# *1ST & 2nd YEAR COURSE STRUCTURE*

## *FOR*

# *B.TECH –COMPUTER SCIENCE AND* ENGINEERING

## *w.e.f.*

# *2013-2014 ADMITTED BATCH*

**DEPARTMENT OF COMPUTER SCIENCE ANDENGINEERING**

**COLLEGE OF ENGINEERING (AUTONOMOUS) :: PULIVENDULA**

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**PULIVENDULA – 516390, Y.S.R. (DIST), ANDHRA PRADESH, INDIA**

# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
# COLLEGE OF ENGINEERING (Autonomous) PULIVENDULA – 516 390.

## Academic Regulations 2013 (R13) for
## B. Tech (Regular-Full time)

(With effect from the Academic Year 2013-2014 for the students admitted into I year)

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

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

i. **Pursue a course of study for not less than four academic years and in not more than eight academic years.**

ii. **Register for 180 credits and secure all 180 credits**

**2.** Students, who fail to fulfill all the academic requirements for the award of the degree within eight academic years from the year of their admission, shall forfeit their seat in B.Tech. course and their admission is cancelled.

**3. Courses of study**

The following courses of study are offered at present under B. Tech. program with effect from the academic year 2013-2014.

| S. No. | Branch |
|---|---|
| *01.* | *Civil Engineering* |
| *02.* | *Electrical & Electronics Engineering* |
| *03.* | *Mechanical Engineering* |
| *04.* | *Electronics and Communication Engineering* |
| *05.* | *Computer Science and Engineering* |
| *06.* | *Bio Technology* |

and any other course as approved by the authorities of the University from time to time.

**4. Credits**

| | *I Year* | | Semester | |
|---|---|---|---|---|
| | Periods / Week | Credits | Periods / Week | Credits |
| Theory | 03 | 03 | 04 | 03 |
| | 04 | 05 | -- | -- |
| Practical | 03 | 04 | 03 | 02 |
| Project | -- | -- | 15 | 10 |

**5. Distribution and Weightage of Marks**

i. The performance of a student in each semester / I year shall be evaluated subject –wise with a maximum of 100 marks for theory and 75 marks for practical subject. In addition seminar and project work shall be evaluated for 50 and 200 marks respectively.

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

iii. There shall be five units in each of the theory subjects.

iv. For theory subjects during the semester, there shall be two midterm examinations. Each mid term examination consists of objective paper for 10 marks and subjective paper for 20 marks with duration of 1hour 50 minutes (20 minutes for objective and 90 minutes for subjective paper).

Objective paper is set for 20 bits for 10 marks. Subjective paper shall contain 5 questions of which, student has to answer 3 questions evaluated for 20 marks. First midterm examination shall be conducted for I, II units of syllabus and second midterm examination shall be conducted for III, IV & V units. Final Internal marks for a total of 30marks shall be arrived at by considering the marks secured by the student in both the mid examinations with 80% weight-age to the better mid exam and 20% to the other.

However, for first year, there shall be three midterm examinations as in the above pattern. Final Internal marks for a total of 30 marks shall be arrived at by considering the marks secured by the student in all the three mid examinations* with 80% weightage to the average marks of the best two midterm examinations and 20% to the other.

*****Note 1: 1st midterm examinations, shall be from unit – I, Second midterm examinations shall be from II & III units, and third midterm examinations shall be from IV & V units.

*****Note 2: The subjective paper shall contain 5 questions of equal weightage of 10 marks and the marks obtained for 3questions shall be condensed to 20 marks, any fraction rounded off to the next higher mark.

*****Note 3: The midterm examination shall be conducted first by distribution of the Objective paper simultaneously marking the attendance, after 20 minutes the answered objective paper is to be collected back. The student is not allowed to leave the examination hall. Then the descriptive question paper and the answer booklet shall be distributed. After 90minutes the answered booklets are to be collected back.

v. For practical subjects there shall be a continuous evaluation during the semester for 25 sessional marks and 50 end examination marks. Day-to-day work in the laboratory shall be evaluated for 25 marks by the concerned laboratory teacher based on the report of experiments/jobs. *The end semester practical examination shall be conducted by an external examiner and an internal examiner nominated by the Principal*.

vi. There shall be an audit pass course in Human values & Professional ethics and Advanced Communication skills lab with no credits. There shall be no external examination. However, attendance in the audit course shall be considered while calculating aggregate attendance and student shall be declared pass in the audit course when he/she secures 40% or more in the internal examinations. *If he/she doe not secure 40% in the midterm examinations, he/she has to re-register that subject as and when it is offered.*

vii. For the subject having design and/or drawing, such as Engineering Drawing, Machine Drawing and Estimation, the distribution shall be 30 marks for internal evaluation and 70 marks for end examination. The Internal evaluation for sessionals will be 15 marks for day-to-day work in the class that shall be evaluated by the concerned subject teacher based on the reports/submissions prepared in the class. And there shall be two midterm exams in a semester for a duration of 2hrs each,evenly distributed over the syllabi for 15 marks and the weightage is 80% for better mid marks and 20% for the other shall be considered as internal test marks. The sum of day to day evaluation and the internal test marks will be the final sessionals for the subject. However, when offered in the I year as 5 credits course, there shall be three midterm exams and the weightage is 80% of average marks of the best two midterm examinations and 20% from the other will be taken into consideration.

viii. There shall be a seminar presentation in IV year II Semester. For the seminar, the student shall collect the information on a specialized topic and prepare a technical report, showing his understanding over the topic, and submit to the department before presentation. The report and the presentation shall be evaluated by the departmental committee consisting of Head of the department, seminar supervisor and a senior faculty member. The seminar shall be evaluated for 40 marks. There shall be no external examination for seminar.

There shall be a Comprehensive Viva – Voce in IV year II Semester. The Comprehensive viva-voce will be conducted by the committee consisting of Head of the department and two senior faculty members of the department. The Comprehensive Viva – voce is aimed at to assess the students' understanding in various subjects he/she studies during the B.Tech. course of study. The Comprehensive Viva- Voce is valued for 60 marks by the committee.

A student shall acquire 3 credits assigned to the seminar & comprehensive viva-voce only when he/she secures 40 marks on aggregate out of 100 marks allocated. *If he/she fails to get 40 marks (put together) out of 100, he/she has to re-register for the seminar & comprehensive viva-voce as and when it is offered*.

ix. Out of total of 200 marks for the project work, 60 marks shall be for Internal Evaluation and 140 marks for the End Semester Examination (Viva-voce). Project work shall start in IV- I semester and continue in the next semester. During IV – I semester, the project work (part – A) will be evaluated internally for 30 marks out of allotted internal marks 60, and is given 2 credits. Out of 30 marks, concerned project guide shall evaluate for 15 marks based on day to day performance of the student, and the remaining 15 marks will be evaluated bythe departmental committee consisting of Head, project guide and two senior faculty members of the department on the basis of a seminar given by each student on the topic of his/her project.

At the end of IV – II semester, the remaining internal marks (i.e. 30) for the project work (Part – B) shall be evaluated in the same manner as in IV – I semester. The end semester examination (viva-voce) shall be conducted by a committee consisting of HOD, Project Supervisor and an External Examiner nominated by the Principal at the end of the project work.

x. The laboratory records and internal test papers shall be preserved for minimum of 3 years in the respective institutions as per the University norms and shall be produced to the Committees of the University as and when the same are asked for.

**6. Attendance Requirements:**

i. A student shall be eligible to appear for end semester examinations if he/she acquires a minimum of 75% of attendance in aggregate of all the subjects in a semester/ I year.

ii. **Shortage of Attendance below 65% in aggregate shall in <u>NO</u> case be condoned**.

iii. Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester or I year may be granted by the College Academic Committee.

iv. Students whose shortage of attendance is not condoned in any semester / I year are not eligible to take their end examination of that class and their registration shall stand cancelled.

v. A student will not be promoted to the next semester unless he/she satisfies the attendance requirements of the present semester / I year, as applicable. They may seek readmission for that semester / I year when offered next.

vi. A stipulated fee shall be payable towards condonation of shortage of attendance to the institution.

**7. Minimum Academic Requirements:**

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

i. A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory, practical, design, drawing subject or project if he/she secures not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the internal evaluation and end examination taken together. In the Seminar & Comprehensive viva – voce he/she should secure 40% put together.

ii. A student shall be promoted from II to III year only if he fulfills the academic requirement ofsecuring **26 credits (40%)** of the subjects that have been studied up to II year I semester.

a. One regular and one supplementary examinations of I year.

b. One regular examination of II year I semester irrespective of whether the candidate takes the end examination or not as per the normal course of study.

iii. A student shall be promoted from third year to fourth year only if he fulfills the academic requirements of securing 44 **credits(40%)** of the subjectsthat have been studied upto III year I semester from the following examinations,

a. Two regular and two supplementary examinations of I year.

b. Two regular and one supplementary examinations of II year I semester.

c. One regular and one supplementary examinations of II year II semester.

d. One regular examination of III year I semester irrespective of whether the candidate takes the end examination or not as per the normal course of study.

And in case of getting detained for want of credits by sections 7-(ii) and (iii), the student may make up the credits through supplementary exams of the above exams before the date of class work commencement of Third or Fourth year I semester respectively.

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

v. Students who fail to earn 180 credits as indicated in the course structure within eight academic years from the year of their admission shall forfeit their seat in B.Tech. course and their admission shall stand cancelled.

**8. Course pattern:**

i. The entire course of study is of four academic years. The first year shall be on yearly pattern and the second, third and fourth years on semester pattern.

ii. A student eligible to appear for the end examination in a subject, but absent at it or has failed in the end examination may appear for that subject at the next supplementary examination offered.

**9.Transitory Regulations:**

Candidates who have been detained for want of attendance or not fulfilled academic requirements or who have failed after having undergone the course in earlier regulations or have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same or equivalent subjects as and when subjects are offered, subject to Section **2** and they will be in the academic regulations into which the candidate is presently readmitted.

**10. With–holding of results**:

If the candidate has any dues not paid to the university or if any case of indiscipline or malpractice is pending against him, the result of the candidate shall be withheld and he will not be allowed / promoted into the next higher semester. The issue of awarding degree is liable to be withheld in such cases.

**11. 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/she 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 for the best 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 in internal evaluation and end examination shall be shown separately in the marks memorandum)

Further, the University, vide its University order RP/No. 164/2013 dt: 02.05.2013, has permitted for rounding of percentages to the extent of 0.5% to effect change of class from pass class to Second class, Second class to First class, First class to First class with distinction for all the courses being offered or to be offered by the college without adding any marks to the original marks secured by the students.

**12. Minimum Instruction Days:**

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

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

**14.** There shall be no place for transfer within the Constituent Colleges.

**15. General:**

i. **The academic regulations should be read as a whole for purpose of any interpretation.**

ii. **Malpractices rules- nature and punishments is appended**

iii. **Where the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".**

iv. **In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Principal is final.**

v. **The college may change or amend the academic regulations or syllabi at any time and the changes or amendments shall be made applicable to all the students on roles with effect from the dates notified by the institution.**

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# JNTUA COLLEGE OF ENGINEERING (Autonomous) PULIVENDULA

**Course structure for I B.TECH. COMPUTER SCIENCE ANDENGINEERING (Regular)**
**With effective from 2013-2014**

| S.No. | Course Code | Subject Name | Theory/Tutorial | Drawing/Lab | Credits |
|---|---|---|---|---|---|
| 1 | 13AHS01 | Communicative English | 2 | - | 3 |
| 2 | 13ABS01 | Engineering Physics | 2 | - | 3 |
| 3 | 13ABS03 | Engineering Chemistry | 2 | - | 3 |
| 4 | 13ABS04 | Mathematics-I | 3+1 | - | 5 |
| 5 | 13ABS05 | Mathematics-II | 3+1 | - | 5 |
| 6 | 13ACS01 | Programming in C and Data Structures | 3+1 | - | 5 |
| 7 | 13ABEE01 | Basic Electrical & Electronics Engineering | 3+1 | - | 5 |
| 8 | 13ACS03 | Engineering & IT Workshop | - | 3 | 4 |
| 9 | 13ACS02 | Programming in C and Data Structures Lab | - | 3 | 4 |
| 10 | 13ABS02 | Engineering Physics & Engineering chemistry Lab | - | 3 | 4 |
| 11 | 13AHS02 | Engineering Language Communication Skills Lab | - | 3 | 4 |
| | | Total | 22 | 12 | 45 |
| | | Total Contact Periods/Week : 34 | | | |
| | | Total Credits(7 Theory +4 Labs) : 45 | | | |

**II Year I Semester**

| S.No. | Course Code | Subject Name | Theory/Tutorial | Drawing/Lab | Credits |
|---|---|---|---|---|---|
| 1 | 13AME01 | Engineering Drawing | 3+1 | - | 3 |
| 2 | 13ABS08 | Probability and Statistics | 3+1 | - | 3 |
| 3 | 13ABS10 | Environmental Science | 3+1 | - | 3 |
| 4 | 13ACS04 | File Structures | 3+1 | - | 3 |
| 5 | 13ACS06 | Digital Logic Design | 3+1 | - | 3 |
| 6 | 13ABS09 | Discrete Mathematics | 3+1 | - | 3 |
| 7 | 13AEEE02 | Electrical and Electronics Engineering Lab | - | 3 | 2 |
| 8 | 13ACS05 | File Structures using C++ Lab | - | 3 | 2 |
| | | Total | 24 | 6 | |
| | | **Total Contact Periods / Week 30** | | | |
| | | **Total Credits ( 6 Theory + 2 Labs)** | | | **22** |

II Year II Semester

| S.No. | Course Code | Subject Name | Theory/Tutorial | Drawing/Lab | Credits |
|---|---|---|---|---|---|
| 1 | 13ACS07 | Computer Organization | 4 | - | 3 |
| 2 | 13ACS08 | Object Oriented Analysis, Design and Modeling | 4 | - | 3 |
| 3 | 13ACS10 | Java Programming | 4 | - | 3 |
| 4 | 13ACS12 | Formal Languages and Automata Theory | 4 | - | 3 |
| 5 | 13ACS13 | Principles of Programming Languages | 4 | - | 3 |
| 6 | 13AHS04 | Managerial Economics and Financial Accountancy | 4 | - | 3 |
| 7 | 13AC03 | Human Values and Professional Ethics | 2 | | - |
| 8 | 13AC09 | Object Oriented Analysis, Design and Modeling Lab | - | 3 | 2 |
| 9 | 13ACS11 | Java Programming Lab | - | 3 | 2 |
| | | Total | 26 | 6 | 22 |
| | | Total Contact Periods / Week : 32 | | | |
| | | Total Credits ( 6 Theory + 2 Labs) : 22 | | | |

**III B.Tech I Semester**

| S.No. | Course Code | Subject Name | Theory/Tutorial | Drawing/ Lab | Credits |
|---|---|---|---|---|---|
| 1 | 13ACS14 | Operating Systems | 3+1 | - | 3 |
| 2 | 13ACS15 | Advanced Data structures | 3+1 | - | 3 |
| 3 | 13ACS16 | Computer Networks | 3+1 | - | 3 |
| 4 | 13ACS17 | Software Engineering | 3+1 | - | 3 |
| 5 | 13ACS18 | Data Base Management Systems | 3+1 | - | 3 |
| 6 | 13AHS06 | Management Science | 3+1 | - | 3 |
| 7 | 13AHS05 | Advanced Communication Skills Lab | - | 3 | - |
| 8 | 13ACS19 | System Software Lab | - | 3 | 2 |
| 9 | 13ACS20 | Data Base Management Systems Lab | - | 3 | 2 |
| 10 | 13ACS21 | Comprehensive Online Examination | | | 1 |
| | | Total | 24 | 9 | 23 |
| | | **Total Contact Periods / Week : 33** | | | |
| | | **Total Credits : 23** | | | |

**III B.Tech II Semester**

| S.No. | Course Code | Subject Name | Theory/Tutorial | Drawing /Lab | Credits |
|---|---|---|---|---|---|
| 1 | 13ACS22 | Compiler Design | 3+1 | 2 | 3 |
| 2 | 13AEC25 | Microprocessors & Microcontrollers | 3+1 | - | 3 |
| 3 | 13ACS24 | Design and Analysis of Algorithms | 3+1 | - | 3 |
| 4 | 13ACS25 | Web Programming | 3+1 | - | 3 |
| 5 | 13ACS26 | Software Testing | 3+1 | - | 3 |
| 6 | **Choice Based Credit Course(Inter Department)** | | 3+1 | - | 3 |
| | **ANNEXURE-I** | | | | |
| 7 | 13AEC32 | Microprocessors &Microcontrollers Lab | | 3 | 2 |
| 8 | 13ACS29 | Web Programming & Compiler Design Lab | | 3 | 2 |
| 9 | 13ACS30 | Comprehensive Online Examination | | | 1 |
| | | | **24** | **6** | **23** |
| | | **Total contact periods/week : 30** | | | |
| | | **Total Credits : 23** | | | |

**ANNEXURE-I (Choice based credit course of inter department)**

| Branch | Course Code | Subjects |
|---|---|---|
| Physics | 13ABS11 | Nanomaterials And Engineering Application |
| Chemistry | 13ABS12 | Green Chemistry and Catalysis for Sustainable Environment |
| | 13ABS13 | Instrumental Methods of Chemical Analysis |
| | 13ABS14 | Chemistry of Nano Material and Application |
| English | 13AHS07 | Campus Recruitment Training & Soft Skills |
| | 13AHS08 | Competitive & Spoken English |
| Mathematics | 13ABS15 | Mathematical Modeling and Simulation |
| | 13ABS16 | Optimization Techniques |
| CE | 13ACE27 | Green Buildings |
| | 13ACE28 | Disaster Management and Mitigation |
| | 13ACE29 | Water Harvesting and Conservation |
| EEE | 13AEE23 | Renewable energy sources |
| | 13AEE14 | Power Electronics |
| | 13AEE24 | Electrical energy Management & Conservation |
| ME | 13AME30 | Robotics |
| | 13AME31 | Mechanical Manufacturing Process |
| | 13AME32 | Non Conventional Sources of Energy |
| ECE | 13AEC29 | Fundamentals of communication Systems |
| | 13AEC30 | Industrial Electronics |
| | 13AEC31 | Neural Networks & Fuzzy Logic |
| CSE | 13ACS14 | Operating Systems |
| | 13ACS18 | Database Management Systems |
| | 13ACS27 | Java Programming |
| BT | 13ABT27 | Immunology |
| | 13ABT28 | Downstream Processing |
| | 13ABT29 | Transport Phenomena in Bioprocess |

**IV B.Tech –I Semester**

| S.No. | Course Code | Subject Name | Theory/Tutorial | Drawing/ Lab | Credits |
|---|---|---|---|---|---|
| 1 | 13ACS31 | Data Warehousing and Data Mining | 3+1 | - | 3 |
| 2 | 13ACS32 | Cryptography and Network Security | 3+1 | - | 3 |
| 3 | 13ACS33 | Social Networking | 3+1 | - | 3 |
| 4 | 13ACS34 | Mobile Application Development | 3+1 | - | 3 |
| 5 | **Choice based Credit course-1(Department Specifie)** | | | | |
| | 13ACS35 | Cloud Computing | 3+1 | - | 3 |
| | 13ACS36 | LinuxAdministration&SocketProgramming | | | |
| | 13ACS37 | Business Analytics | | | |
| | 13ACS38 | Intellectual Property Rights & Cyber Laws | | | |
| 6 | **Choice based Credit course-1I(Department Specifie)** | | | | |
| | 13ACS39 | Information Retrieval Systems | 3+1 | - | 3 |
| | 13ACS40 | Human Computer Interaction | | | |
| | 13ACS41 | Computer Forensics | | | |
| 7 | 13ACS42 | Data Warehousing and Data Mining Lab | | 3 | 2 |
| 8 | 13ACS43 | Mobile Application Development Lab | | 3 | 2 |
| | | **Total** | **24** | **6** | **22** |
| | | **Total contact periods/week : 30** | | | |
| | | **Total Credits : 22** | | | |

**IV B.Tech II Semester**

| S.No. | Course Code | Subject Name | Theory/Tutorial | Drawing/ Lab | Credits |
|---|---|---|---|---|---|
| 1 | 13ACS44 | Big Data | 4 | - | 3 |
| 2 | 13ACS45 | Wireless Network Technologies | 4 | - | 3 |
| 3 | **MOOC-I** | **Subject -I** | 4 | - | 3 |
| | | **Subject -II** | | | |
| 4 | **MOOC-II** | **Subject -III** | | | |
| | | **Subject -IV** | | | |
| 5 | | Comprehensive Viva | - | - | 1 |
| 6 | | Seminar & Project Work | | 20 | 10 |
| | | **Total** | **16** | **20** | **23** |
| | | **Total contact periods/week : 36** | | | |
| | | **Total Credits : 23** | | | |

**CSE -I YEAR**

## COMMUNICATIVE ENGLISH

**1. INTRODUCTION:**

English is an international language as well as a living and vibrant one. People have found that knowledge of English is a passport for better career, better pay, advanced knowledge and for communication with the entire world. As it is a language of opportunities in this global age, English is bound to expand its domain of use everywhere. The syllabus has been designed to enhance communication skills of the students of engineering and technology. The prescribed books serve the purpose of preparing them for everyday communication and to face the global competitions in future.

The first text prescribed for detailed study focuses on LSRW skills and vocabulary development. The teachers should encourage the students to use the target language. The classes should be interactive and student-centered. They should be encouraged to participate in the classroom activities keenly.

The text for non-detailed study is meant for extensive reading/reading for pleasure by the students. They may be encouraged to read some select topics on their own, which could lead into a classroom discussion. In addition to the exercises from the texts done in the class, the teacher can bring variety by using authentic materials such as newspaper articles, advertisements, promotional material etc.

**2. OBJECTIVES:**

1. To enable the students to communicate in English for academic and social purpose
2. To enable the students to acquire structure and written expressions required for their profession.
3. To develop the listening skills of the students
4. To inculcate the habit of reading for pleasure
5. To enhance the study skills of the students with emphasis on LSRW skills

**3. SYLLABUS:**

**UNIT –I**

1. **Chapter titled –ASTROLOGER'S DAY (Humour) from "Using English"**
2. **Chapter titled 'HOMI JEHANGIR BHABHA' from 'New Horizons'**

L- Listening -Techniques - Importance of phonetics
L- Meet & Greet and Leave taking, Introducing Oneself and Others (Formal and Informal situations)
R- -Reading Strategies -Skimming and Scanning
W- Writing strategies- sentence structures
G-Parts of Speech –Noun-number, pronoun-personal pronoun, verb- analysis
V-Affixes-prefix and suffix, root words, derivatives

**UNIT –II**

1. **Chapter titled –BUILDING A NEW STATE (Inspiration) from "Using English"**
2. **Chapter titled 'MY STRUGGLE FOR AN EDUCATION' from "New Horizons"**

L- Listening to details
S- Apologizing, Interrupting, Requesting and Making polite conversations
R-note making strategies
W- Paragraph-types- topic sentences, unity, coherence, length , linking devices
G-Auxiliary verbs and question tags
V- synonyms-antonyms, homonyms , homophones, homographs, words often confused

**UNIT –III**

1. **Chapter titled WATER THE ELIXIR OF LIFE ('Sustainable Development) from "Using English"**
2. **Chapter titled 'THE AUTOBIOGRAPHY OF ABRAHAM LINCOLN' from "New Horizons"**

L- Listening to themes and note taking
S- Giving instructions and Directions, making suggestions, Accepting ideas, fixing a time and Advising
R- Reading for details -1
W- Resume and cover letter
G- Tenses – Present tense, Past tense and Future tense
V-Word formation and One-Word Substitutes

**UNIT –IV**

1. **Chapter titled THE WOODROSE ('Relationships') from "Using English"**
2. **Chapter titled 'THE HAPPY PRINCE' from "New Horizons"**

L- Listening to news
S- Narrating stories, Expressing ideas and opinions and telephone skills
R- Reading for specific details and Information
W- Technical Report writing-strategies, formats-types-technical report writing
G- Voice and Subject – Verb Agreement
V- Idioms and prepositional Phrases

**UNIT –V**

1. **Chapter titled PROGRESS 'Science and Humanism' from "Using English"**
2. **Chapter titled 'IF' from "New Horizons"**

L -Listening to speeches
S- Making Presentations and Group Discussions
R- Reading for Information
W- E-mail drafting
G- Conditional clauses and conjunctions
V- Collocations and Technical Vocabulary and using words appropriately

**4.EXPECTED OUTCOME:**

The students will get the required training in LSRW skills through the prescribed texts and develop communicative competence

**Prescribed Books:**

1. **Using English** published by Orient Black Swan,2013
2. **New Horizons** published by Pearson,2013

**SUGGESTED READING:**


1. **Raymond Murphy's English Grammar with CD,** Murphy, Cambridge University Press, 2012.
2. **English Conversation Practice –**Grant Taylor, Tata McGraw Hill,2009.
3. **Communication SKILLS, Sanjay Kumar & Pushpalatha** Oxford University Press, 2012.
4. **A Course in Communication Skills**- Kiranmai Dutt & co. Foundation Books, 2012.
5. **Living English Structures**- William Standard Allen-Pearson, 2011.
6. **Current English grammar and usage-**S M Guptha, PHI, 2013.
7. **Modern English Grammar-**Krishna SWAMI .McMillan, 2009.
8. **Powerful Vocabulary Builder**- Anjana Agarwal New Age International Publishers, 2011.

**CSE -I YEAR**

## ENGINEERING PHYSICS

(Common to all branches of Engineering)

**PREAMBLE:**

The study of Engineering Physics leads to the development of scientific temper and analytical capability through learning physical concepts and their applications in engineering and technology fields. Comprehension of some basic physical concepts will enable the students to logically solve engineering problems.

UNIT 1: **PHYSICAL OPTICS, LASERS AND FIBRE OPTICS**

**Objectives: To evoke interest on applications of superposition effects like interference and diffraction, the mechanisms of emission of light, achieving amplification of electromagnetic radiation through stimulated emission, study of propagation of light through transparent dielectric waveguides along with engineering applications.**

*Physical Optics:* Interference – Formation of Newton's Rings by reflection –Working principle of Michelson Interferometer - Fraunhofer diffraction due to single slit, double slit and diffraction grating.

*Lasers:* Characteristics of laser – Spontaneous and stimulated emission of radiation –- Einstein's coefficients –– Population inversion – optical resonator - He-Ne laser – $CO_2$ laser –Semiconductor laser - Applications of lasers - Holography

*Fiber optics:* Structure and working principle of optical fiber –Numerical aperture and acceptance angle – Types of optical fibers – Attenuation and losses in fibers - Optical fiber communication system – Fiber optic sensors

UNIT 2**:CRYSTALLOGRAPHY AND ULTRASONICS**

**Objectives: To enlighten the periodic arrangement of atoms in crystals, direction of Bragg planes, crystal structure determination by X-rays and also to understand different types of defects in crystals and non-destructive evaluation using ultrasonic techniques.**

*Crystallography:* Introduction – Space lattice –Unit cell – Lattice parameters –Bravias lattice – Crystal systems – Packing fractions of SC, BCC and FCC - Structures of NaCl and Diamond –Directions and planes in crystals – Miller indices – Interplanar spacing in cubic crystals – Bragg's law - X-ray diffraction – Bragg's Spectrometer – Defects in solids: point defects.

*Ultrasonics:* Introduction – Production of ultrasonics by Magnetrostriction & piezoelectric methods – Properties and detection – Applications in non-destructive testing.

UNIT 3: **QUANTUM MECHANICS AND FREE ELECTRON THEORY**

**Objectives: To get an insight into the microscopic meaning of conductivity , classical and quantum free electron model, the effect of periodic potential on electron motion, evolution of band theory to distinguish materials and to understand electron transport mechanism in solids.**

*Quantum Mechanics:* Introduction to matter waves – de'Broglie hypothesis - Heisenberg's uncertainty principle - Schrodinger's time independent and time dependent wave equation – Significance of wave function - Particle in one dimensional infinite potential well - Eigen values and Eigen functions.

*Free electron theory:* Classical free electron theory – Equation for electrical conductivity - Quantum free electron theory – Fermi-Dirac distribution –Kronig-Penny model (qualitative) – Origin of bands in solids – Classification of solids into conductors, semiconductors and insulators.

UNIT 4: **SEMICONDUCTORS, MAGNETIC MATERIALS AND DIELECTRICS**

**Objectives: To open new avenues of knowledge and understanding semiconductor based electronic devices , basic concepts and applications of semiconductors, magnetic materials and dielectrics have been introduced which find potential in the emerging micro device applications.**

*Semiconductors:* Introduction – Intrinsic and extrinsic semiconductors – Drift & diffusion currents and Einstein's equation – Hall effect - Direct and indirect band gap semiconductors – Working principle of p-n junction diode.

*Magnetic materials:* Introduction and basic definitions – Origin of magnetic moments – Bohr magnetron – Classification of magnetic materials into dia, para, ferro, antiferro and ferri magnetic materials (Qualitative) – Hysteresis - Soft and hard magnetic materials and applications.

*Dielectrics:* Dielectric Polarization – Types of Polarization – Lorentz field – Clausius-Mosotti equation.

UNIT 5: **SUPERCONDUCTIVITY AND PHYSICS OF NANOMATERIALS**

**Objectives: To give an impetus on the subtle mechanism of superconductors in terms of conduction of electron pairs using BCS theory, different properties exhibited by them and their fascinating applications. Considering the significance of microminiaturization of electronic devices and significance of low dimensional materials, the basic concepts of nanomaterials, their synthesis, properties and applications in emerging technologies are elicited.**

*Superconductivity:* Introduction – Meissner effect - Properties of superconductors – Type I and type II superconductors – Flux quantization – BCS theory (qualitative) – High $T_c$ superconductors - Applications of superconductors.

*Physics of Nanomaterials*: Introduction - Significance of nanoscale - Surface area and quantum confinement – Physical properties: optical, thermal, mechanical and magnetic properties – Synthesis of nanomaterials: ball mill, chemical vapour deposition, and thermal evaporation – Carbon nanotubes – properties – High strength applications - Graphene- Properties – Applications.

OUTCOMES:

- The different realms of physics and their applications in both scientific and technological systems are achieved through the study of physical optics, lasers and fibre optics.
- The important properties of crystals like the presence of long-range order and periodicity, structure determination using X-ray diffraction are focused along with defects in crystals and ultrasonic non-destructive techniques.
- The discrepancies between the classical estimates and laboratory observations of physical properties exhibited by materials would be lifted through the understanding of quantum picture of subatomic world.
- The electronic and magnetic properties of materials were successfully explained by free electron theory and the basis for the band theory are focussed.
- The properties and device applications of semiconducting, magnetic and dielectric materials are illustrated.
- The importance of superconducting materials and nanomaterials along with their engineering applications are well elucidated.

**Prescribed Text books:**

1. Engineering Physics – Hitendra K Mallik and AK Singh
   MacGraw Hill Publishers, New Delhi
2. Engineering physics – S. ManiNaidu, Pearson Education, New Delhi
3. Engineering Physics – K.Thyagarajan, MacGraw Hill Publishers, NewDelhi

**Reference Books:**

1. Engineering Physics – B K Pandey, S. Chaturvedi, Cengage Learning, New Delhi
2. Engineering Physics – V.Rajendran, MacGraw Hill Publishers, NewDelhi
3. Engineering Physics - Sanjay D. Jain, Girish D Sahasrabudhe
   University Press, Hyderabad

3. Engineering physics – M.N. Avadhanulu and P.G. KrshiSagar,
   Chand and Co, New Delhi
4. Text book of Nanoscience and Nanotechnology: B S Murthy, P.Shankar,
   Baldev Raj B B Rath, James Murday, University Press
5. Carbon nanotubes and Graphene Device Physics – H.S. Philip Wong, Deji
   Akinwande, Cambridge University Press

**CSE -I YEAR**

## ENGINEERING CHEMISTRY

Preamble: Knowledge in chemistry serves as basic nutrient for the understanding and thereby design of materials of importance in life. Thus the advancement in Engineering is depending on the outcome of basic sciences. Many advances in engineering either produce a new chemical demand as in the case of polymers or wait upon chemical developments for their applications as in the case of implants and alloys. Currently the electronics and computer engineers are looking forward for suitable biopolymers and nano materials for use in miniature super computers, the electrical engineers are in search of proper conducting polymers, the mechanical engineers are on lookout for micro fluids and the civil engineers are looking for materials that are environmental friendly, economical but long lasting.

COURSE OBJECTIVES (CO):

- The Engineering Chemistry course for undergraduate students is framed to strengthen the fundamentals of chemistry and then build an interface of theoretical concepts with their industrial/engineering applications.
- The course main aim is to impart in-depth knowledge of the subject and highlight the role of chemistry in the field of engineering.
- The lucid explanation of the topics will help students understand the fundamental concepts and apply them to design engineering materials and solve problems related to them. An attempt has been made to logically correlate the topic with its application.
- The extension of fundamentals of electrochemistry to energy storage devices such as commercial batteries and fuel cells is one such example.
- After the completion of the course, the student would understand about the concepts of chemistry in respect of Electrochemical cells, fuel cells, mechanism of corrosion and factors to influence, polymers with their applications, engineering materials and water chemistry.

**UNIT.1: ELECTROCHEMISTRY**

i).Review of electrochemical cells, Numerical calculations, Batteries: Rechargeable batteries (Lead acid, Ni-Cd, Lithium Ion Batteries), Fuels cells: (Hydrogen-Oxygen and Methanol-Oxygen)

ii). Voltammetry: Basic Principles and applications (Ferrous/Ferric System)

Electrochemical sensors: Potentiometric Sensors and voltammetric sensors. Examples : analysis of Glucose and urea

iii).Corrosion: Electrochemical Theory of corrosion, Factors affecting the corrosion. Prevention: Anodic and cathodic protection and electro and electroless plating.

**UNIT.2: POLYMERS**

i).Introduction to polymers, Polymerisation process, mechanism: cationic, anionic, free radical and coordinate covalent, Polydispercity Index.

Elastomers (rubbers)

Natural Rubber; Compounding of Rubber

Synthetic Rubber: Preparation, properties and engineering applications of Buna-S, buna-N, Polyurethene, Polysulfide (Thiokol) rubbers

Plastomers: Thermosetting and Thermoplatics, Preparation, properties and Engineering applications , PVC, Bakelite, nylons, Polyester

ii).Conducting polymers: Mechanism, synthesis and applications of polyacetyline, polyaniline.

iii).Liquid Crystals: Introduction, classification and applications

iv).Inorganic Polymers: Introduction, Silicones, Polyphospazins (-(R)2-P=N-), applications

**UNIT.3: FUEL TECHNOLOGY**

Classifications of Fuels – Characteristics of Fuels- Calorific Value – Units, Numerical Problems.

i). Solid Fuels–Coal, Coke : Manufacture of Metallurgical Coke by Otto Hoffmann's by product oven processes.

ii).Liquid Fuels:

Petroleum: Refining of Petroleum, Gasoline: Octane Number, Synthetic Petrol: Bergius Processes, Fischer Troph's synthesis

Power Alcohol: Manufacture, merits and demerits of Power Alcohol

iii). Gaseous Fuels: Origin, Production and uses of Natural gas, Producer gas, Water gas, Coal gas and Biogas. Flue Gas analysis by Orsat's apparatus, Solving of problems on Combustion.

iv). Bio Fuels: Biogas, Biodiesel and their significance

**UNIT.4: CHEMISTRY OF ENGINEERING MATERIALS**

i).Semiconducting and Superconducting materials-Principles and some examples

ii).Magnetic materials – Principles and some examples

iii).Cement: Composition, Setting and Hardening (Hydration and Hydrolysis)

iv).Refractories: Classification , properties and applications

v).Lubricants: Classification and characteristics of lubricants, Theory of lubrication.

vi). Rocket Propellants: Classification, Characteristics of good propellant

**UNIT.5: WATER TREATMENT**

Impurities in water, Hardness of water and its Units, Disadvantages of hard water, Estimation of hardness by EDTA method, Numerical problems on hardness, Estimation of dissolved oxygen, Alkalinity, acidity and chlorides in water, Water treatment for domestic purpose (Chlorination, Bleaching, ozonisation, U.V. treatment)

Industrial Use of water:

For steam generation, troubles of Boilers: Scale & Sludge, Priming and Foaming, Caustic Embrittlement and Boiler Corrosion.

Treatment of Boiler Feed water:

Internal Treatment: Colloidal, Phosphate, Carbonate, Calgon and sodium aluminate treatment.

External Treatment: Ion-Exchange and Permutit processes.

Demineralisation of brackish water: Reverse Osmosis and Electrodialysis

**EXPECTED OUTCOMES (EO):** The student is expected to:

- Understand the electrochemical sources of energy
- Understand industrially based polymers, various engineering materials.
- Differentiate between hard and soft water. Understand the disadvantages of using hard water domestically and industrially. Select and apply suitable treatments domestically and industrially.

**Text Books**:

**1.** Engineering Chemistry by KNJayaveera, GVSubba Reddy and C. Ramachandraiah, McGraw Hill Higher Education, New Delhi, Foruth Edition, 2012.

**2.** A Text book of Engineering Chemistry by S.S Dhara, S.S.Umare, S. Chand Publications, New Delhi, 12th Edition, 2010.

**REFERENCES:**

1. A Text Book of Enigneering Chemistry, Jain and Jain, Dhanapath Rai Publishing Company, New Delhi, 15th Edition, 2010.

2. Engineering Chemistry, K. Sesha Maheswaramma and Mrudula Chugh, Pearson Education, First Edition, 2013.

3.Engineering Chemistry by K.B.Chandra Sekhar, UN.Das and Sujatha Mishra, SCITECH, Publications India Pvt Limited, Chennai, 2nd Edition, 2012.

4.Concepts of Engineering Chemistry- Ashima Srivastavaf and N.N. Janhavi, Acme Learning Pvt Ltd, First Edition, 2013.

5. Text Book of Engineering Chemistry – C. Parameswara Murthy, C.V.Agarwal and Andra Naidu, BS Publications, Hyderabad, 3rd Edition, 2008.

6. Text Book of Engineering Chemistry, Shashichawla, Dhanapath Rai Publications, New Delhi, 4th Edition, 2011

**CSE -I YEAR**

## MATHEMATICS-I

**Objectives**

- To train the students thoroughly in Mathematical concepts of ordinary differentialequations and their applications in electrical circuits, deflection of beams, whirling ofshafts.
- To prepare students for lifelong learning and successful careers using mathematicalconcepts of differential, Integral and vector calculus, ordinary differential equationsand Laplace transforms.
- To develop the skill pertinent to the practice of the mathematical concepts includingthe students abilities to formulate the problems, to think creatively and to synthesizeinformation.

**UNIT – I**

Exact, linear and Bernoulli equations. Applications to Newton's law of cooling, law of natural growth and decay, orthogonal trajectories.

Non-homogeneous linear differential equations of second and higher order with constantcoefficients with RHS term of the type eax, Sin ax, cos ax, polynomials in x, eax V(x), xV(x),method of variation of parameters. Applications to oscillatory electrical circuits, Deflectionof Beams, whirling of shafts.

**UNIT – II**

Taylor's and Maclaurin's Series - Functions of several variables – Jacobian – Maxima and Minima of functions of two variables, Lagrange's method of undetermined Multipliers with three variables only. Radius of curvature, center of curvature, Involutes evolutes, envelopes.

**UNIT – III**

Curve tracing – Cartesian, polar and parametric curves. Length of curves.

Multiple integral – Double and triple integrals – Change of Variables – Change of order of integration. Applications to areas and volumes, surface area of solid of revolution in Cartesian and polar coordinates using double integral.

**UNIT – IV**

Laplace transform of standard functions – Inverse transform – First shifting Theorem, Transforms of derivatives and integrals – Unit step function – Second shifting theorem – Dirac's delta function – Convolution theorem – Laplace transform of Periodic function. Differentiation and integration of transform – Application of Laplace transforms to ordinary differential equations of first and second order.

**UNIT – V**

Vector Calculus: Gradient – Divergence – Curl and their properties; Vector integration – Line integral - Potential function – Area – Surface and volume integrals. Vector integral theorems: Green's theorem – Stoke's and Gauss's Divergence Theorem (Without proof). Application of Green's – Stoke's and Gauss's Theorems.

**TEXT BOOKS:**

1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers-42 Edition(2012)
2. Engineering Mathematics, Volume - I, E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher 1st Edition (2010)

**REFERENCES:**

1. Engineering Mathematics Volume-I, by T.K.V. Iyengar, S.Chand publication-12th Edition(2013)
2. Engineering Mathematics, Volume - I, by G.S.S.Raju, CENGAGE publisher.(2013)
3. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India-10thEdition(2012)
4. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers(2008)
5. Advanced Engineering Mathematics, by Alan Jeffrey, Elsevier-1st Edition(2001)

**Outcomes:**

- The students become familiar with the application of differential, integral and vector calculus, ordinary differential equations and Laplace transforms to engineering problems.
- The students attain the abilities to use mathematical knowledge to analyze and solve problems in engineering applications.

**CSE -I YEAR**

## MATHEMATICS-II

**Objectives:**

- This course aims at providing the student with the concepts of Matrices, Fourierseries, Fourier and Z-transforms and partial differential equations which find theapplications in engineering.
- Our emphasis will be more on logical and problem solving development in Numerical methods and their applications.

**UNIT – I**

Rank – Echelon form, normal form – Consistency of System of Linear equations. Linear transformations

Hermitian, Skew-Hermitian and Unitary matrices and their properties. Eigen Values, Eigen vectors for both real and complex matrices. Cayley – Hamilton Theorem and its applications – Diagonolization of matrix. Calculation of powers of matrix. Quadratic forms – Reduction of quadratic form to canonical form and their nature.

**UNIT – II**

Solution of Algebraic and Transcendental Equations: The Bisection Method – The Method of False Position– Newton-Raphson Method.

**Interpolation:** Newton's forward and backward interpolation formulae – Lagrange's Interpolation formula.

Curve fitting: Fitting of a straight line – Second degree curve – Exponentional curve-Power curve by method of least squares. Numerical Differentiation and Integration – Trapezoidal rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule.

**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 – Predictor-Corrector Method – Milne's Method. Numerical solution of Laplace equation using finite difference approximation.

Fourier Series: Determination of Fourier coefficients – Fourier series – Even and odd functions – Fourier series in an arbitrary interval – Even and odd periodic continuation – Half-range Fourier sine and cosine expansions.

**UNIT – IV**

Fourier integral theorem (only statement) – Fourier sine and cosine integrals. Fourier transform – Fourier sine and cosine transforms – Properties – Inverse transforms – Finite Fourier transforms.

z-transform – Inverse z-transform – Properties – Damping rule – Shifting rule – Initial and final value theorems. Convolution theorem – Solution of difference equations by ztransforms.

**UNIT – V**

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Method of separation of variables – Solutions of one dimensional wave equation, heat equation and two-dimensional Laplace's equation under initial and boundary conditions.

**TEXT BOOKS:**

1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers- 42 Edition(2012)
2. Introductory Methods of Numerical Analysis, S.S. Sastry, PHI publisher 5th Edition(2012)

**REFERENCES:**

1. Engineering Mathematics, Volume - II, E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher-1st Edition (2010)
2. Engineering Mathematics, Volume - II, by G.S.S.Raju, CENGAGE publisher – 1st Edition(2013)
3. Mathematical Methods by T.K.V. Iyengar, S. Chand publication-8th Edition(2013)
4. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers(2008)
5. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India 10$^{th}$Edition(2013)

**Outcomes:**

- The student becomes familiar with the application of Mathematical techniques like Fourier series, Fourier and z-transforms.
- The student gains the knowledge to tackle the engineering problems using the concepts of Partial differential equations and Numerical methods.

**CSE -I YEAR**

# PROGRAMMING IN C AND DATA STRUCTURES

**Course Objectives:**

- To make the student understand problem solving techniques
- Students will be able to understand the syntax and semantics of C programming language and other features of the language
- Get acquaintance with data structures, searching and sorting techniques

**Course Outcomes:**

- Student can effectively apply problem solving techniques in designing the solutions for a wide-range of problems
- Student can choose appropriate data structure and control structure depending on the problem to be solved
- Student can effectively use existing data structures and design new data structures appropriate to the problem to be solved
- Student can modularize the problem and also solution
- Student can use appropriate searching and sorting technique to suit the application

**Unit-I**

**Introductory Concepts**: Introduction to computers, What is a Computer, Block diagram of Computer, Computer Characteristics, Hardware Vs Software, How to develop a program, Software development life cycle, Structured programming, Modes of operation, Types of programming languages, Introduction to C, Desirable program characteristics.

**Introduction to Computer problem solving**: Introduction, The problem solving aspect, Top down design, Implementation of algorithms.

**Introduction to C programming**: The C character set, Writing first program of C, Identifiers and key words, A more useful C program, Entering the program into the computer, Compiling and executing the program, Data types, Constants, Variables and arrays, Declarations, Expressions, Statements, Symbolic Constants.

**Operators and Expressions**: Arithmetic operators, Unary operators, Relational and Logical operators, Assignment operators, Conditional operator, Library functions.

**Fundamental algorithms**: Exchanging the values of two variables, Factorial computation, Sine function computation, Reversing the digits of an integer, Generating prime numbers.

**Unit-II**

**Data Input and Output**: Preliminaries, Single character input-getchar function, Single character output-putchar function, Entering input data-the scanf function, More about the scanf function, Writing output data-The printf function, More about the printf function, The gets and puts functions, Interactive(conversational) programming.

**Preparing and running a complete C program**: Planning a C program, Writing a C program, Error diagnostics, Debugging techniques.

**Control statements**: Preliminaries, Branching: if-else statement, Looping: The while statement, More looping: The do-while statement, Still more looping: The for statement, Nested control structures, The switch statement, Break statement, Continue statement, The comma operator, The goto statement.

**Functions**: A brief overview, Defining a function, Accessing a function, Function prototypes, Passing arguments to a function, Recursion

**Unit-III**

**Program Structure**: Storage classes, Automatic variables, External (global) variables, Static variables, Multi file programs, More about library functions.

**Arrays**: Defining an array, Processing an array, Passing arrays to functions, Multi dimensional arrays.

Array Techniques: Array order reversal, Removal of duplicates from an ordered array, Finding the $K^{th}$ smallest element.

**Merging, Sorting and Searching**: The two way merge, Sorting by selection, Sorting by exchange, Sorting by insertion, Sorting by partitioning, Recursive Quick sort, Binary Search.

**Strings:** Defining a string, NULL character, Initialization of strings, Reading and Writing a string, Processing the strings, Character arithmetic, Searching and Sorting of strings, Some more Library functions for strings

**Unit-IV**

**Pointers**: Fundamentals, Pointer Declarations, Passing pointer to a function, Pointers and one dimensional array, Dynamic memory allocation, Operations on pointers, Pointers and multi dimensional arrays, Arrays of pointers, Passing functions to other functions, More about pointer declarations.

**Structures and Unions**: Defining a structure, Processing a structure, User defined data type (typedef), Structures and Pointers, Passing structures to functions, Unions.

**File Handling**: Why files, Opening and closing a data file, Reading and Writing a data file, Processing a data file, Unformatted data files, Concept of binary files, Accessing the file randomly (using fseek).

**Additional Features**: Register variables, Bitwise operations, Bit Fields, Enumerations, Command line parameters, More about Library functions, Macros, The C Preprocessor

**Unit-V**

**Introduction to Data Structures**: Data abstraction

**Stacks and Queues**: Stacks, Stacks using dynamic arrays, Queues, Circular Queues using dynamic arrays

**Evaluations of expressions**: Expressions, Evaluating postfix expressions, Infix to Postfix, Multiple Stacks and Queues.

**Linked Lists**: Singly Linked lists and chains, Representing chains in C, Linked Stacks and Queues.

**Text Books:**

1. "Programming with C", Byron Gottfried, Third Edition, Schaum's Outlines, 3rd edition, 2010, Mc Graw Hill.
2. "Fundamentals of Data Structures in C", Horowitz, Sahni, Anderson-freed, 2nd Edition, 2011, Universities Press.
3. "How to Solve it by Computer", R.G. Dromey, 14th impression, 2013, Pearson. (*Pascal implementations may be considered without loss of generality or Instructors may replace them with C language programs*)

**References:**

1. "Programming in C", Pradip Dey, Manas Ghosh, Oxford Higher Education
2. "Programming in C and Data Structures", Hanly, Koffman, Kamthane, Ananda Rao, Pearson.
3. "Programming in C", Reema Thareja, Oxford Higher Education.
4. "Computer Fundamentals and C Programming", First Edition, Dr.P.Chenna Reddy, Available at: www.pothi.com.
5. "Data Structure and Program Design in C", Second Edition, Kruse, Tondo, Leung, Mogalla, Pearson.
6. "Programming with C", R.S. Bichkar, University Press.
7. "Computer Science A Structured Programming Approach Using C", Third Edition, Fourouzan & Gilberg, Cengage Learning.

