints, by using design variables from an engineering design problem.

2. Apply classical optimization techniques to minimize or maximize a multi-variable objective function, without or with constraints, and arrive at an optimal solution.
3. Formulate a mathematical model and apply linear programming technique by using Simplex method. Also extend the concept of dual Simplex method for optimal solutions.
4. Solve transportation and assignment problem by using Linear programming Simplex method.
5. Apply gradient and non-gradient methods to nonlinear optimization problems and use interior or exterior penalty functions for the constraints to derive the optimal solutions.
6. Formulate and apply Dynamic programming technique to inventory control, production planning, engineering design problems etc. to reach a final optimal solution from the current optimal solution.

**Text Books:**

1. "Engineering optimization : Theory and practice"-by S. S.Rao, New Age International (P) Limited, 3rd edition, 1998.
2. "Introductory Operations Research" by H.S. Kasene & K.D. Kumar, Springer (India), Pvt. LTd.

**Reference Books:**

1. "Optimization Methods in Operations Research and systems Analysis" – by K.V. Mital and C. Mohan, New Age International (P) Limited, Publishers, 3rd edition, 1996.
2. Operations Research – by Dr. S.D.Sharma, Kedarnath, Ramnath & Co
3. "Operations Research : An Introduction" – by H.A.Taha,PHI pvt. Ltd., 6th edition
4. Linear Programming–by G. Hadley.

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**IV Year – I SEMESTER**

| T | P | C |
|---|---|---|
| 0 | 3 | 2 |

## MICROPROCESSORS AND MICROCONTROLLERS LAB

**Learning Objectives**:

- To study programming based on 8086 microprocessor and 8051 microcontroller.
- To study 8056 microprocessor based ALP using arithmetic, logical and shift operations.
- To study modular and Dos/Bios programming using 8086 micro processor.
- To study to interface 8086 with I/O and other devices.
- To study parallel and serial communication using 8051 micro controller.

**Any 8 of the following experiments are to be conducted :**

**I. Microprocessor 8086 :**

Introduction to MASM/TASM.

1. Arithmetic operation – Multi byte addition and subtraction, multiplication and division – Signed and unsigned arithmetic operation, ASCII – Arithmetic operation.
2. Logic operations – Shift and rotate – Converting packed BCD to unpacked BCD, BCD to ASCII conversion.
3. By using string operation and Instruction prefix**:** Move block, Reverse string Sorting, Inserting, Deleting, Length of the string, String comparison.
4. Modular Program: Procedure, Near and Far implementation, Recursion.
5. Dos/BIOS programming: Reading keyboard (Buffered with and without echo) – Display characters, Strings.
6. Interfacing 8255–PPI
7. Programs using special instructions like swap, bit/byte, set/reset etc.
8. Programs based on short, page, absolute addressing.
9. Interfacing 8259 – Interrupt Controller.

10. Interfacing 8279 – Keyboard Display.
11. Stepper motor control using 8253/8255.

Any 2 of the following experiments are to be conducted:

**Microcontroller 8051**

12. Reading and Writing on a parallel port.
13. Timer in different modes.
14. Serial communication implementation.
15. Understanding three memory areas of 00 – FF (Programs using above areas).

    Using external interrupts.

**Learning Outcomes:**

- Will be able to write assembly language program using 8086 micro based on arithmetic, logical, and shift operations.
- Will be able to do modular and Dos/Bios programming using 8086 micro processor.
- Will be able to interface 8086 with I/O and other devices.
- Will be able to do parallel and serial communication using 8051 micro controllers.

**IV Year – I SEMESTER**

| T | P | C |
|---|---|---|
| 0 | 3 | 2 |

## ELECTRICAL SIMULATION LAB

**Learning objectives:**

- To simulate integrator circuit, differentiator circuit, Boost converter, Buck converter, full convertor and PWM inverter.
- To simulate transmission line by incorporating line, load and transformer models.
- To perform transient analysis of RLC circuit and single machine connected to infinite bus (SMIB).
- To find load flow solution for a transmission network with Newton–Rampson method.

**Following experiments are to be conducted:**

1. Simulation of transient response of RLC circuits
   a. Response to pulse input
   b. Response to step input
   c. Response to sinusoidal input
2. Analysis of three phase circuit representing the generator transmission line and load. Plot three phase currents & neutral current.
3. Simulation of single–phase full converter using RLE loads and single phase AC voltage controller using RL loads.
4. Plotting of Bode plots, root locus and nyquist plots for the transfer functions of systems up to $5^{th}$ order.
5. Power system load flow using Newton–Raphson technique.
6. Simulation of Boost and Buck converters.
7. Integrator & Differentiator circuits using op–amp.
8. Simulation of D.C separately excited motor using transfer function approach.

**Any 2 of the following experiments are to be conducted:**

1. Modeling of transformer and simulation of lossy transmission line.
2. Simulation of single phase inverter with PWM control.
3. Simulation of three phase full converter using MOSFET and IGBTs.
4. Transient analysis of single machine connected to infinite bus (SMIB).

**Learning outcomes:**

- Able to simulate integrator circuit, differentiator circuit, Boost converter, Buck converter, full convertor and PWM inverter.
- Able to simulate transmission line by incorporating line, load and transformer models.
- Able to perform transient analysis of RLC circuit and single machine connected to infinite bus (SMIB).
- Able to find load flow solution for a transmission network with Newton–Rampson method.

**Reference Books:**

1. "Simulation of Power Electronic Circuit", by M.B. Patil, V.Ramanarayan, V.T. Ranganathan. Narosha, 2009.
2. Pspice for circuits and electronics using PSPICE – by M.H.Rashid, M/s PHI Publications.
3. Pspice A/D user`s manual – Microsim, USA.
4. Pspice reference guide – Microsim, USA.
5. MATLAB user`s manual – Mathworks, USA.
6. MATLAB – control system tool box – Mathworks, USA.
7. SIMULINK user`s manual – Mathworks, USA.
8. EMTP User`s Manual.
9. SEQUEL– A public domain circuit simulator available at www.ee.iitb.ac.in/~sequel.