**CSE -I YEAR**

## BASIC ELECTRICAL & ELECTRONICS ENGINEERING
## Part A

**UNIT I: Fundamentals of Electrical Circuits**

Circuit Concept–R-L-C Parameters -Kirchhoff's Laws – Network Reduction Techniques-Series, Parallel, Series Parallel, Star-to-Delta or Delta-to-Star Transformation. R.M.S, Average Values and Form Factor for Different Periodic Wave Forms – Sinusoidal Alternating Quantities – Phase and Phase Difference. Concept of Power Factor-Concept of Reactance, Impedance, Susceptance and Admittance-Real and Reactive Power, Complex Power. Examples. Star Delta Transformation Technique. Thevenin's, Norton's and Superposition Theorems for D.C Excitations.

**UNIT II: DC Machines**

Principle of Operation of DC Machines, Constructional features, EMF equation, Types of Generators, Magnetization and load characteristics of DC Generators.

DC motors, Types of DC Motors, Characteristics of DC Motors, Losses and Efficiency, Swinburne's Test, Speed control of DC Shunt and series Motors, Flux and Armature voltage control methods.

**UNIT III: Transformers & Induction machines**

Principle of Operation of Single Phase transformer, Types, Constructional Features, EMF equation, Phasor Diagrams for no load and loaded conditions, efficiency of Transformer and regulation, OC and SC Tests, predetermination of Efficiency and Regulation (Simple Problems). Concept of rotating field, Principle of Operation of induction motors.

**TEXT BOOKS**

1. Network Analysis – A Sudhakar, Shyammohan S.Palli, 3 ed., 2009. TMH.
2. Introduction to Electrical Engineering – M.S.Naidu and S. Kamakshaiah, 2008, TMH.

**REFERENCES**

1. Network analysis and Synthesis – CL Wadhwa, 3 ed., 2007, New Age International Publishers.

ENGINEERING COLLEGE PULIVENDULA

# PART-B

**Objective:**

- The objective of this Course is to provide the students with an introductory and broad treatment of the field of Electronics Engineering.

**UNIT – IV**

**Semiconductor Devices:** Intrinsic semiconductors-Electron-Hole Pair Generation, Conduction in Intrinsic Semiconductors, Extrinsic Semiconductors-N-Type and P-Type Semiconductors, Comparison of N-Type and P-Type Semiconductors. The p-n Junction - Drift and Diffusion Currents, The p-n Junction Diode-Forward Bias, Reverse Bias, Volt-Ampere Characteristics- Diode Specifications, Applications of Diode, Diode as a Switch. Diode as a Rectifier-Half-wave Rectifier, Full-Wave Rectifier, Full-Wave Bridge Rectifier, Rectifiers with Filters, Zener Diode- Volt-Ampere Characteristics, Zener Diode as Voltage Regulator.

**UNIT – V**

**BJT and FETs:** Bipolar Junction Transistor (BJT) – Types of Transistors, Operation of NPN and PNP Transistors, Input-Output Characteristics of BJT-CB, CE and CC Configurations, Relation between $I_C$, $I_B$ and $I_E$.Transistor Biasing- Fixed Bias, Voltage Divider Bias, Transistor Applications- Transistor as an Amplifier, Transistor as a Switch,. Junction Field Effect Transistor (JFET)- Theory and Operation of JFET, Output Characteristics, Transfer Characteristics, Configurations of JFET-CD, CS and CG Configurations, JFET Applications- JFET as an Amplifier, JFET as a Switch, Comparison of BJT and JFET,MOSFET-The Enhancement and Depletion MOSFET, Static Characteristics of MOSFET, Applications of MOSFET

**UNIT – VI**

**Oscillators and Op-Amps:** Sinusoidal Oscillators, Barkhausen Criteria for Oscillator Operation, Components of an Oscillator-Transistor Amplifier Circuits, Feedback Circuits and Oscillator Circuits, Classification of Oscillators, LC Tuned, RC Phase Shift Oscillator circuits.

**Operational Amplifiers(Op-Amps)-**Symbol of an Op-Amp, single Input and Dual Input Op-Amps(Differential Amplifier), Characteristics of an Ideal Op-Amp, Basic Forms of Op-Amps-Inverting & Non-Inverting Amplifiers, Applications of Op-Amps, summing, Differential, Integrator, differentiator Amplifier.

**Text Books:**

1. Basic Electrical Engineering by D P KOTHARI & I J NAGRATH, Tata McGraw Hill, Second Edition, 2007.
2. Electrical Circuit Theory and Technology by JOHN BIRD, Routledge publisher, 4Th Edition, 2011.
3. Basic Electrical and Electronics Engineering, M.S.Sukhija, T.K.Nagsarkar, Oxford University Press, 1st Edition, 2012.
4. Basic Electrical and Electronics Engineering, S.K Bhattacharya, Pearson Education, 2012.

**Reference Books :**

1. Electrical & Electronic Technology by Edward Hughes, 10th Edition, Pearson, 2008
2. “Basic Electrical Engineering”, Uma Rao, Sanguine-Pearson.

**CSE -I YEAR**

**Engineering &IT Workshop**(13ACS03)

**ENGINEERING WORKSHOP**

**(*common for all branches)***

***Course Objective:***

- *The objective of this Lab is to provide the basic concepts about different manufacturing processes, use of various workshops tools and exposer to the power tools.*
- *Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.*

**TRADES FOR EXERCISES:**

**At least 2 exercise in each:**

1. Carpentry
2. Fitting
3. House-wiring
4. Foundry
5. Tin smithy
6. Power Tools Demonstration.

**TEXT BOOK:**

1. Work shop Manual / P.Kannaiah/ K.L.Narayana/Scitech Publishers.
2. Workshop practice manual by K.Venkata Reddy B.S Publications

Codes / Tables : will be provided

Question Paper pattern: Test in any two trades out of 6 trades.

***Course outcomes***

- *Workshop practice is the backbone of the real industrial environment which helps to develop and enhance relevant technical hand skills required by the technician working in the various engineering industries and workshops.*
- *This course intends to impart basic know-how of various hand tools and their use in different sections of manufacturing.*
- *Irrespective of branch, the use of workshop practices in day to day industrial as well domestic life helps to dissolve the problems.*
- *Workshop curricula build the hands on experiences which would help to learn manufacturing processes and production technology courses in successive semesters.*
- *Workshop practice is also important since only practice can make the man perfect.*

**Course Objectives:**

- To provide Technical training to the students on Productivity tools like Word processors, Spreadsheets, Presentations
- To make the students know about the internal parts of a computer, assembling a computer from the parts, preparing a computer for use by installing the operating system
- To learn about Networking of computers and use Internet facility for Browsing and Searching

**Course Outcomes:**

- Disassemble and Assemble a Personal Computer and prepare the computer ready to use
- Prepare the Documents using Word processors
- Prepare Slide presentations using the presentation tool
- Interconnect two or more computers for information sharing
- Access the Internet and Browse it to obtain the required information
- Install single or dual operating systems on computer

**Preparing your Computer ( 5 weeks)**

**Task 1: Learn about Computer:** Identify the internal parts of a computer, and its peripherals. Represent the same in the form of diagrams including Block diagram of a computer. Write specifications for each part of a computer including peripherals and specification of Desktop computer. Submit it in the form of a report.

**Task 2: Assembling a Computer:** Disassemble and assemble the PC back to working condition. Students should be able to trouble shoot the computer and identify working and non-working parts. Student should identify the problem correctly by various methods available (eg: beeps). Students should record the process of assembling and trouble shooting a computer.

**Task 3: Install Operating system:** Student should install Linux on the computer. Student may install another operating system (including proprietary software) and make the system dual boot or multi boot. Students should record the entire installation process.

**Task 4**: **Operating system features**: Students should record the various features that are supported by the operating system(s) installed. They have to submit a report on it. Students should be able to access CD/DVD drives, write CD/DVDs, access pen drives, print files, etc. Students should install new application software and record the installation process.

**Networking and Internet (4 weeks)**

**Task 5:Networking**: Students should connect two computers directly using a cable or wireless connectivity and share information. Students should connect two or more computers using switch/hub and share information. Crimpling activity, logical configuration etc should be done by the student. The entire process has to be documented.

**Task 6:Browsing Internet**: Student should access the Internet for Browsing. Students should search the Internet for required information. Students should be able to create e-mail account and send email. They should get acquaintance with applications like Facebook, skype etc.

If Intranet mailing facility is available in the organization, then students should share the information using it. If the operating system supports sending messages to multiple users (LINUX supports it) in the same network, then it should be done by the student. Students are

expected to submit the information about different browsers available, their features, search process using different natural languages, and creating e-mail account.

**Task 7: Antivirus:** Students should download freely available Antivirus software, install it and use it to check for threats to the computer being used. Students should submit information about the features of the antivirus used, installation process, about virus definitions, virus engine etc.

**Productivity tools (6 weeks)**

**Task 8: Word Processor:** Students should be able to create documents using the word processor tool. Some of the tasks that are to be performed are inserting and deleting the characters, words and lines, Alignment of the lines, Inserting header and Footer, changing the font, changing the colour, including images and tables in the word file, making page setup, copy and paste block of text, images, tables, linking the images which are present in other directory, formatting paragraphs, spell checking, etc. Students should be able to prepare project cover pages, content sheet and chapter pages at the end of the task using the features studied. Students should submit a user manual of the word processor considered.

**Task 9: Spreadsheet:** Students should be able to create, open, save the application documents and format them as per the requirement.Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spreadsheet application considered.

**Task 10: Presentations :** creating, opening, saving and running the presentations, Selecting the style for slides, formatting the slides with different fonts, colours, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyperlinking, running the slide show, setting the timing for slide show. Students should submit a user manual of the Presentation tool considered.

**Optional Tasks**:

**Task 11: Laboratory Equipment**: Students may submit a report on specifications of various equipment that may be used by them for the laboratories in their curriculum starting from I B.tech to IV. B.Tech. It can vary from department to department. Students can refer to their syllabus books, consult staff members of the concerned department or refer websites. The following is a sample list. Instructors may make modifications to the list to suit the department concerned.

- Desktop computer
- Server computer
- Switch (computer science related)
- Microprocessor kit
- Micro controller kit
- Lathe machine
- Generators
- Construction material
- Air conditioner
- UPS and Inverter
- RO system

- Electrical Rectifier
- CRO
- Function Generator
- Microwave benches

**Task 12: Software**: Students may submit a report on specifications of various software that may be used by them for the laboratories in their curriculum starting from I B.tech to IV. B.Tech. The software may be proprietary software or Free and Open source software. It can vary from department to department. Students can refer to their syllabus books, consult staff members of the concerned department or refer websites. The following is a sample list. Instructors may make modifications to the list to suit the department concerned.

- Desktop operating system
- Server operating system
- Antivirus software
- MATLAB
- CAD/CAM software
- AUTOCAD

**References:**

1. "Introduction to Computers", Peter Norton, Mc Graw Hill
2. "LaTeX Companion" – Leslie Lamport, PHI/Pearson.
3. "MOS study guide for word, Excel, Powerpoint & Outlook Exams", Joan Lambert, Joyce Cox, PHI.
4. "Introduction to Information Technology", ITL Education Solutions limited, Pearson Education.
5. "Networking your computers and devices", Rusen, PHI
6. "Trouble shooting, Maintaining & Repairing PCs", Bigelows, TMH.

# PROGRAMMING IN C AND DATA STRUCTURE LAB

**Course Objectives:**

- To make the student learn C Programming language
- To make the student solve problems, implement them using C language.
- To strengthen the ability to identify and apply the suitable data structure for the given real world problem

**Course Outcomes:**

- Apply problem solving techniques to find solutions to problems
- Able to use C language features effectively and implement solutions using C language.
- Be capable to identity the appropriate data structure for a given problem or application.
- Improve logical skills

**List of Experiments/Tasks**

1. Practice DOS and LINUX Commands necessary for design of C Programs.
2. Study of the Editors, Integrated development environments, and Compilers in chosen platform.
3. Write, Edit, Debug, Compile and Execute Sample C programs to understand the programming environment.
4. Practice programs: Finding the sum of three numbers, exchange of two numbers, maximum of two numbers, to read and print variable values of all data types of C language, to find the size of all data types, to understand the priority and associativity of operators using expressions, to use different library functions of C language.
5. Write a program to find the roots of a quadratic equation.
6. Write a program to compute the factorial of a given number.
7. Write a program to check whether the number is prime or not.
8. Write a program to find the series of prime numbers in the given range.
9. Write a program to generate Fibonacci numbers in the given range.
10. Write a program to find the maximum of a set of numbers.
11. Write a program to reverse the digits of a number.
12. Write a program to find the sum of the digits of a number.
13. Write a program to find the sum of positive and negative numbers in a given set of numbers.
14. Write a program to check for number palindrome.
15. Write a program to evaluate the sum of the following series up to 'n' terms e $^{x}=1+x+x^2/2!+x^3/3!+x^4/4!+$--------
16. Write a program to generate Pascal Triangle.
17. Write a program to read two matrices and print their sum and product in the matrix form.
18. Write a program to read matrix and perform the following operations.
    i. Find the sum of Diagonal Elements of a matrix.
    ii. Print Transpose of a matrix.
    iii. Print sum of even and odd numbers in a given matrix.
19. Write a program to accept a line of characters and print the count of the number of Vowels, Consonants, blank spaces, digits and special characters.
20. Write a program to insert a substring in to a given string and delete few characters from the string. Don't use library functions related to strings.

21. Write a program to perform the operations addition, subtraction, multiplication of complex numbers.
22. Write a program to split a 'file' in to two files, say file1 and file2. Read lines into the 'file' from standard input. File1 should consist of odd numbered lines and file2 should consist of even numbered lines.
23. Write a program to merge two files.
24. Write a program to implement numerical methods Lagrange's interpolation, Trapezoidal rule.
25. Write a program to read a set of strings and sort them in alphabetical order.
26. Write a program to sort the elements of an array using sorting by exchange.
27. Write a program to sort the elements of an array using Selection Sort.
28. Write a program to perform Linear Search on the elements of a given array.
29. Write a program to perform Binary Search on the elements of a given array.
30. Write a program to find the number of occurrences of each number in a given array of numbers.
31. Write a program to read two strings and perform the following operations without using built-in string Library functions and by using your own implementations of functions.
    i. String length determination ii .Compare Two Strings
    iii. Concatenate them, if they are not equal iv. String reversing
32. Write programs using recursion for Factorial of a number, GCD, LCM, Towers of Hanoi.
33. Write a program to convert infix expression to postfix expression and evaluate postfix expression.
34. Write a program to exchange two numbers using pointers.
35. Write a program to implement stack, queue, circular queue using array and linked lists.
36. Write a program to perform the operations creation, insertion, deletion, and traversing a singly linked list
37. Write a program to read student records into a file. Record consists of rollno, name and marks of a student in six subjects and class. Class field is empty initially. Compute the class of a student. The calculation of the class is as per JNTUA rules. Write the first class, second class, third class and failed students lists separately to another file.
38. A file consists of information about employee salary with fields employeeid, name, Basic, HRA, DA, IT, other-deductions, Gross and Net salary. Initially only employeeid, name, and basic have valid values. HRA is taken as 10% of the basic, DA is taken as 80% of basic, IT is 20% of the basic, other deductions is user specified. Compute the Gross and Net salary of the employee and update the file.
39. Write a program to perform Base (decimal, octal, hexadecimal, etc) conversion.
40. Write a program to find the square root of a number without using built-in library function.
41. Write a program to convert from string to number.
42. Write a program to generate pseudo random generator.
43. Write a program to remove duplicates from ordered and unordered arrays.
44. Write a program to sort numbers using insertion sort.
45. Write a program to implement quick sort using non-recursive and recursive approaches. Use randomized element as partitioning element.
46. Write a program to search a word in a given file and display all its positions.
47. Write a program to generate multiplication tables from 11 to 20.
48. Write a program to express a four digit number in words. For example 1546 should be written as one thousand five hundred and forty six.

49. Write a program to generate a telephone bill. The contents of it and the rate calculation etc should be as per BSNL rules. Student is expected to gather the required information through the BSNL website.
50. Write a program for tic-tac-toe game.
51. Write a program to find the execution time of a program.
52. Design a file format to store a person's name, address, and other information. Write a program to read this file and produce a set of mailing labels

**Note**: The above list consists of only sample programs. Instructors may choose other programs to illustrate certain concepts, wherever is necessary. Programs should be there on all the concepts studied in the Theory on C programming and Data structures. Instructors are advised to change atleast 25% of the programs every year until the next syllabus revision.

**References:**

4. "Programming with C", Byron Gottfried, Third Edition, Schaum's Outlines, Mc Graw Hill.
5. "Fundamentals of Data Structures in C", Horowitz, Sahni, Anderson-freed, Second Edition, Universities Press.
6. "How to Solve it by Computer", R.G. Dromey, Pearson.
7. "The C Programming Language", Brian W. Kernighan, Dennis M. Ritchie, Pearson.
8. "Classic Data Structures", Samantha, PHI
9. "Let us C", Yeswant Kanetkar, BPB publications
10. "Pointers in C", Yeswant Kanetkar, BPB publications

**CSE -I YEAR**

## ENGINEERING PHYSICS LABORATORY

**PREAMBLE:**

By performing the experiments engineering students acquire the knowledge about the importance of the studied theoretical physical concepts.

**LAB OBJECTIVE**:

- Will understand the role of optical fiber parameters and signal losses in communication.
- Will recognize the importance of energy gap in the study of conductivity and hall effect in a semiconductor
- Will understand the applications of B H curve.
- Will acquire a practical knowledge of studying the crystal structure in terms of lattice constant.
- Will recognize the significance of laser by studying its characteristics and its application in finding the particle size.
- Will learn to synthesis of the nanomaterials and recognize its importance by knowing its nano particle size and its impact on its properties.

**Any 10 of the following experiments has to be performed during the academic year**

1. Determination of radius of curvature of a lens by forming Newton's rings.
2. Determination of wavelength of various colours of mercury spectrum using diffraction grating in normal incidence method.
3. Determination of Numerical aperture, acceptance angle and losses of an optical fiber.
4. Energy gap of a material using p-n junction diode.
5. Hall effect – Determination of mobility of charge carriers.
6. B-H curve – Determination of hysteresis loss.
7. Determination of lattice constant using X-ray spectrum.
8. Determination of particle size by using laser source.
9. Determination of dielectric constant.
10. Study of Laser characteristics.
11. Synthesis of nanomaterial by sol-gel method.
12. Particle size analysis of the synthesized nanomaterials.

**LAB OUTCOMES:**

- Would have acquired the practical application knowledge of optical fiber, semiconductor, dieclectric and magnetic materials, crystal structure and lasers by the study of their relative parameters.
- Would recognize the significant importance of nanomaterials in various engineering fields.

**CSE -I YEAR**

## ENGINEERING CHEMISTRY LAB

**Preamble:**The experiments are designed in a manner that the students can validate their own theory understanding in chemistry by self involvement and practical execution. Thus the execution of these experiments by the student will reinforce his/her understanding of the subject and also provide opportunity to refine their understanding of conceptual aspects. As a result, the student gets an opportunity to have felt good factor at the laboratory bench about the chemical principles that he/she learned in the classroom.

**Programme Objective**:

- Will learn practical understanding of the redox reaction
- Will able to understand the function of fuel cells, batteries and extend the knowledge to the processes of corrosion and its prevention
- Will learn the preparation and properties of synthetic polymers and other material that would provide sufficient impetus toengineer these to suit diverse applications
- Will also learn the hygiene aspects of water would be in a position to design methods to produce potable water using modern technology

**LIST OF EXPERIMENTS**

1. Determination of total hardness of water by EDTA method.
2. Determination of Copper by EDTA method.
3. Estimation of Dissolved Oxygen by Winkler's method
4. Determination of Manganese by colorimetry.
5. Estimation of iron (II) using diphenylamine indicator (Dichrometry – Internal indicator method).
6. Determination of Alkalinity of Water
7. Determination of acidity of Water
8. Preparation of Phenol-Formaldehyde (Bakelite)
9. Determination of Viscosity of oils using Redwood Viscometer I
10. Determination of Viscosity of oils using Redwood Viscometer II
11. Conductometric titration of strong acid Vs strong base (Neutralization titration).
12. Conductometric titration of Barium Chloride vs Sodium Sulphate (Precipitation Titration)
13. Determination of Corrosion rate and inhibition efficiency of an inhibitor for mild steel in hydrochloric acid medium.
14. Estimation of Chloride ion using potassium Chromate indicator (Mohrs method)
15. Acid-Base neutralisation by pH method.

(Any 10 experiments from the above list)

**Course Outcomes**

- **Would be confident in handling energy storage systems and would be able combat chemical corrosion**
- **Would have acquired the practical skill to handle the analytical methods with confidence.**
- **Would feel comfortable to think of design materials with the requisite properties**
- **Would be in a position to technically address the water related problems.**

**TEXT BOOKS:**

1. Vogel's Text book of Quantitative Chemical Analysis, J. Mendham et al, Pearson Education, Sixth Edition, 2012.

2. Chemistry Practical – Lab Manual by K.B.Chandra Sekhar, G.V. Subba Reddy and K.N.Jayaveera, SM Publications, Hyderabad, 3rd Edition, 2012.

**CSE -I YEAR**

## English Language & Communication Skills Lab

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

**OBJECTIVES:**

- To train students to use language effectively in everyday conversations, to participate in group discussions, to help them face interviews, and sharpen public speaking skills
- To expose the students to a varied blend of self-instructional learner-friendly modes of language learning through computer-aided multi-media instruction.
- To enable them to learn better pronunciation through stress on word accent, intonation, and rhythm.
- To help the second language learners to acquire fluency in spoken English and neutralize mother tongue influence
- To train students to use language appropriately for interviews, group discussion and public speaking

**SYLLABUS:**

**Unit-1**

1. Phonetics -importance
2. Introduction to Sounds of Speech
3. Vowels sounds
4. Consonants sounds
5. Phonetic Transcription

**Unit-2**

6. Word Stress
7. Syllabification
8. Rules of word stress
9. Intonation
10. Falling
11. Rising Tone
12. Fall rise tones

**Unit-3**

Situational Dialogues

13. Role Plays
14. JAM
15. Describing people/object/place
16. Stage dynamics
17. Body language

**Unit-4**

18. Debates
19. Group Discussions
20. Interview skills
21. Telephone skills
22. Public Speaking
23. Preparation of resume

**Unit-5**

24. Basics of Communication Skills
25. Objectives & Characteristics of Communication
26. LSRW Skills –
27. Presentation Skills

**EXPECTED OUTCOMES**:

- Becoming active participants in the learning process and acquiring proficiency in spoken English of the students
- Speaking with clarity and confidence thereby enhancing employability skills of the students

**MINIMUM REQUIREMENT FOR ELCS LAB:**

The English Language Lab shall have two parts:

1. Computer Assisted Language Learning (CALL) Lab:
   The Computer aided Language Lab for 60 students with 60 systems, one master console, LAN facility and English language software for self- study by learners.

2. The Communication Skills Lab with movable chairs and audio-visual aids with a P.A. system, Projector, a digital stereo-audio & video system and camcorder etc.

System Requirement (Hardware component):

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

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

**SUGGESTED SOFTWARE:**

1. Clarity Pronunciation Power – Part I (Sky Pronunciation)
2. Clarity Pronunciation Power – part II
3. K-Van Advanced Communication Skills
4. TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
5. *DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.*
6. Lingua TOEFL CBT Insider, by Dreamtech
7. English Pronunciation in Use (Elementary, Intermediate, Advanced) CUP
8. Cambridge Advanced Learners' English Dictionary with CD.
9. Oxford Advanced Learner's Compass, 8th Edition
10. Sanjay Kumar & Pushp Lata. 2011. Communication Skills, OUP

**REFERENCE BOOKS:**

1. **A Textbook of English Phonetics for Indian Students** 2nd Ed T. Balasubramanian. (Macmillian),2012.
2. **A Course in Phonetics and Spoken English**, Dhamija Sethi, Prentice-Hall of India Pvt.Ltd
3. **Strengthen Your Steps,** Maruthi Publicaions, 2012.
4. **Speaking English Effectively**, 2nd Edition Krishna Mohan & NP Singh, 2011. (Mcmillan).
5. **Listening in the Language Classroom**, John Field (Cambridge Language Teaching Library),2011
6. **A Hand book for English Laboratories**, E.Suresh kumar, P.Sreehari, Foundation Books,2011
7. **English Pronunciation in Use. Intermediate & Advanced** ,Hancock, M. 2009. CUP
8. **Basics of Communication in English** ,Soundararaj, Francis. 2012.. *New Delhi: Macmillan*
9. **Spoken English** (CIEFL) in 3 volumes with 6 cassettes, OUP.

**English Pronouncing Dictionary**, Daniel Jones Current Edition with CD.Cambridge,17th edition, 2011.

**II- Year B.Tech- I Sem**

## Engineering Drawing
## (CSE, ECE & EEE)

***Course Objectives:***

- *To impart and inculcate proper understanding of the theory of projection.*
- *To improve the visualization skills.*
- *To enable the students with various concepts like dimensioning, conventions and standards related to working drawings in order to become professionally efficient.*
- *To impart the knowledge on understanding and drawing of simple residential/office buildings.*

**Unit-I**

Introduction to Engineering Drawing: Principles of Engineering Graphics and their significance; Drawing Instruments and their Usage – BIS Conventions in drawing and Lettering.

Curves used in engineering practice:

a) Conic sections including Rectangular Hyperbola
b) Cycloid, Epicycloid and Hypocycloid –Normals and Tangents
c) Involute of a circle –Normals and Tangents

**Unit –II**

Principles of orthographic projection in I and III angle projections –Conventions & dimensions – Projections of points. Projection of lines inclined to both planes –traces,

**Unit –III**

Projection of planes inclined to both planes. Projection of regular solids inclined to both planes.

**Unit –IV**

Conversion of Pictorial views to orthographic views –Conventions.

**Unit –V**

Isometric projections: Principles of pictorial representations-Isometric projection- Isometric scale-Isometric views- conventions- Isometric views of plane figures, solids-Isometric projection of objects with non isometric lines.

**TEXT BOOKS:**

1. Engineering Drawing, N.D. Bhat, Charotar Publishers
2. Engineering Drawing, Shah and Rana, 2/e, Pearson Education
3. Engineering Drawing, K.L. Narayana, P. Khanniah, Scitech Pub.

**REFERENCES:**

1. Engineering Drawing and Graphics, Venugopal/ New age
2. Engineering Drawing, B.V.R. Gupta, J.K. Publishesrs
3. Engineering Drawing, Johle, Tata McGraw-Hill
4. Engineering Drawing, K.Venkata Reddy, B.S.Publishers.

***Course Outcomes:***

- *Students will be able to improve their visualization skills so that they can apply these skills in developing new products.*
- *Students will be able to prepare simple layout of factory buildings.*

*Students will be able to know and understand the conventions and the methods of engineering drawing.*

# PROBABILITY AND STATISTICS

**Objectives:**

- To help the students in getting a thorough understanding of the fundamentals of probability and usage of statistical techniques like testing of hypothesis, ANOVA, Statistical Quality Control and Queuing theory

**UNIT – I**

Conditional probability – Baye's theorem. Random variables – Discrete and continuous Distributions – Distribution functions. Binomial and poison distributions Normal distribution – Related properties.

**UNIT – II**

Test of Hypothesis: Population and Sample - Confidence interval of mean from Normal distribution - Statistical hypothesis - Null and Alternative hypothesis - Level of significance - Test of significance - Test based on normal distribution - Z test for means and proportions; Small samples - t- test for one sample and two sample problem and paired t-test, F-test and Chi-square test (testing of goodness of fit and independence).

**UNIT – III**

Analysis of variance one way classification-CRD and two way classification (RBD and Latin square Design)

**UNIT – IV**

Statistical Quality Control: Concept of quality of a manufactured product -Defects and Defectives - Causes of variations - Random and assignable - The principle of Shewhart Control Chart-Charts for attribute and variable quality characteristics- Constructions and operation of X- bar Chart, R-Chart, P-Chart and C-Chart.

**UNIT – V**

Queuing Theory: Pure Birth and Death process, M/M/1 & M/M/S & their related simple problems.

**TEXT BOOKS:**

1. Probability & Statistics for engineers by Dr. J. Ravichandran WILEY-INDIA publishers(2010)
2. Probability & Statistics by T.K.V. Iyengar, S.Chand publications-4$^{th}$ Edition(2013)

**REFERENCES:**

1. Probability & Statistics by E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher-1$^{st}$ Edition(2010)
2. Statistical methods by S.P. Gupta, S.Chand publications-41th Edition(2011)
3. Probability & Statistics for Science and Engineering by G.Shanker Rao, Universities Press-1$^{st}$ Edition(2011)
4. Probability and Statistics for Engineering and Sciences by Jay L.Devore, CENGAGE-8$^{th}$ Edition,(2011).
5. Probability and Statistics by R.A. Jhonson and Gupta C.B, Pearson Education- 7$^{th}$ Edition(2007).

**Outcomes:**

- The student will be able to analyze the problems of engineering & industry using the techniques of testing of hypothesis, ANOVA, Statistical Quality Control and Queuing theory and draw appropriate inferences.

# ENVIRONMENTAL SCIENCE

## UNIT I: MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES AND NATURAL RESOURCES

Definition, Scope and Importance – Need for Public Awareness.

Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – 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, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources:

## UNIT II : ECOSYSTEMS & BIODIVERSITY AND ITS CONSERVATION

Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem.
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Introduction 0 Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-soports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

## UNIT III: ENVIRONMENTAL POLLUTION, SOLID WASTE MANAGEMENT & SOCIAL ISSUES AND THE ENVIRONMENT

Definition, Cause, effects and control measures of :

a. Air Pollution.
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear hazards

Causes**,** effects and control measures of urban and industrial waste – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

Social issues and the environment From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment 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 IV: HUMAN POPULATION AND THE ENVIRONMENT**

Population growth, variation among nations. Population explosion–Family Welfare programme. Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

**UNIT V: FIELD WORK**

Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, birds – river, hill slopes, etc..

**TEXT BOOKS** :

1. Text book of Environmental Studies for Undergraduate Courses, Erach Bharucha for University Grants Commission, Univ. Press, 2001.
2. Environmental Studies by R.Rajagopalan, Oxford Univ.Press,2008.
3. Environmental Studies by Benny Joseph, Mc.Graw Hill Publications, 2007.

**REFERENCES:**

1. Text book of Environmental Sciences and Technology by M.Anji Reddy, BS Publication, 2008.
2. Comprehensive Environmental studies by J.P.Sharma, Laxmi publications, 2008.
3. Environmental sciences and engineering – J. Glynn Henry and Gary W. Heinke – Printice hall of India Private limited, 2004.
4. Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Printice hall of India Private limited, 1992.
5. Environmental Studies by Anindita Basak – Pearson education, 2009.

## File Structures

**Course Objectives:**

- To study the object oriented approach for programming
- To make the students understand the basic concepts, syntax, semantics and features of C++ language.
- To make the students understand the concept of file structures, its significance and the way of using object oriented programming language C++ to design and Implement the file structures.

**Course Outcomes:**

- Knowledge about the syntax and semantics of C++ language
- Use object oriented features to solve problems
- Develop reusable software components with better protection for data
- Able to use File structures to store the data permanently
- Combine File structures and C++ for application development.

**Unit-I**

**An overview of C++**: The origins of C++, What is Object oriented programming, Some C++ fundamentals, Old style Vs Modern C++, Introducing C++ classes, Constructors and Destructors, C++ keywords, The general form of C++ program.

**Class and Objects**: Classes, Structures and classes are related, Unions and Classes are related, Friend functions, Friend classes, Inline functions, Parameterized constructors, Static class members, When constructors and destructors are executed, The scope resolution operator, Nested classes, Local Classes, Passing Objects to Functions, Returning objects, Object assignment.

**Arrays, Pointers, References and Dynamic allocation Operators**: Arrays of Objects, Pointers to objects, Type checking C++ pointers, The this Pointer, Pointers to derived types, Pointers to class members, References, A matter of style, C++'s Dynamic allocation operators.

**Unit-II**

**Function Overloading Copy constructors and Default arguments**: Function Overloading, Overloading Constructors, Copy constructors, Finding the address of an overloaded function, The overload anachronism, Default function arguments, Function overloading and ambiguity.

**Operator overloading**: Creating a member operator function, Operator Overloading using friend function, Overloading new and delete, Overloading some special operators.

**Inheritance**: Base class access control, Inheritance and protected members, Inheriting Multiple Base classes, Constructors, Destructors and Inheritance, Granting access, Virtual base classes.

**Unit III**

**Virtual function and Polymorphism**: Virtual functions, The virtual attribute is inherited, Virtual functions are hierarchical, Pure virtual functions, Using virtual functions, Early Vs late binding.

**Templates**: Generic functions, Applying generic functions, generic classes.

**Trees**: Introduction, Binary trees, Binary tree traversal and Tree iterators, Binary search trees.

**Unit IV**

**Introduction to the Design and Specification of File structures**: The heart of file structure design, A short history of file structure design, A conceptual Toolkit: File structure literacy, An object oriented toolkit: Making file structures usable, Using Objects in C++.

**Fundamental file processing operations**: Physical files and logical files, Opening files, Closing files, Reading and writing, Seeking, Special characters in files, The Unix Directory Structure, Physical devices and logical files, Physical devices as files, File-related Header files, UNIX file system commands.

**Secondary storage and System Software**: Disks, Magnetic tape, Disk Versus Tape, Storage as a Hierarchy, A journey of a Byte, Buffer management.

**Unit-V**

**Fundamental File Structure Concepts**: Field and record organization, Using classes to manipulate buffers, Using Inheritance for Record buffer classes, Managing Fixed-length fixed-field buffers, An object oriented class for record files.

**Managing Files of Records**: Record Access, More about record structures, Encapsulating record I/O operations in single class, File access and file organization.

Organizing Files for Performance: Data compression, Reclaiming space in files, Keysorting.

**Text Books:**

1. "The Complete Reference C++", Herbert Schildt, 4th edition, 2012, TMH.
2. "File Structures: An object oriented approach with C++", Michael J. Folk, Greg Riccardiand Bill, Zoellick, 3rd edition, 2011, Pearson.
3. "Fundamentals of Data Structures in C++", Ellis Horowitz, Saratj Sahni, Dinesh Mehta, 2nd edition, 2012, University Press

**References:**

1. "Programming with ANSI C++", Second Edition, Bhushan Trivedi, Oxford Higher Education.
2. "C++ for Scientists, Engineers and Mathematicians", Second Edition, D.M.Chapper, Springer International Edition.
3. "Data Structure using C++", D.S Malik, Cengage Learning.
4. "Exploring C++", Ray Lischner, Apress.
5. "File Structure Using C++", K.R.Venu Gopal, K.G.Sreenivasa, P.M.Krishna Raj, Mc Graw Hill.

## Digital Logic Design

Course Objectives

- Acquire the skills to manipulate and examine Boolean algebraic expressions, logical operations, Boolean functions and their simplifications.
- Get familiarized with fundamental principles of digital design.
- Acquaint with classical hardware design for both combinational and sequential logic circuits.

Course Outcomes

- Ability to interpret, convert and represent different number systems and binary arithmetic.
- Able to design sequential and combinational circuits
- Able to design different units of a digital computer.

**Unit - I :**

**Binary Systems:** Digital Systems, Binary Numbers, Number Base Conversions, Octal and Hexadecimal Numbers, Compliments, Signed Binary Numbers, Binary Codes, Binary Storage and Registers, Binary Logic.

**Boolean Algebra And Logic Gates:** Basic Definitions, Axiomatic Definition of Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Other Logic Operations, Digital Logic Gates, Integrated Circuits

**Unit – II:**

**Gate – Level Minimization:** The Map Method, Four Variable Map, Five-Variable Map, Product of Sums Simplification, Don't-Care Conditions, NAND and NOR Implementation, Other Two Level Implementations, EX-OR Function, Other Minimization Methods

**Unit – III :**

**Combinational Logic:** Combinational Circuits, Analysis Procedure, Design Procedure, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers

**Unit – IV :**

**Synchronous Sequential Logic:** Sequential Circuits, Latches, Flip-Flops, Analysis of Clocked Sequential Circuits, State Reduction and Assignment, Design Procedure

**Registers & Counters:** Registers, Shift Registers, Ripple Counters, Synchronous Counters, Other counters

**Unit – V :**

**Memory And Programmable Logic:** Random access memory, memory decoding, Error Detection and Correction, Read-only Memory, Programmable Logic Array, Programmable Array Logic.

**Digital Logic Circuits:** RTL and DTL Circuits,Transistor-Transistor Logic (TTL), Emitter-Coupled Logic (ECL), MOS, CMOS Logic, Comparisons of Logic Families

**Text Books :**

1. Digital Design, M.Morris Mano & Micheal D. Ciletti, Pearson, 5th Edition, 2013.
2. Digital Logic & State Machine Design, David J. Comer, Oxford University Press, 3rd Reprinted Indian Edition, 2012

**Reference Books :**

1. Digital Logic Design, R.D. Sudhakar Samuel, Elsevier
2. Fundamentals of Logic Design, 5/e, Roth, Cengage
3. Switching and Finite Automata Theory,3/e,Kohavi, Jha, Cambridge.
4. Digital Logic Design, Leach, Malvino, Saha,TMH
5. Modern Digital Electronics, R.P. Jain, TMH

## Discrete Mathematics

**Course Objective**

- Apply logical reasoning to solve a variety of problems.
- Understand and apply methods of discrete mathematics such as proofs, counting principles, number theory, logic and set theory to mathematical problems in a creative way.
- To apply the abstract concepts of graph theory in modelling and solving non-trivial problems in different fields of study.
- To provide a prerequisite for the courses like Fundamentals of Computer Organization, RDBMS, Analysis of Algorithms, Theory of Computation, Cryptography, Artificial Intelligence…

**Unit - I :**

**The Language of Logic:** Propositions, Logical Equivalences, Quantifiers, Arguments, Proof Methods.

**The Language of Sets:** The Concepts of a Set, Operations with Sets, Computer Operations with Sets, The Cardinality of a Set, Recursively Defined Sets.

**Functions:** The concept of Functions, Special Functions, Properties of Functions, The Pigeonhole principle, Composite Functions, Sequences and the Summation Notation.

**Unit – II:**

**Relations:** Boolean Matrices, Relations and Digraphs, Computer Representations of Relations, Properties of Relations, Operations on Relations, Transitive Closure, Equivalence Relations, Partial and Total Ordering.

**Lattices & Boolean Algebra:** Lattices as Partially Ordered Sets, Properties of Lattices, Lattices as Algebraic Systems, Sublattices, Direct Product and Homomorphism, Boolean Algebra, Boolean Functions

**Unit – III :**

**Algebraic Structures:** Algebraic Systems,Semigroups and Monoids, Groups, Subgroups and Homomorphisms, Normal Subgroups.

**Combinatorics:** The Fundamental Counting Principles, Permutations, Derangements, Combinations, Permutations and Combinations with Repetitions, The Binomial Theorem, The Generalized Inclusion- Exclusion Principle.

**Unit – IV :**

**Induction and Algorithms:** The Division Algorithm, Divisibility Properties, Nondecimal Bases, Mathematical Induction, Algorithm Correctness, The Growth Functions, Complexity of Algorithms.

**Recursion:** Recursively Defined Functions, Solving Recurrence Relations, Generating Functions, Recursive Algorithms, Correctness of Recursive Algorithms, Complexities of Recursive Algorithms.

**Unit – V :**

**Graphs:** Computer Representation of Graphs, Isomorphic Graphs, Paths, Cycles, and Circuits, Eulerian and Hamiltonial Graphs, Planar Graphs, Graph Coloring, Digraphs, Dags, Weighted Digraphs, DFS and BFS Algorithms.

**Trees:** Trees, Spanning Trees, Minimal Spanning Trees, Kruskal's and Prim's Algorithm, Rooted Trees, Binary Trees, and Binary Search Trees.

**Text Books :**

1. Discrete Mathematics with Applications, Thomas Koshy, Elsevier Academic Press.
2. Discrete Mathematical Structures with Applications to Computer Science, J.P. Tremblay and R. Manohar, TMH

**Reference Books :**


1. *Discrete and Combinatorial Mathematics, Fifth Edition, R. P. Grimaldi, B.V. Ramana, Pearson*
2. *Discrete Mathematics Theory and Applications, D.S Malik and M.K. Sen, Cengage Learning*
3. *J .L.Mott, A.Kandel, T.P .Baker, Discrete Mathematics for Computer Scientists and Mathematicians, second edition 1986, Prentice Hall of India*
4. *C.L.Liu, Elements of Discrete Mathematics, Second Edition 1985, McGraw-Hill Book Company. Reprinted 2000*
5. *Discrete Mathematics, Norman L. Biggs, Second Edition, OXFORD Indian Edition.*
6. *K.H.Rosen, Discrete Mathematics and applications, 5th Edition 2003, TataMcGraw Hillpublishing Company*
7. Graph Theory with Applications to Engineering & Computer Science: Narsingh Deo, PHI (2004)
8. "Discrete Mathematical Structures" Jayant Ganguly, Sanguine

# ELECTRICAL AND ELECTRONICS LAB

## (PART – A)ELECTRICAL LAB

1. Verification of Superposition Theorem.
2. Verification of Thevenin's Theorem.
3. Open Circuit Characteristics of DC Shunt Generator.
4. Swinburne's Test on DC Shunt Machine(Predetermination of efficiency of a given DC shunt Machine Working as Motor and Generator).
5. Brake test on DC Shunt Motor. Determination of Performance Characteristics
6. OC &SC Tests on Single phase transformer (Predetermination of efficiency and regulation at given Power factors)

## PART – B (ELECTRONICS LAB)

**OBJECTIVES:**

- This Lab provides the students to get an electrical model for various semiconductor devices. Students can find and plot V-I characteristics of all semiconductor devices. Student learns the practical applications of the devices. They can learn and implement the concept of the feedback and frequency response of the small signal amplifier

**OUTCOMES:**

- Students able to learn electrical model for various semiconductor devices and learns the practical applications of the semiconductor devices

**LIST OF EXPERIMENTS:**

**(For Laboratory Examination-Minimum of Six Experiments)**

1. Identification, specifications and testing of R, L and C components (color codes), Potentiometers, Bread board, Identification and specification of active devices, Diodes, BJTs, low power JFETs, MOSFETs, UJTs, Linear and Digital ICs
2. P-N Junction Diode Characteristics
   a. Germanium Diode (Forward bias& Reverse bias)
   b. Silicon Diode (Forward bias only)
3. Zener Diode Characteristics
   a. V-I Characteristics
   b. Zener Diode act as a Voltage Regulator
4. Rectifiers (without and with c-filter)
   a. Half-wave Rectifier
   b. Full-wave Rectifier
5. BJT Characteristics (CE Configuration)
   a. Input Characteristics
   b. Output Characteristics
6. FET Characteristics(CS Configuration)
   a. Drain (Output) Characteristics
   b. Transfer Characteristics

## File Structures using C++ Lab

**Course Objectives**

1. To solve the problems using object oriented programming approach
2. To implement the solutions to the problem using object oriented programming language C++
3. To explore features inheritance, encapsulation and polymorphism

**Course Outcomes**

- Able to Achieve better control over the data
- Able to design and implement reusable programs

**List of Experiments:**

1. Write a C++ program using instance variables, class level variables.
2. Write a C++ program to illustrate the concepts of inline functions, friend functions.
3. Write a C++ program to implement Stack as abstract data type.
4. Write a C++ program to implement Queue as abstract data type.
5. Write a C++ program to implement Circular Queue as abstract data type.
6. Write a C++ program to exchange two numbers using functions and appropriate parameter passing technique.
7. A sparse matrix is a two dimensional and consists of majority values as zeroes. The traditional way of representing sparse matrix is inefficient. It's better to represent it using class with member variables row, col, non-zero value. Represent the sparse matrix using a class and perform the operations addition, transpose and multiplication of sparse matrixes.
8. C++ by default doesn't support the following operations related to array: range checking, indexing to start at any value, array assignment, dynamic modification of range and size. Create your own class which represents the array and permits the above operations.
9. Define string as abstract data type using class. Support the operations: inserting a substring into a string, removing a substring from a string, and finding a pattern in a string.
10. Write a C++ program to create a binary search tree and perform operations insertion, deletion and traversing.
11. Write a C++ program to overload '+' operator to add matrices.
12. Write a C++ program to overload '+' operator to concatenate two stings. Overload the '<' operator which produces output similar to built-in library function strcmp.
13. Write a C++ program to sort integers, floating point values using the concept of function overloading.
14. Write a C++ program illustrating different types of inheritance supported by C++ language.
15. Write a C++ program to illustrate the concept of runtime polymorphism.
16. Write a C++ program to represent multiple stacks and queues using array.

17. Write a C++ program to implement the search algorithms of the graph: Depth first search and Breadth first search.
18. Write a C++ program to find the connected components of the graph.
19. Write a C++ program to implement the spanning tree algorithms Kruskal's, Prim's, and sollin's.
20. Write a C++ program to implement heap sort algorithm.
21. Write a C++ program to write to a file character by character, read character by character from the same file and write it to the screen.
22. Write a C++ program using all the predefined File related library functions of C++ .
23. Write a C++ program to read first 'n' lines from a file, last 'n' lines from a file, odd numbered lines and even numbered lines from a file. The program should be made to work as command with options.
24. Two classes share a file. Other areas of the program need to know when this file is busy. Create a function that returns 1 when the file is being used by either of these two classes.
25. Write a C++ program that takes sequence of file names as input, searches for a given word in those filenames and prints the list of files containing the word and not containing the word separately.
26. Define a base class shape that can describe any simple shape such as a square, circle or equilateral triangle. The size of all these shapes can be reduced to a single dimension. Define derived classes for each of the three shapes. Create a virtual function in the base class that returns the area of each shape.

    Note: You will need to more precisely define what dimensions are stored in the base class. (Is the size in the base class for circle, the radius, or the diameter?)
27. Write a base class called person that describes a person of either gender. Define two derived classes called man and woman that define gender specific items. Write pure virtual functions in the base class for operations that are common to both sexes, yet are handled in different ways by each of them.
28. Write a full-date class that allows you to add, subtract, read, and print dates of the form MM/DD/YY.
29. Write a class to handle fractions such as "1/3." Define addition, subtraction, multiplication, and division operators for these fractions.

    For example: 1/3 + 1/2 = 5/6.
30. Write a C++ program that defines a class 'complex' which permits handling complex numbers. All arithmetic operations have to be defined. Use operator overloading.

31. Open problem: The following is an open problem. Intentionally some of the information is not specified. Students have to gather the required information, understand the problem and solve the problem. Different students are expected to represent class in different ways, write different algorithms etc.

**Student information system:**

Design a simple project which maintains the student personal information, marks in different subjects, attendance in different subjects. Consider only one semester. The solution should support the functionality of computing the class of different students. The attendance details are to be computed at the end of the every month and at the end of the semester. Students should not be able to access the marks and attendance particulars of others.

**References:**


6. "Programming with ANSI C++", Second Edition, Bhushan Trivedi, Oxford Higher Education.
7. "C++ for Scientists, Engineers and Mathematicians", Second Edition, D.M.Chapper, Springer International Edition.
8. "Data Structure using C++", D.S Malik, Cengage Learning.
9. www.dsi.fceia.unr.edu.ar
10. "File Structure Using C++", K.R.Venu Gopal, K.G.Sreenivasa, P.M.Krishna Raj, Mc Graw Hill.
11. "Fundamentals of Data Structures in C++", Dinesh Mehta, Sartaj Sahni, Ellis Horwitz, University Press

## Computer Organization

Course Objective

- To gain methodical understanding of the basic structure and operation of a digital computer.
- To learn the fundamentals of computer organization and its relevance to classical and modern problems of computer design
- To make the students understand the structure and behavior of various functional modules of a computer.
- To explore the hardware requirements for cache memory and virtual memory for better understanding of memory management
- To understand the techniques that computers use to communicate with I/O devices
- To study the concepts of pipelining and the way it can speed up processing.
- To understand the basic characteristics of multiprocessors

**Course Outcomes:**

- Optimize the algorithms to exploit pipelining and multiprocessors
- Algorithm design for bit level arithmetic
- Ability to use memory and I/O devices effectively

**Unit - I :**

**Introduction to Computer Organization and Architecture**

Basic Computer Organization – CPU Organization – Memory Subsystem Organization and Interfacing – I/O Subsystem Organization and Interfacing – A Simple Computer Levels of Programming Languages, Assembly Language Instructions, Instruction Set Architecture Design, A simple Instruction Set Architecture

Unit – II:

**CPU Design:** Instruction Cycle – Memory – Reference Instructions – Input/output and Interrupt – Addressing Modes – Data Transfer and Manipulation – Program Control.