**IV Year – I SEMESTER**

| T | P | C |
|---|---|---|
| 0 | 3 | 2 |

## POWER SYSTEMS LAB

**Learning Objectives:**

To impart the practical knowledge of functioning of various power system components and determination of various parameters and simulation of load flows, transient stability, LFC and Economic dispatch.

**Any 10 of the Following experiments are to be conducted:**

1. Sequence impedances of 3 phase Transformer.
2. Sequence impedances of 3 phase Alternator by Fault Analysis.
3. Sequence impedances of 3 phase Alternator by Direct method.
4. ABCD parameters of Transmission network.
5. Power Angle Characteristics of 3phase Alternator with infinite bus bars.
6. Dielectric strength of Transformer oil.
7. Calibration of Tong Tester.

8&9. Load flow studies any two methods.

10. Transient Stability Analysis
11. Load frequency control without control
12. Load frequency control with control
13. Economic load dispatch without losses
14. Economic load dispatch with losses.

**Learning Outcomes:**

The student is able to determine the parameters of various power system components which are frequently occur in power system studies and he can execute energy management systems functions at load dispatch centre.

| IV Year – II SEMESTER | T | P | C |
|---|---|---|---|
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## DIGITAL CONTROL SYSTEMS

**Preamble:**

In recent years digital controllers have become popular due to their capability of accurately performing complex computations at high speeds and versatility in leading non linear control systems. In this context, this course focuses on the analysis and design of digital control systems.

**Learning objectives:**

- To understand the concepts of digital control systems and assemble various components associated with it. Advantages compared to the analog type.
- The theory of z–transformations and application for the mathematical analysis of digital control systems.
- To represent the discrete–time systems in state–space model and evaluation of state transition matrix.
- To examine the stability of the system using different tests.
- To study the conventional method of analyzing digital control systems in the w–plane.
- To study the design of state feedback control by "the pole placement method."

**UNIT – I:**

**Introduction and signal processing**

Introduction to analog and digital control systems – Advantages of digital systems – Typical examples – Signals and processing – Sample and hold devices – Sampling theorem and data reconstruction – Frequency domain characteristics of zero order hold.

**UNIT–II:**

**Z–transformations**

Z–Transforms – Theorems – Finding inverse z–transforms – Formulation of difference equations and solving – Block diagram representation – Pulse transfer functions and finding open loop and closed loop responses.

**UNIT–III:**

**State space analysis and the concepts of Controllability and observability**

State Space Representation of discrete time systems – State transition matrix and

methods of evaluation – Discretization of continuous – Time state equations – Concepts of controllability and observability – Tests (without proof).

**UNIT – IV:**

**Stability analysis**

Mapping between the S–Plane and the Z–Plane – Primary strips and Complementary Strips – Stability criterion – Modified routh's stability criterion and jury's stability test.

**UNIT – V:**

**Design of discrete–time control systems by conventional methods**

Transient and steady state specifications – Design using frequency response in the w–plane for lag and led compensators – Root locus technique in the z–plane.

**UNIT – VI:**

**State feedback controllers:**

Design of state feedback controller through pole placement – Necessary and sufficient conditions – Ackerman's formula.

**Learning outcomes:**

- The students learn the advantages of discrete time control systems and the "know how" of various associated accessories.
- The learner understand z–transformations and their role in the mathematical analysis of different systems(like laplace transforms in analog systems).
- The stability criterion for digital systems and methods adopted for testing the same are explained.
- Finally, the conventional and state–space methods of design are also introduced.

**Text Book:**

1. Discrete–Time Control systems – K. Ogata, Pearson Education/PHI, 2nd Edition

**Reference Books:**

1. Digital Control Systems, Kuo, Oxford University Press, 2nd Edition, 2003.
2. Digital Control and State Variable Methods by M.Gopal, TMH

**IV Year – II SEMESTER**

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## ELECTIVE – II

## ADVANCED CONTROL SYSTEMS

**Preamble:**

This subject aims to study state space, describing function, phase plane and stability analysis including controllability and observability. It also deals with modern control and optimal control systems.

**Learning Objectives:**

- Review of the state space representation of a control system**:** Formulation of different models from the signal flow graph, diagonalization.
- To introduce the concept of controllability and observability. Design by pole placement technique.
- Analysis of a nonlinear system using Describing function approach and Phase plane analysis.
- The Lypanov's method of stability analysis of a system.
- Formulation of Euler Laugrange equation for the optimization of typical functionals and solutions.
- Formulation of linear quadratic optimal regulator (LQR) problem by parameter adjustment and solving riccatti equation.

**UNIT – I:**

**State space analysis**

State Space Representation – Solution of state equation – State transition matrix, –Canonical forms – Controllable canonical form – Observable canonical form, Jordan Canonical Form.

**UNIT – II:**

**Controllability, observability and design of pole placement**

Tests for controllability and observability for continuous time systems – Time varying case – Minimum energy control – Time invariant case – Principle of duality – Controllability and observability form Jordan canonical form and other canonical forms – Effect of state feedback on controllability and observability – Design of state feedback control through pole placement.

**UNIT – III:**

**Describing function analysis**

Introduction to nonlinear systems, Types of nonlinearities, describing functions, Introduction to phase–plane analysis.

**UNIT–IV:**

**Stability analysis**

Stability in the sense of Lyapunov – Lyapunov's stability and Lypanov's instability theorems – Direct method of Lypanov for the linear and nonlinear continuous time autonomous systems.

**UNIT–V:**

**Calculus of variations**

Minimization of functional of single function – Constrained minimization – Minimum principle – Control variable inequality constraints – Control and state variable inequality constraints – Euler lagrangine equation.

**UNIT –VI:**

**Optimal control**

Linear quadratic optimal regulator (LQR) problem formulation – Optimal regulator design by parameter adjustment (Lyapunov method) – Optimal regulator design by continuous time algebraic riccatti equation (CARE) - Optimal controller design using LQG framework.

**Learning Outcomes:**

- State space representation of control system and formulation of different state models are reviewed.
- Able to design of control system using the pole placement technique is given after introducing the concept of controllability and observability.
- Able to analyse of nonlinear system using the describing function technique and phase plane analysis.
- Able to analyse the stability analysis using lypnov method.
- Minimization of functionals using calculus of variation studied.
- Able to formulate andsolve the LQR problem and riccatti equation.

**Text Books:**

- Modern Control Engineering – by K. Ogata, Prentice Hall of India, 3rd edition, 1998
- Automatic Control Systems by B.C. Kuo, Prentice Hall Publication

**Reference Books:**

1. Modern Control System Theory – by M. Gopal, New Age International Publishers, 2nd edition, 1996
2. Control Systems Engineering by I.J. Nagarath and M.Gopal, New Age International (P) Ltd.
3. Digital Control and State Variable Methods – by M. Gopal, Tata Mc Graw– Hill Companies, 1997.
4. Systems and Control by Stainslaw H. Zak , Oxford Press, 2003.
5. Optimal control theory: an Introduction by Donald E.Kirk by Dover publications.

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# HIGH VOLTAGE ENGINEERING
# (ELECTIVE – II)

**Preamble:**

With the growth of power, HV power transmission has become an important subject. The performance of generating equipment requires knowledge of different phenomena occurring at higher voltage. Thus evaluations of various insulating materials are required for protection of HV equipments. Keeping this in view the course is designed to understand various phenomena related to breakdown study and withstand characteristics of insulating materials. The course also describes the generation and measurement of DC, AC and Impulse voltages as well various testing techniques.

**Learning Objectives:**

- To understand electric field distribution and computation in different configuration of electrode systems.
- To understand HV breakdown phenomena in gases, liquids and solids dielectric materials.
- To acquaint with the generating principle of operation and design of HVDC, AC and Impulse voltages and impulse currents.
- To understand various techniques of AC, DC and Impulse measurement of high voltages and currents.
- To understand the insulating characteristics of dielectric materials.
- To understand the various testing techniques of HV equipments.

**UNIT–I:**

**Introduction to High Voltage Technology**

Electric Field Stresses – Uniform and non–uniform field configuration of electrodes – Estimation and control of electric Stress – Numerical methods for electric field computation.

**UNIT–II:**

**Break down phenomenon in gaseous, liquid and solid insulation**

Gases as insulating media – Collision process – Ionization process – Townsend's criteria of breakdown in gases – Paschen's law – Liquid as Insulator – Pure and commercial liquids – Breakdown in pure and commercial liquid – Intrinsic breakdown – Electromechanical breakdown – Thermal breakdown –Breakdown of solid dielectrics in practice – Breakdown in composite dielectrics used in practice.

**UNIT–III:**

**Generation of High voltages and High currents**

Generation of high DC voltages – Generation of high alternating voltages – Generation of impulse voltages – Generation of impulse currents – Tripping and control of impulse generators.

**UNIT–IV:**

**Measurement of high voltages and High currents**

Measurement of high AC, DC and Impulse voltages – Voltages and measurement of high currents – Direct, alternating and Impulse.

**UNIT–V:**

**Non–destructive testing of material and electrical apparatus**

Measurement of DC resistivity – Measurement of dielectric constant and loss factor – Partial discharge measurements.

**UNIT–VI:**

**High voltage testing of electrical apparatus**

Testing of insulators and bushings – Testing of isolators and circuit breakers – Testing of cables – Testing of transformers – Testing of surge arresters – Radio interference measurements.

**Learning Outcomes:**

- To be acquainted with the performance of high voltages with regard to different configurations of electrode systems.
- To be able to understand theory of breakdown and withstand phenomena of all types of dielectric materials.
- To acquaint with the techniques of generation of AC,DC and Impulse voltages.
- To be able to apply knowledge for measurement of high voltage and high current AC,DC and Impulse.
- To be in a position to measure dielectric property of material used for HV equipment.
- To know the techniques of testing various equipment's used in HV engineering.

**Text Books:**

1. High Voltage Engineering by M.S.Naidu and V. Kamaraju – TMH Publications, 3rd Edition.

2. High Voltage Engineering : Fundamentals by E.Kuffel, W.S. Zaengl, J. Kuffel by Elsevier, 2nd Edition.
3. High Voltage Engineering and Technology by Ryan, IET Publishers.

**Reference Books:**

1. High Voltage Engineering by C.L.Wadhwa, New Age Internationals (P) Limited, 1997.
2. High Voltage Insulation Engineering by Ravindra Arora, Wolfgang Mosch, New.

Age International (P) Limited, 1995.

## SPECIAL ELECTRICAL MACHINES
## (Elective – II)

**Preamble:**

This is an advanced course on electrical machines. Students will be exposed to various special machines which are gaining importance in industry. This course covers topics related to principles, performance and applications of these special machines including switched reluctance motors, stepper motors, permanent magnet dc motors, linear motors and electric motors for traction drives.

**Learning Objective:**

- To explain theory of operation and control of switched reluctance motor.
- To explain the performance and control of stepper motors, and their applications.
- To describe the operation and characteristics of permanent magnet dc motor.
- To distinguish between brush dc motor and brush less dc motor**.**
- To explain the theory of travelling magnetic field and applications of linear motors.
- To understand the significance of electrical motors for traction drives.

**UNIT I:**

**Switched Reluctance Motor**

Principle of operation – Design of stator and rotor pole arc – Power converter for switched reluctance motor – Control of switched reluctance motor.