**Computer Arithmetic:** Addition and Subtraction – Multiplication Algorithms – Division Algorithms – Floating-Point Arithmetic Operations – Decimal Arithmetic unit

Unit – III :

**Register Transfer:** Register Transfer Language – Register Transfer – Bus and Memory Transfers – Arithmetic Micro operations – Logic Micro operations – Shift Micro operations.

**Control Unit:** Control Memory – Address Sequencing – Micro program Example – Design of Control Unit

Unit – IV :

**MemoryOrganization:** Memory Hierarchy – Main Memory – Auxiliary Memory – Associative Memory – Cache Memory – Virtual Memory.

**Input/output Organization:** Input-Output Interface – Asynchronous Data Transfer – Modes of Transfer – Priority Interrupt – Direct Memory Access (DMA).

Unit – V :

**Pipeline:** Parallel Processing – Pipelining – Arithmetic Pipeline – Instruction Pipeline.

**Multiprocessors:** Characteristics of Multiprocessors – Interconnection Structures – Inter Processor Arbitration – Inter Processor Communication and Synchronization

Text Books :

1. “Computer Systems Organization and Architecture”, John D. Carpinelli, PEA, 2009.
2. “Computer Systems Architecture”, 3/e, M. Moris Mano, PEA, 2007

Reference Books :

1. “Computer Organization”, Carl Hamacher, Zvonks Vranesic, SafeaZaky, 5/e, MCG, 2002.
2. “Computer Organization and Architecture”, 8/e, William Stallings, PEA, 2010.
3. “Computer Systems Architecture a Networking Approach”, 2/e, Rob Williams.
4. “Computer Organization and Architecture” Ghoshal, Pearson Education, 2011.
5. “Computer Organization and Architecture”, V. Rajaraman, T. Radakrishnan.
6. “Computer Organization and Design”, P. Pal Chaudhuri, PHI
7. “Structured Computer Organization”, Andrew S. Janenbaum, Todd Austin
8. “Computer Architecture” Parahmi, Oxford University Press

**II Year B.Tech II Sem**

## Object Oriented Analysis Design & Modeling

**Course Objective**

- To understand how to solve complex problems
- Analyze and design solutions to problems using object oriented approach
- Study the notations of Unified modeling language

Course Outcomes

- Find solutions to the complex problems using object oriented approach
- Represent classes, responsibilities and states using UML notation
- Identify classes and responsibilities of the problem domain

Unit - I :
The Inherent Complexity of Software, Attributes of Complex System, Designing Complex System, Foundation of Object Model, Elements of Object Model

Unit – II:
Classes and Objects: Nature of object, Relationships among object, Nature of class, Relationship among classes, Interplay of classes and objects, Identifying classes and objects

Unit – III :
Why we model, introducing the UML, Classes, Relationship, Common Mechanisms, class diagram, Object diagram

Unit – IV :
Advance Classes, Advance relationship, Interfaces, types & Roles, Packages, Interaction, Usecases, usecase diagram

Unit – V :
Interaction Diagrams, Activity diagram, Events and Signals, State chart diagram, time & space, component and component diagram, deployment & display diagrams, case study

Text Books :
1.“Object- Oriented Analysis And Design with Applications”, Third Edition. Grady BOOCH, Robert A. Maksimchuk, Michael W. ENGLE, Bobbi J. Young, Ph.D, Jim Conallen, Kellia. Houston, Pearson
2.“The Unified Modeling Language User Guide”, Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson

Reference Books :
1. “Object-oriented analysis and design using UML”, Mahesh P. Matha, PHI
2. “Head first object-oriented analysis and design”, Brett D. McLaughlin, Gary Pollice, Dave West, O’Reilly
3. “Object-oriented analysis and design with the Unified process”, John W. Satzinger, Robert B. Jackson, Stephen D. Burd, Cengage Learning
4. “The Unified modeling language Reference manual”, James Rumbaugh, Ivar Jacobson, Grady Booch, Addison-Wesley

## Java Programming

**Course Objectives:**

- Study the syntax, semantics and features of Java Programming Language
- Study the Object Oriented Programming Concepts of Java Programming language
- Learn the method of creating Multi-threaded programs and handle exceptions
- Learn Java features to create GUI applications & perform event handling

**Course Outcomes:**

- Solve problems using object oriented approach and implement them
- Ability to write Efficient programs that handle exceptions
- Create user friendly interface

**Unit - I**

**Introduction to Java**: The key attributes of object oriented programming, simple program, The Java keywords, Identifiers, Data types and operators, Program control statements, Arrays, Strings, String Handling

**Unit – II:**

**Classes**: Classes, Objects, Methods, Parameters, Constructors, Garbage Collection, Access modifiers, Pass Objects and arguments, Method and Constructor Overloading, Understanding static, Nested and inner classes.

**Inheritance** – Basics, Member Access, Usage of Super, Multi level hierarchy, Method overriding, Abstract class, Final keyword.

**Interfaces** – Creating, Implementing, Using, Extending, and Nesting of interfaces.

**Packages –** Defining, Finding, Member Access, Importing.

**Unit – III:**

**Exception handling**: Hierarchy, Fundamentals, Multiple catch clauses, subclass exceptions, Nesting try blocks, Throwing an exception, Using Finally and Throws, Built-in exceptions, User-defined exceptions.

**I/O**: Byte streams and Classes, Character streams and Classes, Predefined streams, Using byte streams, Reading and Writing files using byte streams, Reading and writing binary data, Random-access files, File I/O using character streams, Wrappers.

**Unit – IV:**

**Multithreading:** Fundamentals, Thread class, Runnable interface, Creating multiple threads, Life cycle of thread, Thread priorities, Synchronization, Thread communication, Suspending, resuming and stopping threads.

**Applets**: Basics, skeleton, Initialization and termination, Repainting, Status window, Passing parameters.

**Networking**: Basics, Networking classes and interfaces, InetAddress, Inet4Address and Inet6Address, TCP/IP Client Sockets, URL, URLConnection, HttpURLConnection, The URI class, Cookies, TCP/IP Server sockets, Datagrams.

**UNIT – V:**

**Swings: T**he origin and design philosophy of swing, Components and containers, Layout managers, Event handling, Using a push button, jtextfield, jlabel and image icon, The swing buttons, Trees, An overview of jmenubar, jmenu and jmenuitem, Creating a main menu, Add mnemonics and accelarators to Menu items, showmessagedialog, showconfirmdialog, showinputdialog, showoptiondialog, jdialog, Create a modeless dialog.

**Text Books :**

1. "Java Fundamentals - A Comprehensive Introduction", Herbert Schildt and Dale Skrien, Special Indian Edition, McGrawHill, 2013.
2. "Java The Complete Reference" Herbert Schildt, 8th Edition, 2011, Oracle press, TataMcGraw-Hill
3. "Java – How to Program", Paul Deitel, Harvey Deitel, PHI.

**Reference Books :**

1. "Programming with Java" T.V.Suresh Kumar, B.Eswara Reddy, P.Raghavan Pearson Edition.
2. "Core Java", Nageswar Rao, Wiley Publishers.
4. "Thinking in Java", Bruce Eckel, Pearson Education.
5. "A Programmers Guide to Java SCJP", Third Edition, Mughal, Rasmussen, Pearson.
6. "Head First Java", Kathy Sierra, Bert Bates, O'Reilly
7. "SCJP – Sun Certified Programmer for Java Study guide" – Kathy Sierra, Bert Bates, McGrawHill
8. "Java in Nutshell", David Flanagan, O'Reilly
9. "Core Java : Volume I – Fundamentals, Cay S. Horstmann, Gary Cornell, The Sun Micro Systems Press

# Formal Languages and Automata Theory

**Course Objective**

The course aims to introduce the basic methods and conclusions of the Theory of Computation. At the end of the course, students learn to apply these methods to problems from different fields and be guided by the results in searching for computational solutions to the problems.

1. Understand formal definitions of machine models.
2. Classify machines by their power to recognize languages.
3. Understanding of formal grammars, analysis
4. Understanding of hierarchical organization of problems depending on their complexity
5. Understanding of the logical limits to computational capacity
6. Understanding of undecidable problems

**Unit - I :**

**Introduction:** Basics of set theory, Relations on sets, Deductive proofs, Reduction to definitions, Other theorem forms, Proving equivalences about sets, The Contrapositive, Proof by contradiction, Counter examples, Inductive proofs, Alphabets, Strings, Languages, Problems, Grammar formalism, Chomsky Hierarchy

**Finite Automata:** An Informal picture of Finite Automata, Deterministic Finite Automata (DFA), Non Deterministic Finite Automata (NFA), Applying FA for Text search, Finite Automata with Epsilon transitions (ϵ-NFA or NFA- ϵ ), Finite Automata with output, Conversion of one machine to another, Minimization of Finite Automata, Myhill-Nerode Theorem.

**Unit – II:**

**Regular Languages:** Regular Expressions (RE), Finite Automata and Regular Expressions, Applications of Regular Expressions, Algebraic laws for Regular Expressions, The Arden's Theorem, Using Arden's theorem to construct RE from FA, Pumping Lemma for RLs, Applications of Pumping Lemma, Equivalence of Two FAs, Equivalence of Two REs, Construction of Regular Grammar from RE, Constructing FA from Regular Grammar, Closure properties of RLs, Decision problem's of RLS, Applications of REs and FAs

**Unit – III :**

**Context Free Grammars and Languages:** Definition of Context Free Grammars (CFG), Derivations and Parse trees, Ambiguity in CFGs, Removing ambiguity, Left recursion and Left factoring, Simplification of CFGs, Normal Forms, Linear grammars, Closure properties for CFLs, Pumping Lemma for CFLs, Decision problems for CFLs, CFG and Regular Language

**Unit – IV :**

**Push Down Automata (PDA):** Informal introduction, The Formal Definition, Graphical notation, Instantaneous description, The Languages of a PDA, Equivalence of PDAs and CFGs, Deterministic Push Down Automata, Two Stack PDA.

**Unit – V :**

**Turing Machines and Undecidability:** Basics of Turing Machine (TM), Transitional Representation of TMs, Instantaneous description, Non Deterministic TM, Conversion of Regular Expression to TM, Two stack PDA and TM, Variations of the TM, TM as an integer function, Universal TM, Linear Bounded Automata, TM Languages, Unrestricted grammar , Properties of Recursive and Recursively enumerable languages, Undecidability, Reducibility, Undeciadable problems about TMs, Post's Correspondence Problem(PCP), Modified PCP.

**Text Books :**

1. "Introduction to Automata Theory, Formal Languages and Computation", Shyamalendu kandar, PEARSON.
2. "Introduction to Automata Theory, Languages, and Computation", Third Edition, John E.Hopcroft, Rajeev Motwani, Jeffery D. Ullman, PEARSON.

**Reference Books :**

1. "Introduction To Languages And The Theory of Computation", John C Martin, The McGraw-Hill Companies, Third Edition. (TATA McGRAW HILL)
2. "Theory of Computation", Vivek Kulkarni, OXFORD.
3. Introduction to the Theory of Computation., Michel Sipser, 2nd Edition, Cengage Learning
4. "Theory of computer Science Automata, Languages and Computation", K.L.P. Mishra, N. Chandrasekaran, PHI, Third Edition.
5. "Fundamentals of the Theory of Computation, Principles and Practice", Raymond Greenlaw, H. James Hoover, MK(MORGAN KAUFMANN)
6. Finite Automata and Formal Language A Simple Approach, A.M. Padma Reddy, Pearson

**II Year B.Tech II Sem**

## Principles of Programming Languages

Course Objective

- To study various programming paradigms.
- To provide conceptual understanding of High level language design and implementation.
- To introduce the power of scripting languages

Course Outcomes

- Select appropriate programming language for problem solving
- Design new programming language.
- Gain Knowledge and comparison of the features programming languages

Unit - I :

**Preliminary Concepts:** Reasons for studying, concepts of programming languages, Programming domains, Language Evaluation Criteria, influences on Language design, Language categories, Programming Paradigms – Imperative, Object Oriented, functional Programming , Logic Programming. Programming Language Implementation – Compilation and Virtual Machines, programming environments. **Syntax and Semantics:** general Problem of describing Syntax and Semantics, formal methods of describing syntax - BNF, EBNF for common programming languages features, parse trees, ambiguous grammars, attribute grammars, denotational semantics and axiomatic semantics for common programming language features

Unit – II:

**Data types:** Introduction, primitive, character, user defined, array, associative, record, union, pointer and reference types, design and implementation uses related to these types. Names, Variable, concept of binding, type checking, strong typing, type compatibility, named constants, variable initialization.
**Expressions and Statements:** Arithmetic relational and Boolean expressions, Short circuit evaluation mixed mode assignment, Assignment Statements, Control Structures – Statement Level, Compound Statements, Selection, Iteration, Unconditional Statements, guarded commands

Unit – III :

**Subprograms and Blocks**: Fundamentals of sub-programs, Scope and lifetime of variable, static and dynamic scope, Design issues of subprograms and operations, local referencing environments, parameter passing methods, overloaded sub-programs, generic sub-programs, parameters that are sub-program names, design issues for functions user defined overloaded operators, co routines.

Unit – IV :

**Abstract Data types**: Abstractions and encapsulation, introductions to data abstraction, design issues, language examples, C++ parameterized ADT, object oriented programming in small talk, C++, Java, C#, Ada 95
**Concurrency**: Subprogram level concurrency, semaphores, monitors, massage passing, Java threads, C# threads.
**Exception handling** : Exceptions, exception Propagation, Exception handler in Ada, C++ and Java.
Logic Programming Language : Introduction and overview of logic programming, basic elements of prolog, application of logic programming

**Unit – V :**

**Functional Programming Languages**: Introduction, fundamentals of FPL, LISP, ML, Haskell, application of Functional Programming Languages and comparison of functional and imperative Languages.
**Scripting Language**: Pragmatics, Key Concepts, Case Study : Python – Values and Types, Variables , Storage and Control, Bindings and Scope, Procedural Abstraction, Data Abstraction, Separate Compilation, Module Library

**Text Books :**

1. “Concepts of Programming Languages”, Robert .W. Sebesta 10/e, Pearson Education,2008.
2. “Programming Language Design Concepts”, D. A. Watt, Wiley dreamtech,rp-2007.

**Reference Books :**

1. “Programming Languages”, 2nd Edition, A.B. Tucker, R.E. Noonan, TMH.
2. “Programming Languages”, K. C.Louden, 2nd Edition, Thomson, 2003.
3. “LISP”, Patric Henry Winston and Paul Horn, Pearson Education.
4. “Programming in Prolog”, W.F. Clocksin,& C.S.Mellish, 5th Edition, Springer.
5. “Programming Python”, M.Lutz, 3rd Edition, O’reilly, SPD, rp-2007.
6. “Core Python Programming”, Chun, II Edition, Pearson Education, 2007.
7. “Guide to Programming with Python”, Michael Dawson, Thomson, 2008

## Managerial Economics and Financial Accountancy

**Unit I: INTRODUCTION TO MANAGERIAL ECONOMICS**

Definition, nature and scope of managerial economics- relation with other disciplines- Demand Analysis: Demand Determinants, Law of Demand and its exceptions

**Unit II**: **ELASTICITY OF DEMAND**

Definition, Types, Measurement and Significance of Elasticity of Demand. Demand forecasting, factors governing demand forecasting, methods of demand forecasting (Survey methods, Statistical methods, Expert opinion method, Test marketing, Controlled experiments, Judgmental approach to Demand Forecasting)

**UNIT III :THEORY OF PRODUCTION AND COST ANALYSIS**

Production Function – Isoquants and Isocosts, MRTS, least cost combination of inputs, Cobb-Douglas production function, laws of returns, internal and external economies of scale.

**Cost Analysis**: Cost concepts, opportunity cost, fixed Vs variable costs, explicit costs Vs Implicit costs, out of pocket costs Vs Imputed costs. Break-Even Analysis (BEA) - Determination of Break Even Point (Simple Problems)- Managerial significance and limitations of BEA.

**UNIT IV: INTRODUCTION TO MARKETS AND PRICING POLICIES**

Market structures: Types of competition, features of perfect competition, monopoly- monopolistic competition. Price-Output determination under perfect competition and monopoly - Methods of Pricing-cost plus pricing, marginal cost, limit pricing, skimming pricing, bundling pricing, sealed bid pricing and peak load pricing.

**UNIT V: BUSINESS ORGANISATIONS AND NEW ECONOMIC ENVIRONMENT**

Characteristic features of business, features and evaluation of sole proprietorship, partnership, Joint Stock Company, public enterprises and their types, changing business environment in post-liberalization scenario.

**UNIT VI: CAPITAL AND CAPITAL BUDGETING**

Capital and its significance, types of capital, estimation of fixed and working capital requirements, methods and sources of raising finance.

Nature and scope of capital budgeting, features of capital budgeting proposal, methods of capital budgeting – payback method, accounting rate of return (ARR) and Net present value method (Simple problems).

**UNIT VII: INTRODUCTION TO FINANCIAL ACCOUNTING**

Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).

**UNIT VIII: FINANCIAL ANALYSIS THROUGH RATIOS**

Computation, Analysis and Interpretation of financial statements through Liquidity Ratios (Current and Quick ratio), Activity ratios (Inventory Turnover Ratio and Debtor Turnover Ratio), Capital Structure Ratios (Debt- Equity Ratio, Interest Coverage Ratio) and Profitability ratios (Gross Profit Ratio, Net Profit Ratio, Operating Ratio, P/E Ratios and EPS), Du Pont Chart.

**TEXT BOOKS:**

1. Aryasri: **Managerial Economics and Financial Analysis**, 4/e, TMH, 2009.
2. Varshney & Maheswari: **Managerial Economics**, Sultan Chand, 2009.

**REFERENCES:**

1. Premchand Babu, Madan Mohan:Financial **Accounting and Analysis**,Himalaya, 2009
2. S.A. Siddiqui and A.S. Siddiqui: **Managerial Economics and Financial Analysis**, New Age International,. 2009.
3. Joseph G. Nellis and David Parker: **Principles of Business Economics**, Pearson, 2/e, New Delhi.
4. Domnick Salvatore: **Managerial Economics in a Global Economy**, Cengage, 2009.
5. H.L.Ahuja: **Managerial Economics**, S.Chand, 3/e, 2009

**II Year B.Tech II Sem**

## HUMAN VALUES AND PROFESSIONAL ETHICS-SYLLABUS

**OBJECTIVE**

- To create an awareness on Engineering Ethics and Human Values.
- To instill Moral and Social Values and Loyalty
- To appreciate the rights of Others

**Unit I: HUMAN VALUES**

Morals, Values and Ethics-Integrity-Work Ethic-Service learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty - Courage- Co Operation – Commitment – Empathy – Self Confidence Character – Spirituality.

**Unit II: ENGINEERING ETHICS**

Senses of 'Engineering Ethics- Variety of moral issued – Types of inquiry – Moral dilemmas – Moral autonomy –Kohlberg's theory- Gilligan's theory- Consensus and controversy – Models of professional roles- Theories about right action- Self interest - Customs and religion –Uses of Ethical theories – Valuing time –Co operation – Commitment.

**Unit III** :**ENGINEERING AS SOCIAL EXPERIMENTATION**

Engineering As Social Experimentation – Framing the problem – Determining the facts – Codes of Ethics – Clarifying Concepts – Application issues – Common Ground - General Principles – Utilitarian thinking respect for persons.

**UNIT IV: ENGINEERS RESPONSIBILITY FOR SAFETY AND RISK**

Safety and risk – Assessment of safety and risk – Risk benefit analysis and reducing risk- Safety and the Engineer- Designing for the safety- Intellectual Property rights(IPR).

**UINIT V: GLOBAL ISSUES**

Globalization – Cross culture issues- Environmental Ethics – Computer Ethics – Computers as the instrument of Unethical behavior – Computers as the object of Unethical acts – Autonomous Computers- Computer codes of Ethics – Weapons Development - Ethics and Research – Analyzing Ethical Problems in research – Intellectual property Rights( IPR).

**BOOKS FOR REFERENCE**

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

## Object Oriented Analysis Design & Modeling Lab

### Course Objective

- Practice the notation for representing various UML diagrams
- Analyze and design the problem by representing using UML diagrams
- Become familiar with all phases of OOAD

### Course Outcomes

- Find solutions to the problems using object oriented approach
- Represent using UML notation and interact with the customer to refine the UML diagrams

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

### Problems that may be considered are

1. College information system
2. Hostel management
3. ATM system
4. Library management system
5. Railway Reservation

**II Year B.Tech II Sem**

## Object Oriented Programming using Java Lab

**Course Objective/Outcomes**

- To introduce java compiler and eclipse platform
- To impart hand on experience with java programming

**Note:**

1. **IDEs are not mandatory, encourage the use of Eclipse or Netbean platform**
2. **The list suggests the minimum program set. Hence, the concerned staff is requested to add more problems to the list as needed**

**Week-1:**

1. Use Eclipse or Netbean platform and acquaint with the various menus. Create a test project, add a test class and run it. See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods and classes. Try debug step by step with java program to find prime numbers between 1 to n.

**Week-2:**

1. Write a Java program that prints all real and imaginary solutions to the quadratic equation ax2 + bx + c = 0. Read in a, b, c and use the quadratic formula.
2. Write a Java program for sorting a given list of names in ascending order
3. Write a java program to accept a string from user and display number of vowels, consonants, digits and special characters present in each of the words of the given text.

**Week -3:**

1. Write a java program to make rolling a pair of dice 10,000 times and counts the number of times doubles of are rolled for each different pair of doubles.
   *Hint: Math.random()*
2. Write java program that inputs 5 numbers, each between 10 and 100 inclusive. As each number is read display it only if it's not a duplicate of any number already read display the complete set of unique values input after the user enters each new value.
3. Write a java program to read the time intervals (HH:MM) and to compare system time if the system time between your time intervals print correct time and exit else try again to repute the same thing. By using StringToknizer class

**Week-4:**

1. Write a java program to split a given text file into n parts. Name each part as the name of the original file followed by .part<n> where n is the sequence number of the part file.
2. Write java program to create a super class called Figure that receives the dimensions of two dimensional objects. It also defines a method called area that computes the area of an object. The program derives two subclasses from Figure. The first is Rectangle and second is Triangle. Each of the sub class overridden area() so that it returns the area of a rectangle and a triangle respectively.
3. Write a Java program that creates three threads. First thread displays "Good Morning" every one second, the second thread displays "Hello" every two seconds and the third thread displays "Welcome" every three seconds

**Week-5:**

1. Write a Java program that correctly implements producer consumer problem using the concept of inter thread communication
2. Write a java program to find and replace pattern in given file,
3. Use inheritance to create an exception super class called EexceptionA and exception sub class ExceptionB and ExceptionC, where ExceptionB inherits from ExceptionA and ExceptionC inherits from ExceptionB. Write a java program to demonstrate that the catch block for type ExceptionA catches exception of type ExceptionB and ExceptionC

**Week-6:**

1. Write a java program to convert an ArrayList to an Array.
2. Write a Java Program for waving a Flag using Applets and Threads
3. Write a Java Program for Bouncing Ball (The ball while moving down has to increase the size and decrease the size while moving up)

**Week-7:**

1. Write a Java Program for stack operation using Buttons and JOptionPane input and Message dialog box.
2. Write a Java Program to Addition, Division, Multiplication and substraction using JOptionPane dialog Box and Textfields.

**Week-8:**

1. Write a Java Program for the blinking eyes and mouth should open while blinking.
2. Implement a Java Program to add a new ball each time the user clicks the mouse. Provided a maximum of 20 balls randomly choose a color for each ball.

**Week-9:**

1. Suppose that a table named Table.txt is stored in a text file. The first line in the file is the header, and the remaining lines correspond to rows in the table. The elements are eparated by commas. Write a java program to display the table using Jtable component
2. Write a program that creates a user interface to perform integer divisions. The user enters two numbers in the textfields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a NumberFormatException. If Num2 were Zero, the program would throw an ArithmeticException Display the exception in a message dialog box.

**Week-10:**

1. Write a Java Program to implement the opening of a door while opening man should present before hut and closing man should disappear.
2. Write a Java code by using JtextField to read decimal value and converting a decimal number into binary number then print the binary value in another JtextField

**Week-11:**

1. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result.
2. Write a Java program for handling mouse events.

**Week-12:**

1. Write a java program establish a JDBC connection, create a table student with properties name, register number, mark1,mark2, mark3. Insert the values into the table by using the java and display the information of the students at front end.

Text Books :

1. Java How to Program, Sixth Edition, H.M.Dietel and P.J.Dietel, Pearson Education/PHI
2. Java The Complete Reference" by Herbert Schildt, TMH, 8th Edition

Reference Books :

1. Introduction to Java programming, Sixth edition, Y.Daniel Liang, Pearson Education
2. Programming in java Sachine
3. Big Java, 2nd edition, Cay Horstmann, Wiley Student Edition, Wiley India Private Limited.
4. Introduction to Programming with Java, J.Dean & R.Dean, McGraw Hill education.
5. Java Programming, D S Malik, cengage learning, India Edition

**B.TECH. III Year I sem (C.S.E)**

## OPERATING SYSTEMS

| L | T | P | C |
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**Course Objective:**

- To make the students understand the basic operating system concepts such as processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystems and protection.
- To get acquaintance with the class of abstractions afford by general purpose operating systems that aid the development of user applications

**Course Outcomes:**

- Understand what makes a computer system function and the primary PC components.
- Understand past and current trends in computer technology.
- Use basic software applications.
- Add functionality to the exiting operating systems
- Design new operating systems

**UNIT I**

**Operating Systems Overview:** Operating system functions, Operating system structure, operating systems Operations, protection and security, Kernel data Structures, Computing Environments, Open- Source Operating Systems

**Operating System Structure:** Operating System Services, User and Operating-System Interface, systems calls, Types of System Calls, system programs, operating system structure, operating system debugging, System Boot.

**Processes:** Process concept, process Scheduling, Operations on processes, Inter process Communication, Examples of IPC systems.

**UNIT II**

**Threads:** overview, Multicore Programming, Multithreading Models, Thread Libraries, Implicit threading, Threading Issues.

**Process Synchronization:** The critical-section problem, Peterson‘s Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic problems of synchronization, Monitors, Synchronization examples, Alternative approaches.

**CPU Scheduling:** Scheduling-Criteria, Scheduling Algorithms, Thread Scheduling, Multiple-Processor Scheduling, Real-Time CPU Scheduling, Algorithm Evaluation.

**UNIT III**

**Memory Management:** Swapping, contiguous memory allocation, segmentation, paging, structure of the page table.

**Virtual memory:** demand paging, page-replacement, Allocation of frames, Thrashing, Memory-Mapped Files, Allocating Kernel Memory

**Deadlocks:** System Model, deadlock characterization, Methods of handling Deadlocks, Deadlock prevention, Detection and Avoidance, Recovery from deadlock.

**UNIT IV**

**Mass-storage structure:** Overview of Mass-storage structure, Disk structure, Disk attachment, Disk scheduling, Swap-space management, RAID structure, Stable-storage implementation.

**File system Interface:** The concept of a file, Access Methods, Directory and Disk structure, File system mounting, File sharing, Protection.

**File system Implementation:** File-system structure, File-system Implementation, Directory Implementation, Allocation Methods, Free-Space management.

**UNIT V**

**I/O systems:** I/O Hardware, Application I/O interface, Kernel I/O subsystem, Transforming I/O requests to Hardware operations.

**Protection:** Goals of Protection, Principles of Protection, Domain of protection, Access Matrix, Implementation of Access Matrix, Access control, Revocation of Access Rights, Capability-Based systems, Language – Based Protection

**Security:** The Security problem, Program threats, System and Network threats, Cryptography as a security tool, User authentication, Implementing security defenses, Firewalling to protect systems and networks, Computer–security classifications.

**TEXT BOOKS:**

1. Operating System Concepts, Abraham Silberschatz, Peter B. Galvin, Greg Gagne, Ninth Edition, 2012, Wiley.
2. Operating Systems: Internals and Design Principles, Stallings, Sixth Edition, 2009, Pearson Education.

**REFERENCE BOOKS:**

1. Modern Operating Systems, Andrew S Tanenbaum, Second Edition, PHI.
2. Operating Systems, S.Haldar, A.A.Aravind, Pearson Education.
3. Principles of Operating Systems, B.L.Stuart, Cengage learning, India Edition.
4. Operating Systems, A.S.Godbole, Second Edition, TMH.
5. An Introduction to Operating Systems, P.C.P. Bhatt, PHI.
6. Operating Systems, G.Nutt, N.Chaki and S.Neogy, Third Edition, Pearson Education.
7. Operating Systems, R.Elmasri, A,G.Carrick and D.Levine, Mc Graw Hill.

**B. Tech. III-I Year (C.S.E)**

## ADVANCED DATA STRUCTURES

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|---|---|---|---|
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**Course Outcomes:**

**Unit –I**

Introduction to OOPs, Templates, Virtual Functions, Exception Handling,
Linear Lists –Linked Representation: Singly Linked Lists and Chains, Circular lists and Header Nodes, Doubly Linked Lists, Glossary of Linked List Terms, Applications

**Unit –II**

**Arrays and Matrices:** Arrays, Matrices, Special Matrices, Sparse Matrices.
**Skip list and Hashing:** Dictionaries, The Abstract Data Type, Linear List Representation, Skip List representation, Hash Table Representation.

**Unit –III**

**Binary and Other Trees:** Trees, Binary Trees, Properties of Binary Trees, Representation of Binary Trees, Common Binary Tree Operations, Binary Tree Traversal, The ADT Binary Tree, The Class Linked Binary Tree, Applications.
**Priority Queues:** Definition and Applications, The Abstract data Type, Linear Lists, Heaps, Leftist trees, applications

**Unit-IV**

**Binary Search Trees:** Definitions, Abstract data Type, Binary Search tree Operations and implementations, Binary search Tree with Duplicate, Indexed Binary search Tree, Applications.
**Balanced Search tree**: AVL Trees, Red – Black Trees, Splay Trees, B – Trees.

**Unit –V**

**Graphs:** Definitions, Applications and More Definitions, Properties, The ADT Graph, Representation of Un weighted Graph, Representation of Weighted Graph, Class Implementations, Graph Search methods, Application revisited.

**TEXT BOOK**:

1. "The Complete Reference C++", Herbert Schildt, 4th edition, 2012, TMH
2. Data Structures, Algorithms and Applications in C++ Second Edition SartajSahni Universities Press.

**REFERENCES BOOKS**:

12. "Fundamentals of Data Structures in C++", Dinesh Mehta, SartajSahni, Ellis Horwitz, University Press
13. "Fundamentals of Data Structures in C++", Ellis Horowitz, SaratjSahni, Dinesh Mehta, 2nd edition, 2012, University Press.

**B. Tech. III-I Year (C.S.E)**

## COMPUTER NETWORKS

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**Course Objectives:**

- Study the evolution of computer networks and future direction
- Study the concepts of computer networks from layered perspective
- Study the issues open for research in computer networks

**Course Outcomes:**

- Use appropriate transmission media to connect to a computer network and Internet
- Work on the open issues for their project
- Start using the Internet effectively
- Able to design new protocols for computer network

**UNIT -I**

Data Communications, Network, Business and Home applications of Computer Network, Internet history, Standards and Administration, Network hardware, Network Software: Protocol Hierarchies- Design Issues for the Layers- Connection-Oriented Versus Connectionless Service, Reference Models.

Data and Signals, Periodic Analog Signals, Digital Signals, Transmission Impairment, Data rate Limits, Performance, Circuit-Switched Networks, Packet Switching, Guided Transmission Media.

**UNIT -II**

Data Link Layer Design Issues, Error Detection and Correction, Elementary Data Link Protocols, Sliding Window Protocols, The Channel Allocation Problem, Multiple Access Protocols, Ethernet

**UNIT -III**

Data Link Layer Switching, Routing algorithms: The Optimality Principle-Shortest path Algorithm-Flooding-Distance Vector Routing-Link State Routing-Hierarchical Routing-Broadcast Routing-Multicast Routing-Anycast Routing, Congestion Control Algorithms

**UNIT -IV**

Internetworking, The Network Layer in the Internet: The IP Version 4 Protocol- IP Addresses-IP Version 6- Internet Control Protocols- Label Switching and MPLS-OSPF-BGP, Elements of Transport Protocols, Congestion Control: Desirable bandwidth Allocation-Regulating the Sending Rate

**UNIT -V**

The Internet Transport Protocols: UDP, The Internet Transport Protocols: TCP, World Wide Web and HTTP, FTP, Electronic Mail, TELNET, Secure Shell (SSH), Domain Name System (DNS)

**TEXT BOOKS:**

1.Andrew S. Tanenbaum, David J.Wetherall, "**Computer Networks**", Pearson Education, 5th ed., ISBN 978-81-317-8757-1
2. Behrouz A. Forouzan, "**Data Communications and Networking**", McGraw Hill Education, 5th ed., ISBN 978-1-25-906475-3.

**REFERENCES:**

1. Douglas E. Comer**,** "**Internetworking with TCP/IP – Principles, protocols, and architecture- Volume 1**", 5th ed., PHI
2. Peterson, Davie,"**Computer Networks**", 5th ed., Elsevier.
3. Chawan- Hwa Wu, Irwin,"**Introduction to Computer Networks and Cyber Security**", CRC Publications.

**Computer Networks and Internets with Internet Applications**, Comer

**B.TECH. III Year I sem (C.S.E)**

## SOFTWARE ENGINEERING

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**Course Objectives:**

- To understand the software life cycle models.
- To understand the software requirements and SRS document.
- To understand the importance of modeling and modeling languages.
- To design and develop correct and robust software products.
- To understand the quality control and how to ensure good quality software.
- To understand the planning and estimation of software projects.
- To understand the implementation issues, validation and verification procedures.
- To understand the maintenance of software

**Course Outcomes:**

- Define and develop a software project from requirement gathering to implementation.
- Obtain knowledge about principles and practices of software engineering.
- Focus on the fundamentals of modeling a software project.
- Obtain knowledge about estimation and maintenance of software systems

**UNIT I**

**Software and Software Engineering:** The Nature of Software, The Unique Nature of WebApps, Software Engineering, Software Process, Software Engineering Practice, Software Myths.

**Process Models:** A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, The Unified Process, Personal and Team Process Models, Process Terminology, Product and Process.

**UNIT II**

**Understanding Requirements:** Requirements Engineering, Establishing the Groundwork, Eliciting Requirements, Developing Use Cases, Building the Requirements Model, Negotiating Requirements, Validating Requirements.

**Requirements Modeling:** Requirements Analysis, Scenario-Based Modeling, UML Models That Supplement the Use Case, Data Modeling Concepts, Class-Based Modeling.

**UNIT III**

**Design Concepts:** Design within the Context of Software Engineering, Design Process, Design Concepts, The Design Model.

**Architectural Design:** Software Architecture, Architectural Genres, Architectural Styles, Architectural Design.

**Component-Level Design:** What is a Component, Designing Class-Based Components, Conducting Component-Level Design, Component-Level Design for WebApps.

**UNIT IV**

**User Interface Design:** The Golden Rules, User Interface Analysis and Design, Interface

Analysis, Interface Design Steps, Design Evaluation.
**Coding and Testing:** Coding, Code Review, Software Documentation, Testing, Testing in the Large versus Testing in the Small, Unit Testing, Black-Box Testing, White-Box Testing, Debugging, Program Analysis Tools, Integration Testing, Testing Object-Oriented Programs, System Testing, Some General Issues Associated with Testing.

**UNIT V**
**Software Project Management:** Responsibilities of a Software Project Manager, Project Planning, Metrics for Project Size Estimation, Project Estimation Techniques, Empirical Estimation Techniques, COCOMO-A Heuristic Estimation Technique, Halstead‘s Software Science-An Analytical Technique, Staffing Level Estimation, Scheduling, Organization and Team Structures, Staffing, Risk Management, Software Configuration Management. .
**Software Maintenance:** Characteristics of Software Maintenance, Software Reverse Engineering, Software Maintenance Process Models, Estimation of Maintenance cost.

**TEXT BOOKS :**
1. Software Engineering A practitioner‟s Approach, Roger S. Pressman, Seventh Edition, 2009, McGrawHill International Edition.
2. Fundamentals of Software Engineering, Rajib Mall, Third Edition, 2009, PHI.
**REFERENCE BOOKS:**
1. Software Engineering, Ian Sommerville, Ninth edition, Pearson education.
2. Software Engineering : A Primer, Waman S Jawadekar, Tata McGraw-Hill, 2008
3. Software Engineering, A Precise Approach, Pankaj Jalote, Wiley India,2010.
4. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press.
5. Software Engineering1: Abstraction and modeling, Diner Bjorner, Springer International edition, 2006.
6. Software Engineering2: Specification of systems and languages, Diner Bjorner, Springer International edition , 2006.
7. Software Engineering Foundations, Yingxu Wang, Auerbach Publications,2008.
8. Software Engineering Principles and Practice, Hans Van Vliet,3rd edition, John Wiley &Sons Ltd.
9. Software Engineering 3:Domains,Requirements,and Software Design, D.Bjorner, Springer International Edition.
10. Introduction to Software Engineering, R.J.Leach, CRC Press.

**B.TECH. III Year I sem (C.S.E)**

## DATABASE MANAGEMENT SYSTEMS

| L | T | P | C |
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**Course Objective:**

- To create database and query it using SQL queries, design forms and generate reports.
- Learn to use integrity constraints, referential integrity constraints, triggers, assertions

**Course Outcomes:**

- Design databases
- Retrieve information from data bases
- Use procedures to program the data access and manipulation
- Create user interfaces and generate reports

**UNIT I**

**The Worlds of Database Systems** -The Evolution of Database Systems - Overview of a Database Management System - Outline of Database System Studies.

**The Entity-Relationship Model** – Elements of E/R Model – Design Principles – The Modeling of Constraints – Weak Entity Sets.

**The Relational Data Model** – Basics of the Relational Model – From E/R Diagrams to Relational Designs – Converting Subclass Structures to Relations.

**UNIT II**

**Relational Algebra and Calculus** – Preliminaries, Relational algebra: Selection and Projection , Set Operations, Renaming, Joins, Division - Relational Calculus – Expressive power of Algebra and Calculus.

**The Database Language SQL** – Simple Queries in SQL – Queries Involving More than One Relation – Subqueries – Full Relation Operations – Database Modifications – Defining a Relation Schema in SQL – View Definitions

**UNIT III**

**Constraints and Triggers** – Keys and Foreign keys – Constraints on Attributes and Tuples, Schemalevel

Constraints and Triggers.

Functional Dependencies– Rules about Functional Dependencies -- Design of Relational Database Schemas, Normal Forms based on FDs – Multivalued Dependencies, 4NF, 5NF

**UNIT IV**

Transaction Management : Transactions, ACID properties, Serializability, Other isolation levels.

**Concurrency Control** – Serial and Serializable Schedules – Conflict Serializability – Enforcing Serializability by Locks – Locking Systems with Several Lock Modes - Concurrency Control by Timestamps – Concurrency Control by Validation.

**UNIT V**

**Index Structures** – Indexes on Sequential Files – Secondary Indexes – B-Trees, B+ Trees – Hashing.

**Introduction to Query Optimization**.

**Failures and Recovery: System Failures** – Issues and Models for Resilient Operation – Undo Logging – Redo Logging – Undo/Redo Logging – Protecting Against Media Failures.

**TEXT BOOKS:**

1. **"Database Systems, The Complete Book",** Hector Garcia-Molina, Jeffrey D. Ullman and Jennifer Widom, 6th impression, 2011, Pearson.
2. **"Data base Management Systems",** Raghu Rama Krishnan, Johannes Gehrke, 3rd Edition, 2003, McGraw Hill.

**REFERENCE BOOKS:**

1. "Fundamentals of Database Systems", Elmasri Navrate, 6th edition, 2013, Pearson.
2. "Data base Systems design", Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
3. "Introduction to Database Systems", C.J.Date, Pearson Education.
4. "Data base System Concepts", Silberschatz, Korth, McGraw Hill, V edition.

(refer Raghu Rama Krishnan text book latest version and frame new syllabus)

**B.TECH. III Year I sem (C.S.E)**

## MANAGEMENT SCIENCE

| L | T | P | C |
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**Course objectives**

1. To analyze the characteristics and contributions of enterprising people
2. To assess their own entrepreneurial and enterprising potential To develop an understanding of the general role of Small Business Enterprises
3. To develop skills to start, run and manage SMEs
4. Understand the role of entrepreneurship in economic development.
5. Identify the general characteristics of entrepreneurs.
6. Know the differences between entrepreneurial and managerial type jobs.
7. Understand the significance and sources of capital. Participate in the preparation of a complete business plan.
8. Have an understanding of individual personalities and interpersonal skills needed for effective communications in a diverse business environment.
9. Have an introductory understanding of global entrepreneurship concepts.
10. Acquire entrepreneurial quality, competency & motivation.
11. Understand the concept & process of entrepreneurship- its contribution & role in the growth & development of individual & the nation.

**UNIT I**

**Introduction To Management:**

Concepts of Management Nature - importance and Functions of Management, Taylor‘s Scientific Management Theory, Fayol‘s Principles of Management, Maslow‘s Theory of Human Needs, Douglas McGregor‘s Theory X and Theory Y, Leadership Styles, Social responsibilities of Management.

**Designing Organizational Structures:**

Basic concepts related to Organisation - Departmentation and Decentralization, Types of mechanistic and organic structures of organization (Line organization, Line and staff organization, functional organization, Committee organization, matrix organization, team structure) their merits, demerits and suitability.

**UNIT II**

**Operations Management:**

Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production), Work Study. Statistical Quality Control**:**c chart, p chart, (simple Problems) Deming‘s contribution to quality.

**Materials Management:** EOQ, ABC Analysis, Purchase Procedure and Stores Management. Inventory — functions. Types, inventory classification techniques.

**Marketing:** Functions of Marketing, Marketing Mix, and Marketing Strategies based on Product Life Cycle, Channels of distribution.

**UNIT III**

**Human Resources Management (HRM):**

Concepts of HRM ,Personnel Management and Industrial Relations (PMIR), Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Placement, Wage and Salary Administration, Promotion, Transfer, Separation, Performance

Appraisal, Grievance Handling and Welfare Administration, Job Evaluation, Merit Rating and methods.

**UNIT IV**

**Strategic Management:**

Vision, Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of Corporate Planning Process, Environmental Scanning, Value Chain Analysis, SWOT Analysis, Steps in Strategy Formulation and Implementation, Generic Strategy alternatives.

**Project Management (PERT/CPM):**

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

**UNIT V**

**Contemporary Management Practices:**

Basic concepts of MIS, Materials Requirement Planning (MRP), Just-In-Time (JIT) System, Total Quality Management (TQM), Six sigma concept, Supply Chain Management, Enterprise Resource Planning (ERP), Performance Management, Business Process outsourcing (BPO), Business Process Re-engineering and Bench Marking, Balanced Score Card.

**Assignments, case studies And mini project.**

**TEXT BOOKS:**

1. Aryasri: Management Science, TMH, 2004.
2. Stoner, Freeman, Gilbert, Management, 6th Ed, Pearson Education,New Delhi, 2004.

**REFERENCES:**

1. Kotler Philip & Keller Kevin Lane: Marketing Mangement 12/e, PHI,2005.
2. Koontz & Weihrich: Essentials of Management, 6/e, TMH, 2005.
3. Thomas N.Duening & John M.Ivancevich Management—Principles and Guidelines, Biztantra, 2003.
4. Kanishka Bedi, Production and Operations Management, Oxford University Press, 2004.
5. Memoria & S.V.Gauker, Personnel Management, Himalaya, 25/e, 2005
6. Samuel C.Certo: Modern Management, 9/e, PHI, 2005
7. Schermerhorn, Capling, Poole & Wiesner: Management, Wiley, 2002.
8. Parnell: Strategic Management, Biztantra, 2003.
9. Lawrence R Jauch, R.Gupta &William F.Glueck: Business Policy and Strategic Management, Frank
Bros., 2005.
10. L.S.Srinath: PERT/CPM,Affiliated East-West Press, 2005.

**Learning Outcome**

The M.S. prepares engineers for a lifelong career addressing the critical technical and managerial needs of private and public organizations. The program emphasizes developing analytic abilities, making better decisions, developing and executing strategies while also leading people who innovate. Unlike an MBA, our master's program addresses the technical as well as the behavioral challenges of running organizations and complex systems. We emphasize quantitative analytic skills and an entrepreneurial spirit.

**B.Tech. III –I SEM (CSE)**

## ADVANCED ENGLISH LANGUAGE COMMUNICATION SKILLS (AELCS) LAB

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**Introduction:**

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

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

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

**Objectives:**

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

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

**Syllabus**:

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

**UNIT-I: Communicative Competency**

1. Reading Comprehension – Techniques-Book Review
2. Listening comprehension – Video Talks-Eminent speeches
3. Verbal Competency - Vocabulary - Spotting Errors- Aptitude Tests

**UNIT-II: Technical Writing**

1. Essentials of writing -Technical Paper/ Report writing-Concise writing
2. Administrative / Business Documentation – Circular Writing -Meeting – Agenda – Minutes-Resolutions
3. Project Writing – Framing Outline – Finding Problem- Documentation-Citation

**UNIT-III: Presentational Skills**

1. Oral presentations – Public Speaking –Paper & Seminar Presentation
2. Digital Presentations -Power point - Video Presentation -Poster presentation
3. Stage Dynamics – Body Language – Para Language

**UNIT-IV: Corporate Skills**

1. Etiquettes -Dress - Dining – Net Etiquettes
2. Telephonic skills –Mobile Etiquettes
3. Soft Skills – Intra – Inter Personal Skills

**UNIT-V: Getting Ready For Job**

1. Before Interview -Curriculum vitae/ Resume-Covering letter-E-mail writing
2. During Interview – G.D-Mock Interviews– Psychometric Tests – Follow up
3. After interview - Excelling in Profession– Team spirit– Work culture

**Learning Outcomes:**

- Acquiring extensive range of vocabulary and its proper use contextually
- Flair in Writing and felicity in written expression.
- Enhanced job prospects / Employability skills /developing organizational abilities in tune with corporate requirement
- Effective Speaking Abilities

**Minimum Requirement:**

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

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

**Suggested Software:**

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

1. **K-VAN SOLUTIONS-Advanced communication lab**
2. **DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.**
3. **TOEFL & GRE**( KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
4. **Train2success.com**

**Books Recommended:**


1. **Objective English for Competitive Exams**, Hari Mohana Prasad, 4th edition, Tata Mc Graw Hill.
2. **Effective Technical Communication,** Ashrif Rizvi, TataMcGrahill, 2011.
3. **Technical Communication**, Meenakshi Raman & Sangeeta Sharma, O U Press 2009.
4. Books on **TOEFL/GRE/GMAT/CAT/IELTS**, Barron's/DELTA/Cambridge University Press.2012.
5. **Soft Skills for Everyone,** Butterfield Jeff, Cengage Publications, 2011.
6. **Ultimate Psychometric Tests**: Mike Bryon,Vinod Vasishtha for Kogan Page India Pvt. Ltd, New Delhi.
7. **Soft Skills-** Know Yourself And Know The World, Dr.K.Alex, Chand Publications ,Third revised edition 2014.
8. **Management Shapers Series** , Universities Press (India) Pvt Ltd., Himayatnagar, Hyderabad 2008.
9. **Word Power Made Handy,** Shalini Verma, S Chand Publications, 2011.

**B.TECH. III Year I sem (C.S.E)**

## SYSTEM SOFTWARE LAB

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Course Objectives:

- This course will introduce the basic principles in Operating System. It will cover all the management modules present in the OS like process management, Memory management, File management, Disk management, Network management, I/O management,
- 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

**PART A: Computer Networks**

1. Implement the data link layer framing methods such as character, character stuffing and bit stuffing.
2. Implement on a data set of characters the three CRC polynomials – CRC 12, CRC 16 and CRC CCIP.
3. Implement Dijkstra's algorithm to compute the Shortest path thru a graph.
4. Take an example subnet graph with weights indicating delay between nodes. Now obtain Routing table art each node using distance vector routing algorithm.
5. Take an example subnet of hosts. Obtain broadcast tree for it.
6. Take a 64 bit playing text and encrypt the same using DES algorithm .
7. Write a program to break the above DES coding.
8. Using RSA algorithm Encrypt a text data and Decrypt the same .

**PART- B: Operating System**

1. Simulate the following CPU scheduling algorithms
   a) Round Robin b) SJF c) FCFS d) Priority
2. Simulate all file allocation strategies
   a) Sequential b) Indexed c) Linked
3. Simulate MVT and MFT
4. Simulate all File Organization Techniques
   a) Single level directory b) Two level c) Hierarchical d) DAG
5. Simulate Bankers Algorithm for Dead Lock Avoidance
6. Simulate Bankers Algorithm for Dead Lock Prevention
7. Simulate all page replacement algorithms
   a) FIFO b) LRU c) LFU Etc. …
8. Simulate Paging Technique of memory management.