**UNIT II:**

**Stepper Motors**

Construction – Principle of operation – Theory of torque production – Hybrid stepping motor – Variable reluctance stepping motor – Open loop and closed loop control.

**UNIT III:**

**Permanent Magnet DC Motors**

Construction – Principle of working – Torque equation and equivalent circuits – Performance characteristics – Moving coil motors.

**UNIT IV:**

**Permanent Magnet Brushless DC Motor**

Construction – Principle of operation – Theory of brushless DC motor as variable speed synchronous motor – Sensor less and sensor based control of BLDC motors.

**UNIT V:**

**Linear motors**

Linear induction motor: Construction– principle of operation– applications. Linear synchronous motor: Construction – principle of operation– applications.

**UNIT VI:**

**Electric Motors for traction drives**

AC motors– DC motors –Single sided linear induction motor for traction drives – Comparison of AC and DC traction.

**Learning Outcomes:**

The student should be able to

- Explain theory of operation and control of switched reluctance motor.
- Explain the performance and control of stepper motors, and their applications.
- Describe the operation and characteristics of permanent magnet dc motor.
- Distinguish between brush dc motor and brush less dc motor**.**
- Explain the theory of travelling magnetic field and applications of linear motors.
- Understand the significance of electrical motors for traction drives.

**Text Books:**

1. Special electrical Machines, K.Venkata Ratnam, University press, 2009, New Delhi.
2. Brushless Permanent magnet and reluctance motor drives, Clarenden press, T.J.E. Miller, 1989, Oxford.
3. Special electrical machines, E.G. Janardhanan, PHI learning private limited, 2014.

**IV Year – II SEMESTER**

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## ELECTIVE – III

## ELECTRIC POWER QUALITY

**Preamble:**

Power quality is a major problem for utilities and customers. Customers using sensitive critical loads need quality power for proper operation of the electrical equipment. It is important for the student to learn the power quality issues and improvement measures provided by the utility companies. This course covers the topics on voltage and current imperfections, harmonics, voltage regulation, power factor improvement, distributed generation, power quality monitoring and measurement equipment.

**Learning Objectives:**

- To learn different types of power quality phenomena.
- To identify sources for voltage sag, voltage swell, interruptions, transients, long duration over voltages and harmonics in a power system.
- To describe power quality terms and study power quality standards.
- To learn the principle of voltage regulation and power factor improvement methods.
- To explain the relationship between distributed generation and power quality.
- To understand the power quality monitoring concepts and the usage of measuring instruments.

**UNIT–I:**

**Introduction**

Overview of power quality – Concern about the power quality – General classes of power quality and voltage quality problems – Transients – Long–duration voltage variations – Short–duration voltage variations – Voltage unbalance – Waveform distortion – Voltage fluctuation – Power frequency variations.

**UNIT–II:**

**Voltage imperfections in power systems**

Power quality terms – Voltage sags – Voltage swells and interruptions –

Sources of voltage sag, swell and interruptions – Nonlinear loads – IEEE and IEC standards. Source of transient over voltages – Principles of over voltage protection – Devices for over voltage protection – Utility capacitor switching transients.

**UNIT–III**

**Voltage Regulation and power factor improvement:**

Principles of regulating the voltage – Device for voltage regulation – Utility voltage regulator application – Capacitor for voltage regulation – End–user capacitor application – Regulating utility voltage with distributed resources – Flicker – Power factor penalty – Static VAR compensations for power factor improvement.

**UNIT– IV**

**Harmonic distortion and solutions**

Voltage distortion vs. Current distortion – Harmonics vs. Transients – Harmonic indices – Sources of harmonics – Effect of harmonic distortion – Impact of capacitors, transformers, motors and meters – Point of common coupling – Passive and active filtering – Numerical problems.

**UNIT–V**

**Distributed Generation and Power Quality**

Resurgence of distributed generation – DG technologies – Interface to the utility system – Power quality issues and operating conflicts – DG on low voltage distribution networks.

**UNIT–VI**

**Monitoring and Instrumentation**

Power quality monitoring and considerations – Historical perspective of PQ measuring instruments – PQ measurement equipment – Assessment of PQ measuring data – Application of intelligent systems – PQ monitoring standards.

**Learning Outcomes:**

At the end of this course the student should be able to

- Differentiate between different types of power quality problems.
- Explain the sources of voltage sag, voltage swell, interruptions, transients, long duration over voltages and harmonics in a power system.
- Analyze power quality terms and power quality standards.

- Explain the principle of voltage regulation and power factor improvement methods.
- Demonstrate the relationship between distributed generation and power quality.
- Explain the power quality monitoring concepts and the usage of measuring instruments.

**Textbooks:**

1. Electrical Power Systems Quality, Dugan R C, McGranaghan M F, Santoso S, and Beaty H W, Second Edition, McGraw–Hill, 2012, 3rd edition.
2. Electric power quality problems –M.H.J. Bollen IEEE series-Wiley india publications, 2011.
3. Power Quality Primer, Kennedy B W, First Edition, McGraw–Hill, 2000.

**Reference Books:**

1. Understanding Power Quality Problems: Voltage Sags and Interruptions, Bollen M HJ, First Edition, IEEE Press; 2000.
2. Power System Harmonics, Arrillaga J and Watson N R, Second Edition, John Wiley & Sons, 2003.
3. Electric Power Quality control Techniques, W. E. Kazibwe and M. H. Sendaula, Van Nostrad Reinhold, New York.
4. Power Quality c.shankaran, CRC Press, 2001
5. Harmonics and Power Systems –Franciso C.DE LA Rosa–CRC Press (Taylor & Francis).
6. Power Quality in Power systems and Electrical Machines–EwaldF. fuchs, Mohammad A.S. Masoum–Elsevier.

## DIGITAL SIGNAL PROCESSING
## (Elective – III)

**Preamble:**

Signals analysis is very important in daily life. Hence it is required to study the different signals (continuous and discrete) and their properties. The behavior of the signals in time and frequency domain are important in analyzing the response of the network. The tools like FFT, DFT, Z–transforms may be used in the analysis of the signals. Filters must be required to eliminate the unwanted signals. Hence digital filter design also required to be studied. Sampling of signals are required to convert continuous to discrete signals. To have knowledge on the implementation signals, DSP processors must be studied.

**Learning Objectives:**

- To study different types of signals and properties of systems.
- To study the application of Fourier transform to discrete time systems.
- To study the FFT and inverse FFT and its applications to discrete sequences.
- To study the realization of digital filters and their design.
- To study the multi–rate signal processing.
- To study the architecture of digital signal processors.

**UNIT–I:**

**Introduction**

Introduction to Digital Signal Processing**:** Discrete time signals & sequences – Linear shift invariant systems – Stability and causality – Linear constant coefficient difference equations.

**UNIT–II:**

**Discrete Fourier Series**

Properties of discrete Fourier series, DFS representation of periodic sequences, Discrete Fourier transforms: Properties of DFT, linear convolution of sequences using DFT, Computation of DFT. Relation between Z–transform and DFS.

**UNIT–III:**

**Fast Fourier Transforms**

Frequency domain representation of discrete time signals and systems – Fast

Fourier transforms (FFT) – Radix–2 decimation in time and decimation in frequency FFT Algorithms – Inverse FFT – and FFT for composite N.

**UNIT–IV:**

**Realization of Digital Filters**

Solution of difference equations of digital filters – Block diagram representation of linear constant – Coefficient difference equations – Basic structures of IIR systems – Transposed forms – Basic structures of FIR systems – System function.

**IIR Digital Filters**

Analog filter approximations – Butter worth and Chebyshev – Design of IIR Digital filters from analog filters – Design Examples**:** Analog–Digital transformations.

**FIR Digital Filters**

Characteristics of FIR Digital Filters – Frequency response – Design of FIR Digital Filters using Window Techniques – Frequency Sampling technique – Comparison of IIR & FIR filters.

**UNIT–V:**

**Multirate Digital Signal Processing:**

Decimation – Interpolation – Down sampling – Up sampling rate – Conversion – Implementation of sampling rate conversion.

**UNIT–VI:**

**Introduction to Digital Signal Processors(DSP):**

Introduction to programmable DSPs**:** Multiplier and Multiplier Accumulator (MAC) – Modified bus structures and memory access schemes in DSPs – Multiple access memory – Multiport memory – VLSI architecture – Pipelining – Special addressing modes – On–chip peripherals – Architecture of TMS 320C5X – Introduction – Bus structure – Central arithmetic logic unit – Auxiliary registrar – Index registrar – Auxiliary register compare register – Block move address register – Parallel logic unit – Memory mapped registers – Program controller – Some flags in the status registers – On–chip registers, On–chip peripherals.

**Learning outcomes:**

- Able to study different types of signals and properties of systems.
- Able to apply of Fourier transform to discrete time systems.
- Able to apply the FFT and inverse FFT to discrete sequences.

- Able to realize and design digital filters.
- Able to understand the multi–rate signal processing.
- Able to understand architecture of digital signal processors.

**Text Books:**

1. Digital Signal Processing – Alan V. Oppenheim, Ronald W. Schafer, PHI Ed., 2006
2. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education / PHI, 2007

**Reference Books:**

1. Digital Signal Processing: Andreas Antoniou, TATA McGraw Hill , 2006
2. Digital Signal Processing: MH Hayes, Schaum's Outlines, TATA Mc–Graw Hill, 2007.
3. DSP Primer – C. Britton Rorabaugh, Tata Mc Graw Hill, 2005.
4. Fundamentals of Digital Signal Processing using Matlab – Robert J. Schilling, Sandra L. Harris, Thomson, 2007.
5. Digital Signal Processors – Architecture, Programming and Applications, B.Venkataramani, M.Bhaskar, TATA McGraw Hill, 2002.

# FLEXIBLE ALTERNATING CURRENT TRANSMISSION SYSTEMS (FACTS)

## (Elective – III)

**Preamble:**

Flexible Alternating Current Transmission System controllers have become a part of modern power system. It is important for the student to understand the principle of operation of series and shunt compensators by using power electronics. As the heart of many power electronic controllers is a voltage source converter (VSC), the student should be acquainted with the operation and control of VSC. Two modern power electronic controllers are also introduced.

**Learning Objectives:**

- To learn the basics of power flow control in transmission lines by using FACTS controllers
- To explain the operation and control of voltage source converter.
- To discuss compensation methods to improve stability and reduce power oscillations in the transmission lines.
- To learn the method of shunt compensation by using static VAR compensators.
- To learn the methods of compensation by using series compensators
- To explain the operation of two modern power electronic controllers (Unified Power Quality Conditioner and Interline Power Flow Controller).

**UNIT–I:**

**Introduction to FACTS**

Power flow in an AC System – Loading capability limits – Dynamic stability considerations – Importance of controllable parameters – Basic types of FACTS controllers – Benefits from FACTS controllers – Requirements and characteristics of high power devices – Voltage and current rating – Losses and speed of switching – Parameter trade–off devices.

**UNIT–II:**

**Voltage source and Current source converters**

Concept of voltage source converter(VSC) – Single phase bridge converter – Square–wave voltage harmonics for a single–phase bridge converter – Three–phase full wave bridge converte r– Three–phase current source

converter – Comparison of current source converter with voltage source converter.

**UNIT–III:**

**Shunt Compensators–1**

Objectives of shunt compensation – Mid–point voltage regulation for line segmentation – End of line voltage support to prevent voltage instability – Improvement of transient stability – Power oscillation damping.

**Methods of controllable VAR generation**

Variable impedance type static VAR generators – Thyristor Controlled Reactor (TCR) and Thyristor Switched Reactor (TSR).