**PART – C: Week1 :**

Write C++ programs to implement the following using an array.
a) Stack ADT b) Queue ADT

**Week2 :**

Write C++ programs to implement the following using a singly linked list.
a) Stack ADT b) Queue ADT

**Week3 :**

Write C++ programs to implement the deque (double ended queue)

ADT using a doubly linked list and an array.

**Week 4 :**

Write a C++ program to perform the following operations:

a) Insert an element into a binary search tree.

b) Delete an element from a binary search tree.

c) Search for a key element in a binary search tree.

**Week5 :**

Write C++ programs that use recursive functions to traverse the given binary tree in

a) Preorder b) inorder and c) postorder.

**Course Outcomes**:

1. Basic UNIX Commands.
2. Introduction to Shell Programming and control structure
3. Loop control Structure and formatted output.
4. Function and Command line argument
5. Programs on process creation and synchronization,
6. Inter process communication including shared memory, pipes and messages
7. Programs on UNIX System calls.
8. Simulation of CPU Scheduling Algorithms. (FCFS, RR, SJF, Priority, Multilevel Queuing)
9. Simulation of Banker's Algorithm for Deadlock Avoidance, Prevention
10. Program for FIFO, LRU, and OPTIMAL page replacement algorithm.
11. Argue the correctness of algorithms using inductive proofs and invariants.
12. Analyze worst-case running times of algorithms using asymptotic analysis.
13. Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize divide-and-conquer algorithms. Derive and solve recurrences describing the performance of divide-and-conquer algorithms.
14. Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize dynamic-programming algorithms, and analyze them.
15. Describe the greedy paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize greedy algorithms, and analyze them.
16. 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.
17. 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

**B.TECH. III Year I sem (C.S.E)**

**DATABASE MANAGEMENT SYSTEMS LAB**

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**Course Objective:**

- To create a database and query it using SQL, design forms and generate reports.
- Understand the significance of integrity constraints, referential integrity constraints, triggers, assertions.

**Learning Outcome:**

- Design databases
- Retrieve information from data bases
- Use procedures to program the data access and manipulation
- Create user interfaces and generate reports

**List Of Experiments:**

1. Practice session: Students should be allowed to choose appropriate DBMS software, install it, configure it and start working on it. Create sample tables, execute some queries, use SQLPLUS features, use PL/SQL features like cursors on sample database. Students should be permitted to practice appropriate User interface creation tool and Report generation tool.
2. A college consists of number of employees working in different departments. In this context, create two tables **employee** and **department**. Employee consists of columns empno, empname, basic, hra, da, deductions, gross, net, date-of-birth. The calculation of hra,da are as per the rules of the college. Initially only empno, empname, basic have valid values. Other values are to be computed and updated later. Department contains deptno, deptname, and description columns. Deptno is the primary key in department table and referential integrity constraint exists between employee and department tables. Perform the following operations on the the database:

- Create tables department and employee with required constraints.
- Initially only the few columns (essential) are to be added. Add the remaining columns separately by using appropriate SQL command
- Basic column should not be null
- Add constraint that basic should not be less than 5000.
- Calculate hra,da,gross and net by using PL/SQL program.
- Whenever salary is updated and its value becomes less than 5000 a trigger has to be raised preventing the operation.
- The assertions are: hra should not be less than 10% of basic and da should not be less than 50% of basic.
- The percentage of hra and da are to be stored separately.
- When the da becomes more than 100%, a message has to be generated and with user permission da has to be merged with basic.
- Empno should be unique and has to be generated automatically.
- If the employee is going to retire in a particular month, automatically a message has to be generated.
- The default value for date-of-birth is 1 jan, 1970.
- When the employees called daily-wagers are to be added the constraint that salary should be greater than or equal to 5000 should be dropped.
- Display the information of the employees and departments with description of the fields.

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- Display the average salary of all the departments.

□□Display the average salary department wise.
□□Display the maximum salary of each department and also all departments put together.
□□Commit the changes whenever required and rollback if necessary.
□□Use substitution variables to insert values repeatedly.
□□Assume some of the employees have given wrong information about date-of-birth. Update the corresponding tables to change the value.
□□Find the employees whose salary is between 5000 and 10000 but not exactly 7500.
□□Find the employees whose name contains _en‘.
□□Try to delete a particular deptno. What happens if there are employees in it and if there are no employees.
□□Create alias for columns and use them in queries.
□□List the employees according to ascending order of salary.
□□List the employees according to ascending order of salary in each department.
□□Use _&&‘ wherever necessary
□□Amount 6000 has to be deducted as CM relief fund in a particular month which has to be accepted as input from the user. Whenever the salary becomes negative it has to be maintained as 1000 and the deduction amount for those employees is reduced appropriately.
□□The retirement age is 60 years. Display the retirement day of all the employees.
□□If salary of all the employees is increased by 10% every year, what is the salary of all the employees at retirement time.
□□Find the employees who are born in leap year.
□□Find the employees who are born on feb 29.
□□Find the departments where the salary of atleast one employee is more than 20000.
□□Find the departments where the salary of all the employees is less than 20000.
□□On first January of every year a bonus of 10% has to be given to all the employees. The amount has to be deducted equally in the next 5 months. Write procedures for it.
□□As a designer identify the views that may have to be supported and create views.
□□As a designer identify the PL/SQL procedures necessary and create them using cursors.
□□Use appropriate Visual programming tools like oracle forms and reports, visual basic etc to create user interface screens and generate reports.

**Note**: As a designer identify other operations that may be required and add to the above list. The above operations are not in order. Order them appropriately. Use SQL or PL/SQL depending on the requirement.

3. Students may be divided into batches and the following experiments may be given to them to better understand the DBMS concepts. Students should gather the required information, draw ER diagrams, map them to tables, normalize, create tables, triggers, procedures, execute queries, create user interfaces, and generate reports.

□□Student information system
□□APSRTC reservation system
□□Hostel management
□□Library management
□□Indian Railways reservation
□□Super market management
□□Postal system
□□Banking system
□□Courier system
□□Publishing house system

4. Design of user interfaces and generation of reports

**REFERENCES:**

1. “Learning Oracle SQL and PL/SQL”, Rajeeb C. Chatterjee, PHI.
2. “Oracle Database 11g PL/SQL Programming”, M.Mc Laughlin,TMH.
3. “Introduction to SQL”, Rick F.Vander Lans, Pearson education.
4. “Oracle PL/SQL”, B.Rosenzweig and E.Silvestrova, Pearson education

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
योगः कर्मसु कौशलम्
ENGINEERING COLLEGE PULIVENDULA

**B.TECH. III Year II sem (C.S.E)**

## COMPILER DESIGN

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**Course Objective:**

This course is a de facto capstone course in Computer Science, as it combines skills in software design, programming, data structures and algorithms, theory of computing, documentation, and machine architecture to produce a functional compiler.

- Realize that computing science theory can be used as the basis for real applications
- Introduce the major concept areas of language translation and compiler design.
- Learn how a compiler works
- Know about the powerful compiler generation tools and techniques, which are useful to the other non-compiler applications
- Know the importance of optimization and learn how to write programs that execute faster

Course Outcomes

- Able to design a compiler for a simple programming language
- Able to use the tools related to compiler design effectively and efficiently
- Can write an optimized code

**UNIT – I**

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

**UNIT – II**

**Top down Parsing** : Context free grammars, Top down parsing – Backtracking, LL (1), recursive descent
parsing, Predictive parsing, Preprocessing steps required for predictive parsing.
**Bottom up parsing** : Shift Reduce parsing, LR and LALR parsing, Error recovery in parsing , handling
ambiguous grammar, YACC – automatic parser generator.

**UNIT – III**

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

**UNIT – IV**

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

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

**UNIT – V**

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

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

**TEXT BOOKS** :

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

**REFERENCES** :

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

**III B.Tech II Sem (Common E.C.E. E.E.E and C.S.E)**

## MICROPROCESSORS & MICROCONTROLLERS

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**Course Objectives:**This subject deals about the basic 16-bit (8086) processor and an 8-bit (8051) controllers, their architecture, internal organization and their functions, interfacing an external device with the processors/ controllers.

**Learning Outcomes:** Students are able to

a. Recall and apply a basic concept of digital fundamentals to Microprocessor based personal computer system.
b. Identify a detailed s/w & h/w structure of the Microprocessor.
c. Illustrate how the different peripherals (8255, 8253 etc.) are interfaced with Microprocessor.
d. Distinguish and analyze the properties of Microprocessors & Microcontrollers.
e. Analyze the data transfer information through serial & parallel ports.
f. Train their practical knowledge through laboratory experiments.

**UNIT-I: Introduction**

Microprocessor based personal computer system, Overview of 8085 Micro Processors: Architecture, Addressing modes, Instruction set, interrupts. Programmer's model for 8086, Segmented memory operation, Instruction set of 8086, Addressing modes supported by 8086 instruction set, Assembly language programming.

**UNIT- II: Interfacing with 8086 –Part 1**

Memory interface to 8086, Interrupts in 8086, Programming with DOS and BIOS function calls, Parallel and serial data transfer methods, 8255 PPI chip, I/O interface method.

**UNIT-III: Interfacing with 8086 – Part 2**

Pin diagram detail of 8086, Bus timing, Minimum and Maximum mode of operation, 8259 Interrupt controller, 8237 DMA controller.

**UNIT-IV: Introduction to Microcontrollers**

Introduction to Micro Controllers 8051, 8096/97, Architecture, Registers, Pin Description, Connections, I/O Ports, Memory Organization, Addressing Modes, Instruction Set.

**UNIT–V: Interfacing with Microcontroller**

Assembly directives, Simple assembly software programs, Interfacing with keyboards, LEDs, 7 segment LEDs, LCDs, Interfacing with ADCs, Interfacing with DACs.

**TEXT BOOKS:**

1. J.L. Antonakos, An Introduction to the Intel Family of Microprocessors, Pearson, 1999.
2. Barry B. Brey, The Intel Microprocessors, (7/e), Eastern Economy Edition , 2006.
3. M.A. Mazidi & J.C. Mazidi Microcontroller and Embedded systems using Assembly & C. (2/e), Pearson Education, 2007.

**REFERENCES:**

1. Kenneth J Ayala, The 8051 Microcontroller, (3/e), Thomson Delmar Learning, 2004.
2. I. Scott MacKenzie and Raphael C.W. Phan. The 8051 Microcontroller.(4/e), Pearson education, 2008.

**B.TECH. III Year II sem (C.S.E)**

## DESIGN AND ANALYSIS OF ALGORITHMS

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### 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:

- Argue the correctness of algorithms using inductive proofs and invariants.
- 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. Recite algorithms that employ this paradigm. Synthesize divide-and-conquer algorithms. Derive and solve recurrences describing the performance of divide-and-conquer algorithms.
- Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize dynamic-programming algorithms, and analyze them.
- Describe the greedy paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize greedy algorithms, and analyze them.
- 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.

**UNIT - I :**

**Introduction to** Algorithm, Algorithm specification, Performance analysis.
**Divide and Conquer:** General method, Binary Search, Finding the maximum and minimum, Merge sort, Quick Sort, Selection, Stressen's matrix multiplication.

**UNIT – II:**

**Greedy Method**: General method, Knapsack problem, Job Scheduling with Deadlines, Minimum cost Spanning Trees, Optimal storage on tapes, Single-source shortest paths.
**Dynamic programming:** General Method, Multistage graphs, All-pairs shortest paths, Optimal binary search trees, 0/1 knapsack, The traveling sales person problem.

**UNIT – III :**

**Basic Traversal and Search Techniques**: Techniques for binary trees, Techniques for Graphs, Connected components and Spanning trees, Bi-connected components and DFS

**Back tracking:** General Method, 8 – queens problem, Sum of subsets problem, Graph coloring and Hamiltonian cycles, Knapsack Problem.

**UNIT – IV :**

**Branch and Bound:** The method, Travelling salesperson, 0/1 Knapsack problem, Efficiency considerations.

**Lower Bound Theory**: Comparison trees, Lower bounds through reductions – Multiplying triangular matrices, Inverting a lower triangular matrix, Computing the transitive closure.

**UNIT – V :**

**Network Flow Problems. (from Text Book 2)**

**NP – Hard and NP – Complete Problems:** NP Hardness, NP Completeness, Cook's Theorem (without proof), Reductions for Clique Decision Problem, Chromatic Number Decision Problem,.

**TEXT BOOKS :**

1. "Fundamentals of Computer Algorithms", Ellis Horowitz, S. Sartaj Sahani and Rajasekharan, 2nd edition, 2012, University Press.
2. Algorithm Design – Jon Kleinberg and Eva Tardos, Pearson.

**REFERENCES :**

3. "Introduction to Algorithms", secondedition,T.H.Cormen,C.E.Leiserson, R.L.Rivest,and C.Stein,PHI Pvt. Ltd./ Pearson Education
4. "Introduction to Design and Analysis of Algorithms A strategic approach", R.C.T.Lee, S.S.Tseng, R.C.Chang and T.Tsai, Mc Graw Hill.
5. "Data structures and Algorithm Analysis in C++", Allen Weiss, Second edition, Pearson education.
6. "Design and Analysis of algorithms", Aho, Ullman and Hopcroft,Pearson education.
7. "Algorithms" – Richard Johnson baugh and Marcus Schaefer, Pearson Education

**B.TECH. III Year II sem (C.S.E**

## WEB PROGRAMMING

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**Objectives:**

- key concepts are explained in lectures, where fundamental concepts will be presented and illustrated through relevant demonstrations and examples;
- tutorials and/or labs and/or group discussions (including online forums) are focussed on analysis and problem solving as applied to specific projects and scenarios, will provide practice in the application of theory, explore concepts with teaching staff and peers, and provide feedback on your progress and understanding;
- interaction with IT specialist teaching staff to justify design and implementation of approaches
- private study, work through the course as presented in classes and learning materials, gain practice at solving conceptual and technical problems.

**Outcomes:**

- define modern protocols and systems used on the Web (such as XHTML,HTTP, URLs, CSS, SSI, XML)
- explain the functions of clients and servers on the Web
- describe the strengths and weaknesses of the client-server internet approaches to web design and implementation
- program, access, and manipulate data through the adoption of world accepted standards, mark-up languages, client-side programming, server-side programming
- select and justify the implications of implementation and design considerations to internet security
- design and implement an interactive web site(s) with regard to issues of usability, accessibility and internationalisation
- analyse and model requirements and constraints for the design of client-server internet applications
- design and implement a client-server internet application that accommodates specific requirements and constraints, based on analysis, modelling or requirements specification
- justify and explain particular internet application concepts, relevant alternatives and decision recommendations.

- **UNIT I:**
- Introduction to web Programming – Fundamentals – XHTML – XHTML tags and its attributes – CSS – Basics of Java script – Java script and XHTML Document
- Introduction to Web echnologies: Introduction to Web servers like Apache 1.1,IIS XAMPP(Bundle Server), WAMP(Bundle Server),Handling HTTP Request and Response ,installations of above servers.
-
- **UNIT – II :**
- Introduction to Java Servlets – Basics of Servlet API – Working with Servlets- Working with databases – Cookies – Sessions – Request Dispatching Introduction to Java Server Pages – Getting started with JSP – JSP document – Action elements of JSP – Implicit Objects scope and e expression – JSP standard tag libraries

- **UNIT – III:**Introduction to PHP: The problem with other Technologies (Servelets and JSP), downloading, installing, configuring PHP, Programming in a Web environment and The anatomy of a PHP Page. Overview of PHP Data types and Concepts: Variables and data types, Operators, Expressions and Statements, Strings, Arrays and Functions.
- **UNIT IV:**

Overview of Classes, Objects, and Interfaces**:** Creating instances using Constructors, Controlling access to class members, Extending classes, Abstract classes and methods, using interfaces, Using class destructors, File Handling and Using Exceptions.

**UNIT V**

Creating and Using Forms: Understanding Common Form Issues, GET vs. POST, Validating form input, Working with multiple forms, and Preventing Multiple Submissions of a form.

PHP and Database Access: Basic Database Concepts, Connecting to a MYSQL database, Retrieving and Displaying results, Modifying, Updating and Deleting data. MVC architecture.

PHP Advanced Concepts: Using Cookies, Using HTTP Headers, Using Sessions, Authenticating users,

- **TEXT BOOKS** :

1. "Java How to program", Paul deitel, Harvey deital, PHI
2. "The Complete Reference Java" Herbert Schildt, 5th Edition, TataMcGraw-Hill
3. Beginning PHP and MySQL, 3rd Edition , Jason Gilmore, Apress
   Publications (Dream tech.).
4. PHP 5 Recipes A problem Solution Approach Lee Babin, Nathan A
   Good, Frank M.Kromann and Jon Stephens.

**B.TECH. III Year II sem (C.S.E)**

## SOFTWARE TESTING

| L | T | P | C |
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**Course Objectives:**

- Basic software debugging methods.
- Various testing methodologies.
- The procedure for designing test cases.
- The significance of software testing

**Course Outcomes:**

- Understand the basic testing procedures.
- Generating test cases and test suites.
- Test the applications manually and by automation using different testing methods.

**UNIT I**

Introduction: Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs. Flow graphs and Path testing: Basics concepts of path testing, predicates, path predicates and Achievable paths, path sensitizing, path instrumentation, application of path testing.

**UNIT II**

Transaction Flow Testing: transaction flows, transaction flow testing techniques. Dataflow testing: Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing.

**UNIT III**

Domain Testing: domains and paths, Nice & ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains and testability.

**UNIT IV**

Paths, Path products and Regular expressions: path products & path expression, reduction Procedure, applications, regular expressions & flow anomaly detection.

Logic Based Testing: overview, decision tables, path expressions, kv charts, specifications.

**UNIT V**

State, State Graphs and Transition testing: state graphs, good & bad state graphs, state testing, Testability tips. Graph Matrices and Application: Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools. (Student should be given an exposure to a tool like JMeter or Win-runner).

**TEXT BOOKS:**

1. Software Testing techniques, Boris Beizer, Dreamtech, Second Edition.
2. Software Testing Tools, Dr.K.V.K.K.Prasad, Dreamtech.

**REFERENCES:**

1. The craft of software testing - Brian Marick, Pearson Education.
2. Software Testing, Third Edition, P.C.Jorgensen, Aurbach Publications (Dist.by SPD).
3. Software Testing, N.Chauhan, Oxford University Press.
4. Introduction to Software Testing, P.Ammann and J.Offutt, Cambridge Univ. Press.
5. Effective methods of Software Testing, Perry, John Wiley, Second Edition, 1999.
6. Software Testing Concepts and Tools, P.Nageswara Rao, Dreamtech Press.
7. Software Testing, M.G.Limaye, TMH.
8. Software Testing, Desikan, G.Ramesh, Pearson.
9. Foundations of Software Testing, D.Graham and Others, Cengage Learning.
10. Foundations of Software Testing, A.P.Mathur, Pearson.

**B.Tech. III –II Semester**

**NANOMATERIALS AND ENGINEERING APPLICATIONS**
**(Choice Based Credit Course Inter Department)**
**(Common to all branches)**

| L | T | P | C |
|---|---|---|---|
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**Objectives:**

i) to be able to critically evaluate nanotechnology concepts and therefore be equipped to develop deeper into research.

ii) Acquire knowledge of basic significance of TEM, Nanosemiconductors, nanopolymers and nanocomposites towards Engineering applications.

iii) Understand and describe the use of unique properties of nanoscale structures for various applications.

iv) Understand the physical and chemical properties of carbon based nanostructures.

**UNIT -1**: Nano Structures: Zero, one –two and three dimensional structures , size control of metal nano particles and their properties- optical, electronic, magnetic properties- surface Plasmon resonance- change of band gap-applications, catalysis, electronic devices

**UNIT-II:** Carbon Nanostructures: DLCs, fullerences, C-60, C-80, single walled nanotube (SWNT) and Multi Walled nanotuebs (MWNT) properties-mechanical, optical and electrical properties.

**UNIT-III:** Thermo electric materials (TEM): concept of phonon, thermal conductivity, specific heat, exothermic and endothermic processes. Bulk TEM properties, different types of TEM; one dimensional TEM; composite TEM; applications.

**UNIT-IV:** Nano semiconductors: Nanoscale electronic devices including CMOS, potentiometric sensors etc., MRAM devices, spintronic devices including spin values.

**UNIT-V:** Nanopolymers; preparation of and characterization of diblock Copolymer based nanocomposites, nanoparticles polymer ensembles; applications of nanopolymers in catalysis. Nano Composites: metal-metal nano composites, polymer-metal nanocomposites, ceramic nanocomposites: Dielectric and CMR based nanocomposites.( one example for each type)

**TEXT BOOKS**

1. Physics of Magnetism – S. Chikazumi and S. H. Charap., John Wiley and Sons, 1964.
2. Physical Properties of Carbon nanotube - R. Satio, 5th Edition, Imperial College Press,2004. ISBN-13: 978-1860942235
3. Nanoscale materials – Liz Marzan and Kamat, Springer, 2003, ISBN 978-0-306-48108-6.

**REFERENCES:**


1. Novel nanocrystalline Alloys and Magnetic nanomaterials – Brain Cantor, 1st Edition, CRC Press, 2004, ISBN-13: 978-0750310024
2. Polymer nanocomposites: Edited by Yiu-Wing Mai and Zhong, Znen Yu, 1st edition, Woodhead Publishing Limited and CRC Press LLC, USA.2006,
3. Physics of Magnetism – S. Chikazumi and S. H. Charap., John Wiley and Sons, 1964.
4. Magnetostriction and Magnetomechanical Effects – E. W. Lee, IOP Science, Rep. Prog. Phys. 18 184 doi:10.1088/0034-4885/18/1/305 1955.
5. Carbon Nanotubes: Properties and Applications – Michael J. O'Connel, 1st Edition, Taylor & Francis, 2006.
6. Carbon nanotechnology – Liming Dai, Science Direct. ISBN: 978-0-444-51855-2
7. Nanotubes and Nanowires – CNR Rao and A Govindaraj, 2nd Edition, RSC Publishing, 2011.
8. CRC Handbook of thermoelectric, Ed. Cr Rowe., 1st Edition, CRC Press, 2001.


**Outcomes:**

- Students will have a sound knowledge in multidisciplinary areas of nanotechnology.
- The necessary foundation for future nanomaterials engineering.
- Recognize the role of carbon based nanomaterials, TEM, Nanosemiconductors, nanopolymers and nanocomposites towards Engineering applications.
- Techniques to characterize, design and validate nano devices

**B.Tech. III –II Semester**

## GREEN CHEMISTRY AND CATALYSIS FOR SUSTAINABLE ENVIRONMENT
**(Choice Based Credit Course Inter Department)**

| L | T | P | C |
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| 3 | 1 | 0 | 3 |

**Course Objectives:**

- Learn an interdisciplinary approach to the scientific and societal issues arising from industrial chemical production, including the facets of chemistry and environmental health sciences that can be integrated to promote green chemistry and the redesign of chemicals, industrial processes and products.
- Understand the use of alternatives assessments that combine chemical, environmental health, regulatory, and business considerations to develop safer products.

### UNIT 1: Principles and Concepts Of Green Chemistry

Introduction, Green chemistry Principles, sustainable development and green chemistry, atom economy, atom economic: Rearrangement and addition reactions and un-economic reactions: Substitution, elimination and Wittig reactions, Reducing Toxicity. Waste - problems and Prevention: Design for degradation, Polymer recycling.

### UNIT 2: Catalysis and Green Chemistry

Introduction to catalysis, Heterogeneous catalysts: Basics of Heterogeneous Catalysis, Zeolites and the Bulk Chemical Industry, Heterogeneous Catalysis in the Fine Chemical and Pharmaceutical Industries, Catalytic Converters, Homogeneous catalysis: Transition Metal Catalysts with Phosphine Ligands, Greener Lewis Acids, Asymmetric Catalysis, Heterogenising the Homogenous catalysts, Phase transfer catalysis: Hazard Reduction, C–C Bond Formation, Oxidation Using Hydrogen Peroxide, Bio-catalysis and photo-catalysis with examples.

### UNIT 3: Organic Solvents: Environmentally Benign Solutions

Organic solvents and volatile organic compounds, solvent free systems, supercritical fluids: Super critical carbondioxide, super critical water and water as a reaction solvent: water based coatings, Ionic liquids as catalyst and solvent

.

### UNIT 4: Emerging Greener Technologies and Alternative Energy Sources

Biomass as renewable resource, Energy: Fossil Fuels, Energy from Biomass, Solar Power, Other Forms of Renewable Energy, Fuel Cells, Chemicals from Renewable feedstocks: Chemicals from Renewable Feedstocks: Chemicals from Fatty Acids, Polymers from Renewable Resources, Some Other Chemicals from Natural Resources, Alternative Economies: The Syngas Economy, The Biorefinery, Design for energy efficiency: Photochemical Reactions: Advantages of and Challenges Faced by Photochemical Processes, Examples of Photochemical Reactions, Chemistry Using Microwaves: Microwave Heating, Microwave-assisted Reactions, Sonochemistry: Sonochemistry and Green Chemistry, Electrochemical Synthesis: Examples of Electrochemical Synthesis. Industrial applications of alternative environmentally benign catalytic systems for carrying out the important reactions such as selective oxidation, reduction and C-C bond formations (specific reactions).

**UNIT 5: Green Processes for Green Nanoscience**

Introduction and traditional methods in the nanomaterials synthesis, Translating green chemistry principles for practicing Green Nanoscience. Green Synthesis of Nanophase Inorganic Materials and Metal Oxide Nanoparticles: Hydrothermal Synthesis, Reflux Synthesis, Microwave-Assisted Synthesis, Other methods for Green synthesis of metal and metal oxide nanoparticles, Green chemistry applications of Inorganic nanomaterials

**TEXT BOOKS :**

1. M. Lancaster, Green Chemistry an introductory text, Royal Society of Chemistry, 2002.
2. Paul T. Anastas and John C. Warner, Green Chemistry Theory and Practice, 4th Edition, Oxford University Press, USA

**REFERENCES :**

1. Green Chemistry for Environmental Sustainability, First Edition, Sanjay K. Sharma and Ackmez Mudhoo, CRC Press, 2010.
2. Edited by Alvise Perosa and Maurizio Selva , Hand Book of Green chemistry Volume 8: Green Nanoscience, wiley-VCH, 2013.

**Course Outcomes:**

Upon completion of this course the students should recognize and acquire green chemistry concepts and apply these ideas to develop respect for the inter connectedness of our world and an ethic of environmental care and sustainability.

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**B.Tech. III –II Semester**

## INSTRUMENTAL METHODS OF CHEMICAL ANALYSIS
**(Choice Based Credit Course Inter Department)**

| L | T | P | C |
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**Course Objectives:**

- To understand the principles of different instruments
- To apply the instruments for analysis of various species in different matrices
- To apply instrumental methods for framing project works

**UNIT – I: Molecular Spectrophotometry**

Absorption spectra, Lamberts Law, Beer's Law - Combined law equation; Derivations from Beer's Law. Block diagram of a uv- visible spectrophotometer – quantitative analysis ; Direct method for the determination of metal ions; Chromium, Manganese, Iron etc in alloys.

**UNIT – II: Infrared Spectroscopy**

Interaction of infra-red radiation with molecules, Sources of IR Radiation ; Spectral regions; Block diagram of IR Spectrometer , Function of each component; Sampling Techniques; Application of IR Spectroscopy to functional group analysis ( -OH, $-NH_2$, -CHO, -CO-R, -CONH).

**UNIT III: Chromatography**

**Gas Chromatography**: Principles of Gas Chromatography, block diagram of gas chromatograph, Function of each component, Detectors (FID, ECD), stationary phase for column, mobile phase, chromatogram, qualitative analysis, quantitative analysis, retention time, retention volume, capacity factor, area., normalization method. Analysis of gaseous and volatile impurities.

**HPLC:** Principles of high performance liquid chromatography, Block diagram of HPCL, Systems, functions of each component, stationary phases, eluting solvents, pumps, detectors, quantitative applications of HPLC for environmental analysis.

**UNIT IV: Atomic Spectrophotometry**

Principle of atomization, atomic absorption spectrometer, applications for metal ions, Atomic emission, application and principle of ICP-OES, X-ray fluorescence spectrometry- Applications

**UNIT V: Thermal methods of analysis**

TGA- Thermo Gavimetry – Principle, instrumentation and applications
DTA- Differential Thermal Analysis- Principle, instrumentation and applications
DSC- Differential Scanning Coulometry- Principle, instrumentation and applications

**TEXT BOOK**:

1.Principles of Instrumental Analysis, 6th Edition, Douglas A. Skoog, James Holler. J, Stanley R. Crouch, Cengage Learning, New Delhi, 2014.
2.Instrumentaiotn methods of analysis, Chatwal & Anand, Himalaya Publ;ications, 2003

**REFERENCES:**

1.Instrumental methods of analysis, Willand merrit and dean, caps publications & Distribution, 1999.
2.Vogels Text book of Quantitative chemical analysis, 6th edition ,Mendham J, Denny R.C,Barnes J.D, Thomas M.J.K, pearson education, 2002.
3.Modern Analytical Chemistry, 1St edition, David Harvey, McGraw-Hill Higher Education, 2010.

**Course Outcomes:** Upon successful completion of this course, the students will be able to:

1. Differentiate between classical and instrumental methods of Chemical analysis.
2. Apply different types of Instrumental methods for analysis of various samples in water and other environmental samples

# CHEMISTRY OF NANOMATERIALS AND APPLICATIONS
## (Choice Based Credit Course Inter Department)

| L | T | P | C |
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**Course Objectives**:

- To understand synthetic principles of Nanomaterials by various methods
- And also characterisae the synthetic nanomaterials by various instrumental methods
- To enumerate the applications of nanomaterials in engineering

**UNIT I:**

Introduction**:**Scope of nanoscience and nanotecnology, nanoscience in nature, classification of nanostructured materials, importance of nano materials.

Synthetic Methods**:** Bottom-Up approach**:-** Sol-gel synthesis, microemulsions or reverse micelles, co-precipitation method, solvothermal synthesis, hydrothermal synthesis, microwave heating synthesis and sonochemical synthesis.

**UNIT-II**

Top-Down approach**:-** Inert gas condensation, arc discharge method, aerosol synthesis, plasma arc technique, ion sputtering, laser ablation, laser pyrolysis, and chemical vapour deposition method, electrodeposition method, high energy ball milling.

**UNIT-III**

Techniques for characterization**:** Diffraction technique, spectroscopy techniques, electron microscopy techniques for the characterization of nanomaterilas, BET method for surface area analysis, dynamic light scattering for particle size determination.

**UNIT-IV**

Studies of Nano-structured Materials**:** Synthesis, properties and applications of the following nanomaterials, fullerenes, carbon nanotubes, core-shell nanoparticles, nanoshells, self-assembled monolayers, and monolayer protected metal nanoparticles, nanocrystalline materials, magnetic nanoparticles and important properties in relation to nanomagnetic materials, thermoelectric materials, non-linear optical materials, liquid crystals.

**UNIT.V**

Engineering Applications of Nanomaterials

**TEXT BOOKS:**

1. **NANO: The Essentials :** T Pradeep, MaGraw-Hill, 2007.
2. **Textbook of Nanoscience and nanotechnology:** B S Murty, P Shankar, Baldev Rai, BB Rath and James Murday, Univ. Press, 2012.

**REFERENCE BOOKS:**

1. Concepts of Nanochemistry; Ludovico Cademrtiri and Geoffrey A. Ozin & Geoffrey A. Ozin, Wiley-VCH, 2011.
2. **Nanostructures & Nanomaterials; Synthesis, Properties & Applications:** Guozhong Cao, Imperial College Press, 2007.
3. **Nanomaterials Chemistry**, C. N. R. Rao, Achim Muller, K.Cheetham, Wiley-VCH, 2007.

**Course Out Come**

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

- Understand the state of art synthesis of nano materials
- Characterize nano materials using ion beam, scanning probe methodologies, position sensitive atom probe and spectroscopic ellipsometry.
- Analyze nanoscale structure in metals, polymers and ceramics
- Analyze structure-property relationship in coarser scale structures
- Understand structures of carbon nano tubes

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**B.Tech. III –II Semester**

## MATHEMATICAL MODELING AND SIMULATION

**(Choice Based Credit Course Inter Department)**

| L | T | P | C |
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**Objectives:**

- This course aims at providing the basic knowledge to understand a Mathematical model and formulate a Mathematical model related to a real word problems of engineering, biological science etc.

**Prerequisite:** Instructor's permission

**UNIT – I**

Mathematical Model, types of Mathematical models and properties, Procedure of modeling,

**UNIT – II**

Graphical method: Barterning model, Basic optimization, Basic probability: Monte-Carlo simulation,

**UNIT – III**

Approaches to differential equation: Heun method, Local stability theory: Bernoulli Trials, Classical and continuous models, Case studies in problems of engineering and biological sciences.

**UNIT – IV**

General techniques for simulating continuous random variables, simulation from Normal and Gamma distributions, simulation from discrete probability distributions

**UNIT – V**

simulating a non – homogeneous Poisson Process and queuing system.

**TEXT BOOKS:**

1. Edward A. Bender.. An Introduction to Mathematical Modeling.
2. J. N. Kapoor.. Mathematical Modeling, Wiley eastern Limited.

**REFERENCES:**

1. A. C. Fowler.. Mathematical Models in Applied Sciences, Cambridge University Press.
2. S.M. Ross ..Simulation, India Elsevier Publication.
1. A.M.Law and W.D.Kelton.. Simulation Modeling and Analysis, T.M.H. Edition.

**Outcomes:** The student will be able to analyze the real word problem through the technique of modeling of that problem to have better insight of the real word problem.

**B.Tech. III –II Semester**

## OPTIMIZATION TECHNIQUES
**(Choice Based Credit Course Inter Department)**

| L | T | P | C |
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**Objectives:**

- This course aims at providing the student with the basic concepts and several methods of optimization .

**Prerequisite:** Instructor's permission

**UNIT – I**

Convex sets and functions, constrained optimization methods: Introduction, Kuhn-Tucker conditions, convex optimization, Lagrange multipliers.

**UNIT – II**

Non-linear programming: One-dimensional minimization method, seach method, unconstrained and constrained optimization theory and practices.

**UNIT – III**

Reliability: Basic concepts, conditional failure rate function, Failure time distributions, Certain life models, Reliability of a system in terms of the reliability of it's components, series system, Parallel system.

**UNIT – IV**

Dynamic Programming: Multistage decision problems, computation procedure and case studies.

**UNIT – V**

Fundamentals of queuing system, Poisson process, the birth and death process, special queuing methods.

**TEXT BOOKS:**

1. S.S Rao.. Optimization: Theory and Practices, New Age Int. (P) Ltd. Publishers, New Delhi.
2. Chong, E.K.P.and Zak, S. H.. An Introduction to Optimization, John Wiley & Sons, N.Y.
3. Peressimi A.L., Sullivan F.E., Vhl, J.J..Mathematics of Non-linear Programming, Springer – Verlag.

**Outcomes:**The student will be able to analyze optimization problems in engineering and technology using various elegant optimization technique.

**B.Tech. III –II Semester**

**CAMPUS RECRUITMENT TRAINING & SOFT SKILLS**
**(Choice Based Credit Course Inter Department)**

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

**Objectives**:

1. To develop awareness in students of the relevance and importance of soft skills.
2. To provide students with interactive practice sessions to make them internalize soft skills.
3. To prepare the students for placements.
4. To train students to use language appropriately for interviews, group discussion and public speaking
5. To help the students to understand interpersonal skills.
6. To support them in building interpersonal skills.
7. To better the ability to work with others

**Outcome:**

After completing this course,

- The students would have Understood of what Soft Skills is,
- Understood the significance of soft skills in the working environment
- Turning out engineering students with a clear concept of soft skills and equipping them with readiness to implement them at work place.

**SYLLABUS:**

**UNIT I:** Interview Dynamics-Preparation-Power Selling- Cracking the top Questions- Stress Control.

**UNIT II:** Intra Personal Skills: Knowing Strengths & Weaknesses – Goal Setting-Quotient Skills- Positive thinking- Problem Solving-analytical Skills.

**UNIT III:** Intra Personal Skills: Managerial Skills, Group dynamics- Negotiation Skills- Time Management.

**UNIT IV:** Verbal Skills: Dynamics of listening, Speaking, Reading & Writing skills- Email writing.

**UNIT V:** Non Verbal Skills: Body Language-Body Posture, Gestures, Eye Contact, Facial Expressions,Appearance, Space Distance /Proxemics , Touch/Haptics,. Para Language-Tone, Pace, Pause, Volume , Quality**.**

**Reference books:**

1. M. Ashraf Rizvi: Effective Technical Communication, Tata McGraw Hill, New Delhi, 2014.
2. Alex.k, soft skills, 3rd ed. S. Chand Publication, New Delhi, 2014.
3. Technical Communication, Principle and Practice, Meenakshi Raman and Sangita Sharma, OUP, 2009.
4. Sherfield, M. Robert at al Cornerstone Developing Soft Skills, 4th ed. Pearson Publication,

New Delhi, 2014.

5. Shalini Varma, Body Language for your success mantra, 4th ed, S. Chand Publication, New Delhi, 2014.

**B.Tech. III –II Semester**

## COMPETITIVE & SPOKEN ENGLISH.
## (Choice Based Credit Course Inter Department)

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

**Objectives:**

- To train students to use language effectively in everyday conversations, to participate in group discussions, to help them face interviews, and sharpen public speaking skills
- To help the second language learners to acquire fluency in spoken English and neutralize mother tongue influence.
- To enable them to learn better pronunciation through stress on word accent, intonation, and rhythm.
- To train students to use language appropriately for interviews, group discussion and public speaking
- To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.

**Expected Outcomes**:

- Becoming active participants in the learning process and acquiring proficiency in spoken English of the students.
- Speaking with clarity and confidence thereby enhancing employability skills of the students.
- Accomplishment of sound vocabulary and its proper use contextually
- Flair in Writing and felicity in written expression.
- Enhanced job prospects.
- Effective Speaking Abilities.

**SYLLABUS**:

**UNIT I:** Creating the unknowing passage-Reading Comprehension- Listening Comprehension.

**UNIT II:** Correction of the Sentences Nouns – Pronouns – Verbs- Tenses- Articles- Prepositions- Sentences.

**UNIT III:** Competitive Vocabulary – Word Building – Memory techniques

**UNIT IV:** Functional English – Sentences – Construction – Neutralization of accent – Intonation.

**UNIT V:** Dynamics of Speaking – Communication Skills – Speech Preparation – Speaking Practices.

**Reference books:**

1. M. Ashraf Rizvi: **Effective Technical Communication**, Tata McGraw Hill, New Delhi, 2014.
2. Wren and Martin, **High School English Grammar and Composition,**S. Chand Publication, New Delhi, 2014.
3. Hari Mohan Prasad, **Objective English for Competitive Examination,**Tata McGraw Hill, New Delhi, 2014.
4. R.S. Aggarwal , **Objective General English**, S. Chand Publication, New Delhi.
5. R.K Bansal, **Spoken English : Manual of Speech and Phonetics**,4th Edition, Orient Black swan Pvt Ltd.-New Delhi, 2013.

**B.Tech III – II Semester**

## GREEN BUILDINGS
## (Choice Based Credit Course Inter Department)

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

**Course Objective:**

To enable the students learn to reduce the overall impact of the built environment on human health and natural environment. Student will able to learn how to reduce waste, pollution and environmental degradation and also to understand how to use effectively energy, water and other resources.

**UNIT I Introduction** :Concept of Green Building, Need for Green Building, Benefits of Green Buildings, Green Building Materials and Equipment in India, Key Requisites for Constructing a Green Building, Important Sustainable features for Green Building,

**UNIT-II Green Building Concepts and Practices** Indian Green Building Council, Green Building Moment in India, Benefits Experienced in Green Buildings, Launch of Green Building Rating Systems, Residential Sector, Market Transformation;

**Green Building Opportunities And Benefits**: Opportunities of Green Building, Green Building Features, Material and Resources, Water Efficiency, Optimum Energy Efficiency, Typical Energy Saving Approach in Buildings, LEED India Rating System and Energy Efficiency,

**UNIT-III Green Building Design** Introduction, Reduction in Energy Demand, Onsite Sources and Sinks, Maximise System Efficiency, Steps to Reduce Energy Demand and Use Onsite Sources and Sinks, Use of Renewable Energy Sources. Ecofriendly captive power generation for factory, Building requirement,

**UNIT IV Air Conditioning** Introduction,CII Godrej Green business centre,Design philosophy,Design interventions,Energy modeling, HVAC System design,Chiller selection,pump selection,Selection of cooling towers,Selection of air handing units,Precooling of fresh air,Interior lighting system,Key feature of the building. Eco-friendly captive power generation for factory,Building requirement.

**UNIT-V Material Conservation** Handling of non process waste, waste reduction during construction,materials with recycled content,local materials,material reuse,certified wood ,Rapidly renewable building materials and furniture; Indoor Environment Quality And Occupational Health: Air conditioning, Indore air quality, Sick building syndrome, Tobacco smoke control, Minimum fresh air requirements avoid use of asbestos in the building, improved fresh air ventilation, Measure of IAQ, Reasons for poor IAQ, Measures to achieve Acceptable IAQ levels,

**Text Books**:

1. Handbook on Green Practices published by Indian Society of Heating Refrigerating and Air conditioning Engineers, 2009.
2. Green Building Hand Book by Tomwoolley and Samkimings, 2009.

**Reference Books**:

1. Complete Guide to Green Buildings by Trish riley
2. Standard for the design for High Performance Green Buildings by Kent Peterson, 2009

**B.Tech III – II Semester**

## DISASTER MANAGEMENT AND MITIGATION
## (Choice Based Credit Course Inter Department)

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

**Course Objective:**

To know the various types of disaster caused by the nature and disaster prone areas in India. To have knowledge about the response of the structure for various disasters. To obtain a brief knowledge about the planning and preparedness for a disaster. To have knowledge about the various modern materials and tools in disaster reduction.

**UNIT I - Introduction To Disaster** :Meaning, Nature, Importance of Hazard, Risk, Vulnerability and Disaster- Dimensions & Scope of Disaster Management - India's Key Hazards – Vulnerabilities - National disaster management framework - Disaster Management Cycle.

**UNIT II - Natural Disaster** : Natural Disasters- Meaning and nature of natural disaster; their types and effects. Floods, drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, Heat and cold waves, Climatic change: global warming, Sea level rise, ozone depletion.

**UNIT III - Anthropogenic Disaster** :Man Made Disasters- Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, air pollution, water pollution, deforestation and industrial waste water pollution.

**UNIT IV - Approaches In Disaster Management** :Pre- disaster stage (preparedness) - Preparing hazard zonation maps, Predictability/ forecasting & warning - Preparing disaster preparedness plan - Land use zoning - Preparedness through Information, education. Emergency Stage - Rescue training for search & operation - Immediate relief - Assessment surveys. Post Disaster stage – Rehabilitation - Social Aspect - Economic Aspect and Environmental Aspect.

**UNIT V - Disaster Mitigation** : Meteorological observatory - Seismological observatory - Hydrology Laboratory and Industrial Safety inspectorate. Technology in Disaster Management - Emergency Management Systems (EMS) in the Disaster Management Cycle - Remote Sensing and Geographic Information Systems(GIS) in Disaster Management. 2

**Text book:**

Sharma.S.R, "Disaster management", A P H Publishers, 2011.

REFERENCES

1. VenuGopalRao.K, "Geoinformatics for Disaster Management", Manglam Publishers and Distributors, 2010.
2. Singh.R.B, "Natural Hazards and Disaster Management: Vulnerability and Mitigation", Rawat Publications, 2006.
3. Gupta.H.K, "Disaster Management", University Press, India, 2003.
4. Gupta.M.C, "Manuals on Natural Disaster management in India", National Centre for Disaster Management,IIPA, New Delhi, 2001.

**B.Tech III-II Semester**

## RENEWABLE ENERGY SOURCES
**(Choice Based Credit Course Inter Department)**

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

**Course objectives:**

1. To understand processing and limitations of fossil fuels (coal, petroleum and natural gas)
2. To know the necessity of harnessing alternate energy resources such as solar, wind, nuclear, geothermal, tidal and biomass.
3. To understand and practice various characterization techniques for different renewable fuels.
4. To do the design and analysis practice for solar, wind systems.

**UNIT-I:**

Photo voltaic power generation ,spectral distribution of energy in solar radiation, solar cell configurations, voltage developed by solar cell, photo current and load current, practical solar cell performance, commercial photo voltaic systems, test specifications for PV systems, applications of super conducting materials in electrical equipment systems.

**UNIT-II:**

Principles of MHD power generation, ideal MHD generator performance, practical MHD generator, MHD technology.

**Wind Energy conversion:** Power from wind, properties of air and wind, types of wind Turbines, operating characteristics.

**UNIT-III:**

Tides and tidal power stations, modes of operation, tidal project examples, turbines and generators for tidal power generation.

**Wave energy conversion:** properties of waves and power content, vertex motion of Waves, device applications. Types of ocean thermal energy conversion systems Application of OTEC systems examples,

**UNIT-IV:**

**Miscellaneous energy conversion systems:** coal gasification and liquefaction, biomass conversion, geothermal energy, thermo electric energy conversion, principles of EMF generation, description of fuel cells, Co-generation and energy storage, combined cycle co-generation, energy storage.

**Global energy position and environmental effects:** energy units, global energy position.

**UNIT-V:**

Types of fuel cells, $H_2$-$O_2$ Fuel cells, Application of fuel cells – Batteries, Description of batteries, Battery application for large power. Environmental effects of energy conversion systems, pollution from coal and preventive measures steam stations and pollution, pollution free energy systems.

**TEXT BOOKS:**

1. "Energy conversion systems" by Rakosh das Begamudre, New age International publishers, New Delhi - 2000.
2. "Renewable Energy Resources" by John Twidell and Tony Weir, 2nd Edition, Fspon & Co

**B.Tech III-II Semester**

## POWER ELECTRONICS

**(Choice Based Credit Course Inter Department)**

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

**Objective:**

With the advent of semiconductor devices, revolution is taking place in the power transmission distribution and utilization. This course introduces the basic concepts of power semiconductor devices, converters and choppers and their analysis.

**UNIT – I Power Semi Conductor Devices**

Semiconductor Power Diodes, Thyristors – Silicon Controlled Rectifiers (SCR's) – BJT – Power Transistor - Power Mosfet – Power IGBT - TRIACs, GTOs - Characteristics and Principles of Operation and other Thyristors – Basic Theory of Operation of SCR – Static Characteristics – Turn On and Turn Off Methods- Dynamic Characteristics of SCR - Two Transistor Analogy – Triggering Circuits—– Series and Parallel Connections of SCR's – Snubber Circuits – Specifications and Ratings of SCR's, BJT, IGBT - Numerical Problems –Commutation Circuits.

**UNIT – II Phase Controlled Converters**

Phase Control Technique – Single Phase Line Commutated Converters – Mid Point and Bridge Connections – Half Controlled Converters, Fully Controlled Converters with Resistive, RL Loads and RLE Load– Derivation of Average Load Voltage and Current – Line Commutated Inverters -Active and Reactive Power Inputs to the Converters without and with Free Wheeling Diode, Effect of Source Inductance – Numerical Problems.

Three Phase Line Commutated Converters – Three Pulse and Six Pulse Converters – Mid Point and Bridge Connections - Average Load Voltage with R and RL Loads – Effect of Source Inductance–Dual Converters (Both Single Phase and Three Phase) - Waveforms –Numerical Problems.

**UNIT – III Dc – Dc Converters**

Buck converters, boost converters and buck boost converters. Steady state analysis, voltage and current ripple, design of inductor and capacitor values.

**UNIT – IV Inverters**

Inverters – Single Phase Inverter – Basic Series Inverter – Basic Parallel Capacitor Inverter Bridge Inverter – Waveforms –sine-triangle PWM, Three Phase VSI in $120^0$ And $180^0$ Modes of Conduction. unipolar, bipolar inverter PWM techniques selective harmonic elimination - Voltage Control Techniques for Inverters Pulse Width Modulation Techniques – Numerical Problems,

**UNIT – V AC Voltage Controllers & Cyclo Converters**

**AC Voltage Controllers** – Single Phase Two SCR's in Anti Parallel – With R and RL Loads – Modes of Operation of Triac – Triac with R And RL Loads – Derivation of RMS Load Voltage, Current and Power Factor Wave Forms –Firing Circuits -Numerical Problems - Thyristor Controlled Reactors; Switched Capacitor Networks.