**UNIT–IV:**

**Shunt Compensators–2**

Thyristor Switched Capacitor(TSC)– Thyristor Switched Capacitor – Thyristor Switched Reactor (TSC–TCR). Static VAR compensator(SVC) and Static Compensator(STATCOM)**:** The regulation and slope transfer function and dynamic performance – Transient stability enhancement and power oscillation damping– Operating point control and summary of compensation control.

**UNIT V:**

**Series Compensators**

Static series compensators**:** Concept of series capacitive compensation – Improvement of transient stability – Power oscillation damping – Functional requirements. GTO thyristor controlled Series Capacitor (GSC) – Thyristor Switched Series Capacitor (TSSC) and Thyristor Controlled Series Capacitor (TCSC).

**UNIT–VI:**

**Combined Controllers**

Schematic and basic operating principles of unified power flow controller(UPFC) and Interline power flow controller(IPFC) – Application of these controllers on transmission lines.

**Learning Outcomes:**

The student should be able to

- Determine power flow control in transmission lines by using FACTS controllers.
- Explain operation and control of voltage source converter.

- Discuss compensation methods to improve stability and reduce power oscillations in the transmission lines.
- Explain the method of shunt compensation by using static VAR compensators.
- Appreciate the methods of compensations by using series compensators.
- Explain the operation of modern power electronic controllers (Unified Power Quality Conditioner and Interline Power Flow Controller).

**Text Books:**

1. "Understanding FACTS" N.G.Hingorani and L.Guygi, IEEE Press.Indian Edition is available:—Standard Publications, 2001.
2. "Flexible ac transmission system (FACTS)" Edited by Yong Hue Song and Allan T Johns, Institution of Electrical Engineers, London.
3. Thyristor-based FACTS Controllers for Electrical Transmission Systems, by R.Mohan Mathur and Rajiv K.Varma, Wiley.

**IV Year – II SEMESTER**

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## ELECTIVE – IV

## OOPS THROUGH JAVA

**Preamble:**

This course teaches students how to develop Java applications. Topics covered include the Java programming language syntax, OO programming using Java, exception handling, file input/output, threads, collection classes, and networking.

**Learning Objectives:**

- Focus on object oriented concepts and java program structure and its installation.
- Comprehension of java programming constructs, control structures in Java.
- Implementing Object oriented constructs such as various class hierarchies, interfaces and exception handling.
- Understanding of Thread concepts and I/O in Java.
- Being able to build dynamic user interfaces using applets and Event handling in java.
- Understanding of various components of Java AWT and Swing and writing code snippets using them.

**UNIT I:**

**Introduction to OOP**

Introduction, Need of Object Oriented Programming, Principles of Object Oriented Languages, Procedural languages Vs OOP, Applications of OOP, History of JAVA, Java Virtual Machine, Java Features, Program structures, Installation of JDK1.6

**UNIT II:**

**Programming Constructs**

Variables, Primitive Datatypes, Identifiers- Naming Coventions, Keywords, Literals, Operators-Binary, Unary and ternary, Expressions, Precedence rules

and Associativity, Primitive TypeConversion and Casting, Flow of control-Branching, Conditional, loops.

**Classes and Objects**- classes, Objects, Creating Objects, Methods, constructors-Constructor overloading, cleaning up unused objects-Garbage collector, Class variable and Methods-Static keyword, this keyword, Arrays, Command line arguments.

**UNIT III:**

**Inheritance:** Types of Inheritance, Deriving classes using extends keyword, Method overloading, super keyword, final keyword, Abstract class.

**Interfaces, Packages and Enumeration:** Interface-Extending interface, Interface Vs Abstract classes, Packages-Creating packages, using Packages, Access protection, java. lang package.

**Exceptions & Assertions** - Introduction, Exception handling techniques-try... catch, throw, throws, finally block, user defined exception, Exception Encapsulation and Enrichment, Assertions.

**UNIT IV:**

**MultiThreading :** java.lang.Thread, The main Thread, Creation of new threads, Thread priority, Multithreading- Using isAlive () and join (), Syncronization, suspending and Resuming threads, Communication between Threads

**Input/Output:** reading and writing data, java.io package

**UNIT V:**

**Applets**- Applet class, Applet structure, An Example Applet Program, Applet Life Cycle, paint (), update () and repaint ()

**Event Handling** -Introduction, Event Delegation Model, java.awt.event Description, Sources of Events, Event Listeners, Adapter classes, Inner classes.

**UNIT VI:**

**Abstract Window Toolkit**

Why AWT?, java.awt package, Components and Containers, Button, Label, Checkbox, Radio buttons, List boxes, Choice boxes, Text field and Text area, container classes, Layouts, Menu, Scroll bar

**Swing:**

Introduction, JFrame, JApplet, JPanel, Components in swings, Layout Managers, JList and JScroll Pane, Split Pane, JTabbedPane, Dialog Box

Pluggable Look and Feel.

**Learning Outcomes:**

- Understand the format and use of objects.
- Understand basic input/output methods and their use.
- Understand object inheritance and its use.
- Understand development of JAVA applets vs. JAVA applications.
- Understand the use of various system libraries.

**Text Books:**

1. The Complete Refernce Java, 8ed, Herbert Schildt, TMH
2. Programming in JAVA, Sachin Malhotra, Saurabh choudhary, Oxford.
3. JAVA for Beginners, 4e, Joyce Farrell, Ankit R. Bhavsar, Cengage Learning.
4. Object oriented programming with JAVA, Essentials and Applications, Raj Kumar Bhuyya, Selvi, Chu TMH.
5. Introduction to Java rogramming, 7th ed, Y Daniel Liang, Pearson.