**Cyclo Converters** – Single Phase Mid Point Cyclo Converters With Resistive and Inductive Load (Principle of Operation only) – Bridge Configuration Of Single Phase Cyclo Converter (Principle of Operation only) – Waveforms

**Text Books:**

1. Power Electronics – by M. D. Singh & K. B. Kanchandhani, Tata Mc Graw – Hill Publishing company, 1998.
2. Power Electronics : Circuits, Devices and Applications – by M. H. Rashid, Prentice Hall of India, 2nd edition, 1998

**Reference Books:**


1. Power Electronics – by P.S.Bimbra, Khanna Publications.
2. Power electronics, Essentials and applications – L.Umanand Wiley Publications
3. Power Electronics – by Vedam Subramanyam, New Age International (P) Limited, Publishers
4. Power Electronics - by V.R.Murthy , 1st edition -2005, OXFORD University Press
5. Power Electronics-by P.C.Sen,Tata Mc Graw-Hill Publishing.
6. The power electronics (hand book) : Timothy L.Skgarnina

**B.Tech III-II Semester**

## ELECTRICAL ENERGY MANAGEMENT AND CONSERVATION
**(Choice Based Credit Course Inter Department)**

| L | T | P | C |
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**Course objectives:**

1. To Understanding, analysis and application of electrical energy systems
2. To acquire the knowledge regarding energy conservation methods and its management.
3. Able to calculate Energy Efficiency, Energy accounting, monitoring and control.
4. To do Specific Energy Consumption; ECO assessment and Evaluation methods, Case study.

**UNIT-I**

Induction Motors – Three Phase - Cage motors - Equivalent circuit - Speed - torque characteristics - Performance characteristics - voltage unbalance - over motoring - slip ring induction motor characteristics multi speed motors - Single Phase Induction Motors - Starting & running performance - Split phase - Capacitor type motors - Characteristics - Reluctance motors – Universal motors – Stepper motor – Servo motor – Characteristics - Applications

**UNIT-II**

Energy Efficient Motors - Constructional details - Factors affecting efficiency - Losses distribution - Characteristics - Calculation of R.M.S rating - Power Factor – Causes and disadvantages of low power factor – Methods to improve p.f – Economics of power factor improvement - Simple pay back method - Return on investment - Life cycle analysis.

**UNIT-III**

Energy efficient lighting - Terminology - Cosine law of luminance - Types of lamps - Characteristics - Design of illumination systems - Good lighting practice - Lighting control - Steps for lighting energy conservation.

**UNIT-IV**

Economics of Electrical Energy Generation, Audit and Distribution: Definitions - Connected load, Maximum demand - Demand factor – Diversity factor – Significance - Load curve – Load sharing between base load and peak loads - Electrical Energy Audit: Check List – Data Collection – Data Analysis – Case Studies - Electrical Distribution: Electrical load analysis - types of consumers & tariffs - line losses - corona losses - types of distribution system - Kelvin's law - loss load factor.

**UNIT-V**

Economics Of Electrical Drives - Selection of motors - types of loads - Energy Consumption during starting of a.c and d.c motors - Braking of d.c and a.c motors - Plugging - Regenerative braking – Applications of different electric drives.

**TEXT BOOKS:**

1. Energy Efficient Electrical motors / John C.Andreas / Marcel Dekker Inc.
2. Generation,Distribution&Utilization of Electrical Energy /CLWadhwa /Wiley Eastern ltd

**REFERENCE BOOKS:**

1. Electrical Machines /Bimbra / Khanna Publishers
2. Electrical Machinery / Fitzgerland, Kingsley, Kusko / Mc Graw Hill Ltd
3. Electrical Machines/ S.K.Bhattacharya
4. Electrical Machines /I.J.Nagarath and D.P.Kothari / TMH
5. Electrical Technology/ Edward Hughes / ELBS.

Energy Management and good lighting practice: Fuel Efficiency Booklet 12 / EEO

**III B.Tech II Semester**

## ROBOTICS

**(Choice Based Credit Course Inter Department)**

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**Course objectives**

- To design, develop and complete robotic activities and challenges
- This course aims at providing the students the fundamental knowledge of the various subscriptions such as kinematics, Dynamics, controls, sensors, actuators, etc.
- It is aimed to provide adequate background in both analysis and design of robots.

**UNIT – I**

**Fundamentals of Robots:** Introduction, definition, classification and history of robotics, robot characteristics and precision of motion, advantages, disadvantages and applications of robots. Introduction to matrix representation of a point in a space a vector in space, a frame in space, Homogeneous transformation matrices, representation of a pure translation, pure rotation about an axis.

**UNIT – II**

**Kinematics of robot:** Forward and inverse kinematics of robots- forward and inverse kinematic equations for position and orientation, Denavit-Hartenberg(D-H) representation of forward kinematic equations of robots, The inverse kinematic of robots, Degeneracy and Dexterity, simple problems with D-H representation.

**Differential motions and Velocities:** Introduction, differential relationship, Jacobian, differential motions of a frame-translations, rotation, rotating about a general axis, differential transformations of a frame. Differential changes between frames, differential motions of a robot and its hand frame, calculation of Jacobian, relation between Jacobian and the differential operator, Inverse Jacobian.

**UNIT – III**

**Control of Manipulators:** Open- and Close-Loop Control, the manipulator control problem, linear control schemes, characteristics of second-order linear systems, linear second-order SISO model of a manipulator joint, joint actuators, partitioned PD control scheme, PID Control Scheme, computer Torque control, force control of robotic manipulators, description of force-control tasks, force control strategies, hybrid position/force control, impedance force/torque control.

**UNIT – IV**

**Robot Vision:** Industrial applications of vision-controlled robotic systems, process of imaging, architecture of robotic vision system, Image acquisition, description of other components of vision system, image representation, image processing.

**UNIT – V**

**Robot Cell Design and Programming:** Robot cell layouts-Robot centered cell, In-line robot cell, Considerations in work cell design, Work cell control, Inter locks, Error detection, Work cell controller.

Methods of robot programming, WAIT, SIGNAL, and DELAY commands, Robotic languages, VAL system.

**TEXT BOOKS**

1. Industrial Robotics – Mikell P. Groover and Mitchell Weiss, Roger N. Nagel,Nicholas G.Odrey – Mc Graw Hill, 1986.
2. Robotics and control – R K Mittal and I J Nagrath, - Tata Mc Graw Hill

**REFERENCES**

1. Introduction to Robotics – Analysis, System, Applications by Saeed B. Niku, PHI Publications
2. Robot Analysis and Control - H. Asada and J.J.E. Slotine John Willey & Sons.
3. Fundamentals of Robotics: Analysis and control, Robert J. Schilling, Prentice Hall, 1990.
4. A robot Engineering text book – Mohsen shahinpoor, Harper & Row Publishers,1987
5. Introduction to Robotics: Mechanics and Control, John.J.Craig, Addison- Wesley, 1999
6. Robotics: Control, sensing, vision, and intelligence – K.S. FU, R.C. Gonzalez and C.S.G Lee. Mc Graw Hill, 1987.
7. Robotic Engineering an integrated approach- Richard D. Klafter Thomas – PHI publications

**Course outcomes**

By studying this course, students will be

- Familiar with the history, concept development and key components of robotics technologies.
- Understand basic mathematic manipulation of spatial coordinate representation and transformation.
- Understand and able to solve basic robot forward and inverse kinematic problems.
- Understand and able to solve robotic dynamics, path planning and control problems.
- Able to undertake practical robotics experiments that demonstrate the above skills.

**III B.Tech II Semester**

## MECHANICAL MANUFACTURING PROCESSES
**(Choice Based Credit Course Inter Department)**

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**Objectives:**
The objectives of this course are to introduce to demonstrate the various manufacturing processes. To develop knowledge and importance of surface treatment, processing of powder metals, glass, ceramics plastics. To apply knowledge of basic mathematics to calculate the machining parameters for different machining processes and acquire knowledge on advanced manufacturing processes.

**UNIT – I**
**Surface treatment:** Scope, Cleaners, Methods of cleaning, Surface coating types, and ceramic and organic methods of coating, economics of coating. Electro forming, Chemical vapour deposition, thermal spraying, Ion implantation, diffusion coating, Diamond coating and cladding.

**UNIT – II**
**Processing of Powder metals, Glass and Superconductors**: Introduction, production of metal powders, compaction of metal powders, sintering, secondary and finishing operations, design considerations for powder metallurgy, Process capabilities, economics of powder metallurgy, forming and shaping of Glass, techniques for strengthening and treating Glass, design considerations for Glass, processing of superconductors.
**Processing of ceramics:** Applications, characteristics, classification .Processing of particulate ceramics, Powder preparations, consolidation, Drying , sintering, Hot compaction, Area of application , finishing of ceramics.

**UNIT – III**
**Fabrication of Microelectronic devices:** Crystal growth and wafer preparation, Film Deposition oxidation, lithography, bonding and packaging, reliability and yield, Printed Circuit boards, computer aided design in microelectronics, surface mount technology, Integrated circuit economics. E-Manufacturing, nanotechnology, and micromachining, High speed Machining
**UNIT – IV**
**Processing Of Plastics**, injection and blow moulding, calendaring, thermo forming, compression moulding, transfer moulding, High energy rate forming methods Rapid manufacturing: - Introduction - concepts of rapid manufacturing, information flow for rapid prototyping, classification of rapid prototyping process, sterer holography fused deposition modeling, selective laser sintering, Applications of rapid prototyping process

**UNIT – V**
**Processing of Composites:** Composite Layers, Particulate and fiber reinforced composites, Elastomers, Reinforced plastics, MMC, CMC, Polymer matrix composites.

**TEXT BOOKS:**

1. Manufacturing Engineering and Technology, Schmid and kalpakjin, Pearson Education.
2. Manufacturing Technology, Foundry forming and welding, Vol I , P.N. Rao,TMH
3. Rapid Prototyping Principles and Applications, RafiqNoorani, Wiely Pub

**REFERENCE BOOKS:**


1. Production Technology, R.K. Jain, Khanna Publishers,17th edition, 2012
2. Process and materials of manufacturing -Lindberg, PE
3. Principles of Metal Castings, Rosenthal.
4. Welding Process, Parmar, Khanna publication.
5. Manufacturing Technology, R.K. Rajput, Laxmi Pub


**Course Outcomes:**

After completion of this course student will be able to

- Understand the principles of processing of various powder metals, glass, ceramics and semiconductors.
- Understand the applications of rapid prototyping and processing of plastics

**SUGGESTED LINKS:**

- www.casde.iitb.ac.in/store/events/2003/IAT-Pune.../DFMA.ppt
- www.rose-hulman.edu/~stienstr/ME470/DFA.ppt
- www.design4manufacturability.com/DFM_article.htm
- http://www.learnerstv.com/Free-Engineering-Video-lectures-ltv234-Page1.htm

**III B.Tech II Semester**

## NON-CONVENTIONAL SOURCES OF ENERGY
**(Choice Based Credit Course Inter Department)**

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**Course Objective:**

- To explain concept of various forms of renewable energy
- To outline division aspects and utilization of renewable energy sources for both domestics and industrial applications
- To analyse the environmental and cost economics of using renewable energy sources compared to fossil fuels.

**UNIT - I**

**Principles Of Solar Radiation**: Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

**UNIT-II**

**Solar Energy Collection**: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

**Solar Energy Storage and Applications** :

Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications solar heating technique, solar distillation and drying, photovoltaic energy conversion.

**UNIT-III**

**Wind Energy** : Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria

**BIO-MASS** : Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engineoperation and economic aspects.

**UNIT-IV**

**Geothermal Energy** : Resources, types of wells, methods of harnessing the energy, potential in India.

**Ocean Energy**: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

**UNIT-V**

**Direct Energy Conversion**: Need for DEC, Carnot cycle, limitations, principles of DEC.

Thermo-electric generators, Seebeck, Peltier and Joule Thomson effects, Figure of merit, materials, applications, MHD generators, principles, dissociation and ionization, hall effect, magnetic flux, MHD accelerator, MHD Engine, power generation systems, electron gas dynamic conversion, economic aspects.Fuel cells, principles, faraday's law's, thermodynamic aspects, selection of fuels and operating conditions.

**TEXT BOOKS**

1. Renewable energy resources, Tiwari and Ghosal, Narosa.
2. Non-Conventional Energy Sources ,G.D. Rai

**REFERENCES**

1. Renewable Energy Sources, Twidell& Weir
2. Solar Energy, Sukhatme
3. Solar Power Engineering,B.S.Magal Frank Kreith&J.F.Kreith.
4. Principles of Solar Energy, Frank Krieth& John F Kreider.
5. Non-Conventional Energy, Ashok V Desai, Wiley Eastern 6. Non-Conventional Energy Systems, K Mittal , Wheeler.

**Course Outcome:**

At the end of the course the student will

1. Have knowledge about various renewable energy sources
2. Be able to choose the appropriate renewable energy as an alternate for conventional power in any application.

**III B.Tech II Semester**

## FUNDEMENTALS OF COMMUNICATION SYSTEMS

**(Choice Based Credit Course Inter Department)**

**(QUALITATIVE TREATMENT ONLY)**

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**Course Objectives**:

1. To study the fundamental concept of the analog communication systems.
2. To analyze various analog modulation and demodulation techniques.
3. To know the working of various transmitters and receivers.
4. To understand the influence of noise on the performance of analog communication systems, and to acquire the knowledge about information and capacity.

**Learning Outcomes**:

This course provides the foundational education in Analog Communication systems, and applications. The students are provided the learning experience through class room teaching and solving assignment & tutorial problems. At the end of course, students should be able to:

a. Acquire knowledge on the basic concepts of Analog Communication Systems.
b. Analyze the analog modulated and demodulated systems.
c. Verify the effect of noise on the performance of communication systems.
d. Know the fundamental concepts of information and capacity.

**UNIT- I**

Elements of communication systems, need for Modulation, Modulation Methods, Baseband and carrier communication, Amplitude Modulation (AM), Generation of AM signals, Rectifier detector, Envelope detector, sideband and carrier power of AM, Double sideband suppressed carrier (DSB-SC) modulation & its demodulation, Switching modulators, Ring modulator, Balanced modulator, Single sideband (SSB) transmission, VSB Modulation.

**UNIT- II**

**Angle Modulation &Demodulation**: Concept of instantaneous frequency, Generalized concept of angle modulation, Bandwidth of angle modulated waves – Narrow band frequency modulation (NBFM); and Wide band FM (WBFM), Phase modulation, Pre-emphasis, & De-emphasis, Illustrative Problems.

**UNIT -III**

**Pulse Analog Modulation Techniques**

Pulse analog modulation techniques, Generation and detection of Pulse amplitude modulation, Pulse width modulation, Pulse position modulation.

**Multiple Access Techniques**

Introduction to multiple access techniques, FDMA, TDMA, CDMA, SDMA: Advantages and applications.

**UNIT IV**

**Digital Communication (Qualitative Approach only)**

Pulse Code Modulation, DPCM, Delta modulation, Adaptive delta modulation, Overview of ASK, PSK, QPSK, BPSK and M- PSK techniques

**UNIT -V**

**Modern Communication Trends (Qualitative Approach only)**

Basics of Spectrum utilizations, Comparison of 2G, 3G, Types of Ethernet, Modems – Types of Modems, 100Mbps, 1Gbps modems, Role of IPV6 in Present trends.

**TEXT BOOKS**:

1. B. P. Lathi, "Modern Digital and Analog Communication Systems," Oxford Univ. press, 3rd Edition, 2006.
2. Sham Shanmugam, "Digital and Analog Communication Systems", Wiley-India edition, 2006.
3. Electronic Communications System: Fundamentals Through Advancedby 2nd editions By Wayne Tomasi
4. Simon Hakin, "Communication Systems," Wiley India Edition, 4th Edition, 2011.

**REFERENCES**:

1. A. Bruce Carlson, & Paul B. Crilly, "Communication Systems – An Introduction to Signals & Noise in Electrical Communication", McGraw-Hill International Edition, 5th Edition, 2010.
2. Simon Haykin, "Communication Systems", Wiley-India edition, 3rd edition, 2010.
3. Herbert Taub & Donald L Schilling, "Principles of Communication Systems", Tata McGraw-Hill, 3rd Edition, 2009.

**III B.Tech II Semester**

## FUZZY LOGIC & NEURAL NETWORKS

**(Choice Based Credit Course Inter Department)**

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**UNIT-I**

**Neural Networks Characteristics:** History of Development in neural networks, Artificial neural net terminology, model of a neuron, Topology, Types of learning. Supervised, Unsupervised learning. Basic Learning laws, Hebb's rule, Delta rule, widrow and Hoff LMS learning rule, correlation learning rule instar and ouster learning rules.

**UNIT-II**

**Unsupervised Learning:** Competitive learning, K-means clustering algorithm, Kohonen's feature maps. Radial Basis function neural networks- recurrent networks, Real time recurrent and learning algorithm. Introduction to Counter propagation Networks- CMAC Network, ART networks, Application of NN in pattern recognition, optimization, Control, Speech and decision making.

**UNIT-III**

**Neural Network models:** neural network models, layers in neural network and their connections. Instar, outstar, weights on connections, threshold function, application- Adaline and madaline. Back propagation: feed forward back propagation network- mapping, layout, training, BPN applications

**UNIT-IV**

**Fuzzy Logic:** Basic concepts of Fuzzy logic, Fuzzy vs Crisp set, Linguistic variables, membership functions, operations of Fuzzy sets, Fuzzy if-then rules, Variables inference techniques, defuzzification techniques, basic Fuzzy interference algorithm, application of fuzzy logic , Fuzzy system design implementation , useful tools supporting design.

**UNIT-V**

Bidirectional Associative Memory (BAM), inputs and outputs, weights and training. FAM-fuzzy associative memory, association, FAM neural networks, encoding Adaptive Resource theory-network for ART, processing in ART

**Text Books:**


1. Berkin Riza C and Trubatch, " Fuzzy System design principles- Building Fuzzy IF-THEN rule bases", IEEE Press.
2. Yegna Narayanan, "Artificial Neural Networks". 8th Printing. PHI(2003)
3. Patterson Dan W, "Introduction to artificial Intelligence and Expert systems", 3rd Ed., PHI
4. Simon Haykin, "Neural Networks" Pearson Education.
5. Yen and Langari, "Fuzzy Logic: Intelligence, Control and Information", Pearson Education.
6. Jacek M Zaurada, "Introduction to artificial neural Networks Jaico Publishing Home, Fourth Impression.

**III B.Tech II Semester**

## INDUSTRIAL ELECTRONICS

**(Choice Based Credit Course Inter Department)**

| L | T | P | C |
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**Course Objective:**

1. To get an overview of semi-conductor devices (such as PN junction diode & Transistor) and their switching characteristics.
2. To study the characteristics of AC to DC converters.
3. To know about the practical applications Electronics in industries.

**Learning Outcome:**

After completion of the course the students will be able to

a. Get an overview of semi-conductor devices (such as PN junction diode & Transistor) and their switching characteristics.
b. Understand the characteristics of AC to DC converters.
c. Understand about the practical applications Electronics in industries.

**UNIT – I :**

**Semiconductor Devices:** Scope of industrial Electronics, Semiconductors, Merits of semiconductors, crystalline structure, Intrinsic semiconductors, Extrinsic semiconductors, current flow in semiconductor, Open-circuited p-n junction, Diode resistance, Zener diode, Photoconductors and junction photo diodes, Photo voltaic effect, Light emitting diodes (LED)

**UNIT – II:**

**Junction Transistors:** Introduction, The junction transistor, Conventions for polarities of voltages and currents, Open circuited transistor, Transistor biased in the active region, Current components in transistors, Currents in a transistor, Emitter efficiency, Transport factor and transistor-α, Dynamic emitter resistance, Transistor as an amplifier, Transistor construction, Letter symbols for semiconductor Devices, Characteristic curves of junction transistor in common configuration, static characteristic curves of PNP junction transistor in common emitter configuration, The transistor in common collector Configuration.

**UNIT – III :**

**AC To DC Convertors:** AC to DC converters- Introduction, Classification of Rectifiers, Half wave Rectifiers, Full wave Rectifiers, Comparison of Half wave and full wave rectifiers, Bridge Rectifiers, Bridge Rectifier meter, Voltage multiplying Rectifier circuits, Capacitor filter, LC Filter, Metal Rectifiers, Regulated Power Supplies, Classification of Voltage Regulators, Short period Accuracy of Regulators, Long period Accuracy of Voltage Regulator, Principle of automatic voltage Regulator, Simple D.C. Voltage stabilizer using Zener diode, D.C. Voltage Regulators, Series Voltage Regulators, Complete series voltage regulator circuit, Simple series voltage regulator.

**UNIT – IV: Industrial Applications – I**

**Resistance welding controls:** Introduction, Resistance welding process, Basic Circuit for A.C. resistance welding, Types of Resistance welding, Electronic welding control used in Resistance welding, Energy storage welding.

**Induction heating:** Principle of induction heating, Theory of Induction heating merits of induction heating, Application of induction heating, High frequency power source of induction heating

**Dielectric heating**: Principle of dielectric heating, theory of dielectric heating, dielectric properties of typical materials, electrodes used in dielectric heating, method of coupling of electrodes to the R.F. generator, Thermal losses in Dielectric heating, Applications.

**UNIT – V: Industrial Applications - II**

**Ultrasonics:** Introduction, Generation of Ultrasonic waves, Application of Ultrasonic waves, Ultrasonic stroboscope, ultrasonic as means of communication, ultrasonic flaw detection, Optical image on non-homogeneities, ultrasonic study of structure of matter, Dispersive study of structure of matter, Dispersive and colloidal effect of Ultrasonic, Coagulating action of Ultrasonic, separation of mixtures by ultrasoni8c waves, cutting and machining of hard materials by ultrasonic vibrations, Degassing of liquids by ultrasonic waves, Physico-chemical effects of ultrasonics, chemical effects of ultrasonics, Thermal effects of Ultrasonics, soldering and welding by ultrasonics, Ultrasonic Drying

**TEXT BOOKS:**

1. G. K. Mithal, “Industrial Electronics”, Khanna Publishers, Delhi, 2000.
2. J.Gnanavadivel, R.Dhanasekaran, P.Maruthupandi, “Industrial Electronics”, Anuradha Publications, 2011.

**REFERENCE BOOKS:**

1. F. D. Petruzulla, “Industrial Electronics”, McGraw Hill, Singapore, 1996.
2. M. H. Rashid, “power Electronics Circuits, Devices and Application”, PHI, 3rd edition, 2004.
3. G. M. Chute and R. D. Chute, “Electronics in Industry”, McGraw Hill Ltd, Tokyo, 1995.

**III B.Tech II Semester**

## OPERATING SYSTEMS
**(Choice Based Credit Course Inter Department)**

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**Course Objective**

- To make the students understand the basic operating system concepts such as processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystems and protection.
- To get acquaintance with the class of abstractions afford by general purpose operating systems that aid the development of user applications

**Course Outcomes**

- Understand what makes a computer system function and the primary PC components.
- Understand past and current trends in computer technology.
- Use basic software applications.
- Add functionality to the exiting operating systems
- Design new operating systems

**UNIT I**

**Operating Systems Overview:** Operating system functions, Operating system structure, operating systems Operations, protection and security, Kernel data Structures, Computing Environments, Open- Source Operating Systems

**Operating System Structure:** Operating System Services, User and Operating-System Interface, systems calls, Types of System Calls, system programs, operating system structure, operating system debugging, System Boot.

**Processes:** Process concept, process Scheduling, Operations on processes, Inter process Communication, Examples of IPC systems.

**UNIT II**

**Threads:** overview, Multicore Programming, Multithreading Models, Thread Libraries, Implicit threading, Threading Issues.

**Process Synchronization:** The critical-section problem, Peterson‘s Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic problems of synchronization, Monitors, Synchronization examples, Alternative approaches.

**CPU Scheduling:** Scheduling-Criteria, Scheduling Algorithms, Thread Scheduling, Multiple-Processor Scheduling, Real-Time CPU Scheduling, Algorithm Evaluation.

**UNIT III**

**Memory Management:** Swapping, contiguous memory allocation, segmentation, paging, structure of the page table.

**Virtual memory:** demand paging, page-replacement, Allocation of frames, Thrashing, Memory-Mapped Files, Allocating Kernel Memory

**Deadlocks:** System Model, deadlock characterization, Methods of handling Deadlocks, Deadlock prevention, Detection and Avoidance, Recovery from deadlock.

**UNIT IV**

**Mass-storage structure:** Overview of Mass-storage structure, Disk structure, Disk attachment, Disk scheduling, Swap-space management, RAID structure, Stable-storage implementation.

**File system Interface:** The concept of a file, Access Methods, Directory and Disk structure, File system mounting, File sharing, Protection.

**File system Implementation:** File-system structure, File-system Implementation, Directory Implementation, Allocation Methods, Free-Space management.

**UNIT V**

**I/O systems:** I/O Hardware, Application I/O interface, Kernel I/O subsystem, Transforming I/O requests to Hardware operations.

**Protection:** Goals of Protection, Principles of Protection, Domain of protection, Access Matrix, Implementation of Access Matrix, Access control, Revocation of Access Rights, Capability-Based systems, Language – Based Protection

**Security:** The Security problem, Program threats, System and Network threats, Cryptography as a security tool, User authentication, Implementing security defenses, Firewalling to protect systems and networks, Computer–security classifications.

**TEXT BOOKS:**

1. Operating System Concepts, Abraham Silberschatz, Peter B. Galvin, Greg Gagne, Ninth Edition, 2012, Wiley.
2. Operating Systems: Internals and Design Principles, Stallings, Sixth Edition, 2009, Pearson Education.

**REFERENCE BOOKS:**

1. Modern Operating Systems, Andrew S Tanenbaum, Second Edition, PHI.
2. Operating Systems, S.Haldar, A.A.Aravind, Pearson Education.
3. Principles of Operating Systems, B.L.Stuart, Cengage learning, India Edition.
4. Operating Systems, A.S.Godbole, Second Edition, TMH.
5. An Introduction to Operating Systems, P.C.P. Bhatt, PHI.
6. Operating Systems, G.Nutt, N.Chaki and S.Neogy, Third Edition, Pearson Education.
7. Operating Systems, R.Elmasri, A,G.Carrick and D.Levine, Mc Graw Hill.

**III B.Tech II Semester**

## DATABASE MANAGEMENT SYSTEMS
## (Choice Based Credit Course Inter Department)

| L | T | P | C |
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**Course Objective:**

- To create database and query it using SQL queries, design forms and generate reports.
- Learn to use integrity constraints, referential integrity constraints, triggers, assertions

**Course Outcomes**

- Design databases
- Retrieve information from data bases
- Use procedures to program the data access and manipulation
- Create user interfaces and generate reports

**UNIT I**

**The Worlds of Database Systems** -The Evolution of Database Systems - Overview of a Database Management System - Outline of Database System Studies.

**The Entity-Relationship Model** – Elements of E/R Model – Design Principles – The Modeling of Constraints – Weak Entity Sets.

**The Relational Data Model** – Basics of the Relational Model – From E/R Diagrams to Relational Designs – Converting Subclass Structures to Relations.

**UNIT II**

**Relational Algebra and Calculus** – Preliminaries, Relational algebra: Selection and Projection , Set Operations, Renaming, Joins, Division - Relational Calculus – Expressive power of Algebra and Calculus.

**The Database Language SQL** – Simple Queries in SQL – Queries Involving More than One Relation – Subqueries – Full Relation Operations – Database Modifications – Defining a Relation Schema in SQL – View Definitions

**UNIT III**

**Constraints and Triggers** – Keys and Foreign keys – Constraints on Attributes and Tuples, Schemalevel

Constraints and Triggers.

Functional Dependencies– Rules about Functional Dependencies -- Design of Relational Database Schemas, Normal Forms based on FDs – Multivalued Dependencies, 4NF, 5NF

**UNIT IV**

Transaction Management : Transactions, ACID properties, Serializability, Other isolation levels.

**Concurrency Control** – Serial and Serializable Schedules – Conflict Serializability – Enforcing Serializability by Locks – Locking Systems with Several Lock Modes - Concurrency Control by Timestamps – Concurrency Control by Validation.

**UNIT V**

**Index Structures** – Indexes on Sequential Files – Secondary Indexes – B-Trees, B+ Trees – Hashing.

**Introduction to Query Optimization**.

**Failures and Recovery: System Failures** – Issues and Models for Resilient Operation – Undo Logging – Redo Logging – Undo/Redo Logging – Protecting Against Media Failures.

**TEXT BOOKS:**

1. **"Database Systems, The Complete Book",** Hector Garcia-Molina, Jeffrey D. Ullman and Jennifer Widom, 6th impression, 2011, Pearson.
2. **"Data base Management Systems",** Raghu Rama Krishnan, Johannes Gehrke, 3rd Edition, 2003, McGraw Hill.

**REFERENCE BOOKS:**

1. "Fundamentals of Database Systems", Elmasri Navrate, 6th edition, 2013, Pearson.
2. "Data base Systems design", Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
3. "Introduction to Database Systems", C.J.Date, Pearson Education.
4. "Data base System Concepts", Silberschatz, Korth, McGraw Hill, V edition.

**III B.Tech II Semester**

## JAVA PROGRAMMING
**(Choice Based Credit Course Inter Department)**

| L | T | P | C |
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| 3 | 1 | 0 | 3 |

**Course Objectives:**
- Study the syntax, semantics and features of Java Programming Language
- Study the Object Oriented Programming Concepts of Java Programming language
- Learn the method of creating Multi-threaded programs and handle exceptions
- Learn Java features to create GUI applications & perform event handling

**Course Outcomes:**
- Solve problems using object oriented approach and implement them
- Ability to write Efficient programs that handle exceptions
- Create user friendly interface

**UNIT I**

**The History and Evolution of Java:**Java's Lineage, The Creation of Java, How Java Changed the Internet, Java's Magic: The Bytecode, Servlets: Java on the Server Side, The Java Buzzwords, The Evolution of Java, Java SE 8, A Culture of Innovation.

**An Overview of Java:** Object-Oriented Programming, A First Simple Program, A Second Short Program, Two Control Statements, Using Blocks of Code, Lexical Issues, The Java Class Libraries.

**UNIT II**

**Data Types, Variables, and Arrays:** Java Is a Strongly Typed Language, The Primitive Types, Integers, Floating-Point Types, Characters, Booleans, A Closer Look at Literals, Variables, Type Conversion and Casting, Automatic Type Promotion in Expressions, Arrays, A Few Words About Strings, A Note to C/C++ Programmers About Pointers.

**Operators:** Arithmetic Operators, The Bitwise Operators, Relational Operators, Boolean Logical Operators, The Assignment Operator, The ? Operator, Operator Precedence, Using Parentheses.

**Control Statements:** Java's Selection Statements, Iteration Statements, Jump Statements.

**UNIT III**

**Introducing Classes:** Class Fundamentals,Declaring Objects, Assigning Object Reference Variables ,Introducing Methods,Constructors,The this Keyword, The finalize( ) Method, A Stack Class.

**A Closer Look at Methods and Classes:**Overloading Methods, Using Objects as Parameters, A Closer Look at Argument Passing, Returning Objects, Recursion, Introducing Access Control, Understanding static, Introducing final, Arrays Revisited, Introducing Nested and Inner Classes, Exploring the String Class, Using Command-Line Arguments, Varargs: Variable-Length Arguments.

**UNIT IV**

**Inheritance:** Inheritance Basics, Using super, Creating a Multilevel Hierarchy, When Constructors Are Executed**,** Method Overriding, Dynamic Method Dispatch,Using Abstract Classes, Using final with Inheritance, The Object Class.

**Packages and interfaces:** Packages, Access Protection, Importing Packages, Interfaces,Default Interface Methods,Use static Methods in an Interface, Final Thoughts on Packages and Interfaces.

**Exception Handling**: Exception-Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch,Multiple catch Clauses, Nested try Statements, throw, throws, finally, Java's Built-in Exceptions,

Creating Your Own Exception Subclasses, Chained Exceptions, Three Recently Added Exception Features, Using Exceptions.

**UNIT V**

**Multithreaded Programming:** The Java Thread Model, The Main Thread, Creating a Thread, Creating Multiple Threads, Using isAlive( ) and join( ), Thread Priorities, Synchronization, Interthread Communication, Suspending, Resuming, and Stopping Threads. Obtaining A Thread's State, Using Multithreading.

**Enumerations, Autoboxing, and Annotations (Metadata):** Enumerations, Type Wrappers, Autoboxing, Annotations (Metadata), Type Annotations, Repeating Annotations.

**Text Book:**

JAVA the Complete Reference 9th edition, Herbert schildt

**III B.Tech II Semester**

## IMMUNOLOGY

**(Choice Based Credit Course Inter Department)**

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

**Course Objective:**

This course aims to familiarize the students to mechanisms associated with immune system, any abnormalities which could lead to disease development.

**Course Outcome:**

Students will be able to distinguish between innate & acquired immunity, they should also be able to demonstrate and identify immune cells specific functions. They can correlate between immune/disease developments.

**UNIT I: Basics of immunology**

Immunity: Types of immunity, Innate & Adaptive; Cells of immune system, Organs of the immune system, Primary lymphoid organs (bone marrow, Thymus), Secondary lymphoid organs (Spleen, Lymphnode, MALT, CALT), Immunogen, Antigen and their chemical nature, Factors that influence immunogenicity, epitopes, properties of "B" cell epitopes & "T" cell epitopes, haptens & adjuvants.

**UNIT II: Immunoglobulin's: structure & function**

Basic & fine structure of Immunoglobulin classes & their functions, isotopes, allotypes & idiotypes, Monoclonal antibodies: production of Monoclonal antibodies and their uses.

**UNIT III:** Complement system & its path ways, antigen- antibody interactions & immune assays.

**UNIT IV: Humoral immunity & cell mediated immunity**

MHC, Antigen processing and, Antigen presentation cells, structure & functions of TCR, T-cell maturation, activation & differentiation of T cell. T cell subclasses & linkage. Activation of B cells, proliferation by thymus dependent & thymus independent antigens. B cell differentiation, class switching & generation of plasma & memory cells. Primary immune response & secondary immune responses.

**UNIT V: Hyper sensitivity & Auto immune disease & tumor immunology**

Hypersensitivity & its types, autoimmunity, autoimmune disorders, transplantation, tumor Transplantation, mechanism of graft rejection, immuno suppressive drugs.

**TEXT BOOKS:**

1. E. Roitt Essential Immunology, Vaccines conventional, subunit and recombinant, antidiotypic vaccine, Blackwell Scientific publications, Oxford,1991.
2. Kuby Immunology, 5th Edition. Richard A Goldsby, Thomas J Kindt Barbara A Osborne. W H Freeman and Company, 2006.

**REFERENCES:**

1. Benjamin E and Leskowitz S, immunology A short Course. Wiley LISS NY, 1991. ELISA Immunological Techniques. DNA vaccines Immunotechnology.

2. Cellular Molecular Immunology. Abul Abbas and Litchman, 2003.

**III B.Tech II Semester**

## DOWNSTREAM PROCESSING
## (Choice Based Credit Course Inter Department)

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

**Course Objective**:
This course aims to introduce the students to different steps of downstream processing including cell disruption, separations, extractions, fractionations & Concentrations.

**Course Outcome**:
At the end of the course the students will be able to differentiate between different separation techniques and design a combination of downstream techniques for a given process. They will be able to analyze scientific results from real examples and calculate operating parameters for a particular operation.

**UNIT I: Role of Downstream Processing In Biotechnology**
Role and importance of downstream processing in biotechnological processes. Problems and requirements of bio product purification. Economics of downstream processing in Biotechnology, cost-cutting strategies, characteristics of biological mixtures, process design criteria for various classes of bio products (high volume, low value products and low volume, high Value products)

**UNIT II: Primary Separation And Recover Process**
Cell disruption methods for intracellular products, removal of insoluble, biomass (and particulate debris) separation techniques, flocculation and sedimentation, centrifugation and filtration methods.

**UNIT III: Membrane Separations**
Introduction, Principles & theory, Requirements of membranes, Structure of membranes, Membrane types and their preparation, Membrane modules, flow patterns in membrane modules, Membrane fouling, Membrane separation process: Types Principles, driving forces and applications

**UNIT IV: Enrichment Operations**
Precipitation methods (with salts, organic solvents, and polymers, extractive separations, aqueous two-phase extraction, supercritical extraction), in situ product removal, integrated bioprocessing.

**UNIT V: Electrophoresis & Product Resolution / Fractionation**
Introduction, Principles and theory, Electrophoresis equipment, Gel electrophoresis, SDS Page, Isoelectric focusing, 2D Gel Electrophoresis, Pulse field Electrophoresis
Chromatographic techniques- Paper, TLC, Adsorption, Ion exchange, Gel filtration, affinity chromatographic separation processes, GC, HPLC, FPLC, Chromatofocusing electrophoretic separations.

**TEXT BOOKS:**
1. Wankat PC. Rate controlled separations, Elsevier, 1990.
2. Ajay Kumar and Abhisek Awasthi " Bioseparation Engineering" I.K. International publicationsm, 2007.

**REFERENCES:**
1. Product Recovery in Bioprocess Technology, BIOTOL.' Series, VCH, 1990.
2. Asenjo J.M. Separation processes in Biotechnology, 1993, Marcel Dekkere Inc.
3. M.R.Ladisch, Bioseparation engineering: Principles, Practice and Economics, Wiley Interscience, 2001.
4. Belter PA and Cussler E. Bioseparations, Wiley, 1985.

**III B.Tech II Semester**

## TRANSPORT PHENOMENA IN BIOPROCESSES
**(Choice Based Credit Course Inter Department)**

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

**Course Objective:**

This course will provide the fundamentals to solve real life problems involving transports of momentum, energy and mass in biological, mechanical and chemical systems using a unified approach.

**Course Outcomes:**

- Understanding of transport processes.
- Ability to do heat, mass and momentum transfer analysis.
- Ability to analyze industrial problems along with appropriate boundary conditions.
- Ability to develop steady and time dependent solutions along with their limitations

**UNIT I: Momentum Transport**

Mechanism of Momentum Transport: Newton's Law of Viscosity, Non- Newtonian fluids, theory of viscosity of liquids, time dependant viscosity, viscosity measurement ( cone-and-plate viscometer, coaxial cylinder rotary viscometer, impeller viscometer ), use of viscometers with biological reaction fluids, rheological properties of fermentation broth, factors affecting broth viscosity ( cell concentration, cell morphology, osmotic pressure, product and substrate concentration ), Velocity distribution in laminar flow and turbulent flow

**UNIT II: Shell Momentum balances and Mixing of Fluids**

Flow of Falling Film, Flow through circular tube, Flow through the annulus, Flow of two adjacent immiscible fluids

Introduction to turbulent flow, time smoothening, mixing, mixing mechanism, power requirements in ungassed Newtonian and Non Newtonian fluids, gassed fluids, interaction between cell and turbulent Eddies, operating conditions for turbulent shear damage.

**UNIT III: Energy Transport**

Thermal conductivity and the mechanisms of energy transport- measurement of thermal conductivity, Fourier's law, steady state conduction, analogy between heat and momentum transfer

**UNIT IV: Mass Transport & Shell Mass Balances**

Theory of Diffusion and estimation of Diffusion coefficient for gases, liquids, in colloidal a polymers suspensions in polymers. shell mass balances: Diffusion through a stagnant gas film, diffusion with in a heterogeneous and homogeneous chemical reaction. Diffusion and chemical reaction inside a porous catalyst.

**UNIT V: Oxygen Transport**

Oxygen uptake in cell cultures, Factors affecting cellular oxygen demand, oxygen transfer from gas bubbles to aerobic culture, oxygen transfer in fermentors- bubbles, factors affecting oxygen transport- sparging, stirring, medium properties, antifoam agents, temperature, mass transfer correlations, measurements of kLa - oxygen balance method, dynamic method.

**Note: In all units relevant basic numerical problems should be practiced**

**TEXT BOOKS:**

1. R.B.Bird, W.E.Stewart, E.N.Lightfoot, Transport Phenomena, John wiley and sons, Singapore , 1994.

2. P.M.Doran, Bioprocess Principles, Academic Press, 1995.

3.Harvey W. Blanch, Douglas S. Clark Biochemical Engineering, Marcecel, Dekker, 2007.

**REFERENCES:**1. M.L.Shuler and F. Kargi, Bioprocess Engineering: Basic concepts, 2nd edition, Prentice Hall of India, 2003.

**III B.Tech II Sem (CSE)**

## MICROPROCESSORS & MICROCONTROLLERS LAB

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

**Course Objectives:**

1. To become skilled in 8086 Assembly Language programming.
2. To understand programmable peripheral devices and their Interfacing.
3. To understand and learn 8051 microcontroller.
4. To learn 8051 assembly Language programming

**Learning Outcomes:**

a. Able to write8086 Assembly Language programs.
b. Able to understand programmable peripheral devices and their Interfacing.
c. Able to write 8051 assembly Language programs.

**Minimum Ten Experiments to be conducted (Five from each section)**

**I) 8086 Microprocessor Programs using MASM/8086 kit.**

1. Introduction to MASM Programming.
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, Length of the string, String comparison.

**Interfacing:**

5. 8259 – Interrupt Controller and its interfacing programs
6. 8255 – PPI and its interfacing programs (A /D, D/A, stepper motor,)
7. 7-Segment Display.

**II) Microcontroller 8051 Trainer kit**

1. Arithmetic operation – Multi byte Addition and Subtraction, Multiplication and Division – Signed and unsigned Arithmetic operation.
2. Logic operations – Shift and rotate.
3. Sorting- Ascending and descending order.

**Interfacing using 8051 Trainer kit:**

4. Key board Interfacing
5. Seven Segment display
6. Switch Interfacing
7. Relay Interfacing
8. UART

**B.TECH. III Year II sem (C.S.E)**

## WEB PROGRAMMING AND COMPILER DESIGNLAB

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

**Course Objectives**:

1. Design, develop and test software systems for engineering applications.
2. Analyze technical solutions to computational problems and develop efficient algorithms.
3. Work in multi-disciplinary teams to specify software requirements and to achieve project goals.
4. Communicate effectively and demonstrate professional ethics with societal responsibilities.
5. Engage in lifelong learning to keep pace with changing landscape of technologies for professional advancement.

**Course outcomes:**

Develop client-server based applications.
Analyze security vulnerabilities in TCP/IP.
Develop secure protocols for different types of attacks.

**Web Programming Experiments**

1) Write a Java program which stores the user login information in database in a server, creates user interface for inserting, deleting, retrieving information from the database, accepts user login information and verifies it.
2) Write a JAVA program which establishes a connection between client and server and transfers data. Transfer the data without establishing the connection.
3) Write a Java Program to create an Employee class with the data members Emp_id, name, Department and create a member function to get the employee information, display the details.
4) Write a java program to create a package for simple arithmetic operations
5) Write a Java Program to create a user defined Exception called ―StringNotMatchException‖ when the user entered input is not equal to ―INDIA‖
6) Write a HTML to create user registration form with following constraints; Validate the registration, user login, user profile and payment by credit card pages using Java Script
7) Create and save an XML document at the server, which contains 10 users information. Write a program which takes User ID as input and returns the user details by taking the user information from the XML document.
8) Write a XHTML form for Employee Information like Emp_id, Name, Department Name, Phone, E-mail. using java script check the validation for each Fields(The First Character of Emp_id character followed by number, name should accept 20 characters, phone max 8 digits, email)
9) Write a Java Servlet Program to display the Current time on the server.
10) To write html and servlet to demonstrate invoking a servlet from a html
11) Write a Java servlet program to change the Background color of the page by the color selected by the user from the list box.
12) Write a Java servlet to get the personal details about the user(Like name, Address, City, Age, Email
id) and check whether the user is Eligible to vote or not.
13) Write a Java servlet Program to create a Cookie and keep it alive on the client for 30 minutes.

14) Write a java servlet program to display the various client information like Connection, Host, Accept-Encoding, User Agent.
15) To write java servlet programs to conduct online examination and to display student mark list available in a database
16) Write a Java servlet Program to implement the Book Information using JDBC
17) Write a Java Servlet Program to create a Session and display the various information like, Last accessed time, Modified time, Expiration)
18) Write a JSP Program to Display the number of visitors visited the page.
19) Write a JSP Program to implement the Book Information using Database.
20) Write a JSP Program to implement the Telephone Directory

**Compiler DesignExperiments**

1. Design a lexical analyzer for given language and the lexical analyzer should ignore redundant spaces, tabs and new lines. It should also ignore comments. Although the syntax specification states that identifiers can be arbitrarily long, you may restrict the length to some reasonable value. Simulate the same in C language.
2. Write a C program to identify whether a given line is a comment or not.
3. Write a C program to recognize strings under 'a', 'a*b+', 'abb'.
4. Write a C program to test whether a given identifier is valid or not.
5. Write a C program to simulate lexical analyzer for validating operators.
6. Implement the lexical analyzer using JLex, flex or other lexical analyzer generating tools.
7. Write a C program for implementing the functionalities of predictive parser for the mini language specified
8. A) Write a C program for constructing of LL (1) parsing.
   b) *Write a C program for constructing recursive descent parsing.
9. Write a C program to implement LALR parsing.
10. a) Write a C program to implement operator precedence parsing.
    b) Write a C program to implement Program semantic rules to calculate the expression that takes an expression with digits, + and * and computes the value.
11. Convert the BNF rules into Yacc form and write code to generate abstract syntax tree for the mini

12. Write a C program to generate machine code from abstract syntax tree generated by the parser.

**REFERENCE BOOKS :**

1. Web Technologies, Uttam K Roy, Oxford University Press
2. The Complete Reference PHP – Steven Holzner, Tata McGraw-Hill
3. Web Programming, building internet applications, Chris Bates 2nd edition, Wiley Dreamtech
4. Java Server Pages –Hans Bergsten, SPD O‟Reilly
5. Java Script, D.Flanagan, O‟Reilly, SPD.
6. Beginning Web Programming-Jon Duckett WROX.
7. Programming World Wide Web, R.W.Sebesta, Fourth Edition, Pearson.
8. Internet and World Wide Web – How to program, Dietel and Nieto, Pearson

**IV B.Tech –I Sem**

## DATA WAREHOUSING AND DATA MINING

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

**Course Objectives:**

Study data warehouse principles and its working, learn data mining concepts, understand association rules mining, study classification algorithms, learn how data is grouped using clustering techniques.

**Course Outcomes:**

- Design Data warehouse
- Design solutions for data retrieval using data mining
- Design innovative solutions for data mining

**UNIT-I**

**Data warehouse:** Introduction to Data warehouse, Difference between operational database systems and data warehouses, Data warehouse Characteristics, Data warehouse Architecture and its Components, Extraction-Transformation-Loading, Logical(Multi-Dimensional), Data Modeling, Schema Design, Star and Snow-Flake Schema, Fact Consultation, Fact Table, Fully Addictive, Semi-Addictive, Non Addictive Measures; Fact-Less-Facts, Dimension Table Characteristics; OLAP Cube, OLAP Operations, OLAP Server Architecture-ROLAP, MOLAP and HOLAP.

**UNIT-II**

**Introduction to Data Mining:** Introduction**,** What is Data Mining, Definition, KDD, Challenges, Data Mining Tasks, Data Preprocessing, Data Cleaning, Missing data, Dimensionality Reduction, Feature Subset Selection, Discretization and Binaryzation, Data Transformation; Measures of Similarity and Dissimilarity- Basics.

**UNIT-III**

**Association Rules:**

Problem Definition, Frequent Item Set Generation,TheAPRIORI Principle, Support and Confidence Measures, Association Rule Generation; APRIOIRI Algorithm, The Partition Algorithms, FP-Growth Algorithms, Compact Representation of Frequent Item Set- Maximal Frequent Item Set, Closed Frequent Item Set.

**UNIT-IV**

**Classification:**

Problem Definition, General Approaches to solving a classification problem , Evaluation of Classifiers , Classification techniques, Decision Trees-Decision tree Construction , Methods for Expressing attribute test conditions, Measures for Selecting the Best Split, Algorithm for Decision tree Induction ; Naive-Bayes Classifier, Bayesian Belief Networks; K- Nearest neighbor classification-Algorithm and Characteristics.

**UNIT-V**

**Clustering:** Problem Definition, Clustering Overview, Evaluation of Clustering Algorithms**,** Partitioning Clustering-K-Means Algorithm, K-Means Additional issues, PAM Algorithm; Hierarchical Clustering-Agglomerative Methods and divisive methods, Basic Agglomerative Hierarchical Clustering Algorithm, Specific techniques, Key Issues in Hierarchical Clustering, Strengths and Weakness; Outlier Detection.

**TEXT BOOKS:**

1) "Introduction to Data Mining", Pang-Ning Tan, Vipin Kumar, Michael Steinbanch, Pearson Education.
2) "Data Mining", Vikaram Pudi, P Radha Krishna, Oxford University Press.

**REFERENCE BOOKS:**

1) "Data Mining Techniques", Arun K Pujari, 3rd Edition, Universities Press.
2) "Data Mining- Concepts and Techniques", Jiawei Han, Micheline Kander, Jian Pei, Morgan Kaufmann
3) "Data Warehousing Fundamentals", Pualraj Ponnaiah, Wiley Student Edition.
4) "The Data Warehouse Life Cycle Toolkit", Ralph Kimball, Wiley Student Edition.