**Reference Books:**

1. JAVA Programming, K. Rajkumar. Pearson.
2. Core JAVA, Black Book, Nageswara Rao, Wiley, Dream Tech
3. Core JAVA for Beginners, Rashmi Kanta Das, Vikas.
4. Object Oriented Programming through JAVA , P Radha Krishna, University Press.

# UNIX AND SHELL PROGRAMMING
## (Elective – IV)

**Learning Objectives:**

- to provide a comprehensive introduction to Shell Programming.
- have the fundamental skills required to write simple and complex Shell scripts to automate jobs and processes in the Unix environment.

**UNIT I:**

Introduction to Unix:- Architecture of Unix, Features of Unix, Unix Commands – PATH, man, echo, printf, script, passwd, uname, who, date, stty, pwd, cd, mkdir, rmdir, ls, cp, mv, rm, cat, more, wc, lp, od, tar, gzip.

**UNIT II :**

**Unix Utilities:-** Introduction to unix file system, vi editor, file handling utilities, security by file permissions, process utilities, disk utilities, networking commands, unlink, du, df, mount, umount, find, unmask, ulimit, ps, w, finger, arp, ftp, telnet, rlogin.Text processing utilities and backup utilities, detailed commands to be covered are tail, head, sort, nl, uniq, grep, egrep, fgrep, cut, paste, join, tee, pg, comm, cmp, diff, tr, awk, cpio.

**UNIT III :**

**File Management :** File Structures, System Calls for File Management – create, open, close, read, write, lseek, link, symlink, unlink, stat, fstat, lstat, chmod, chown, Directory API – opendir, readdir, closedir, mkdir, rmdir, umask.

**Introduction to Shells :** Unix Session, Standard Streams, Redirection, Pipes, Tee Command, Command Execution, Command- Line Editing, Quotes, Command Substitution, Job Control, Aliases, Variables, Predefined Variables, Options, Shell/Environment Customization.

**Filters :** Filters and Pipes, Concatenating files, Display Beginning and End of files, Cut and Paste, Sorting, Translating Characters, Files with Duplicate Lines, Count characters, Words or Lines, Comparing Files.

**UNIT IV :**

**Grep :** Operation, grep Family, Searching for File Content.

**Sed :** Scripts, Operation, Addresses, commands, Applications, grep and sed.

**awk:** Execution, Fields and Records, Scripts, Operations, Patterns, Actions, Associative Arrays, String.

Functions, String Functions, Mathematical Functions, User – Defined Functions, Using System commands, in awk, Applications, awk and grep, sed and awk.

**UNIT V :**

**Interactive Korn Shell :** Korn Shell Features, Two Special Files, Variables, Output, Input, Exit Status of a Command, eval Command, Environmental Variables, Options, Startup Scripts, Command History, Command Execution Process.

**Korn Shell Programming :** Basic Script concepts, Expressions, Decisions: Making Selections, Repetition, special Parameters and Variables, changing Positional Parameters, Argument Validation, Debugging Scripts, Script Examples.

**UNIT VI :**

**Interactive C Shell :** C shell features, Two Special Files, Variables, Output, Input, Exit Status of a Command, eval Command, Environmental Variables, On-Off Variables, Startup and Shutdown Scripts, Command History, Command Execution Scripts.

**C Shell Programming :** Basic Script concepts, Expressions, Decisions: Making Selections, Repetition, special Parameters and Variables, changing Positional Parameters, Argument Validation, Debugging Scripts, Script Examples.

**Learning Outcomes:**

Upon completing this course students will have skills in:

1. Use UNIX shells and commands to create powerful data processing applications.
2. Build UNIX applications using the shell command interpreter and UNIX commands.
3. Use UNIX at the command line to manage data, files, and programs.
4. Use UNIX editors and tools to create and modify data files and documents.

**Text Books :**

1. Unix and shell Programming Behrouz A. Forouzan, Richard F. Gilberg. Thomson.

2. Your Unix the ultimate guide, Sumitabha Das, TMH. 2nd Edition. 2007-2008 Page 34 of 95.

**References Books:**

1. Unix for programmers and users, 3rd edition, Graham Glass, King Ables, Pearson Education.
2. Unix programming environment, Kernighan and Pike, PHI. / Pearson Education.
3. The Complete Reference Unix, Rosen, Host, Klee, Farber, Rosinski, Second Edition, TMH.

## AI TECHNIQUES
## (Elective IV)

**Preamble:**

The aim of this course is to study the AI techniques such as neural networks and fuzzy systems. The course focuses on the application of AI techniques to electrical engineering.

**Learning Objectives:**

- To study various methods of AI
- To study the models and architecture of artificial neural networks.
- To study the ANN paradigms**.**
- To study the fuzzy sets and operations.
- To study the fuzzy logic systems.
- To study the applications of AI.

**UNIT–I:**

**Introduction to AI techniques**

Introduction to artificial intelligence systems– Humans and Computers – Knowledge representation – Learning process – Learning tasks – Methods of AI techniques.

**UNIT–II:**

**Neural Networks**

Organization of the Brain – Biological Neuron – Biological and Artificial neuron Models, MC Culloch-pitts neuron model, Activation functions, Learning rules, neural network architectures- Single-layer feed-forward networks: – Perceptron, Learning algorithm for perceptron- limitations of Perceptron model

**UNIT–III:**

**ANN paradigm**

Multi-layer feed-forward network (based on Back propagation algorithm)– Radial-basisn function networks- Recurrent networks (Hopfield networks).

**UNIT – IV:**

**Classical and Fuzzy Sets**

Introduction to classical sets – properties – Operations and relations – Fuzzy sets – Membership – Uncertainty – Operations – Properties – Fuzzy relations – Cardinalities – Membership functions.

**UNIT–V:**

**Fuzzy Logic System Components**

Fuzzification – Membership value assignmen – Development of rule base and decision making system – Defuzzification to crisp sets – Defuzzification methods – Basic hybrid system.