**IV B.Tech –I Sem**

## CRYPTOGRAPHY & NETWORK SECURITY

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

**Course Objective:**

- Extensive, thorough and significant understanding of the concepts, issues, principles and theories of computer network security
- Identifying the suitable points for applying security features for network traffic
- Understanding the various cryptographic algorithms and implementation of the same at software level
- Understanding the various attacks, security mechanisms and services

**Course Outcomes:**

- Protect the network from both internal and external attacks

Design of new security approaches

- **UNIT - I** :
- Computer Security concepts, The OSI Security Architecture, Security attacks, Security services and Security mechanisms, A model for Network Security, Classical encryption techniques- symmetric cipher model, substitution ciphers, transposition ciphers, Steganography, Modern Block ciphers, Modern Stream ciphers.
- **Modern Block Ciphers:** Block ciphers principles, Data encryption standard (DES), Strength of DES, linear and differential cryptanalysis, block cipher modes of operations, AES, RC4
- 
- **UNIT – II**:
- **Introduction to Number theory :** Integer Arithmetic, Modular Arithmetic, Matrices, Linear Congruence, Algebraic Structures, GF($2^n$) Fields, Primes, Primality Testing, Factorization, Chinese remainder Theorem, Quadratic Congruence, Exponentiation and Logarithm.
- **Public-key cryptography :**Principles of public-key cryptography, RSA Algorithm, Diffie-Hellman Key Exchange, ELGamal cryptographic system, Elliptic Curve Arithmetic, Elliptic curve cryptography
- 
- **UNIT – III :**
- **Cryptographic Hash functions:** Applications of Cryptographic Hash functions, Requirements and security, Hash functions based on Cipher Block Chaining, Secure Hash Algorithm (SHA)
- **Message Authentication Codes:** Message authentication Requirements, Message authentication functions, Requirements for Message authentication codes, security of MACs, HMAC, MACs based on Block Ciphers, Authenticated Encryption
- **Digital Signatures :** RSA with SHA & DSS
- 
- **UNIT – IV** :
- **Key Management and distribution:** Symmetric key distribution using Symmetric Encryption, Symmetric key distribution using Asymmetric, Distribution of Public keys, X.509 Certificates, Public key Infrastructure.
- **User Authentication:** Remote user Authentication Principles, Remote user Authentication using Symmetric Encryption, Kerberos, Remote user Authentication using

Asymmetric Encryption, Federated Identity Management

- **Electronic mail security:** Pretty Good Privacy (PGP), S/MIME
- 
- **UNIT – V** :
- **Security at the Transport Layer(SSL and TLS)** : SSL Architecture, Four Protocols, SSL Message Formats, Transport Layer Security, HTTPS, SSH
- **Security at the Network layer (IPSec):** Two modes, Two Security Protocols, Security Association, Security Policy, Internet Key Exchange.
- **System Security:** Description of the system, users, Trust and Trusted Systems, Buffer Overflow and Malicious Software, Malicious Programs, worms, viruses, Intrusion Detection System(IDS), Firewalls
- 
- 
- **TEXT BOOKS** :

1. "Cryptography and Network Security: Principals and Practice", William Stallings, Fifth Edition, Pearson Education.
2. "Cryptography and Network Security", Behrouz A. Frouzan and Debdeep Mukhopadhyay, 2nd edition, Mc Graw Hill Education

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- **REFERENCE BOOKS** :

1. "Network Security and Cryptography", Bernard Menezes , Cengage Learning.
2. "Cryptography and Security", C.K. Shymala, N. Harini and Dr. T.R. Padmanabhan, Wiley-India.
3. "Applied Cryptography, Bruce Schiener, 2nd edition, John Wiley & Sons.
4. "Cryptography and Network Security", Atul Kahate, TMH.
5. "Introduction to Cryptography", Buchmann, Springer.
6. "Number Theory in the Spirit of Ramanujan", Bruce C.Berndt, University Press
7. "Introduction to Analytic Number Theory", Tom M.Apostol, University Pr

**IV B.Tech –I Sem**

## SOCIAL NETWORKING

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

**Course Objectives**

1. Understand social media fundamentals
2. Understand basic social media etiquette
3. Create a social media campaign
4. Publish social media updates and engage with a community
5. Apply social media best practices to enhance their personal brand

**Course Outcomes**

1. Drive traffic to their blog using social media
2. Create a content calendar
3. Understand social media advertising
4. Measure site traffic using Google Analytics
5. Create and follow a social media policy

**UNIT I**

1 Social Networking: Definition, Overview of Social Networking Sites, Types of Social Networking Sites: General purpose, Niche Advantages of Social Networking Sites, Drawbacks of Social Networking Sites, Features And Need of Social Networking, Security Issues with Social Networking Sites,

**UNIT II**

.Enterprise Content Management: ECM Introduction, Definition, Process, Types of Content, Examples Content Management System(CMS) Overview and examples, Electronic Document Management(EDM) : introduction, Need,

**UNIT III**

e-Learning: Definition, Introduction, Types of e-Learning: 1.Learner-led eLearning 2.facilitated e-Learning 3.Instructor-led e-Learning 4. Embedded e-Learning Telemonitoring And e-Coaching e-Learning Models: 1. WBT 2.CBT 3.LMS 4.LCMS 5.Virtual School Systems e-Learning Tools And Technologies:EMail,Online Discussion, Chat and Instant Messaging,Voting,Whiteboard, Application Sharing,Conferencing, Online Meeting Tools Standards for e-Learning CaseStudy

**UNIT IV**

Facebook , Twitter , LinkedIN

**UNIT V**

e/m-Commerce: e-Commerce definition, Models of eCommerce, Electronic Payment Systems: Credit/Debit Cards, Smart Cards, Paypal, e-Billing,eMicropayments Point Of Sales System(POS): Meaning, Uses m-Commerce: Overview of mobileCommerce, Attributes of m-Commerce, Drivers of m-Commerce, m-Commerce Security issues, Mobile ATM(ICICI Bank Case Study) Applications of m-Commerce: 1.Mobile Financial Applications, m-wallet 2.Mobile Shopping 3.Advertising And Content provision Case-Study 10 20 3,4

**REFERENCES**:

1. E-Learning Tools and Technologies William Hortan, Katherine Hortan,Wiley Pub.

2. Cloud Computing Bible Barrie Sosinsky,Wiley India pub

3. E-Commerce C.S.V. Murthy,Himalaya Pub.

4. E-World (Excel Publications) Arpita Gopal and Chandrani Singh

5. Electronic Commerce A Managerial Perspective Efraim Turban, Pearson Pub.

6. Decision Support Systems and Intelligent Systems Efraim Turban, Jay Aronson, Pearson,7th Ed

7. Cloud computing Michael Miller, Pearson Pub. 8. Internet (Use of Search Engines Google & yahoo etc)

**IV B.Tech –I Sem**

## MOBILE APPLICATION DEVELOPMENT

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

**Course Objectives**

- This program provides career options for our students in the emerging technology sector of Mobile Applications. The students will possess the competent knowledge and skills to seek jobs in this sector.
- The course provides comprehensive knowledge, technical expertise and hands-on experience in the mobile application sector.
- This course provides students with an understanding of all aspects of mobile technologies. Students will have an in-depth knowledge of Android and iphone (iOS) application development.
- At the end of this course, the student will be able to understand the basics concepts of mobile networks, architecture and application development, comprehend the features of iOS, Objective C and Android. He/she will also implement Application Development Concepts and Techniques of Android and iOS.

**Course Outcomes**

- The course integrates the mobile application principles with the real-world experience. The course's learning outcomes arm the students with technical expertise and mobile application development experience. Industry leaders support the course by providing valuable industry inputs and invaluable insight into the process of developing cutting edge mobile applications.

**UNIT - I** :

**J2ME Overview:** Java 2 Micro Edition and the World of Java, Inside J2ME, J2ME and Wireless Devices. Small computing Technology: Wireless Technology, Radio Data Networks, Microwave Technology, Mobile Radio Networks, Messaging, Personal Digital Assistants.

**J2ME Architecture and Development Environment:** J2ME Architecture, Small Computing Device Requirements, Run – Time Environment, MIDlet programming, Java Language for J2ME, J2ME Software Development Kits, Hello World J2ME Style, Multiple MIDlets in a MIDlet Suite, J2ME wireless Toolkit.

**UNIT – II:**

**J2ME Best Practices and Patterns:** The Reality of Working in a J2ME World, Best Practices, **Commands, Items, and Event Processing:** J2ME User Interfaces, Display Class, The Palm OS Emulator, Command Class, Item Class, Exception Handling.

**High – Level Display:** Screens, Screen Class, Alert Class, Form Class, Item Class, List Class, Text Box Class, Ticker Class.

**UNIT – III :**

**Low Level Display:** The Canvas, User Interactions, Graphics, Clipping Regions, Animation.
**Record Management System:** Record Storage, Writing and Reading Records, Record Enumeration, Sorting Records, Searching Records, Record Listener.

**UNIT – IV :**

**JDBC Objects:** The Concept of JDBC, JDBC Driver Types, JDBC Packages. Overview of the JDBC process, Database Connection, Statement Objects, Result Set, Transaction Processing, Metadata, Data Types, Exceptions.

**JDBC and Embedded SQL:** Model programs, Tables, Indexing, Inserting Data into Tables, Selecting Data from a Table, Updating Tables, Deleting Data from a table.

**Introduction Android Programming:** What is Android, Activities, Linking Activities Using Intents, Fragments, Calling Built – in Applications using Intents, Displaying Notifications

**UNIT – V :**

**Android User Interface:** Understanding the Components of a Screen, Adapting to Display Orientation, Managing Changes to Screen Orientation, Utilizing the Action Bar, Listening for UI Notifications.

**Designing User Interface with Views:** Basic Views, Picker Views, Using List Views to Display Long Lists.

**TEXT BOOKS** :

1. J2ME: The Complete Reference, James Keogh, TMH.
2. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India

**REFERENCE BOOKS** :

1. Enterprise J2ME: Developing Mobile Java Applications, Michael Juntao Yuan, Pearson Education, 2004.
2. Android Application Development for Java programming by James C. Sheusi, Cengage Learning
3. Android A Programmers Guide by Jerome DiMargio, TMH.

**IV B.Tech –I Sem(CSE)**

## CLOUD COMPUTING
## (CBCC for CSE)

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### Course objectives

1. To impart fundamental concepts in the area of cloud computing

To impart knowledge in applications of cloud computing

### Course outcomes

1. Define cloud computing and related concepts
2. Understand the key dimensions of the challenges of Cloud Computing
3. Understand the assessment of the economics , financial, and technological implications for selecting cloud computing for an organization
4. Describe the benefits of cloud computing
5. Understand the challenges of cloud computing
6. Understand how cloud components fit together
7. Determine the suitability of in-house v/s hosted solutions

**UNIT-I**

**Introduction to Virtualization**: Objectives of virtualization, history of virtualization, benefits of virtualized technology, the virtual service desk, what can be virtualized, related forms of computing, cloud computing, software as a service – SaaS, grid computing, utility computing, virtualization processes.

**UNIT-II**

**Virtualization Technologies-I**: ubuntu (server edition), altiris, windows, server, software virtualization, vmware, intel virtualization, red hat virtualization, softgrid application, Linux virtualization, desktop, virtualization, hardware virtualization, resource virtualization, processor virtualization, application virtualization.

**Virtualization Technologies-II:** Storage virtualization, virtualization density, para-virtualization, OS virtualization, virtualization software, data storage virtualization.

**UNIT–III**

**Introduction to Cloud Computing**: Cloud Introduction and overview- Components, Infrastructure and Services, Why Use Cloud Computing, Benefits and Limitations, Cloud Application Architectures, Cloud Infrastructure Models, Cloud Computing Technology- Hardware & Software Infrastructure

**UNIT–IV**

**Cloud Computing Architecture:** Requirements, Introduction to Cloud Computing Architecture, various kinds of Cloud Computing Architecture, Grid Computing, Transactional Computing, On Demand Computing, and Distributed Computing.

**UNIT–V**

**Security:** Security issues in Cloud Computing - Data Security, Network Security, and Host Security

**Disaster Recovery:** Disaster Recovery Planning, Disasters in the Cloud, Disaster Management. Scaling a Cloud Infrastructure- Capacity Planning, Cloud Scale.

**Case Studies**: ANEKA, Amazon S3, Google APP Engine, IBM Clouds, Oracle OBIEE

**TEXT BOOKS:**

1. Cloud Computing Virtualization Specialist Complete Certification Kit - Study Guide Book, Ivanka Menken, Gerard Blokdijk, 2009.
   CloudApplicationArchitecturesBuilding Applications and Infrastructure in the Cloud, George Reese, O'Reilly Media Press, 2009.

**REFERENCE BOOKS:**

1. Cloud Computing: A Practical Approach, Anthony T.Velte, TobeJ. Velte, Robert Elsenpeter, Publication Person Education, 2009
2. Storage Virtualization: Technologies for Simplifying Data Storage and Management, Tom Clark, Addison-Wesley, 2005
3. Cloud Computing Technologies and Strategies of the Ubiquitous DataCenter,Curtis Franklin Jr.Brian J.S. Chee**,** 2010
4. Introduction to Cloud Computing: Business & Technology, Timothy Chou,2009

**IV B.Tech –I Sem(CSE)**

## LINUX ADMINISTRATION AND SOCKET PROGRAMMING
## (CBCC for CSE)

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**Course objectives:**

This course provides an intensely practical introduction to Unix System Administration using Linux. The Linux Operating System, a free implementation of UNIX for personal computers, will be used extensively throughout this course for lecture/tutorial examples and importantly during laboratory classes. In addition to System Administration proper, TCP/IP network service administration and the use of scripting languages will be introduced.

Since Linux implements the POSIX standard, most of the learning from this course will be directly applicable to commercial Unix systems.

**Course outcomes:**

On completion of this course you should be able to:

- Understand the role and responsibilities of a Unix system administrator
- Install and configure the Linux operating system
- Manage the resources and security of a computer running Linux at a basic level
- Make effective use of Unix utilities, and scripting languages
- Configure and manage simple TCP/IP network services on a Linux system
- Develop an appreciation of the documentation available as part of an installed Unix/Linux system

**UNIT-I**

**Introduction:** Introduction to UNIX, Linux, GNU and Linux distributions Duties of the System Administrator, The Linux System Administrator, Installing and Configuring Servers, Installing and Configuring Application Software, Creating and Maintaining User Accounts, Backing Up and Restoring Files, Monitoring and Tuning Performance, Configuring a Secure System, Using Tools to Monitor Security Booting and shutting down: Boot loaders-GRUB, LILO, Bootstrapping, Init process, rc scripts, Enabling and disabling services.

**The File System**: Understanding the File System Structure, Working with Linux Supported File Systems, Memory and Virtual File Systems, Linux Disk Management, Network Configuration Files

**UNIT-II**

**System Configuration Files:** System wide Shell Configuration Scripts, System Environmental Settings, Network Configuration Files, Managing the init Scripts, Configuration Tool, Editing Your Network Configuration

**TCP/IP Networking**: Understanding Network Classes, Setting Up a Network Interface Card (NIC), Understanding Subnetting, Working with Gateways and Routers, Configuring Dynamic Host Configuration Protocol, Configuring the Network Using the Network

**The Network File System**: NFS Overview, Planning an NFS Installation, Configuring an NFS Server, Configuring an NFS Client, Using Automount Services, Examining NFS Security

**UNIT-III**

**Internet Services**: Secure Services, SSH, scp, sftp Less Secure Services (Telnet ,FTP, sync,rsh ,rlogin, finger, talk and ntalk, Linux Machine as a Server, Configuring the xinetd Server, Comparing xinetd and Standalone, Configuring Linux Firewall Packages, Domain Name

System: Understanding DNS, Understanding Types of Domain Servers, Examining Server Configuration Files, Configuring a Caching DNS Server, Configuring a Secondary

**UNIT-IV**

Configuring Mail Services: Tracing the Email Delivery Process, Mail User Agent (MUA), Introducing SMTP, Configuring Sendmail, Using the Postfix Mail Server, Serving Email with POP3 and IMAP, Maintaining Email Security.

Configuring a Web Server: Introducing Apache, Configuring Apache, Implementing SSI, Enabling CGI, Enabling PHP, Creating a Secure Server.

**UNIT-V**

**Inter process Communication:** Pipes, FIFO's, Message Queues, Semaphores, Shared memory, A Network primer, **Communication Protocols**: XNS – Xerox Network Systems, Net BIOS, UUCP – Unix - to – Unix Copy**. Berekely Sockets:** Overview, Unix Domain Protocols, Socket Addresses, Elementary Socket System Calls, Advanced Socket System Calls, Socket Options, Socket & Signals, Socket implementation. **Library routines:** Berekely Network Library routines,Network utility Routines,Summary.

**TEXT BOOKS**: :

1. Red hat Linux Networking and System Administration, 3rd Edition by Terry Collings and Kurt Wall, Wiley Publishing

2. UNIX network Programming volume 1 third edition.by W Richard Stevens (Unit 5)

**IV B.Tech –I Sem(CSE)**

## BUSINESS ANALYTICS (CBCC for CSE)

| L | T | P | C |
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**Course Objectives**

Students who have completed the MS in Data Science and Business Analytics Program will be able to:

- Apply quantitative modeling and data analysis techniques to the solution of real world business problems, communicate findings, and effectively present results using data visualization techniques.
- Recognize and analyze ethical issues in business related to intellectual property, data security, integrity, and privacy.
- Apply ethical practices in everyday business activities and make well-reasoned ethical business and data management decisions.
- Demonstrate knowledge of statistical data analysis techniques utilized in business decision making.
- Apply principles of Data Science to the analysis of business problems.
- Use data mining software to solve real-world problems.
- Employ cutting edge tools and technologies to analyze Big Data.
- Apply algorithms to build machine intelligence.

Demonstrate use of team work, leadership skills, decision making and organization theory

**Course outcomes:**

- Develop in depth understanding of the key technologies in data science and business analytics: data mining, machine learning, visualization techniques, predictive modeling, and statistics.
- Practice problem analysis and decision-making.

Gain practical, hands-on experience with statistics programming languages and big data tools through coursework and applied research experiences.

**UNIT I:**

**Introduction to Data Mining:** What is Data Mining? Integration of Data Mining system with a Database or a Data Warehouse System, Major issues in Data Mining, Applications and Trends in Data Mining

**UNIT II:**

**Algorithms of Data Mining**: Mining Frequent Patterns, Associations: Basic Concepts, Efficient and Scalable Frequent Itemset Mining methods ( Apriori Algoithm, improving efficiency of Apriori, Mining frequent Itemsets without Candidate generation, using vertical data formats, closed frequent itemsets). Mining various kinds of association rules, from association analysis to Correlation analysis, constraint-based association mining

**UNIT III:**

**Classification and Prediction:** What is classification? What is Prediction? Classification by Decision tree Induction, Bayesian classification, Rule based classification, Prediction: Linear Regression, non-linear regression

**Cluster Analysis:** Types of data in cluster analysis, classical Partitioning methods : k-Means and k-Medoids.

**UNIT IV:**

**Introduction to Interactive Visual Data Analysis**: Challenges faced by everyday data analysts, A brief history of interactive visual data analysis, Differences between statics graphics and interactive graphics.

**UNIT V:**

**Sensing and Analyzing Univariate Data:** Sensing and Analyzing Univariate Data**,** Distribution analysis of categorical data**,** Distribution analysis of continuous data**,** Deviation analysis**,** Part-to whole and ranking analysis**,** Univariate data analysis best practices.

**Sensing and Analyzing Time Series Data:** Characteristics of time-series data**,** Visual analysis techniques for time-series data**,** Interactive graphics aided time-series analysis**,** Visual time-series analysis best practices.

**TEXT BOOKS:**

1. Jiawei Han and Micheline Kamber, Data Mining: Concepts and Techniques, Second Edition, Elsevier
2. Michael Berry and Gordon Linoff, Data Mining Techniques,Wiley Publishing, 2004.
3. Kimball and Ross, The Data Warehouse Toolkit, Second Edition, John Wiley & Sons, 2002.
4. T. Davenport, "Competing on Analytics," Harvard Business Review (Decision Making), January 2006.

**IV B.Tech –I Sem(CSE)**

## INTELLECTUAL PROPERTY RIGHTS AND CYBER LAWS
## (CBCC-I)

| L | T | P | C |
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**Course Objective:**

- To understand IPR
- To learn Legal protection, IPR in cyberspace
- To learn Intellectual Property exploitation and Risk coverage

**Course Outcomes:**

- The students understands the breadth and complexity of intellectual property protection in the global context
- develop the understanding of relationship between commerce and cyberspace
- develop competencies for dealing with frauds and deceptions (confidence tricks, scams)and other cyber crimes for example, child pornography etc. that are taking place via the Internet;

**UNIT - I :**

**IP & Trade Mark:** IP Law – Types of IP - Agencies for IP Registration – International Treaties. Purpose and Function of Trademarks – Types of marks – Acquisition of Trademark Rights – Categories of marks – Trade names and Business names – protectable matter. Selection and Evaluation of a mark.Loss of Trademark Rights – Trademark Use and Compliance Policies – Trademark Policing and Maintenance - Use of Marks Owned by Third Parties – Transfer of Ownership or Rights in Trademarks

**UNIT – II:**

**Copy Rights:** Foundations of Copyright Law – Originality of Material – Fixation of Material – Exclusions from Copyright Protection – Compilations, Collections, and Derivative Works. Rights of Reproduction – Rights to Prepare Derivative works – Rights of Distribution – Rights to Perform the Work Publicly – Rights to Display the Work Publicly – Limitations on Exclusive Rights. Copyright Ownership Issues – Joint works – Ownership in Derivative works – Works Made for hire – Transfers of Copyright – Termination of Transfers of Copyright – Duration of Copyright

**UNIT – III** :

**Copyright Infringement:** Elements of Infringement – Contributory Infringement and Vicarious Infringement – Defenses to Infringement – Infringement Actions – Remedies for Infringement. Copyright Protection for Computer Programs – Copyright Protection for Automated Databases – Copyright in the Electronic Age – The Digital Millenium Copyright Act – Recent Developments in Copyright Law – Terms of the Trade – Vessel Hull Protection

**UNIT – IV** :

**Patents:** Patentability – Design Patents – Double Patenting – Patent Searching – Patent Application Process – Prosecuting the Application, Post-issuance Actions, Term and Maintenance of Patents. Ownership Rights – Sole and Joint Inventors – Disputes over

Inventorship – Inventions Made by Employees and Independent Contractors – Assignment of Patent Rights – Licensing of Patent Rights – Invention Developers and Promoters

**UNIT – V** :

**Patent Infringement:** Direct Infringement – Inducement to Infringe – Contributory Infringement – First Sale Doctrine – Claims Interpretation – Defenses to Infringement – Remedies for Infringement – Resolving an Infringement Dispute – Patent Infringement Litigation. New Developments in Patent Law – International Patent Protection, Patent Law Treaty

**TEXT BOOKS :**

1. Intellectual Property Rights by Deborah E. Bouchoux, Cengage Learning

**REFERENCE BOOKS** :

1. Managing Intellectual Property – The Strategic Imperative, Second Edition by Vinod V. Sople, PHI Learning Private Limited.
2. Intellectual Property – Copyrights, Trademarks, and Patents by Richard Stim, Cengage Learning
3. "Intellectual Property Rights" Watal, Oxford University Press

**IV B.Tech –I Sem (CSE)**

**INFORMATION RETRIEVAL SYSTEMS**

**(CBCC-II)**

| L | T | P | C |
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**Course Objective**:

- To learn the different models for information storage and retrieval
- To learn about the various retrieval utilities
- To understand indexing and querying in information retrieval systems
- To expose the students to the notions of structured and semi structured data
- To learn about web search

**Course Outcomes**:

- Possess the ability to store and retrieve textual documents using appropriate models
- Possess the ability to use the various retrieval utilities for improving search
- Possess an understanding of indexing and compressing documents to improve space and time efficiency
- Possess the skill to formulate SQL like queries for unstructured data
- Understand issues in web search

**UNIT - I** :

Introduction :Retrieval Strategies: Vector space model, Probabilistic retrieval strategies: Simple term weights, Non binary independence model Language Models

**UNIT – II**:

Retrieval Utilities: Relevance feedback, Clustering, N-grams, Regression analysis, Thesauri.

**UNIT – III** :

Retrieval Utilities: Semantic networks, Parsing.

Cross-Language Information Retrieval: Introduction, Crossing the language barrier

**UNIT – IV** :

Efficiency: Inverted index, Query processing, Signature files, Duplicate document detection

**UNIT – V** :

Integrating Structured Data and Text: A Historical progression, Information retrieval as a relational application, Semi-structured search using a relational schema.

Distributed Information Retrieval: A Theoretical model of distributed retrieval, Web search

**TEXT BOOKS** :

1. David A. Grossman, Ophir Frieder, Information Retrieval – Algorithms and Heuristics, Springer, 2nd Edition (Distributed by Universities Press), 2004

**REFERENCE BOOKS** :

1.“Modern Information Retrieval Systems”, Yates, Pearson Education

2.“Information Storage and Retrieval Systems “ Gerald J Kowalski, Mark T Maybury., Springer, 2000

3.“Mining the Web : Discovering Knowledge from Hypertext Data” Soumen Chakrabarti, , Morgan-Kaufmann Publishers, 2002

4.“An Introduction to Information Retrieval” Christopher D. Manning, Prabhakar Raghavan, Hinrich Schütze, , Cambridge University Press, Cambridge, England, 2009

**IV B.Tech –I Sem(CSE)**

## HUMAN COMPUTER INTERACTION
## (CBCC-II)

| L | T | P | C |
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**Course Objective:**

- Gain an overview of Human-Computer Interaction (HCI), with an understanding of user interface design in general, and alternatives to traditional "keyboard and mouse" computing
- Become familiar with the vocabulary associated with sensory and cognitive systems as relevant to task performance by humans
- Be able to apply models from cognitive psychology to predicting user performance in various human-computer interaction tasks and recognize the limits of human performance as they apply to computer operation
- Be familiar with a variety of both conventional and non-traditional user interface paradigms

**Course Outcomes:**

- Find innovative ways of interacting with computers
- Help the disabled by designing non-traditional ways of interacting
- Use cognitive psychology in the design of devices for interaction

**UNIT - I** :

Introduction: Importance of user Interface: Definition, Importance of Good Design, Benefits of Good Design, A Brief History of Screen Design.

The Graphical User Interface : Popularity of Graphics, the Concept of Direct Manipulation, Graphical System, Characteristics, Web User – Interface Popularity, Characteristics- Principles of User Interface.

**UNIT – II**:

Design Process: Human Interaction with Computers, Importance of Human Characteristics Human Consideration, Human Interaction Speeds, Understanding Business Functions.

Screen Designing: Design Goals – Screen Planning and Purpose, Organizing Screen Elements, Ordering of Screen Data and Content – Screen Navigation and Flow – Visually Pleasing Composition : Amount of Information – Focus and Emphasis – Presentation Information Simply and Meaningfully – Information Retrieval on Web – Statistical Graphics – Technological Consideration in Interface Design

**UNIT – III** :

Windows : New and Navigation Schemes Selection of Window, Selection of Devices Based and Screen Based Controls.

Components : Text and Messages, Icons and Increases – Multimedia, Colors, User Problems, Choosing Colors

**UNIT – IV :**

Software tools : Specification Methods, Interface – Building Tools

**UNIT – V** :

Interaction Devices : Keyboard and Function Keys – Pointing Devices – Speech Recognition digitization and generation : Image and Video Displays – Drivers

**TEXT BOOKS** :

1. "The essential guide to user interface design", Wilbert O Galitz, Wiley DreamTech.
2. "Designing the user interface", 3rd Edition Ben Shneidermann, Pearson Education Asia.

**REFERENCE BOOKS :**

1. "Human –Computer Interaction", D.R.Olsen, Cengage Learning.
2. "Human – Computer Interaction", I.Scott Mackenzie, Elsevier Publishers.
3. "Interaction Design", Prece, Rogers, Sharps, Wiley Dreamtech.
4. "User Interface Design", Soren Lauesen , Pearson Education.
5. "Human –Computer Interaction", Smith - Atakan, Cengage Learning

**IV B.Tech –I Sem(CSE)**

## COMPUTER FORENSICS
## (CBCC-II)

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**Course Objectives**: The main objective of the course is to introduce the students to bring awareness in crimes and tracing the attackers.

**Course outcomes**:

Upon completion of this course, the student should be able to:

- The Student will gain the knowledge on various attackers and how they attack systems.
- The Student will gain the knowledge on tracing attackers.
- The Students will get exposure on various Forensic tools.
- The Student will get exposure on crimes and real time problems.

**UNIT- I:**

Introduction & evidential potential of digital devices - Keydevelopments , Digital devices in society ,Technologyand culture, Comment, Closedvs. open systems, evaluating digital evidence potential.

Device Handling & Examination Principles : Seizure issues,Device identification, Networked devices , Contamination, Previewing, Imaging, Continuity and hashing, Evidence locations.

**UNIT-II:**

Evidence creation & Evidence Interpretation-A seven-element security model, A developmental model of digital systems, Knowing, Unknowing, Audit and logs ,Data content, Data context.

Internet & Mobile Devices – A little bit of history, The ISO/OSI model, The internet protocol suite, DNS, Internet applications,Mobile phones and PDAs, GPS, Other personal technology.

**UNIT-III**:

Computer Forensics Fundamentals – Introduction to Computer Forensics, Use of Computer Forensics in Law Enforcement, Computer Forensics Assistance to Human Resources/

Employment Proceedings, Computer Forensics Services, Benefits of Professional Forensics Methodology, Steps Taken by Computer Forensics Specialists, Who Can Use Computer Forensic Evidence?,Case Histories,Case Studies.

**UNIT-IV:**

Types of Computer Forensics Technology – Types of Military Computer Forensic Technology, Types of Law Enforcement:Computer Forensic Technology, Types of Business Computer Forensic Technology, Specialized Forensics Techniques, Hidden Data and How to Find It, Spyware and Adware,Encryption Methods and Vulnerabilities, Protecting Data from Being Compromised, Internet Tracing Methods 65,Security and Wireless Technologies,Avoiding Pitfalls with Firewalls, Biometric Security Systems.

**UNIT-V:**

Types of Computer Forensics Systems – Internet Security Systems, Intrusion Detection Systems, Firewall Security Systems, Storage Area Network Security Systems, Network Disaster Recovery Systems,Public Key Infrastructure Systems, Wireless Network Security Systems, Satellite Encryption Security Systems, Instant Messaging (IM) Security Systems, Net Privacy Systems,

TEXT BOOKS

1.Angus M.Mashall : “Digital Forensics ”,1st Edition,Wiley-Blackwell, A John Wiley & Sons Ltd Publication, 2008.

2. John R. Vacca: “ Computer forensics: Computer Crime Scene Investigation” , 2nd Edition, Charles River Media, Inc. Boston, Massachusetts.

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## DATA WAREHOUSING AND DATA MINING LAB

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### Course Objectives

- To introduce students to the basic concepts and techniques of Data Mining.
- To develop skills of using recent data mining software for solving practical problems.
- To gain experience of doing independent study and research.
- To learn the fundamentals of shell scripting/programming
- To conceptualize Data Mining and the need for pre-processing.
- To learn the algorithms used for various types of Data Mining Problem

**Course Outcomes:**

- Will be able to implement algorithms to solve data mining problems using weka tool
- Will be able to analyse data mining problems by using different mining tools

**Description:** The business of banks is making loans. Assessing the credit worthiness of an applicant is of
crucial importance. You have to develop a system to help a loan officer decide whether the credit of a
customer is good, or bad. A bank's business rules regarding loans must consider two opposing factors. On
the one hand, a bank wants to make as many loans as possible. Interest on these loans is the banks profit
source. On the other hand, a bank cannot afford to make too many bad loans. Too many bad loans could
lead to the collapse of the bank. The bank's loan policy must involve a compromise: not too strict, and not
too lenient.

To do the assignment, you first and foremost need some knowledge about the world of credit. You can
acquire such knowledge in a number of ways.

1. Knowledge Engineering. Find a loan officer who is willing to talk. Interview her and try to represent
her knowledge in the form of production rules.
2. Books. Find some training manuals for loan officers or perhaps a suitable textbook on finance.
Translate this knowledge from text form to production rule form.
3. Common sense. Imagine yourself as a loan officer and make up reasonable rules which can be used to
judge the credit worthiness of a loan applicant.
4. Case histories. Find records of actual cases where competent loan officers correctly judged when, and
when not to, approve a loan application.

**The German Credit Data**:

Actual historical credit data is not always easy to come by because of confidentiality rules. Here is one
such dataset, consisting of 1000 actual cases collected in Germany. Credit dataset (original) Excel
spreadsheet version of the German credit data.
In spite of the fact that the data is German, you should probably make use of it for this assignment.
(Unless you really can consult a real loan officer !)
A few notes on the German dataset
• DM stands for Deutsche Mark, the unit of currency, worth about 90 cents Canadian (but looks and acts
like a quarter).
• owns_telephone. German phone rates are much higher than in Canada so fewer people own telephones.
• foreign_worker. There are millions of these in Germany (many from Turrkey). It is very hard to get
German citizenship if you were not born of German parents.
• There are 20 attributes used in judging a loan applicant. The goal is to classify the applicant into one of
two categories, good or bad.

**Subtasks: (Turn in your answers to the following tasks)**

1. List all the categorical (or nominal) attributes and the real-valued attributes separately. (5 marks)
2. What attributes do you think might be crucial in making the credit assessment? Come up with some
simple rules in plain English using your selected attributes. (5 marks)
3. One type of model that you can create is a Decision Tree - train a Decision Tree using the complete dataset as the training data. Report the model obtained after training. (10 marks)
4. Suppose you use your above model trained on the complete dataset, and classify credit good/bad
for each of the examples in the dataset. What % of examples can you classify correctly? (This is also called testing on the training set) Why do you think you cannot get 100 % training accuracy?
(10 marks)
5. Is testing on the training set as you did above a good idea? Why or Why not? (10 marks)
6. One approach for solving the problem encountered in the previous question is using crossvalidation?
Describe cross-validation, briefly. Train a Decision Tree again using cross-validation
and report your results. Does your accuracy increase/decrease? Why? (10 marks)
7. Check to see if the data shows a bias against "foreign workers" (attribute 20), or "personal-status"
(attribute 9). One way to do this (perhaps rather simple minded) is to remove these attributes from
the dataset and see if the decision tree created in those cases is significantly different from the full
dataset case which you have already done. To remove an attribute you can use the preprocess tab

in Weka's GUI Explorer. Did removing these attributes have any significant effect? Discuss. (10 marks)
8. Another question might be, do you really need to input so many attributes to get good results? Maybe only a few would do. For example, you could try just having attributes 2, 3, 5, 7, 10, 17 (and 21, the class attribute (naturally)). Try out some combinations. (You had removed two attributes in problem 7. Remember to reload the arff data file to get all the attributes initially before you start selecting the ones you want.) (10 marks)
9. Sometimes, the cost of rejecting an applicant who actually has a good credit (case 1) might be higher than accepting an applicant who has bad credit (case 2). Instead of counting the misclassifications equally in both cases, give a higher cost to the first case (say cost 5) and lower cost to the second case. You can do this by using a cost matrix in Weka. Train your Decision Tree
again and report the Decision Tree and cross-validation results. Are they significantly different from results obtained in problem 6 (using equal cost)? (10 marks)
10. Do you think it is a good idea to prefer simple decision trees instead of having long complex decision trees? How does the complexity of a Decision Tree relate to the bias of the model? (10 marks)
11. You can make your Decision Trees simpler by pruning the nodes. One approach is to use Reduced
Error Pruning - Explain this idea briefly. Try reduced error pruning for training your Decision Trees using cross-validation (you can do this in Weka) and report the Decision Tree you obtain? Also, report your accuracy using the pruned model. Does your accuracy increase? (10 marks)
12.(Extra Credit): How can you convert a Decision Trees into "if-then-else rules"?. Make up your
own small Decision Tree consisting of 2-3 levels and convert it into a set of rules. There also exist different classifiers that output the model in the form of rules - one such classifier in Weka is rules. PART, train this model and report the set of rules obtained. Sometimes just one attribute can be good enough in making the decision, yes, just one! Can you predict what attribute that might be in this dataset? One R classifier uses a single attribute to make decisions (it chooses the attribute based on minimum error). Report the rule obtained by training a one R classifier. Rank the performance of j48, PART and oneR. (10 marks)

**Task Resources:**
□□Andrew Moore's Data Mining Tutorials (See tutorials on Decision Trees and Cross Validation)
□□Decision Trees (Source: Tan, MSU)
□□Tom Mitchell's book slides (See slides on Concept Learning and Decision Trees)
□□Weka resources:
o Introduction to Weka (html version) (download ppt version)
o Download Weka
o Weka Tutorial
o ARFF format
o Using Weka from command line
Task 2: Hospital Management System
Data Warehouse consists Dimension Table and Fact Table.
REMEMBER The following
Dimension
The dimension object (Dimension):
_ Name

_ Attributes (Levels) , with one primary key
_ Hierarchies
One time dimension is must.
About Levels and Hierarchies
Dimension objects (dimension) consist of a set of levels and a set of hierarchies defined over those levels. The levels represent levels of aggregation. Hierarchies describe parent-child relationships
among a set of levels.
For example, a typical calendar dimension could contain five levels. Two hierarchies can be defined on these levels:
H1: YearL > QuarterL > MonthL > WeekL > DayL
H2: YearL > WeekL > DayL
The hierarchies are described from parent to child, so that Year is the parent of Quarter, Quarter the parent of Month, and so forth.
About Unique Key Constraints
When you create a definition for a hierarchy, Warehouse Builder creates an identifier key for each level of the hierarchy and a unique key constraint on the lowest level (Base Level)
Design a Hospital Management system data warehouse (TARGET) consists of Dimensions Patient,
Medicine, Supplier, Time. Where measures are _ NO UNITS‘, UNIT PRICE.
Assume the Relational database (SOURCE) table schemas as follows
TIME (day, month, year),
PATIENT (patient_name, Age, Address, etc.,)
MEDICINE ( Medicine_Brand_name, Drug_name, Supplier, no_units, Uinit_Price, etc.,)
SUPPLIER :( Supplier_name, Medicine_Brand_name, Address, etc., )
If each Dimension has 6 levels, decide the levels and hierarchies, Assume the level names suitably.
Design the Hospital Management system data warehouse using all schemas. Give the example 4-D cube
with assumption names.

**Reference Books :**

1. Object- Oriented Analysis And Design with Applications, Third Edition. Grady BOOCH, Robert
A. Maksimchuk, Michael W. ENGLE, Bobbi J. Young, Ph.D, Jim Conallen, Kellia. Houston, Pearson
2. The Unified Modeling Language User Guide, Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson
3. Introduction to Data Mining, Pang-Ning Tan, Vipin Kumar, Michael Steinbach, Pearson
4. Data Mining: Concepts and Techniques, Jiawei Han and Micheline Kamber, Morgan Kaufmann
Publishers, Elsevier, Second Edition, 2006

**IV B.Tech –I Sem(CSE)**

## MOBILE APPLICATION DEVELOPMENT LAB

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**Course Objectives**

- This program provides career options for our students in the emerging technology sector of Mobile Applications. The students will possess the competent knowledge and skills to seek jobs in this sector.
- The course provides comprehensive knowledge, technical expertise and hands-on experience in the mobile application sector.
- This course provides students with an understanding of all aspects of mobile technologies. Students will have an in-depth knowledge of Android and iphone (iOS) application development.
- At the end of this course, the student will be able to understand the basics concepts of mobile networks, architecture and application development, comprehend the features of iOS, Objective C and Android. He/she will also implement Application Development Concepts and Techniques of Android and iOS.

**Course Outcomes**

- The course integrates the mobile application principles with the real-world experience. The course's learning outcomes arm the students with technical expertise and mobile application development experience. Industry leaders support the course by providing valuable industry inputs and invaluable insight into the process of developing cutting edge mobile applications.

1. Installation of Java Wireless Toolkit (J2ME) and run sample program
2. Working with J2ME Features: lists, text boxes, buttons, radio boxes, soft buttons, graphics, etc
3. Working with Threads & High Level UI
4. Working on Drawing and Images
5. Developing Networked Applications using the Wireless Toolkit
6. Developing Authentication with a Web Server
7. Developing different Web Application using J2ME

**TEXT BOOKS** :

3. J2ME: The Complete Reference, James Keogh, TMH.
4. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India

**IV B.Tech –II Sem(CSE)**

## BIG DATA

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

**Objectives**

● The basics of Hadoop , Mapreduce, Pig Latin (the coding language)
● The basics of Analytics – Concepts , Data preparation – merging, managing missing numbers sampling , Data visualisation, Basic statistics
● Lots of practise to ensure that we are very comfortable handling an Analytics project on BigData

**Outcome:**

Data sets that have the potential to grow rapidly need to be manageable. This course provides the knowledge and training to use new Big Data tools and techniques as well as learn ways of storing information that will allow for efficient processing and analysis for informed business decision-making. Further, you learn to store, manage, process and analyze massive amounts of unstructured data.

**UNIT-I** : Introduction to Big Data. What is Big Data. Why Big Data is Important. Meet Hadoop. Data. Data Storage and Analysis. Comparison with other systems. Grid Computing. A brief history of Hadoop. Apache hadoop and the Hadoop EcoSystem. Linux refresher; VMWare Installation of Hadoop.

**UNIT-II** : The design of HDFS. HDFS concepts. Command line interface to HDFS.Hadoop File systems. Interfaces. Java Interface to Hadoop. Anatomy of a file read. Anatomy of a file write. Replica placement and Coherency Model. Parallel copying with distcp, Keeping an HDFS cluster balanced.

**UNIT-III**: Introduction. Analyzing data with unix tools. Analyzing data with hadoop. Java MapReduce classes (new API). Data flow, combiner functions, Running a distributed MapReduce Job. Configuration API. Setting up the development environment. Managing configuration. Writing a unit test with MRUnit. Running a job in local job runner. Running on a cluster.Launching a job. The MapReduce WebUI.

**UNIT-IV**: Classic Mapreduce. Job submission. Job Initialization. Task Assignment. Task execution .Progress and status updates. Job Completion. Shuffle and sort on Map and reducer side. Configuration tuning. MapReduce Types. Input formats. Output formats ,Sorting. Map side and Reduce side joins.

**UNIT-V** : The Hive Shell. Hive services. Hive clients. The meta store. Comparison with traditional databases. Hive Ql. Hbasics. Concepts. Implementation. Java and Mapreduce clients. Loading data, web queries.

**TEXT BOOKS**:

1. Tom White, Hadoop,"The Definitive Guide", 3rd Edition, O'Reilly Publications, 2012.
2. Dirk deRoos, Chris Eaton, George Lapis, Paul Zikopoulos, Tom Deutsch ,"Understanding Big Data Analytics for Enterprise Class Hadoop and Streaming Data", 1st Edition, TMH,2012.

**REFERENCES:**

1. Frank J.Ohlhorst, "Big Data Analytics: Turning Big Data Into Big Money",2nd Edition, TMH,2012.

**IV B.Tech –II Sem**

## WIRELESS NETWORK TECHNOLOGIES

**COURSE OBJECTIVES**

- Comprehend and demonstrate command in the principles of wireless networking.
- Describe the networking technologies including Cellular networks, WLANs and WWANs.
- Understand the functions of TCP/IP and the organization of the Internet.
- Design and evaluate a wireless network in terms of cost, performance, privacy and security.
- Plan and design a small and practical network for home or small business applications under a specified set of constraints
- To understand new trends and emerging technologies

**Course outcome**

This course focuses on imparting knowledge about the practical aspects of wireless network systems with the required basic principles behind them, along with some practical assignments. The course examines the conceptual framework for specifying a wireless network and the related protocols.

**UNIT- I**

Fundamentals of wireless communications technology, The Electromagnetic Spectrum, Radio propagation mechanisms, Characteristics of the wireless channels, modulation techniques

Wireless LANs and PANs: Introduction, Fundamentals of WLANs, IEEE 802.11 standard, Bluetooth

Wireless in local Loop, IEEE 802.16 standard

**UNIT-II**

Wireless Internet: Introduction, What is Wireless Internet, Mobile IP, TCP in Wireless Domain, WAP

AD HOC Wireless Networks: Introduction, Issues in Ad Hoc wireless networks, Ad Hoc Wireless Internet

MAC Protocol for Ad Hoc wireless Networks: Introduction, Issues in Designing a MAC Protocol for Ad Hoc wireless networks, Design goals of a MAC Protocol for Ad Hoc wireless networks, Classification of MAC Protocols, Connection based protocols, Connection based protocols with Reservation based mechanism, Connection based MAC protocols with scheduling mechanism

**UNIT-III**

Routing Protocols for Ad Hoc Wireless Networks: Introduction, Issues in Designing a Routing Protocol for Ad Hoc wireless networks, Classification of Routing Protocols, Table-driven Routing Protocol, on-demand Routing Protocol, Hybrid Routing protocol, routing protocol with Efficient Flooding mechanism, Hierarchical Routing protocol , Power-Aware Routing protocol

**UNIT-IV**

Transport Layer and Security Protocols for Ad Hoc Wireless Networks: 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: Application Controlled Transport Protocol, Ad Hoc Transport protocol, 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.

**UNIT-V**

Quality Of Service in Ad Hoc Wireless Networks: Introduction, Issues and challenges in providing QoS in Ad Hoc Wireless Networks, Classification of QoS Solutions, MAC Layer Solutions, Network Layer Solutions, QOS Frameworks for Ad Hoc Wireless Networks.

Wireless Sensor Networks: Introduction, Sensor Network Architecture, Data dissemination, Data gathering, MAC Protocols for sensor Networks, Location Discovery, Quality of sensor networks, Evaluation standards, other issues.

**TEXT BOOKS**:

1. "Ad Hoc Wireless Networks- architecture and Protocols"- C Siva Ram Murthy,B.S.Manoj, Pearson Edition.

**REFERENCES**:

1. Feng Zhao and Leonidas Guibas, "Wireless Sensor Networks", Morgan Kaufman Publishers, 2004.
2. C.K.Toh, "Ad Hoc Mobile Wireless Networks", Pearson Education, 2002.
3. Thomas Krag and Sebastin Buettrich, "Wireless Mesh Networking", O'Reilly Publishers, 2007.

# R15 REGULATIONS

# COURSE STRUCTURE

# FOR

# B.TECH –COMPUTER SCIENCE AND ENGINEERING

**w.e.f.**

# 2015 ADMITTED BATCH

**DEPARTMENT OF COMPUTER SCIENCE ANDENGINEERING**

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**COLLEGE OF ENGINEERING (AUTONOMOUS) :: PULIVENDULA**

**Y.S.R. (DIST), ANDHRA PRADESH, INDIA– 516390**

# COURSE STRUCTURE OF R15 REGULATIONS FOR B.TECH IN COMPUTER SCIENCE ENGINEERING

## B. Tech I Year I Semester

| S.No. | Course Code | Subject Name | Theory/Tutorial | Drawing/Lab | Credits |
|---|---|---|---|---|---|
| 1 | 15AHS01 | Functional English | 3+1 | - | 3 |
| 2 | 15ABS06 | Mathematics - I | 3+1 | - | 3 |
| 3 | 15ACS01 | Computer Programming | 3+1 | - | 3 |
| 4 | 15ABS01 | Engineering Physics | 3+1 | - | 3 |
| 5 | 15AME01 | Engineering Drawing | 1 | 3 | 3 |
| 6 | 15ACS03 | Problem Solving and Reasoning Techniques | 3+1 | - | 3 |
| 7 | 15AHS02 | English Language Communication Skills Lab | 3+1 | - | 2 |
| 8 | 15ACS02 | Computer Programming Lab | - | 3 | 2 |
| 9 | 15ABS02 | Engineering Physics Lab | - | 3 | 2 |
| | | Total | 25 | 09 | 24 |

## B. Tech I Year II Semester

| S.No. | Course Code | Subject Name | Theory/Tutorial | Drawing/Lab | Credits |
|---|---|---|---|---|---|
| 1 | 15AHS03 | English for Professional Communication | 3+1 | - | 3 |
| 2 | 15ABS07 | Mathematics - II | 3+1 | - | 3 |
| 3 | 15ACS04 | Data Structures | 3+1 | - | 3 |
| 4 | 15ABS03 | Engineering Chemistry | 3+1 | - | 3 |
| 5 | 15ABS05 | Environmental Studies | 3+1 | - | 3 |
| 6 | 15ACS06 | Digital Logic Design | 3+1 | - | 3 |
| 7 | 15ACS05 | Data Structures Lab | - | 3 | 2 |
| 8 | 15ABS04 | Engineering Chemistry Lab | - | 3 | 2 |
| 9 | 15AME03 | Engineering & IT Workshop Lab | - | 3 | 2 |
| | | Total | 24 | 09 | 24 |

**II Year I Semester**

| S.No. | Course Code | Subject Name | Theory/Tutorial | Drawing/Lab | Credits |
|---|---|---|---|---|---|
| 1 | 15ABS08 | Mathematics – III | 3+1 | - | 3 |
| 2 | 15ACS07 | Computer Organization | 3+1 | - | 3 |
| 3 | 15ABEE01 | Basic Electrical and Electronics Engineering | 3+1 | - | 3 |
| 4 | 15ACS08 | Operating Systems | 3+1 | - | 3 |
| 5 | 15ACS09 | Object oriented Programming through JAVA | 3+1 | - | 3 |
| 6 | **Choice based credit course of inter department**<br>**ANNEXURE-I** | | 3+1 | - | 3 |
| 7 | 15ACS10 | Operating Systems and Java Programming Lab | - | 3 | 2 |
| 8 | 15ABEE03 | Basic Electrical and Electronics Engineering Lab | - | 3 | 2 |
| 9 | 15AHS04 | Human Values and Professional Ethics (Audit Course) | 2 | | |
| | | Total | 26 | 6 | 22 |

# ANNEXURE-I

**Choice Based Credit Course of Inter Department**
**offered in**

## B.TECH II YEAR I SEMESTER

| BRANCH | SUBJECT CODE | SUBJECT NAME |
|---|---|---|
| PHYSICS | 15ABS12 | Basics of Nano Science and Nano Technology |
| MATHEMATICS | 15ABS14 | Set Theory and Mathematical Logic |
| | 15ABS23 | Mathematical Modeling |
| CHEMISTRY | 15ABS15 | Green Chemistry and Catalysis for Sustainable Environment |
| | 15ABS16 | Instrumental Methods of Chemical Analysis |
| | 15ABS17 | Chemistry of Nano Material and Application |
| ENGLISH | 15AHS08 | Campus Recruitment Training & Soft Skills |
| | 15AHS09 | Competitive & Spoken English |
| CE | 15ACE09 | Green Buildings |
| | 15ACE10 | Disaster Management and Mitigation |
| | 15ACE11 | Water Harvesting and Conservation |
| ECE | 15AEC08 | Basic Electronics |
| | 15AEC09 | Fundamentals of Digital Electronics |
| | 15AEC10 | Electronic Measurements & Instrumentation |
| ME | 15AME11 | Robotics |
| | 15AME12 | Mechanical Manufacturing Process |
| | 15AME13 | Non-Conventional Sources of Energy |
| EEE | 15AEE08 | Principles of electrical engineering |
| | 15AEE01 | Electrical engineering materials |
| | 15AEE09 | Electrical measuring instruments |
| CSE | 15ACS04 | Data Structures |
| | 15ACS11 | Object oriented Programming |
| | 15ACS08 | Operating Systems |

**II Year II Semester**

| S.No. | Course Code | Subject Name | Theory/Tutorial | Drawing/Lab | Credits |
|---|---|---|---|---|---|
| 1 | 15ABS09 | Probability and Statistics | 3+1 | - | 3 |
| 2 | 15AHS05 | Managerial Economics and Financial Analysis | 3+1 | - | 3 |
| 3 | 15ABS11 | Discrete Mathematics | 3+1 | - | 3 |
| 4 | 15ACS12 | Database Management Systems | 3+1 | - | 3 |
| 5 | 15ACS13 | Formal Languages and Automata Theory | 3+1 | - | 3 |
| 6 | 15ACS14 | Internet Technologies | 3+1 | - | 3 |
| 7 | 15ACS15 | Database Management Systems Lab | | 3 | 2 |
| 8 | 15ACS16 | Internet Technologies Lab | - | 3 | 2 |
| 9 | 15ACS17 | Comprehensive Online Examination | - | | 1 |
| | | Total | 26 | 6 | 23 |

**III YEAR I SEM**

| S.No. | Course Code | Subject Name | Theory /Tutorial | Drawing /Lab | Credits |
|---|---|---|---|---|---|
| 1 | 15AEC32 | Microprocessors And Micro Controllers | 3+1 | - | 3 |
| 2 | 15ACS19 | Design And Analysis Of Algorithms | 3+1 | - | 3 |
| 3 | 15ACS20 | Computer Networks | 3+1 | - | 3 |
| 4 | 15ACS21 | Software Engineering | 3+1 | - | 3 |
| 5 | 15ACS22 | Data Warehousing And Data Mining | 3+1 | - | 3 |
| 6 | 15AHS07 | Management Science | 3+1 | - | 3 |
| 7 | 15AEC37 | Microprocessors And Microcontrollers Lab | -- | 3 | 2 |
| 8 | 15ACS23 | Data Warehousing And Data Mining Lab | - | 3 | 2 |
| 9 | 15AHS06 | Advanced Communication Skills Lab (Audit Course) | - | 3 | - |
| | | TOTAL | 24 | 9 | 22 |

**III YEAR II SEM**

| S.No. | Course Code | Subject Name | Theory /Tutorial | Drawing /Lab | Credits |
|---|---|---|---|---|---|
| 1 | 15ACS31 | Compiler Design | 3+1 | - | 3 |
| 2 | 15ACS32 | Object Oriented Analysis And Design | 3+1 | - | 3 |
| 3 | 15ACS33 | Mobile Application Development | 3+1 | - | 3 |
| 4 | 15ACS34 | Multimedia Application Development | 3+1 | - | 3 |
| 5 | **MOOC-I** | | 3+1 | - | 3 |
| 6 | **CHOICE BASED CREDIT COURSE (INTER DEPARTMENT)** | | 3+1 | - | 3 |
| 7 | 15ACS38 | Object Oriented Analysis And Design And Compiler Design Lab | - | 3 | 2 |
| 8 | 15ACS39 | Mobile Application Development And Multimedia Application Development Lab | - | 3 | 2 |
| 9 | 15ACS40 | Comprehensive Online Examination | | | 1 |
| | | TOTAL | 24 | 6 | 23 |

## ANNEXURE-II

## CHOICE BASED CREDIT COURSE OF INTER DEPARTMENT

| Branch | Subject Code | Subject Name |
|---|---|---|
| MATHEMATICS | 15ABS18 | FUZZY SETS AND APPLICATIONS |
| | 15ABS19 | OPTIMIZATION TECHNIQUES |
| CHEMISTRY | 15ABS20 | CHEMISTRY ENERGY MATERIALS |
| | 15ABS21 | CHEMISTRY OF LIFE |
| | 15ABS22 | CHEMISTRY OF POLYMERS AND THEIR APPLICATIONS |
| CE | 15ACE35 | REMOTE SENSING & GIS |
| | 15ACE36 | ENVIRONMENTAL IMPACT ASSESTMENT & MANAGEMENT |
| | 15ACE37 | FINITE ELEMENT METHODS |
| EEE | 15AEE19 | POWER ELECTRONICS |
| | 15AEE34 | RENEWABLE ENERGY SOURCES |
| | 15AEE35 | UTILIZATION OF ELECTRICAL ENERGY |
| ME | 15AME35 | OPTIMIZATION TECHNIQUES BY MATLAB |
| | 15AME36 | MECHATRONICS & MEMS |
| | 15AME37 | AUTOMOTIVE ELECTRONICS |
| ECE | 15AEC34 | FUNDAMENTALS OF COMMUNICATION SYSTEMS |
| | 15AEC35 | INDUSTRIAL ELECTRONICS |
| | 15AEC36 | NEURAL NETWORKS & FUZZY LOGIC |
| CSE | 15ACS35 | MOBILE COMPUTING |
| | 15ACS36 | OPTIMIZATION TECHNIQUES |
| | 15ACS37 | MACHINE LEARNING |

**IV YEAR - I SEM**

| S.No. | Course Code | Subject Name | Theory /Tutorial | Drawing /Lab | Credits |
|---|---|---|---|---|---|
| 1 | 15ACS51 | Software Testing | 3+1 | - | 3 |
| 2 | 15ACS52 | Advanced Computer Networks | 3+1 | - | 3 |
| 3 | 15ACS53 | Cloud Computing | 3+1 | - | 3 |
| 4 | CHOICE BASED CREDIT COURSES (**DEPARTMENT SPECIFIC**) | | | | |
| | 15ACS54 | Internet Of Things | | | |
| | 15ACS55 | Natural Language Processing | | | |
| | 15ACS56 | Software Project Management | 3+1 | - | 3 |
| 5 | CHOICE BASED CREDIT COURSES (**DEPARTMENT SPECIFIC**) | | | | |
| | 15ACS57 | Distributed Systems | | | |
| | 15ACS58 | Enterprise Application Systems | | | |
| | 15ACS59 | Semantic Web | 3+1 | - | 3 |
| 6 | | **MOOC-II** | 3+1 | - | 3 |
| 7 | 15ACS60 | Software Testing Lab | - | 3 | 2 |
| 8 | 15ACS61 | Cloud Computing Lab | - | 3 | 2 |
| | | **TOTAL** | 24 | 6 | 22 |

**IV YEAR - II SEM**

| S.No. | Course Code | Subject Name | Theory /Tutorial | Drawing /Lab | Credits |
|---|---|---|---|---|---|
| 1 | 15ACS81 | Information Security | 3+1 | - | 3 |
| 2 | 15ACS82 | Scripting Languages | 3+1 | - | 3 |
| 3 | 15ACS83 | Big Data Analytics | | | |
| 4 | | **MOOC-III** | 3+1 | - | 3 |
| 5 | 15ACS99 | Seminar And Project Work | - | 20 | 10 |
| | | **TOTAL** | 12 | 20 | 22 |

I B.Tech I Sem

## 15AHS01-FUNCTIONAL ENGLISH
## (Common For All Branches)

| L | T | P | C |
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**1. Introduction:**

English is an international language as well as a living and vibrant one. People have found that knowledge of English is a passport for better career, better pay, and advanced knowledge and for communication with the entire world. As it is a language of opportunities in this global age, English is bound to expand its domain of use everywhere. The syllabus has been designed to enhance communication skills of the students of engineering and pharmacy. The prescribed books serve the purpose of preparing them for everyday communication and to face the global competitions in future.

The texts prescribed for detailed study focus on LSRW skills and vocabulary development. The teachers should encourage the students to use the target language. The classes should be interactive and learner-centered. They should be encouraged to participate in the classroom activities keenly.

In addition to the exercises from the text done in the class, the teacher can bring variety by using authentic materials such as newspaper articles, advertisements, promotional material etc.

**2. Objectives:**

1. To enable the students to communicate in English for academic and social purpose.
2. To enable the students to acquire structure and written expressions required for their profession.
3. To develop the listening skills of the students.
4. To inculcate the habit of reading and critical thinking skills.
5. To enhance the study skills of the students with emphasis on LSRW skills.

**3. SYLLABUS:**

**UNIT –I**

Reading: What Is My Name? —P Sathyavathi
Writing: Paragraph writing
Listening: Listening for sounds, stress
Functional English: Greeting, taking leave and introducing oneself and others
Grammar: Nouns -classification
Vocabulary: Homonyms
Non Detailed Study: Listening Skills from English and Soft Skills

**UNIT-II**

Reading : SWOT Analysis of the Indian software Industry (from Mindscapes)
Writing : Essay Writing
Listening : Listening for theme -1
Functional English: Making requests
Grammar: Pronouns
Vocabulary : Homophones
Non detailed Study: Teamwork Skills

verified/ checked

**UNIT-III**

Reading : How To Regain Green Cover? (From Mindscapes)
Writing Descriptive essays
Listening :Listening for theme -2
Functional English : Asking for the time and directions
Grammar: Articles
Vocabulary : Homographs
Non detailed Study : Emotional Intelligence Skills

**UNIT-IV**

Reading : The Kitchen — Vimala
Writing Narrative essays- Expository essays - Argumentative essays
Listening: Listening for main ideas
Functional English: Inviting -Apologizing
Grammar: Kinds of verbs – Auxiliaries- Adjectives
Vocabulary : Synonyms - Antonyms.
Non detailed Study : Assertive Skills

**UNIT-V**

Reading: Adivasis — Kancha Ilaiah
Writing: Letter Writing –official letters-business letters
Listening: Listening for details
Functional English: Interrupting - Asking for and giving opinions
Grammar: Tenses -Adverbs
Vocabulary: Prefixes -Suffixes
Non detailed Study: Learning Skills

**Prescribed Text books:**

Detailed text: **English for Fluency**, K Purushottam, Orient Black Swan,2013.
Non detailed text: **English and Soft Skills**, S P Danavel, Orient Black Swan 2013Edition.

**References:**


1. Mindscapes, English For Technologists And Engineers, Orient Black Swan,2012.
2. A Practical Course in Effective English Speaking Skills. J.K.Gangal, PHI, New Delhi.2012
3. Fundamentals of Technical Communication, Meenakshi Raman, Oxford University Press,2015.
4. Spoken English, R.K. Bansal & JB Harrison, Orient Longman,2013, 4$^{Th}$ edition.
5. Murphy's English Grammar with CD, Murphy, Cambridge University Press,3 $^{Rd}$ edition.
6. Advanced English Grammar , Martin Hewings Cambridge University Press 2007


**Expected Outcomes:**

At the end of the course, students would be expected to:

1. Have improved communication in listening, speaking, reading and writing skills in general.
2. Have developed their oral communication and fluency in group discussions and interviews.
3. Have improved awareness of English in science and technology context.
4. Have achieved familiarity with a variety of technical reports.

I B.Tech I Sem

## 15ABS06-MATHEMATICS – I
**(Common For All Branches)**

| L | T | P | C |
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| 3 | 1 | 0 | 3 |

**Objectives**

- To train the students thoroughly in Mathematical concepts of ordinary differential equations and their applications.
- To prepare students for lifelong learning and successful careers using mathematical concepts of differential and Integral calculus, ordinary differential equations and vector calculus.
- To develop the skill pertinent to the practice of the mathematical concepts including the students' abilities to formulate and modeling the problems, to think creatively and to synthesize information.

**UNIT – I**

Exact, linear and Bernoulli equations, Applications to first order equations; Orthogonal trajectories, Simple electric circuits, Non-homogeneous linear differential equations of second and 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), Method of variation of parameters.

**UNIT – II**

Linear equations with variable coefficients: Euler-Cauchy Equations, Legendre's linear equation. Applications of linear differential equations- Mechanical and Electrical oscillatory circuits.

**UNIT – III**

**Functions of Severable Variables:**

Functions of severable variables, level curves, Limits, Continuity, Partial derivatives, chain Rule, Directional derivative, gradient vectors, Tangent planes & normal line, Maximum, Minimum & Saddle points of functions of two or three variables, Constrained Maxima & Minima, Method of Lagrange multipliers.

**UNIT – IV**

**Multiple Integrals:**

Double Integrals, Area, Change of integrals to Polar Coordinates, Change of order of integration, Triple Integrals in Cartesian, Cylindrical and Spherical Coordinates.

**UNIT – V**

**Vector Calculus:**

Line integral, work, circulation, flux, path independence, potential function, conservative fields; Green's theorem in the plane (without proof), Surface area & Surface Integral; Stokes theorem, Gauss divergence theorem (without proof) and simple problems.

2.7.2018

**Text Books:**

1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
2. Weir, MD, Hass J, Giordano FR: Thomas' Calculus Pearson education 11th ED, 2008.(Unit-III, IV & V)

**References:**


1. Engineering Mathematics-I, E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher
2. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.
3. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers.


**Outcomes:** At the end of the course, the student will be able to attain the abilities to use mathematical knowledge to analyze, formulate and solve problems in engineering applications, using Ordinary Differential Equations, Multiple Integrals and Vector Calculus.

2.7.2018


JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
ENGINEERING COLLEGE PULIVENDULA

I B.Tech I Sem

## 15ACS01-COMPUTER PROGRAMMING
**(Common For All Branches)**

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

**Course Objectives:**

- To make the student understand problem solving techniques
- Students will be able to understand the syntax and semantics of C programming language and other features of the language

**Course Outcomes:**

- Student can effectively apply problem solving techniques in designing the solutions for a wide-range of problems
- Student can choose appropriate data structure and control structure depending on the problem to be solved
- Student can modularize the problem and also solution

**UNIT –I**

**Fundamentals of Computers:** What is Computer, Applications of Computers, Evaluation of Computers, Generations of Computers, Basic I/O Devices, Computer Software, Types of computer, Software Development Methodology, Top-Down Vs Bottom –Up Approaches, Problem Solving, Fundamental Techniques to Solve The Problem, Representation of a solution to a Problem, Developing a computer program, Number Systems.

**Fundamentals of C:** An Overview of C, A Brief History of C , C Is a Middle-Level Language , C Is a Structured Language ,C Is a Programmer's Language Compilers Vs. Interpreters , The Form of a C Program, The Library and Linking, Separate Compilation, Compiling a C Program, C's Memory Map.

**UNIT –II**

**Expressions:** The Basic Data Types, Modifying the Basic Types, Identifier Names, Variables, The Four C Scopes, Type Qualifiers, Storage Class Specifiers,, Variable Initializations, Constants.

**Operators:** The Assignment Operator, Arithmetic Operators, The Increment and Decrement Operators, Relational and Logical Operators, Bitwise Operators, The ? Operator, The & and * Pointer Operators, The Compile-Time Operator sizeof, The Comma Operator, The Dot (.) and Arrow (–>) Operators, The [ ] and ( ) Operators, Precedence Summary, Expressions, Statements.

**Conditional, unconditional and Iteration Statements:** Selection Statements, Iteration Statements, Jump Statements, Expression Statements

**UNIT –III**

**Arrays and Strings:** Single-Dimension Arrays, Generating a Pointer to an Array, Passing Single Dimension Arrays to Functions , Strings, Two-Dimensional Arrays, Multidimensional Arrays, Indexing Pointers, Array Initialization, Variable-Length Arrays, A Tic-Tac-Toe Example.

**Console I/O:** Reading and Writing Characters, Reading and Writing Strings. Formatted Console I/O: printf( ), scanf( ), Suppressing Input.

**Functions:** The General Form of a Function, Understanding the Scope of a Function, Function Arguments, argc and argv— Arguments to main( ), The return Statement ,What Does main( ) Return? , Recursion, Function Prototypes, Declaring Variable Length Parameter Lists, The "Implicit int" Rule, Old Style Vs. Modern Function Parameter Declarations, The inline Keyword.

**UNIT-IV**

**Pointers:** What Are Pointers?, Pointer Variables, The Pointer Operators, Pointer Expressions, Pointer Assignments, Pointer Conversions, Pointer Arithmetic, Pointer Comparisons, Pointers and Arrays, Arrays of Pointers, Multiple Indirection, Initializing Pointers, Pointers to Functions, C's Dynamic Allocation Functions, Dynamically Allocated Arrays, restrict-Qualified Pointers, Problems with Pointers.

**Structures, Unions, Enumerations, and typedef:** Structures , Arrays of Structures, A Mailing List Example, Passing Structures to Functions, Structure Pointers, Arrays and Structures within Structures.

Unions, Bit-Fields , Enumerations, Using sizeof to Ensure Portability, typedef.

**UNIT –V**

**File I/O:** Standard C Vs. Unix File I/O, Streams and Files, File System Basics, fread( ) and fwrite(), Using fread( ) and fwrite( ), fseek( ) and Random-Access, fprintf( ) and fscanf( ), The Standard Streams, The Console I/O Connection, Using freopen( ) to Redirect the Standard Streams.

**The Preprocessor and Comments:** The Preprocessor, #define, #error, #include, Conditional Compilation Directives, #undef, Using defined, #line . #pragma, The # and ## Preprocessor Operators,Predefined Macro Names,Comments, Single-Line Comments.

**Text book:**

1. **"Computer Fundamentals and C Programming"** :Dr. P. Chenna Reddy, Professor of CSE, JNTUA College of Engg, Pulivendula, YSR District, Andhra Pradesh, INDIA. (unit-I)
2. **"The Complete Reference C":** Fourth Edition Herbert Schildt Osborne/McGraw-Hill.(Unit-2,3,4,5).

**References:**


1. "Programming in C", Pradip Dey, Manas Ghosh, Oxford Higher Education
2. "Programming in C and Data Structures", Hanly, Koffman, Kamthane, Ananda Rao, Pearson.
3. "Programming in C", Reema Thareja, Oxford Higher Education.
4. "Computer Fundamentals and C Programming", First Edition, Dr.P.Chenna Reddy, Available at: www.pothi.com.
5. "Data Structure and Program Design in C", Second Edition, Kruse, Tondo, Leung, Mogalla, Pearson.
6. "Programming with C", R.S. Bichkar, University Press.
7. "Computer Science A Structured Programming Approach Using C", Third Edition, Fourouzan & Gilberg, Cengage Learning
8. "Programming with C", Byron Gottfried, Third Edition, Schaum's Outlines, 3rd edition, 2010, Mc Graw Hill.

R-15

I B.Tech I Sem

## 15ABS01-ENGINEERING PHYSICS

(Common for EEE, ECE and CSE)

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

**Objectives:**

1. To evoke interest on applications of superposition effects like interference and diffraction, the mechanisms of emission of light, achieving amplification of electromagnetic radiation through stimulated emission, study of propagation of light through transparent dielectric waveguides along with engineering applications.
2. To enlighten the periodic arrangement of atoms in crystals, direction of Bragg planes, crystal structure determination by X-rays and non-destructive evaluation using ultrasonic techniques.
3. To get an insight into the microscopic meaning of conductivity , classical and quantum free electron model, the effect of periodic potential on electron motion, evolution of band theory to distinguish materials and to understand electron transport mechanism in solids.
4. To open new avenues of knowledge and understanding semiconductor based electronic devices , basic concepts and applications of semiconductors and magnetic materials have been introduced which find potential in the emerging micro device applications.
5. To give an impetus on the subtle mechanism of superconductors in terms of conduction of electron pairs using BCS theory, different properties exhibited by them and their fascinating applications. Considering the significance of microminiaturization of electronic devices and significance of low dimensional materials, the basic concepts of nanomaterials, their synthesis, properties and applications in emerging technologies are elicited.

### UNIT 1: Physical Optics, Lasers And Fibre Optics

Physical Optics: Interference (Review) – Interference in thin film by reflection –Newton's rings –Diffraction (Review) - Fraunhofer diffraction due to single slit, double slit and diffraction grating.

Lasers: Characteristics of laser – Spontaneous and stimulated emission of radiation – Einstein's coefficients — Population inversion – Excitation mechanism and optical resonator – Nd:YAG laser - He-Ne laser – Semiconductor Diode laser - Applications of lasers

Fiber optics: Introduction - construction and working principle of optical fiber –Numerical aperture and acceptance angle – Types of optical fibers – Attenuation and losses in Optical fibers –Block diagram of Optical fiber communication system – Applications of optical fibers

### UNIT 2: Crystallography And Ultrasonics

Crystallography: Introduction – Space lattice –Unit cell – Lattice parameters –Bravias lattice – Crystal systems – Packing fractions of SC, BCC and FCC - Directions and planes in crystals – Miller indices – Interplanar spacing in cubic crystals – X-ray diffraction - Bragg's law – Powder method.

Ultrasonics: Introduction – Production of ultrasonics by piezoelectric method – Properties and detection – Applications in non-destructive testing.

**UNIT 3: Quantum Mechanics And Electron Theory**

Quantum Mechanics: Matter waves – de'Broglie hypothesis and properties - Schrodinger's time independent wave equations – Physical significance of wave function - Particle in one dimensional infinite potential well.

Electron theory: Classical free electron theory – Equation for electrical conductivity - Quantum free electron theory – Fermi-Dirac distribution – Source of electrical resistance – Kronig-Penny model (qualitative treatment) – Origin of bands in solids – Classification of solids into conductors, semiconductors and insulators.

**UNIT 4: Semiconductors And Magnetic Materials**

Semiconductors: Intrinsic and extrinsic semiconductors (Qualitative treatment) – Drift & diffusion currents and Einstein's equation – Hall effect - Direct and indirect band gap semiconductors – Formation of p-n junction.

Magnetic materials: Introduction and basic definitions – Origin of magnetic moments – Bohr magnetron – Classification of magnetic materials into dia, para, ferro, antiferro and ferri magnetic materials (Qualitative treatment) – Hysteresis - Soft and hard magnetic materials, applications of magnetic materials.

**UNIT 5: Superconductivity And Physics Of Nanomaterials**

Superconductivity: Introduction - Effect of magnetic field - Meissner effect – Type I and Type II superconductors – Flux quantization – Penetration depth - BCS theory (qualitative treatment) — Josephson effects –Applications of superconductors.

Physics of Nanomaterials: Introduction - Significance of nanoscale and types of nanomaterials – Physical properties: optical, thermal, mechanical and magnetic properties – Synthesis of nanomaterials by Top down and bottom up approaches: ball mill, chemical vapour deposition, and sol gel –Applications of nanomaterials.

**Text books:**

1. Engineering Physics – K.Thyagarajan, 5th Edition, MacGraw Hill Publishers, NewDelhi, 2014.

2. Physics for Engineers - N.K Verma, 1st Edition, PHI Learning Private Limited, Delhi,2014.

**Reference Books:**

1. Engineering Physics – Dr. M.N. Avadhanulu & Dr. P.G. Kshirsagar, 10th Edition, S.Chand and Company, New Delhi, 2014.

2. Engineering Physics – D K Pandey, S. Chaturvedi, 2nd Edition, Cengage Learning, New Delhi, 2013.

3. Engineering Physics – D.K Bhattacharya, Poonam Tandon, 1nd Edition, Oxford University Press, New Delhi, 2015.

**Outcomes**:

- The different realms of physics and their applications in both scientific and technological systems are achieved through the study of physical optics, lasers and fibre optics.
- The important properties of crystals like the presence of long-range order and periodicity, structure determination using X-ray diffraction are focused along with defects in crystals and ultrasonic non-destructive techniques.
- The discrepancies between the classical estimates and laboratory observations of physical properties exhibited by materials would be lifted through the understanding of quantum picture of subatomic world.
- The electronic and magnetic properties of materials were successfully explained by free electron theory and the bases for the band theory are focused.
- The properties and device applications of semiconducting and magnetic materials are illustrated.
- The importance of superconducting materials and nanomaterials along with their engineering applications are well elucidated.

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## 15AME01-ENGINEERING DRAWING

(Common for EEE, ECE and CSE)

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**Course Objective:**

- By studying the engineering drawing, a student becomes aware of how industry communicates technical information. Engineering drawing teaches the principles of accuracy and clarity in presenting the information necessary about objects.
- This course develops the engineering imagination i.e., so essential to a successful design, By learning techniques of engineering drawing changes the way one things about technical images.
- It is ideal to master the fundamentals of engineering drawing first and to later use these fundamentals for a particular application, such as computer aided drafting. Engineering Drawing is the language of engineers, by studying this course engineering and technology students will eventually be able to prepare drawings of various objects being used in technology.

**UNIT I**

**Introduction to Engineering Drawing**: Principles of Engineering Graphics and their Significance-Conventions in Drawing-Lettering - BIS Conventions. Curves used in Engineering Practice.

a) Conic Sections including the Rectangular Hyperbola- General method only,
b) Cycloid, Epicycloids and Hypocycloid
c) Involutes

**UNIT II**

**Projection of Lines**: Inclined to one or both planes, Problems on projections, Finding True lengths. **Projections of Planes**: Projections of regular plane surfaces/figures, Projection of lines and planes using auxiliary planes.

**UNIT III**

**Projections of solids:** Projections of regular solids inclined to one or both planes – Auxiliary Views. **Sections of Solids**: Section Planes and Sectional View of Right Regular Solids- Prism, cylinder, Pyramid and Cone. True shapes of the sections.

**UNIT IV**

**Development of Surfaces:**Development of Surfaces of Right Regular Solids-Prism, Cylinder, Pyramid, Cone and their Sectional Parts.

**UNIT V**

**Isometric and Orthographic Projections**: Principles of isometric projection- Isometric Scale-Isometric Views- Conventions- Isometric Views of lines, Planes Figures, Simple and Compound Solids-Conversion of isometric Projections/Views of Orthographic Views-Conventions.

**Text Books**:

1. Engineering Drawing, N.D. Bhat, Charotar Publishers
2. Engineering Drawing, K.L. Narayana& P. Kannaih, Scitech Publishers, Chennai

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JNTUA College of Engineering,
PULIVENDULA - 516 390.

**Reference Books**:

1. Engineering Drawing, Johle, Tata McGraw-Hill Publishers
2. Engineering Drawing, Shah and Rana,2/e, Pearson Education
3. Engineering Drawing and Graphics, Venugopal/New age Publishers
4. Engineering Graphics, K.C. John, PHI,2013
5. Engineering Drawing, Basant Agarwal/ C.M.Agarwal

**Suggestions:**

1. Student is expected to buy a book mentioned under Text books " for better understanding.
2. Students can find the applications of various conics in engineering and application of involute on gear teeth. The innovation for drawing can be had on line from introduction to engineering drawing with tools-youtube http-sewor,Carleton.ca/-g,kardos/88403/drawings.html conic sections-online, red woods.edu

This subject also paves the way for learing Auto Cad, CAD / CAM, CATIA and Pro E which are advanced software packages needed for every mechanical engineer (To be taught & examined in First angle projection). The skill acquired by the student in this subject is very useful in conveying his ideas to the layman easily.

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## 15ACS03-PROBLEM SOLVING AND REASONING TECHNIQUES

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**Course Objective:** This course is aimed towardsinculcating programming logic development skills in a student.

### UNIT I

**Introduction to computer problemsolving:** Introduction – The Problemsolving Aspect, Topdown Design, implementation ofAlgorithms, Program Verification , The Efficiency of Algorithms.

**Fundamental algorithms:** Exchanging the values of Two Variables – Counting, Summation of aset of Numbers, Factorial Computation, Generation ofthe Fibonacci sequence,Reversing the Digits of an Integer, Base Conversion, Character to Number Conversion.

### UNIT II

**Factoring methods:** Finding the square Root of a number , The Smallest Divisor of an Integer , TheGreatest Common Divisor of Two Integers , Generating Prime Numbers , Computingthe Prime Factors of an Integer , Raisinga Number to a Large Power , Computing the nth Fibonacci Number.

### UNIT III

**Array techniques**: Array Order Reversal, Array Counting or Histogramming, Finding the MaximumNumber in a Set , Removal of Duplicates from an Ordered Array , Partitioning anArray , Finding the kth Smallest Element , Longest Monotone Subsequence.

### UNIT IV

**Sorting and searching:** The Two-way Merge, Sorting by Selection, Sorting by Exchange, Sorting byInsertion, Sorting by Diminishing Increment, Sorting by Partitioning, Binary Search,Hash Searching.

### UNIT V

**Text processing and pattern searching** :Text Line Length Adjustment , Left and Right Justification of Text, KeywordSearching in Text , Text Line editing , Linear Pattern Search , Sub linear PatternSearch.

**Books Recommended:**

**Essential Readings:**

1. R.G.Dromey "How to Solve it by Computer", Pearson Education, India, 2007.

**References:**

2. Seymour Lipschutz, "Essentials computer Mathematics", Schaums' outlinesseries, Tata

I B.Tech I Sem

## 15AHS02-ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

(Common For All Branches)

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

**Objectives:**

- To enable students to learn better pronunciation through stress on word accent, intonation, and rhythm.
- To help the second language learners to acquire fluency in spoken English and neutralize mother tongue influence
- To train students to use language appropriately for interviews, group discussion and public speaking

**Syllabus:**

**UNIT-I**

1. Phonetics -importance
2. Introduction to Sounds of Speech
3. Vowels and consonants sounds
4. Phonetic Transcription

**UNIT-II**

5. Word Stress
6. Strong and weak forms
7. Sentence stress and Intonation

**UNIT-III**

8. Communication skills –process & barriers
9. Role Plays & JAM
10. Describing people/objects/places

**UNIT-IV**

11. Debates & Group Discussions
12. Speeches for Special Occasions
13. Group Discussions
14. Interview skills

**UNIT-V**

15. Writing video speeches
16. Book reviews -oral and written

**Minimum Requirement For Elcs Lab:**

The English Language Lab shall have two parts:

1. Computer Assisted Language Learning (CALL) Lab: The Computer aided Language Lab for 60 students with 60 systems, one master console, LAN facility and English language software for self- study by learners.
2. The Communication Skills Lab with movable chairs and audio-visual aids with a P.A. system, Projector, a digital stereo-audio & video system and camcorder etc.
   System Requirement (Hardware component):
   Computer network with Lan with minimum 60 multimedia systems with the following specifications:
   i) P – IV Processor
      a) Speed – 2.8 GHZ
      b) RAM – 512 MB Minimum
      c) Hard Disk – 80 GB
   ii) Headphones of High quality

## Suggested Software:

1. Clarity Pronunciation Power – Part I (Sky Pronunciation)
2. Clarity Pronunciation Power – part II
3. K-Van Advanced Communication Skills
4. Walden InfoTech Software.

**Reference Books:**


1. Spring Board Success, Sharada Kouhik, Bindu Bajwa, Orient Blackswan, Hyderbad, 2010.
2. Technical English – Dr. M. Sambaiah- Wiley India Pvt. Ltd..NewDelhi. 2014.
3. A Textbook of English Phonetics for Indian Students 2nd Ed T. Balasubramanian. (Macmillian),2012.
4. A Course in Phonetics and Spoken English, Dhamija Sethi, Prentice-Hall of India Pvt.Ltd
5. Speaking English Effectively, 2nd Edition Krishna Mohan & NP Singh, 2011. (Mcmillan).
6. A Hand book for English Laboratories, E.Suresh Kumar, P.Sreehari, Foundation Books,2011


**Expected Outcomes:**

- Become active participants in the learning process and acquire proficiency in spoken English. Speak with clarity and confidence thereby enhance employability skills.

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I B.Tech I Sem

## 15ACS02-COMPUTER PROGRAMMING LAB

(Common For All Branches)

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| WEEK | LIST OF EXPERIMENTS |
|---|---|
| 1 | Practice DOS Commands necessary for design of C Programs. |
| 2 | Practice LINUX Commands necessary for design of C Programs. |
| 3 | Practice the Raptor Tool |
| 4 | a. Write a program to perform arithmetic operations.<br>b. Write a program to exchange two numbers without using temporary variable<br>c. Write a program to exchange two numbers with temporary variable<br>d. Write a program to find the maximum of three numbers |
| 5. | a. Write a program for s=ut+1/2at^2<br>b. Write a program to find area of square, circle and rectangle.<br>c. Write a program to find the maximum of two numbers using ternary operator.<br>d. Write a program for sum of first N natural numbers. |
| 6 | a. Write a program to compute the factorial of a given number.<br>b. Write a program to check whether the number is prime or not.<br>c. Write a program to check for number palindrome.<br>d. Write a program to generate Fibonacci numbers in the given range. |
| 7 | a. Write a program to find the sum of the digits of a number.<br>b. Write a program to find the sum of positive and negative numbers in a given set of numbers.<br>c. Write a program to perform the operations addition, subtraction, multiplication of complex numbers.<br>d. Write a program to find the sum of first and last digit numbers in a given number. |
| 8 | a. Write a program to read two matrices and print their sum and product in the matrix form.<br>b. Write a program to find the maximum of a set of numbers.<br>c. Write a program to read matrix and perform the following operations.<br>a. Find the sum of Diagonal Elements of a matrix.<br>b. Print Transpose of a matrix.<br>c. Print sum of even and odd numbers in a given matrix. |
| 9 | a. Write a program to accept a line of characters and print the count of the number of Vowels, Consonants, blank spaces, digits and special characters.<br>b. Write a program to insert a substring in to a given string and delete few characters from the string. Don't use library functions related to strings.<br>c. Write a program to read two strings and perform the following operations without using built-in string Library functions and by using your own implementations of functions.<br>i. String length determination ii .Compare Two Strings<br>iii. Concatenate them, if they are not equal iv. String reversing |
| 10 | a. Write programs using recursion for Factorial of a number, GCD, LCM, Towers of Hanoi.<br>b. Write a program for tic-tac-toe game.<br>c. Write a program to implement numerical methods Lagrange's interpolation, Trapezoidal rule. |

| | |
|---|---|
| 11 | a. Write a program to exchange two numbers using pointers.<br>b. Write a program to calculate the length of string using pointers.<br>c. Write a program to using pointers to read in an array of integers and print its elements in reverse order.<br>d. Write a program to generate pseudo random generator. |
| 12 | a. Write a program to evaluate the sum of the following series up to 'n' terms $e^x=1+x+x^2/2!+x^3/3!+x^4/4!+$--------<br>b. Write a program that prints a triangle of stars. Print 1 star in row 0, 3 stars in row 1, 5 stars in row 2, and so on. Here is what this looks like: For the non-star characters, use dot or space.<br>.....*.....<br>....***....<br>...*****...<br>..*******..<br>.*********.<br>c. Write a program to read student records into a file. Record consists of rollno, name and marks of a student in six subjects and class. Class field is empty initially. Compute the class of a student. The calculation of the class is as per JNTUA rules. Write the first class, second class, third class and failed students lists separately to another file. |
| 13 | a. Write a program to read last n characters of the file using appropriate file function.<br>b. Write a program to copy the contents one of one file into another file using fgetc and fputc functions.<br>c. A file consists of information about employee salary with fields employee id, name, Basic, HRA, DA, IT, other-deductions, Gross and Net salary. Initially only employee id, name, and basic have valid values. HRA is taken as 10% of the basic, DA is taken as 80% of basic, IT is 20% of the basic, other deductions is user specified. Compute the Gross and Net salary of the employee and update the file. |
| 14 | a. Write a program to perform Base (decimal, octal, hexadecimal, etc) conversion<br>b. Write a program to read a set of strings and sort them in alphabetical order.<br>c. Write a program to Convert Decimal to Hexa Decimal?<br>d. Write a program to Convert Binary to Decimal?<br>e. **Write a Program to Add two numbers using Command Line Arguments.** |

**NEW PROGRAMS:**

1. Write a program to implement magic square.
2. Write a program to print 50 students details using structures.
3. Write a program to create one structure and declare it inside union then accept values for structure members and display them.
4. Write a program to find the speed of ordinary, express, super luxury buses based on their distance and time.
5. Write c Program to accept N integer numbers and store even and odd integers in separate arrays.
6. Write a c program to input real numbers and find the mean, variance and standard deviation.

I B.Tech I Sem

## 15ABS02-ENGINEERING PHYSICS LABORATORY

(Common for EEE, ECE and CSE)

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**Lab Objective**:

- Will recognize the important of optical phenomenon like Interference and diffraction.
- Will understand the role of optical fiber parameters and signal losses in communication.
- Will recognize the importance of energy gap in the study of conductivity and hall effect in a semiconductor
- Will understand the applications of B H curve.
- Will acquire a practical knowledge of studying the crystal structure in terms of lattice constant.
- Will recognize the application of laser in finding the particle size and its role in diffraction studies.
- Will learn to synthesis of the nano materials and recognize its importance by knowing its nano particle size and its impact on its properties.

**Any 10 of the following experiments has to be performed**

1. Determination of radius of curvature of a Plano-convex lens by forming Newton's rings.
2. Determination of wavelength of given source using diffraction grating in normal incidence method.
3. Determination of Numerical aperture, acceptance angle of an optical fiber.
4. Energy gap of a Semiconductor diode.
5. Hall effect – Determination of mobility of charge carriers.
6. B-H curve – Determination of hysteresis loss for a given magnetic material.
7. Determination of Crystallite size using X-ray pattern (powder) using debye-scheerer method.
8. Determination of particle size by using laser source.
9. Determination of dispersive power of a prism.
10. Determination of thickness of the thin wire using wedge Method.
11. Laser : Diffraction due to single slit
12. Laser : Diffraction due to double slit
13. Laser: Determination of wavelength using diffraction grating
14. Magnetic field along the axis of a current carrying coil – Stewart and Gee's method.
15. Synthesis of nanomaterial by any suitable method.

**Reference:**

1. Engineering Physics Practicals – NU Age Publishing House, Hyderabad.
2. Engineering Practical physics – Cengage Learning, Delhi.

**Lab Outcomes:**

- Would recognize the important of optical phenomenon like Interference and diffraction.
- Would have acquired the practical application knowledge of optical fiber, semiconductor, dieclectric and magnetic materials, crystal structure and lasers by the study of their relative parameters.
- Would recognize the significant importance of nanomaterials in various engineering fields.

I B.Tech II Sem

## 15AHS03-ENGLISH FOR PROFESSIONAL COMMUNICATION

(Common for all Branches)

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**1. Introduction:**

English is a global language and has international appeal and application. It is widely used in a variety of contexts and for varied purposes. The students would find it useful both for social and professional development. There is every need to help the students acquire skills useful to them in their career as well as workplace. They need to write a variety of documents and letters now extending into professional domain that cuts across business and research also. The syllabus has been designed to enhance communication skills of the students of engineering and pharmacy. The prescribed books serve the purpose of preparing them for everyday communication and to face the global competitions in future.

The texts prescribed for detailed study focus on LSRW skills and vocabulary development. The teachers should encourage the students to use the target language. The classes should be interactive and learner-centered. They should be encouraged to participate in the classroom activities keenly.

In addition to the exercises from the text done in the class, the teacher can bring variety by using authentic materials such as newspaper articles, advertisements, promotional material etc.

**2. Objectives:**

1. To develop confidence in the students to use English in everyday situations.
2. To enable the students to read different discourses so that they appreciate English for science and technologies.
3. To improve familiarity with a variety of technical writings.
4. To enable the students to acquire structure and written expressions required for their profession.
5. To develop the listening skills of the students.

**3. Syllabus:**

**UNIT –I**

Reading : Lawley Road — R.K. Narayan
Writing: Emails - Application letters and curricula vitae
Listening: Listening for information
Functional English: Agreeing and disagreeing - Suggesting and advising
Grammar: Types Of sentences
Vocabulary: Compound words -Collocations
Non Detailed Study : Problem-Solving Skills

**UNIT-II**

Reading: Environmental Consciousness- Solution to Plastic Pollution-Soma Basu
Writing: Technical Note making -Memorandums – agenda-Official reports
Listening: Listening for facts

Functional English: Giving instructions - Asking for clarifications and permission
Grammar: Question tags
Vocabulary: Prepositions
Non Detailed Study: Interview Skills

**UNIT-III**

Reading: The Man Behind 'i'
Writing: Summaries –
Listening: Listening for the gist –
Functional English: Telephone skills
Grammar: Adjectives
Vocabulary: Conjunctions
Non Detailed Study: Adaptability Skills

**UNIT-IV**

Reading: The Bet — Anton Chekhov
Writing: Technical documentation-Concise writing-Paraphrases –
Listening: Listening for opinions -Presentations
Functional English: Individual Presentations
Grammar: Subject-verb agreement
Vocabulary: Phrasal verbs- Idioms.
Non Detailed Study: Non-Verbal Communication Skills

**UNIT-V**

Reading: The Gift of the Magi — O. Henry
Writing: Information transfer
Listening: Listening for opinions
Functional English: Group Presentations
Grammar: Active and passive voice
Vocabulary: Commonly confused words- One-word substitutes
Non Detailed Study: Written Communication Skills

**Text books:**

Detailed text: **English for Fluency** , K Purushottam,Orient Black Swan,2013.
Non detailed text: **English and soft skills**, S P Danavel, Orient Black Swan 2013Edition.

**References:**


1. **Mindscapes**, English For Technologists and Engineers, Orient Black Swan,2012.
2. **Effective Technical Communication,** Rizvi,Tata McGraw-Hill Education, 2007.
3. **Technical Communication,** Meenakshi Raman, Oxford University Press.2011.
4. **English Conversations Practice,** Grant Taylor, Tata Mc GrawHill publications,2013.
5. **Practical English Grammar.** Thomson and Martinet, OUP, 2010.


**Expected Outcomes:**

At the end of the course, students would be expected to:

1. Have acquired ability to participate effectively in group discussions.
2. Have developed ability in writing in various contexts.
3. Have acquired a proper level of competence for employability.

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I B.Tech II Sem

## 15ABS07-MATHEMATICS – II

(Common for all Branches)

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**Objectives:** Our emphasis will be more on conceptual understanding and applications of Fourier series, Laplace transforms, Fourier transforms, Z transforms and solutions of partial differential equations.

### UNIT – I

Laplace transform of standard functions – Inverse transform – First shifting Theorem, Transforms of derivatives and integrals – Unit step function – Second shifting theorem – Dirac's delta function – Convolution theorem – Laplace transform of Periodic function.

Differentiation and integration of Laplace transforms – Applications of Laplace transform to ordinary differential equations of first and second order.

### UNIT – II

Fourier Series: Determination of Fourier coefficients – Fourier series – Even and odd functions – Fourier series in an arbitrary interval – Even and odd periodic continuation – Half-range Fourier sine and cosine expansions- Parseval's formula- Complex form of Fourier series.

### UNIT – III

Fourier integral theorem (only statement) – Fourier sine and cosine integrals. Fourier transform – Fourier sine and cosine transforms – Properties – Inverse transforms – Finite Fourier transforms.

### UNIT – IV

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Method of separation of variables – Solutions of one dimensional wave equation, heat equation and two-dimensional Laplace's equation under initial and boundary conditions.

### UNIT – V

z-transform – Inverse z-transform – Properties – Damping rule – Shifting rule – Initial and final value theorems. Convolution theorem – Solution of difference equations by z-transforms.

**Text Books:**

1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
2. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers.

**References:**


1. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.
2. Mathematical Methods by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad S. Chand publication.
3. Engineering Mathematics, Volume - II, E. Rukmangadachari, Pearson Publishers.


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**Outcomes:**

At the end of the course, the student will be able to attain the abilities to use mathematical knowledge to analyze, formulate and solve problems in engineering applications, using discrete and continuous transforms and partial differential equations.

I YEAR II SEM

## 15ACS04-DATA STRUCTURES

(Common for ME, ECE and CSE)

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**UNIT-I**

**Stacks & Queues:** stacks, stacks using dynamic arrays, Queues, circular queues using dynamic arrays, amazing problem, evaluation of expressions.

**Linked List:** single linked list and chains, representing chains in C, Linked stacks and queues, polynomials, additional list operations, equivalence classes, sparse matrices, double linked list.

**UNIT –II**

**Trees :** Introduction, Binary tree, Binary tree traversals , Additional binary tree operations, Threaded binary trees, Heaps, Binary search trees, Selection trees, Forests, Representation of disjoint sets, Counting binary trees.

**UNIT-III**

**Graphs:** The graph abstract data type, Elementary graph operations, Minimam cost spanning trees, Shortest paths and transitive closure.

**Sorting:** Motivation, Insertion sort, Quick sort, Merge sort , Heap sort, sorting on several keys, list and table sorts, external sorting.

**UNIT –IV**

**Hashing:** Introduction, Static hashing, dynamic hashing, Bloom Filters.

**Priority Queues:** Single ended and double ended priority queues, leftist trees, Binominal Heaps, Fibonacci Heaps, Pairing Heaps, Symmetric Min-Max Heaps, and Interval Heaps.

**UNIT-V**

**Efficient binary search trees:** Optimal binary search trees, AVL Trees, RED Black Trees, Splay Trees, M- Way search trees, B-Trees, B+ -Trees.

**Text Books:**

1. Fundamentals of Data structures in C, 2nd edition, HOROWITZ, SAHNI, ANDERSON-FREED.

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## 15ABS03-ENGINEERING CHEMISTRY

(Common for EEE, ECE and CSE)

| L | T | P | C |
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**Course Objectives :**

- The Engineering Chemistry course for undergraduate students is framed to strengthen the fundamentals of chemistry and then build an interface of theoretical concepts with their industrial/engineering applications.
- The course main aim is to impart in-depth knowledge of the subject and highlight the role of chemistry in the field of engineering.
- The lucid explanation of the topics will help students understand the fundamental concepts and apply them to design engineering materials and solve problems related to them. An attempt has been made to logically correlate the topic with its application.
- The extension of fundamentals of electrochemistry to energy storage devices such as commercial batteries and fuel cells is one such example.
- After the completion of the course, the student would understand about the concepts of chemistry in respect of Electrochemical cells, fuel cells, mechanism of corrosion and factors to influence, polymers with their applications, engineering materials and water chemistry.

**UNIT.1: Water Treatment**

Impurities in water, Hardness of water and its Units, Disadvantages of hard water, Estimation of hardness by EDTA method, Numerical problems on hardness, Estimation of dissolved oxygen, Alkalinity, acidity and chlorides in water, Water treatment for domestic purpose (Chlorination, Bleaching, ozonisation, U.V. treatment)

Industrial Use of water:

For steam generation, troubles of Boilers: Scale & Sludge, Priming and Foaming, Caustic Embrittlement and Boiler Corrosion.