**UNIT–VI:**

**Application of AI techniques**

Load forecasting – Load flow studies – Economic load dispatch – Load frequency control – Reactive power control – Speed control of dc and ac motors.

**Text Books:**

1. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by S.Rajasekaran and G.A. Vijayalakshmi Pai – PHI Publication.
2. Fuzzy logic with fuzzy applications- by T.J. Ross, TMH.

**Reference Books:**

1. Introduction to Artificial Neural Systems – Jacek M. Zurada, Jaico Publishing House, 1997.
2. Fundamentals of Neural Networks Architectures, Algorithms and Applications - by laurene Fausett, Pearson.
3. Neural Networks, Algorithms, Applications and programming Techniques by James A. Freeman, David M. Skapura.
4. Introduction to Neural Networks using MATLAB 6.0 by S N Sivanandam, S Sumathi, S N Deepa TMGH

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## POWER SYSTEM REFORMS
## (Elective IV)

**Preamble:**

This course introduces the concepts and issues of power system reforms and aims at computation of Available Transfer Capability (ATC), Congestion Management, Electricity Pricing, Ancillary services Management and Power system operation in competitive environment.

**Learning Objectives:**

- To study fundamentals of power system deregulation and restructuring.
- To study available transfer capability.
- To study congestion management
- To study various electricity pricing.
- To study operation of power system in deregulated environment.
- To study importance of Ancillary services management.

**UNIT–I**

**Over view of key issues in electric utilities**

Introduction – Restructuring models – Independent system operator (ISO) – Power Exchange – Market operations – Market Power – Standard cost – Transmission Pricing – Congestion Pricing – Management of Inter zonal/Intra zonal Congestion.

**UNIT–II**

**OASIS: Open Access Same–Time Information System**

Structure of OASIS – Processing of Information – Transfer capability on OASIS – Definitions Transfer Capability Issues – ATC – TTC – TRM – CBM calculations – Methodologies to calculate ATC.

**UNIT–III**

**Congestion Management**

Introduction to congestion management – Methods to relieve congestion

**UNIT–IV**

**Electricity Pricing:**

Introduction – Electricity price volatility electricity price indexes –

Challenges to electricity pricing – Construction of forward price curves – Short–time price forecasting.

**UNIT–V**

**Power system operation in competitive environment:**

Introduction – Operational planning activities of ISO – The ISO in pool markets – The ISO in bilateral markets – Operational planning activities of a Genco.

**UNIT–VI**

**Ancillary Services Management:**

Introduction – Reactive power as an ancillary service – A review – Synchronous generators as ancillary service providers.

**Learning Outcomes:**

- Will understand importance of power system deregulation and restructuring.
- Able to compute ATC.
- Will understand transmission congestion management.
- Able to compute electricity pricing in deregulated environment.
- Will be able to understand power system operation in deregulated environment.
- Will understand importance of ancillary services.

**Text Books:**

1. Kankar Bhattacharya, Math H.J. Boller, Jaap E.Daalder, 'Operation of Restructured Power System' Klum,er Academic Publisher – 2001
2. Mohammad Shahidehpour, and Muwaffaq alomoush, – "Restructured electrical Power systems" Marcel Dekker, Inc. 2001
3. Loi Lei Lai; "Power system Restructuring and Deregulation", Jhon Wiley & Sons Ltd., England.
4. Electrical Power Distribution Case studies from Distribution reform, upgrades and Management (DRUM) Program, by USAID/India, TMH.

## SYSTEMS ENGINEERING
## (Elective IV)

**Preamble:**

This course is intended to introduce the student to the systems engineering process used to create multidisciplinary solutions to complex problems which have multiple, often conflicting objectives. The course will provide an overview of systems engineering in the context of large developmental programs. By focusing on the objectives, principles and practices of systems engineering, the course will enable the student to better understand the functions, capabilities and limitations of systems engineering.

**Learning Objectives:**

- To understand the foundations of systems Engineering.
- To understand the process of engineering systems systematically
- To understand how to deploy (put to use) the systems engineered.
- To understand the supporting systems during systems life cycle.
- To understand the application of systems engineering in product and service space.
- To understand systems engineering in perspective of related disciplines project management and software engineering.

**UNIT–I:**

Introduction to Systems**:** Systems Fundamentals – Systems Science – Systems Thinking – Modeling Systems.

**UNIT –II:**

Systems Engineering and Management: System life cycle models – System vision and mission – Stakeholder needs and requirements – System requirements – Logical architecture design – Physical architecture design – System analysis – System realization – System implementation – System integration – System verification – System validation.

**UNIT – III:**

System deployment and use – System deployment – Operation of the system – System maintenance – Logistics.

**UNIT – IV:**

Systems engineering management – Planning – Assessment and Control –

Risk Management – Measurement – Decision Management – Configuration Management – Information Management – Quality Management.

**UNIT – V:**
Applications of systems engineering **–** Product systems engineering **–** Services Systems engineering **–** Enterprise systems engineering

**UNIT – VI:**
Enabling systems engineering – People**:** Enabling teams and individuals – Software engineering, Project management – Case studies.

**Learning Outcomes:**

- To be able to appreciate and evaluate systems in general and apply to specific systems.
- Should engineer successful systems fit for intended purpose. Right from concept to development.
- Should be able to successfully deploy the new systems developed.
- Should be able to leverage the support systems for success of systems from womb to tomb.
- Should be able to apply systems engineering in engineering product and services.
- Should be able to relate systems engineering with project management and software engineering.

**Text books:**

1. SEBOK Guide to the Systems Engineering Body of Knowledge (SEBoK), version 1.2 – INCOSEwww.sebowiki.org/wiki/incose systems engineering Hand Book.

**Reference Books:**

1. Systems engineering principles and practice second edition John wiley Alexander Kossiakoff etal.
2. Systems engineering with Economics, Probability and Statistics Khisty C.Jotin. 2nd edition, 2nd edition J Ross publications.

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