Treatment of Boiler Feed water:

Internal Treatment: Colloidal, Phosphate, Carbonate, Calgon and sodium aluminate treatment.

External Treatment: Ion-Exchange and Permutit processes.

Demineralisation of brackish water: Reverse Osmosis and Electrodialysis

**UNIT.2: Electrochemistry**

i).Review of electrochemical cells, Numerical calculations, Batteries: Rechargeable batteries (Lead acid, Ni-Cd, Lithium Ion Batteries),Fuels cells: (Hydrogen-Oxygen and Methanol-Oxygen)

ii). Voltammetry: Basic Principles and applications (Ferrous/Ferric System)

Electrochemical sensors: Potentiometric Sensors and voltammetric sensors. Examples : analysis of Glucose and urea

iii).Corrosion: Electrochemical Theory of corrosion, Factors affecting the corrosion. Prevention: Anodic and cathodic protection and electro and electroless plating.

**UNIT.3: Polymers**

i). Introduction: Basic concepts of polymerisation, Types of poloymerisation (Chain Growth (Addition), Step growth (Condensation)), Mechanism: cationic, anionic, free radical and coordination covalent, Polydispercity Index.

Plastomers: Thermosetting and Thermoplatics, Preparation, properties and Engineering applications , PVC, Bakelite, nylons, Polyester Elastomers (rubbers) Natural Rubber; Processing of natural rubber, Compounding of Rubber Synthetic Rubber: Preparation, properties and engineering applications of Buna-S, buna-N, Polyurethene, Polysulfide (Thiokol) rubbers
ii).Conducting polymers: Mechanism, synthesis and applications of polyacetyline, polyaniline.
iii).Liquid Crystals: Introduction, classification and applications
iv).Inorganic Polymers: Introduction, Silicones, Polyphospazins (-(R)2-P=N-), applications

**UNIT.4: Fuel Technology**

Classifications of Fuels – Characteristics of Fuels- Calorific Value – Units, Numerical Problems.
i). Solid Fuels–Coal, Coke : Manufacture of Metallurgical Coke by Otto Hoffmann's by product oven processes.
ii).Liquid Fuels:
Petroleum: Refining of Petroleum, Gasoline: Octane Number, Synthetic Petrol: Bergius Processes, Fischer Troph's synthesis
Power Alcohol: Manufacture, merits and demerits of Power Alcohol
iii). Gaseous Fuels: Origin, Production and uses of Natural gas, Producer gas, Water gas, Coal gas and Biogas. Flue Gas analysis by Orsat's apparatus, Solving of problems on Combustion.
iv). Bio Fuels: Biogas, Biodiesel and their significance

**UNIT.V: Chemistry Of Engineering Materials**

i).Semiconducting and Superconducting materials-Principles and some examples
ii).Magnetic materials – Principles and some examples
iii).Cement: Composition, Setting and Hardening (Hydration and Hydrolysis)
iv).Refractories: Classification , properties and applications
v).Lubricants: Classification and characteristics of lubricants, Theory of lubrication.

**Expected Outcomes (EO):** The student is expected to:

- Understand the electrochemical sources of energy
- Understand industrially based polymers, various engineering materials.
- Differentiate between hard and soft water. Understand the disadvantages of using hard water domestically and industrially. Select and apply suitable treatments domestically and industrially.

**Text Books**:

1. Engineering Chemistry by KNJayaveera, GVSubba Reddy and C. Ramachandraiah, McGraw Hill Higher Education, New Delhi, Foruth Edition, 2013.
2. A Text Book of Engineering Chemistry, Jain and Jain, Dhanapath Rai Publishing Company, New Delhi, 15th Edition, 2012.

**References:**

1. A Text book of Engineering Chemistry by S.S Dhara, S.S.Umare, S. Chand Publications, New Delhi, 12th Edition, 2010.
1. Engineering Chemistry, K. Sesha Maheswaramma and Mrudula Chugh, Pearson Education, First Edition, 2013.
2. Engineering Chemistry by K.B.Chandra Sekhar, UN.Das and Sujatha Mishra,
3. SCITECH, Publications India Pvt Limited, Chennai, 2nd Edition, 2012.
4. Concepts of Engineering Chemistry- Ashima Srivastavaf and N.N. Janhavi, Acme

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I B.Tech II Sem

## 15ABS05-ENVIRONMENTAL STUDIES

(Common for EEE, ECE and CSE)

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**Objectives**

- To investigate the relationship between human life and environment from scientific prospective
- To help you apply the fundamentals of Environmental science to important local, regional, national and global environmental problems and potential issues

**UNIT-I**:

**i) Multidisciplinary** nature of environmental studies

The **Multidisciplinary** nature of environmental studies Definition; Scope and importance, Need for public awareness.

**ii) Natural Resources:**

Renewable and non-renewable resources: Natural resources and associated problems.

a) Forest resources: Use and Over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems.

c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, Case studies.

f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

**UNIT-II:**

**i) 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 the following ecosystem: -

a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem

d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

**ii) Biodiversity and its Conservation**

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

**UNIT-III:**

**Environmental Pollution:**

**Definition** - Causes, effects and control measures of: -

a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution
e. Noise pollution f. Thermal pollution g. Nuclear hazards

Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. Disaster management: floods, earthquake, cyclone and landslides.

**UNIT-IV:**

**Social Issues and the Environment**

From Unsustainable to Sustainable development. Urban problems related to energy.
Water conservation, rain water harvesting, watershed management.
Resettlement and rehabilitation of people; its problems and concerns. Case studies. Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies. Wasteland reclamation. Environment 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-V:**

**i) Human Population and the Environment**

Population growth, variation among nations. Population explosion-Family welfare Programme. Environment and human health. Human Rights. Value Education. HIV/AIDS. - Women and Child Welfare. Role of information Technology in Environment and human health.
- Case Studies.

**ii) Field Work**

- Visit to a local area to document environmental assets-river/forest/grassland/ hill/mountain.
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural.
- Study of common plants, insects, birds.
- Study of simple ecosystems-pond, river, hill slopes, etc.

**Expected Outcome:**

- **Describe the structure and function of significant environmental systems**
- **Use scientific reasoning to identify and understand environmental problems and evaluate potential solutions**
- **Critically evaluate arguments regarding environmental issues**

**Text Books:**

1. Shashi Chawla, A Text Book of Environmental Studies, Mc Graw Hill Education, 4th edtion, 2014
2. De A.K., Environmental Chemistry, Wiley Eastern Ltd , 2012

**Reference Books**

**1.** Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad -380013, India, Email: mapin@icenet. net (R).
2. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p.
3. Cunningham, W.P.Cooper, T.H. Gorhani, E & Hepworth, M.T.2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p.

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I B.Tech II Sem

## 15ACS06-DIGITAL LOGIC DESIGN

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**Course Objectives**

- Acquire the skills to manipulate and examine Boolean algebraic expressions, logical operations, Boolean functions and their simplifications.
- Get familiarized with fundamental principles of digital design.
- Acquaint with classical hardware design for both combinational and sequential logic circuits.

**Course Outcomes**

- Ability to interpret, convert and represent different number systems and binary arithmetic.
- Able to design sequential and combinational circuits
- Able to design different units of a digital computer.

**UNIT - I :**

**Binary Systems:** Digital Systems, Binary Numbers, Number Base Conversions, Octal and Hexadecimal Numbers, Compliments, Signed Binary Numbers, Binary Codes, Binary Storage and Registers, Binary Logic.

**Boolean Algebra And Logic Gates:** Basic Definitions, Axiomatic Definition of Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Other Logic Operations, Digital Logic Gates, Integrated Circuits

**UNIT – II:**

**Gate – Level Minimization:** The Map Method, Four Variable Map, Five-Variable Map, Product of Sums Simplification, Don't-Care Conditions, NAND and NOR Implementation, Other Two Level Implementations, EX-OR Function, Other Minimization Methods

**UNIT – III :**

**Combinational Logic:** Combinational Circuits, Analysis Procedure, Design Procedure, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers

**UNIT – IV :**

**Synchronous Sequential Logic:** Sequential Circuits, Latches, Flip-Flops, Analysis of Clocked Sequential Circuits, State Reduction and Assignment, Design Procedure

**Registers & Counters:** Registers, Shift Registers, Ripple Counters, Synchronous Counters, Other counters

**UNIT – V :**

**Memory And Programmable Logic:** Random access memory, memory decoding, Error Detection and Correction, Read-only Memory, Programmable Logic Array, Programmable Array Logic.

**Digital Logic Circuits:** RTL and DTL Circuits, Transistor-Transistor Logic (TTL), Emitter-Coupled Logic (ECL), MOS, CMOS Logic, Comparisons of Logic Families

**Text Books :**

1. Digital Design, M.Morris Mano & Micheal D. Ciletti, Pearson, 5th Edition, 2013.
2. Digital Logic & State Machine Design, David J. Comer, Oxford University Press, 3rd Reprinted Indian Edition, 2012

**Reference Books :**

1. Digital Logic Design, R.D. Sudhakar Samuel, Elsevier
2. Fundamentals of Logic Design, 5/e, Roth, Cengage
3. Switching and Finite Automata Theory,3/e,Kohavi, Jha, Cambridge.
4. Digital Logic Design, Leach, Malvino, Saha,TMH
5. Modern Digital Electronics, R.P. Jain, TMH

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**I B.Tech II Sem**

## 15ACS05-DATA STRUCTURES LAB

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1. Write a C Program to implement Stack ADT Using arrays and linked lists?
2. Write a C Program to implement Queue ADT Using arrays and linked lists?
3. Write a c Program to convert infix expression to postfix expression?
4. Write a C Program to implement List ADT?
5. Write a C Program to implement Sparse Matrices?
6. Write a C Program to traverse Binary tree?
7. Write a C Program to implement priority queues using arrays?
8. Write a C++ program to implement the search algorithms of the graph: Depth first search and Breadth first search.
9. Write a C program to find the connected components of the graph.
10. Write a C program to implement the spanning tree algorithms Kruskal's, Prim's.
11. Write a C program to implement insertion sort algorithm
12. Write a C program to implement quick sort algorithm
13. Write a C program to implement merge sort algorithm
14. Write a C program to implement heap sort algorithm
15. Write a C Program to implement Static Hashing.
16. Write a C Program to implement Dynamic Hashing
17. Write a C Program to implement AVL Trees.
18. Write a C Program to implement RED Black Trees.
19. Write a C Program to implement Splay Trees.

Text Books:

1. Fundamentals of Data structures in C 2nd edition HOROWITZ , SAHNI, ANDERSON-FREED.

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I B.Tech II Sem

## 15ABS04-ENGINEERING CHEMISTRY LAB

(Common for EEE, ECE and CSE)

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**Programme Objective:**

- Will learn practical understanding of the redox reaction
- Will able to understand the function of fuel cells, batteries and extend the knowledge to the processes of corrosion and its prevention
- Will learn the preparation and properties of synthetic polymers and other material that would provide sufficient impetus to engineer these to suit diverse applications
- Will also learn the hygiene aspects of water would be in a position to design methods to produce potable water using modern technology

**List Of Experiments**

1. Determination of total hardness of water by EDTA method.
2. Determination of Copper by EDTA method.
3. Estimation of Dissolved Oxygen by Winkler's method
4. Determination of Manganese by colorimetry.
5. Estimation of iron (II) using diphenylamine indicator (Dichrometry – Internal indicator method).
6. Determination of Alkalinity of Water
7. Determination of acidity of Water
8. Preparation of Phenol-Formaldehyde (Bakelite)
9. Determination of Viscosity of oils using Redwood Viscometer I
10. Determination of Viscosity of oils using Redwood Viscometer II
11. Conductometric titration of strong acid Vs strong base (Neutralization titration).
12. Determination of Corrosion rate and inhibition efficiency of an inhibitor for mild steel in hydrochloric acid medium.
13. Estimation of Chloride ion using potassium Chromate indicator (Mohrs method)
14. Acid-Base neutralisation by pH method.

(Any 10 experiments from the above list)

**Course Outcomes**

- Would be confident in handling energy storage systems and would be able combat chemical corrosion
- Would have acquired the practical skill to handle the analytical methods with confidence.
- Would feel comfortable to think of design materials with the requisite properties
- Would be in a position to technically address the water related problems.

**Text Books:**

1. Vogel's Text book of Quantitative Chemical Analysis, J. Mendham et al, Pearson Education, Sixth Edition, 2012.
2. Chemistry Practical – Lab Manual by K.B.Chandra Sekhar, G.V. Subba Reddy and K.N.Jayaveera, SM Publications, Hyderabad, 3rd Edition, 2012.

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## 15AME03-ENGINEERING AND IT WORKSHOP

(Common for all Branches)

| L | T | P | C |
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## PART A: ENGINEERING WORKSHOP

**Course Objective:**

- The objective of this Lab is to provide the basic concepts about different manufacturing processes, use of various workshops tools and exposer to the power tools.
- Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.

**Trades For Exercises:**

**At least 2 exercise in each:**

1. Carpentry
2. Fitting
3. House-wiring
4. Foundry
5. Tin smithy
6. Welding.

**Text Book:**

1. Work shop Manual / P.Kannaiah/ K.L.Narayana/Scitech Publishers.
2. Workshop practice manual by K.Venkata Reddy B.S Publications

Codes / Tables : will be provided

Question Paper pattern : Test in any two trades out of 6 trades.

**Course outcomes**

- Workshop practice is the backbone of the real industrial environment which helps to develop and enhance relevant technical hand skills required by the technician working in the various engineering industries and workshops.
- This course intends to impart basic know-how of various hand tools and their use in different sections of manufacturing.
- Irrespective of branch, the use of workshop practices in day to day industrial as well domestic life helps to dissolve the problems.
- Workshop curricula build the hands on experiences which would help to learn manufacturing processes and production technology courses in successive semesters.

Workshop practice is also important since only practice can make the man perfect.

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**15AME03-ENGINEERING AND IT WORKSHOP**

(Common for all Branches)

| L | T | P | C |
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## PART B: IT Workshop

**Course Objectives:**

- To provide Technical training to the students on Productivity tools like Word processors, Spreadsheets, Presentations
- To make the students know about the internal parts of a computer, assembling a computer from the parts, preparing a computer for use by installing the operating system
- To learn about Networking of computers and use Internet facility for Browsing and Searching

**Course Outcomes:**

- Disassemble and Assemble a Personal Computer and prepare the computer ready to use
- Prepare the Documents using Word processors
- Prepare Slide presentations using the presentation tool
- Interconnect two or more computers for information sharing
- Access the Internet and Browse it to obtain the required information
- Install single or dual operating systems on computer

**Preparing your Computer ( 2 weeks)**

**Task 1: Learn about Computer:** Identify the internal parts of a computer, and its peripherals. Represent the same in the form of diagrams including Block diagram of a computer. Write specifications for each part of a computer including peripherals and specification of Desktop computer. Submit it in the form of a report.

**Task 2: Assembling a Computer:** Disassemble and assemble the PC back to working condition. Students should be able to trouble shoot the computer and identify working and non-working parts. Student should identify the problem correctly by various methods available (eg: beeps). Students should record the process of assembling and trouble shooting a computer.

**Task 3: Install Operating system:** Student should install Linux on the computer. Student may install another operating system (including proprietary software) and make the system dual boot or multi boot. Students should record the entire installation process.

**Task 4: Productivity tools (6 weeks)**

**Word Processor:** Students should be able to create documents using the word processor tool. Some of the tasks that are to be performed are inserting and deleting the characters, words and lines, Alignment of the lines, Inserting header and Footer, changing the font, changing the colour, including images and tables in the word file, making page setup, copy and paste block of text, images, tables, linking the images which are present in other directory, formatting paragraphs, spell checking, etc. Students should be able to prepare project cover pages, content

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sheet and chapter pages at the end of the task using the features studied. Students should submit a user manual of the word processor considered.

**Task 5: Spreadsheet:** Students should be able to create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spreadsheet application considered.

**Task 6: Presentations :** creating, opening, saving and running the presentations, Selecting the style for slides, formatting the slides with different fonts, colours, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyperlinking, running the slide show, setting the timing for slide show. Students should submit a user manual of the Presentation tool considered.

Task 7:ACCESS:

**Optional Tasks**:

**Task 7: Laboratory Equipment**: Students may submit a report on specifications of various equipment that may be used by them for the laboratories in their curriculum starting from I B.tech to IV. B.Tech. It can vary from department to department. Students can refer to their syllabus books, consult staff members of the concerned department or refer websites. The following is a sample list. Instructors may make modifications to the list to suit the department concerned.

- Desktop computer
- Server computer
- Switch (computer science related)
- Microprocessor kit
- Micro controller kit
- Lathe machine
- Generators
- Construction material
- Air conditioner
- UPS and Inverter
- RO system
- Electrical Rectifier
- CRO
- Function Generator
- Microwave benches

**References:**


1. "Introduction to Computers", Peter Norton, Mc Graw Hill
2. "LaTeX Companion" – Leslie Lamport, PHI/Pearson.
3. "MOS study guide for word, Excel, Powerpoint & Outlook Exams", Joan Lambert, Joyce Cox, PHI.


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4. "Introduction to Information Technology", ITL Education Solutions limited, Pearson Education.
5. "Networking your computers and devices", Rusen, PHI
6. "Trouble shooting, Maintaining & Repairing PCs", Bigelows, TMH.

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II B.Tech I Sem

**15ABS08-MATHEMATICS-III**

(Common for all Branches)

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**Objectives:**

- This course aims at providing the student with the concepts and applications of Matrices, Numerical Techniques and Curve fitting.

**UNIT – I**

Elementary row transformations-Rank – Echelon form, normal form – Consistency of System of Linear equations. Linear transformations. Hermitian, Skew-Hermitian and Unitary matrices and their properties. Eigen Values, Eigen vectors for both real and complex matrices. Cayley – Hamilton Theorem and its applications – Diagonolization of matrix. Calculation of powers of matrix and inverse of a matrix. Quadratic forms – Reduction of quadratic form to canonical form and their nature.

**UNIT – II**

Solution of Algebraic and Transcendental Equations: The Bisection Method – The Method of False Position– Newton-Raphson Method, Solution of linear simultaneous equation: Crout's triangularisation method, Gauss - Seidal iteration method.

**UNIT – III**

**Interpolation:** Newton's forward and backward interpolation formulae – Lagrange's formulae. Gauss forward and backward formula, Stirling's formula, Bessel's formula.

**UNIT – IV**

Curve fitting: Fitting of a straight line – Second degree curve – Exponentional curve-Power curve by method of least squares. Numerical Differentiation for Newton's interpolation formula. Numerical Integration: Newton's – Cotes formula - Trapezoidal rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule.

**UNIT – V**

Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive approximations-Euler's, Runge-Kutta $2^{nd}$ and $4^{th}$ order Methods– Milne's Predictor-Corrector Methods.

**Text Books:**


3. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
4. Introductory Methods of Numerical Analysis, S.S. Sastry, PHI publisher.


2.7.2018

**References:**


1. Engineering Mathematics, Volume - II, E. Rukmangadachari Pearson Publisher.
2. Mathematical Methods by T.K.V. Iyengar, B.Krishna Gandhi, S. Ranganatham and M.V.S.S.N.Prasad, S. Chand publication.
3. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers.
4. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.


**Outcomes:**

At the end of the course, student will be able to analyze engineering problems using the concepts of Matrices and Numerical methods.

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II B.Tech I Sem

## 15ACS07-COMPUTER ORGANIZATION

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**Course Objective:**

- To gain methodical understanding of the basic structure and operation of a digital computer.
- To learn the fundamentals of computer organization and its relevance to classical and modern problems of computer design
- To make the students understand the structure and behavior of various functional modules of a computer.
- To explore the hardware requirements for cache memory and virtual memory for better understanding of memory management
- To understand the techniques that computers use to communicate with I/O devices
- To study the concepts of pipelining and the way it can speed up processing.
- To understand the basic characteristics of multiprocessors

**Course Outcomes:**

- Optimize the algorithms to exploit pipelining and multiprocessors
- Algorithm design for bit level arithmetic
- Ability to use memory and I/O devices effectively

**UNIT - I :**

**Introduction to Computer Organization and Architecture**

Basic Computer Organization – CPU Organization – Memory Subsystem Organization and Interfacing – I/O Subsystem Organization and Interfacing – A Simple Computer Levels of Programming Languages, Assembly Language Instructions, Instruction Set Architecture Design, A simple Instruction Set Architecture

**UNIT – II:**

**Central Processing Unit:** Introduction, General Register Organization, Stack Organization, Instruction formats –Addressing Modes – Data Transfer and Manipulation – Program Control.

**Computer Arithmetic:** Addition and Subtraction – Multiplication Algorithms – Division Algorithms –Floating-Point Arithmetic Operations – Decimal Arithmetic unit

**UNIT – III :**

**Register Transfer:** Register Transfer Language – Register Transfer – Bus and Memory Transfers –Arithmetic Micro operations – Logic Micro operations – Shift Micro operations.

**Control Unit:** Control Memory – Address Sequencing – Micro program Example – Design of Control Unit

**UNIT – IV :**

**Memory Organization:** Memory Hierarchy – Main Memory – Auxiliary Memory – Associative Memory – Cache Memory – Virtual Memory.

**Input/output Organization:** Input-Output Interface – Asynchronous Data Transfer – Modes of Transfer– Priority Interrupt – Direct Memory Access (DMA).

**UNIT – V :**

**Pipeline:** Parallel Processing – Pipelining – Arithmetic Pipeline – Instruction Pipeline. **Multiprocessors:** Characteristics of Multiprocessors – Interconnection Structures – Inter Processor Arbitration – Inter Processor Communication and Synchronization

**Text Books :**

1. "Computer Systems Organization and Architecture", John D. Carpinelli, PEA, 2009.
2. "Computer Systems Architecture", 3/e, M. Moris Mano, PEA, 2007

**Reference Books :**


1. "Computer Organization", Carl Hamacher, ZvonksVranesic, SafeaZaky, 5/e, MCG, 2002.
2. "Computer Organization and Architecture", 8/e, William Stallings, PEA, 2010.
3. "Computer Systems Architecture a Networking Approach", 2/e, Rob Williams.
4. "Computer Organization and Architecture" Ghoshal, Pearson Education, 2011.
5. "Computer Organization and Architecture", V. Rajaraman, T. Radakrishnan.
6. "Computer Organization and Design", P. Pal Chaudhuri, PHI
7. "Structured Computer Organization", Andrew S. Janenbaum, Todd Austin
8. "Computer Architecture" Parahmi, Oxford University Press


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II YEAR I SEM

**15ABEE01-BASIC ELECTRICAL & ELECTRONICS ENGINEERING**

(Common for ME and CSE)

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## PART-A: BASIC ELECTRICAL ENGINEERING

**Objectives:** This course aims at providing fundamental concepts of electrical circuits, DC, AC Machines and Electrical instruments, which help to increase knowledge and to apply principles in their applications

**UNIT I: Fundamentals of Electrical Circuits & Instruments**

Basic definitions, Types of elements, Ohm's Law, Resistive networks, Kirchhoff's Laws, Inductive networks, Series, Parallel circuits and Star-Delta and Delta-Star transformations.

Basic Principle of indicating instruments – permanent magnet moving coil and moving iron instruments.

**UNIT II: DC Machines**

Principle of operation of DC Generator – EMF equation – types - DC motor types torque equation applications – Three point starter

**UNIT III: AC Machines**

Principle of Operation of alternators – regulation by synchronous impedance method principle of operation of induction motor – slip – torque characteristics – applications Principle of Operation of single phase transformers –EMF equation – losses –efficiency and regulation

**TEXT BOOKS**

1. Network Analysis – A Sudhakar, Shyammohan S.Palli, 3 ed., 2009. TMH Publications.
2. Principles of Electrical and Electronics Engineering by V.K.Mehta, S.Chand &Co.

**REFERENCES**

1. Network analysis and Synthesis – CL Wadhwa, 3 ed., 2007, New Age International Publishers.
2. Introduction to Electrical Engineering – M.S Naidu and S.Kamakshaiah, THM Publications.
3. Basic Electrical Engineering by Kothari and Nagarath, THM Publications, 2nd Edition

**COURSE OUTCOME:** Students able to apply fundamental concepts, principle of electrical engineering for their applications

BOS - chairman

Service course to R-15 M.E & CSE

II YEAR I SEM

**15ABEE01-BASIC ELECTRICAL & ELECTRONICS ENGINEERING**

(Common for ME and CSE)

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## PART – B: BASIC ELECTRONICS ENGINEERING

**Objective:**

- The objective of this Course is to provide the students with an introductory and broad treatment of the field of Electronics Engineering.

**Course Outcomes:**

Upon completion of the course, students will:

a. Analyze the operating principles of major electronic devices, its characteristics and applications.
b. Design and analyze the DC bias circuitry of BJT and FET.
c. Design and analyze basic transistor amplifier circuits using BJT and FET.

**UNIT – IV**

**Semiconductor Devices:** The p-n Junction Diode-Forward Bias, Reverse Bias, Volt-Ampere Characteristics, Applications of Diodes, Diode as a Switch. Diode as a Rectifier-Half-wave Rectifier, Full-Wave Rectifier, Full-Wave Bridge Rectifier, Rectifiers with Filters.

**UNIT – V**

**Transistors:** Bipolar Junction Transistor (BJT) – Types of Transistors, Operation of NPN and PNP Transistors, Input-Output Characteristics of BJT in CB, CE and CC Configurations, Relation between $I_C$, $I_B$ and $I_E$. Transistor Biasing- Fixed Bias, Voltage Divider Bias, Transistor Applications-Transistor as an Amplifier, Transistor as a Switch, Single stage CE Amplifier-Response of CE amplifier.

**UNIT – VI**

**Oscillators and Op-Amps:** Sinusoidal Oscillators, Barkhausen Criteria for Oscillator Operation, Components of an Oscillator, Classification of Oscillators, LC Tuned, RC Phase Shift Oscillator circuits.

Symbol of an Op-Amp, Characteristics of an Ideal Op-Amp, Basic Forms of Op-Amps in open and closed loop-Inverting & Non-Inverting Amplifiers, Applications of Op-Amps, summing, subtractor, Comparator.

**TEXT BOOKS:**


1. Electronics Devices and Circuits, J.Millman and Christos. C. Halkias, 3rd edition, Tata McGraw Hill, 2006.
2. Electronics Devices and Circuits Theory, David A. Bell, 5th Edition, Oxford University press., 2008.

Service
Course to
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MEECSE

**REFERENCES:**


1. Electronics Devices and Circuits Theory, R.L.Boylestad,Lousis Nashelsky and K.Lal Kishore, 12th edition, 2006, Pearson, 2006.
2. Electronic Devices and Circuits, K. Lal Kishore, 3rd Edition, BSP, 2008.
3. Electronic Devices and Circuits, N.Salivahanan, and N.Suresh Kumar, 3rd Edition, TMH, 2012
4. Microelectronic Circuits, S.Sedra and K.C.Smith, 5th Edition, Oxford University Press.



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II B.Tech I Sem

## 15ACS08-OPERATING SYSTEMS

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**Course Objective**

- To make the students understand the basic operating system concepts such as processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystems and protection.
- To get acquaintance with the class of abstractions afford by general purpose operating systems that aid the development of user applications

**Course Outcomes**

- Understand what makes a computer system function and the primary PC components.
- Understand past and current trends in computer technology.
- Use basic software applications.
- Add functionality to the exiting operating systems
- Design new operating systems

**UNIT I**

**Operating Systems Overview:** Operating system functions, Operating system structure, operating systems Operations, protection and security, Kernel data Structures, Computing Environments, Open- Source Operating Systems

**Operating System Structure:** Operating System Services, User and Operating-System Interface, systems calls, Types of System Calls, system programs, operating system structure, operating system debugging, System Boot.

**Processes:** Process concept, process Scheduling, Operations on processes, Inter process Communication, Examples of IPC systems.

**UNIT II**

**Threads:** overview, Multicore Programming, Multithreading Models, Thread Libraries, Implicit threading, Threading Issues.

**Process Synchronization:** The critical-section problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic problems of synchronization, Monitors, Synchronization examples, Alternative approaches.

**CPU Scheduling:** Scheduling-Criteria, Scheduling Algorithms, Thread Scheduling, Multiple-Processor Scheduling, Real-Time CPU Scheduling, Algorithm Evaluation.

**UNIT III**

**Memory Management:** Swapping, contiguous memory allocation, segmentation, paging, structure of the page table.

**Virtual memory:** demand paging, page-replacement, Allocation of frames, Thrashing, Memory-Mapped Files, Allocating Kernel Memory

**Deadlocks:** System Model, deadlock characterization, Methods of handling Deadlocks, Deadlock prevention, Detection and Avoidance, Recovery from deadlock.

**UNIT IV**

**Mass-storage structure:** Overview of Mass-storage structure, Disk structure, Disk attachment, Disk scheduling, Swap-space management, RAID structure, Stable-storage implementation.

**File system Interface:** The concept of a file, Access Methods, Directory and Disk structure, File system mounting, File sharing, Protection.

**File system Implementation:** File-system structure, File-system Implementation, Directory Implementation, Allocation Methods, Free-Space management.

**UNIT V**

**I/O systems:** I/O Hardware, Application I/O interface, Kernel I/O subsystem, Transforming I/O requests to Hardware operations.

**Protection:** Goals of Protection, Principles of Protection, Domain of protection, Access Matrix, Implementation of Access Matrix, Access control, Revocation of Access Rights, Capability-Based systems, Language – Based Protection

**Security:** The Security problem, Program threats, System and Network threats, Cryptography as a security tool, User authentication, Implementing security defenses, Firewalling to protect systems and networks, Computer–security classifications.

**Text Books:**

1. Operating System Concepts, Abraham Silberschatz, Peter B. Galvin, Greg Gagne, Ninth Edition, 2012, Wiley.
2. Operating Systems: Internals and Design Principles, Stallings, Sixth Edition, 2009, Pearson Education.

**Reference Books:**

1. Modern Operating Systems, Andrew S Tanenbaum, Second Edition, PHI.
2. Operating Systems, S.Haldar, A.A.Aravind, Pearson Education.
3. Principles of Operating Systems, B.L.Stuart, Cengage learning, India Edition.
4. Operating Systems, A.S.Godbole, Second Edition, TMH.
5. An Introduction to Operating Systems, P.C.P. Bhatt, PHI.
6. Operating Systems, G.Nutt, N.Chaki and S.Neogy, Third Edition, Pearson Education.
7. Operating Systems, R.Elmasri, A,G.Carrick and D.Levine, Mc Graw Hill.

II B.Tech I Sem

## 15ACS09-OBJECT ORIENTED PROGRAMMING THROUGH JAVA

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**Course Objectives:**

- Study the syntax, semantics and features of Java Programming Language
- Study the Object Oriented Programming Concepts of Java Programming language
- Learn the method of creating Multi-threaded programs and handle exceptions
- Learn Java features to create GUI applications & perform event handling

**Course Outcomes:**

- Solve problems using object oriented approach and implement them
- Ability to write Efficient programs that handle exceptions
- Create user friendly interface

**UNIT I**

**The History and Evolution of Java:** Java's Lineage, The Creation of Java, How Java Changed the Internet, Java's Magic: The Bytecode, Servlets: Java on the Server Side, The Java Buzzwords, The Evolution of Java, Java SE 8, A Culture of Innovation.

**An Overview of Java:** Object-Oriented Programming, A First Simple Program, A Second Short Program, Two Control Statements, Using Blocks of Code, Lexical Issues, The Java Class Libraries.

**UNIT II**

**Data Types, Variables, and Arrays:** Java Is a Strongly Typed Language, The Primitive Types, Integers, Floating-Point Types, Characters, Booleans, A Closer Look at Literals, Variables, Type Conversion and Casting, Automatic Type Promotion in Expressions, Arrays, A Few Words About Strings, A Note to C/C++ Programmers About Pointers.

**Operators:** Arithmetic Operators, The Bitwise Operators, Relational Operators, Boolean Logical Operators, The Assignment Operator, The ? Operator, Operator Precedence, Using Parentheses.

**Control Statements:** Java's Selection Statements, Iteration Statements, Jump Statements.

**UNIT III**

**Introducing Classes:** Class Fundamentals, Declaring Objects, Assigning Object Reference Variables ,Introducing Methods, Constructors, The this Keyword, The finalize( ) Method, A Stack Class.

**A Closer Look at Methods and Classes:** Overloading Methods, Using Objects as Parameters, A Closer Look at Argument Passing, Returning Objects, Recursion, Introducing Access Control, Understanding static, Introducing final, Arrays Revisited, Introducing Nested and Inner Classes, Exploring the String Class, Using Command-Line Arguments, Varargs: Variable-Length Arguments.

**UNIT IV**

**Inheritance:** Inheritance Basics, Using super, Creating a Multilevel Hierarchy, When Constructors Are Executed, Method Overriding, Dynamic Method Dispatch, Using Abstract Classes, Using final with Inheritance, The Object Class.

**Packages and interfaces:** Packages, Access Protection, Importing Packages, Interfaces, Default Interface Methods, Use static Methods in an Interface, Final Thoughts on Packages and Interfaces.

**Exception Handling**: Exception-Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch Clauses, Nested try Statements, throw, throws, finally, Java's Built-in Exceptions,

Creating Your Own Exception Subclasses, Chained Exceptions, Three Recently Added Exception Features, Using Exceptions.

**UNIT V**

**Multithreaded Programming:** The Java Thread Model, The Main Thread, Creating a Thread, Creating Multiple Threads, Using isAlive( ) and join( ), Thread Priorities, Synchronization, Interthread Communication, Suspending, Resuming, and Stopping Threads. Obtaining A Thread's State, Using Multithreading.

**Enumerations, Autoboxing, and Annotations (Metadata):** Enumerations, Type Wrappers, Autoboxing, Annotations (Metadata), Type Annotations, Repeating Annotations.

**Text Book:**

JAVA The Complete Reference 9th edition, Herbert Schildt, Mc Graw Hill Education, 2014.

**II B.Tech I Sem**

## 15ACS10-OPERATING SYSTEMS AND JAVA PROGRAMMING LAB

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**Course Objective/Outcomes**

- To introduce java compiler and eclipse platform
- To impart hand on experience with java programming

**Note:**

1. IDEs are not mandatory, encourage the use of Eclipse or Netbean platform
2. The list suggests the minimum program set. Hence, the concerned staff is requested to add more problems to the list as needed

## JAVA PROGRAMMING

1. Use Eclipse or Netbean platform and acquaint with the various menus. Create a test project, add a test class and run it. See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods and classes. Try debug step by step with java program to find prime numbers between 1 to n.
2. Write a Java program that prints all real and imaginary solutions to the quadratic equation $ax2 + bx + c = 0$. Read in a, b, c and use the quadratic formula.
3. Write a Java program for sorting a given list of names in ascending order
4. Write a java program to accept a string from user and display number of vowels, consonants, digits and special characters present in each of the words of the given text.
5. Write a java program to make rolling a pair of dice 10,000 times and counts the number of times doubles of are rolled for each different pair of doubles.

   Hint: Math.random()
6. Write java program that inputs 5 numbers, each between 10 and 100 inclusive. As each number is read display it only if it's not a duplicate of any number already read display the complete set of unique values input after the user enters each new value.
7. Write a java program to read the time intervals (HH:MM) and to compare system time if the system time between your time intervals print correct time and exit else try again to repute the same thing. By using StringToknizer class
8. Write a java program to split a given text file into n parts. Name each part as the name of the original file followed by .part<n> where n is the sequence number of the part file.
9. Write java program to create a super class called Figure that receives the dimensions of two dimensional objects. It also defines a method called area that computes the area of an object. The program derives two subclasses from Figure. The first is Rectangle and second is Triangle. Each of the sub class overridden area() so that it returns the area of a rectangle and a triangle respectively.

10. Write a Java program that creates three threads. First thread displays "Good Morning" every one second, the second thread displays "Hello" every two seconds and the third thread displays "Welcome" every three seconds

11. Write a Java program that correctly implements producer consumer problem using the concept of inter thread communication

12. Write a java program to find and replace pattern in given file,

13. Use inheritance to create an exception super class called EexceptionA and exception sub class ExceptionB and ExceptionC, where ExceptionB inherits from ExceptionA and ExceptionC inherits from ExceptionB. Write a java program to demonstrate that the catch block for type ExceptionA catches exception of type ExceptionB and ExceptionC

## OPERATING SYSTEMS LAB

1. Simulate the following CPU scheduling algorithms
   a) Round Robin b) SJF c) FCFS d) Priority
2. Simulate all file allocation strategies
   a) Sequential b) Indexed c) Linked
3. Simulate MVT and MFT
4. Simulate all File Organization Techniques
   a) Single level directory b) Two level c) Hierarchical d) DAG
5. Simulate Bankers Algorithm for Dead Lock Avoidance
6. Simulate Bankers Algorithm for Dead Lock Prevention
7. Simulate all page replacement algorithms
   a) FIFO b) LRU c) LFU Etc. …
8. Simulate Paging Technique of memory management.

II YEAR I SEM

**15ABEE02- ELECTRICAL AND ELECTRONICS ENGINEERING LAB**

(Common for ME and CSE)

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## PART – A: ELECTRICAL LAB

1. Verification of Superposition Theorem.
2. Verification of Thevenin's Theorem.
3. Open Circuit Characteristics of DC Shunt Generator.
4. Swinburne's Test on DC Shunt Machine(Predetermination of efficiency of a given DC shunt Machine Working as Motor and Generator).
5. Brake test on DC Shunt Motor. Determination of Performance Characteristics
6. OC &SC Tests on Single phase transformer (Predetermination of efficiency and regulation at given power factors)

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II YEAR I SEM

**15ABEE02- ELECTRICAL AND ELECTRONICS ENGINEERING LAB**

(Common for ME&CSE

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## PART – B: ELECTRONICS LAB

**Objectives:** This Lab provides the students to get an electrical model for various semiconductor devices. Students can find and plot V-I characteristics of all semiconductor devices. Student learns the practical applications of the devices. They can learn and implement the concept of the feedback and frequency response of the small signal amplifier

**Outcomes:** Students able to learn electrical model for various semiconductor devices and learns the practical applications of the semiconductor devices

**List Of Experiments:(For Laboratory Examination-Minimum of Six Experiments)**

1. Identification, specifications and testing of R, L and C components (color codes), Potentiometers, Bread board, Identification and specification of active devices, Diodes, BJTs, low power JFETs, MOSFETs, UJTs, Linear and Digital ICs
2. P-N Junction Diode Characteristics
   a. Germanium Diode (Forward bias& Reverse bias)
   b. Silicon Diode (Forward bias only)
1. Zener Diode Characteristics
   a. V-I Characteristics
   b. Zener Diode act as a Voltage Regulator
2. Rectifiers (without and with c-filter)
   a. Half-wave Rectifier
   b. Full-wave Rectifier
3. BJT Characteristics (CE Configuration)
   a. Input Characteristics
   b. Output Characteristics
4. FET Characteristics(CS Configuration)
   a. Drain (Output) Characteristics
   b. Transfer Characteristics
5. Applications of Op-Amps:
   a. Summing
   b. Subtractor
   c. Differential

**Equipment required for Laboratory**

1. Regulated Power supplies
2. Analog/Digital Storage Oscilloscopes
3. Analog/Digital Function Generators
4. Digital Multimeters
5. Decade Résistance Boxes
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital)
8. Voltmeters (Analog or Digital)
9. Active & Passive Electronic Components
10. Bread Boards
11. Connecting Wires
12. CRO Probes etc.

II B.Tech I SEM

**15AHS04-HUMAN VALUES AND PROFESSIONAL ETHICS**

(Common for all Branches)

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**Objectives**

- To create an awareness on Engineering Ethics and Human Values.
- To instill Moral and Social Values and Loyalty
- To appreciate the rights of Others

**UNIT-I: Human Values**

Morals, Values and Ethics-Integrity-Work Ethic-Service learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty - Courage- Co Operation – Commitment – Empathy –Self Confidence Character – Spirituality.

**UNIT-II: Engineering Ethics**

Senses of 'Engineering Ethics'- Variety of moral issued – Types of inquiry – Moral dilemmas – Moral autonomy –Kohlberg's theory- Gilligan's theory- Consensus and controversy – Models of professional roles- Theories about right action- Self-interest - Customs and religion –Uses of Ethical theories – Valuing time –Cooperation – Commitment.

**UNIT-III : Engineering As Social Experimentation**

Engineering As Social Experimentation – Framing the problem – Determining the facts – Codes of Ethics – Clarifying Concepts – Application issues – Common Ground - General Principles – Utilitarian thinking –respect for persons.

**UNIT-IV: Engineers Responsibility For Safety And Risk**

Safety and risk – Assessment of safety and risk – Risk benefit analysis and reducing risk-Safety and the Engineer- Designing for safety.

**UINIT-V: Global Issues**

Globalization – Cross Cultural issues- Environmental Ethics – Computer Ethics – Computers as the instrument of Unethical behavior – Computers as the object of Unethical acts – Autonomous Computers- Computer codes of Ethics – Weapons Development - Ethics and Research – Analyzing Ethical Problems in research – Intellectual property Rights( IPR).

**Out Comes:**

- Identify and analyze an ethical issue in the subject matter under investigation or in a relevant field
- Identify the multiple ethical interests at stake in a real-world situation or practice
- Articulate what makes a particular course of action ethically defensible
- Assess their own ethical values and the social context of problems

- Identify ethical concerns in research and intellectual contexts, including academic integrity, use and citation of sources, the objective presentation of data, and the treatment of human subjects
- Demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships, and field work
- Integrate, synthesize, and apply knowledge of ethical dilemmas and resolutions in academic settings, including focused and interdisciplinary research

**Text Books**


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


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II B.Tech II Sem

## 15ABS09-PROBABILITY AND STATISTICS

(Common for CE, ME and CSE)

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**Objectives:** To help the students in getting a thorough understanding of the fundamentals of probability and usage of statistical techniques like testing of hypothesis, Statistical Quality Control and Queuing theory

**UNIT – I**

Basic concepts of Probability – Random variables – Expectation – Discrete and continuous Distributions – Distribution functions. Binomial, Poisson and Normal distributions – Related properties.

**UNIT – II**

Test of Hypothesis: Population and Sample - Confidence interval of mean from Normal distribution - Statistical hypothesis - Null and Alternative hypothesis - Level of significance. Test of significance - Z test for means and proportions.

**UNIT – III**

Small samples - t- test, F-test and Chi-square test (testing of goodness of fit and independence).

**UNIT – IV**

Statistical Quality Control: Concept of quality of a manufactured product -Defects and Defectives - Causes of variations - Random and assignable - The principle of Shewhart Control Chart-Charts for attribute and variable quality characteristics- Constructions and operation of $\overline{X}$ - Chart, R-Chart, p - Chart and C-Chart.

**UNIT – V**

Queuing Theory: Pure Birth and Death process, M/M/1 & M/M/S & their related simple problems.

**Text Books:**

1. Probability and Statistics for Engineers by Richard A. Johnson, 8th edition, PHI Learning Private Ltd.-2011.
2. Probability & Statistics by E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher.
3. Probability & Statistics for engineers by Dr. J. Ravichandran WILEY-INDIA publishers.

**References:**

1. Operations Research by S.D. Sharma, KEDAR NATH RAM NATH, Publications.
2. Statistical methods by S.P. Gupta, S.Chand publications.

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3. Probability and Statistics for Engineers and Scientists by Ronald E. Walpole, Sharon L. Myers and Keying Ye, Pearson eighth edition.
4. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers.

**Outcomes:**

At the end of the course, the student will be able to analyze the problems of engineering & industry using the techniques of Probability, Statistics and Queuing theory and draw appropriate inferences.

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**II B.Tech II Sem**

## 15AHS05-MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

(Common for EEE, ECE and CSE)

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**Course Objectives:**

1. To enhance the knowledge of the students regarding importance of management and Managerial problems with optimum solutions.
2. To develop the concepts viz., Consumer Behaviour and demand-supply concept.
3. To introduce the concept of Demand Forecasting-methods.
4. To provide the knowledge regarding production and cost and Break-Even Analysis.
5. To share the concepts like market structures and Business Organization.
6. To discuss the contemporary practices-which influences the organization?
7. To provide awareness regarding Capital Budgeting decisions(Long term Investment decisions)
8. To introduce the concepts- Financial Accounting and Financial Analysis.
9. To give an idea of practicing technique of Ratio Analysis.
10. To provide the basic concepts which are related to managerial?

**Unit I**

**Introduction to Managerial Economics & Demand Analysis:** Definition of Managerial Economics, Characteristics and Scope – Managerial Economics and its relation with other subjects- Basic economic tools in Managerial Economics.

**Demand Analysis:** Meaning- Demand distinctions- Demand determinants- Law of Demand and its exceptions.

**Elasticity of Demand & Theory of Production and Cost Analysis**: Definition -Types of Elasticity of demand - Measurement of price elasticity of demand: Total outlay method, Point method and Arc method- Significance of Elasticity of Demand.

**Unit-II**

**Demand Forecasting:** Meaning - Factors governing demand forecasting - Methods of demand forecasting - Forecasting demand for new products- Criteria of a good forecasting method.

**Theory of Production and Cost Analysis**: Production Function- Isoquants and Isocosts, MRTS, Cobb-Douglas Production function.

**Cost Analysis:** Cost concepts, Opportunity cost, Fixed Vs Variable costs, Explicit costs Vs. Implicit costs, Out of pocket costs vs. Imputed costs. Break even analysis -Determination of Break-Even Point (simple problems) - Managerial Significance and limitations of BEP.

**Unit-III**

**Introduction to Markets & Pricing Policies:** Market structures: Types of competition, Features of Perfect Competition, Monopoly and Monopolistic Competition. Price-Output Determination under Perfect Competition, Monopoly, Monopolistic Competition.

**Pricing Policies:** Methods of Pricing-Marginal Cost Pricing, Limit Pricing, Market Skimming Pricing, Penetration Pricing, Bundling Pricing, and Peak Load Pricing. Internet Pricing Models:

Flat rate pricing, Usage sensitive pricing, Transaction based pricing, Priority pricing, charging on the basis of social cost, Precedence model, Smart market mechanism model.

**UNIT-IV**

**Types of Industrial Organization & Introduction to business cycles**: Characteristic features of Industrial organization, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, State/Public Enterprises and their types.

**Introduction to business cycles:** Meaning - Features of business cycles.

**Capital and Capital Budgeting**: Meaning of capital budgeting, Need for capital budgeting – Capital budgeting decisions (Examples of capital budgeting) - Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR), IRR and Net Present Value Method (simple problems).

**Unit V**

**Introduction to Financial Accounting:** Introduction to Double-entry system, Journal, Ledger, Trial Balance- Final Accounts (with simple adjustments) - Limitations of Financial Statements.

**Interpretation and analysis of Financial Statement:** Ratio Analysis – Liquidity ratios, Profitability ratios and solvency ratios – Preparation of changes in working capital statement and fund flow statement.

**Learning Outcomes:**

Expected to achieve the overall course objective to understand and enhancing the knowledge regarding managerial concepts and obtaining optimal solutions. And to get an idea of analysis of firm's financial position with the techniques of financial analysis and ratio analysis.

**Text Books:**


1. **J.V. Prabhakar Rao**: Managerial Economics and Financial Analysis, Maruthi Publications, 2011
2. **N. Appa Rao. & P. Vijaya Kumar**: 'Managerial Economics and Financial Analysis', Cengage Publications, New Delhi, 2011


**References:**


1. **A R Aryasri** - Managerial Economics and Financial Analysis, TMH 2011
2. **Suma damodaran**- Managerial Economics, **Oxford** 2011
3. **S.A. Siddiqui & A.S. Siddiqui**, Managerial Economics and Financial Analysis, New Age International Publishers, 2011.

II B.Tech II Sem

## 15ABS11-DISCRETE MATHEMATICS

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**Course Objective**

- Apply logical reasoning to solve a variety of problems.
- Understand and apply methods of discrete mathematics such as proofs, counting principles, number theory, logic and set theory to mathematical problems in a creative way.
- To apply the abstract concepts of graph theory in modeling and solving non-trivial problems in different fields of study.
- To provide a prerequisite for the courses like Fundamentals of Computer Organization, RDBMS, Analysis of Algorithms, Theory of Computation, Cryptography, Artificial Intelligence…

**UNIT - I :**

**The Language of Logic:** Propositions, Logical Equivalences, Quantifiers, Arguments, Proof Methods.

**The Language of Sets:** The Concepts of a Set, Operations with Sets, Computer Operations with Sets, The Cardinality of a Set, Recursively Defined Sets.

**Functions:** The concept of Functions, Special Functions, Properties of Functions, The Pigeonhole principle, Composite Functions, Sequences and the Summation Notation.

**UNIT – II:**

**Relations:** Boolean Matrices, Relations and Digraphs, Computer Representations of Relations, Properties of Relations, Operations on Relations, Transitive Closure, Equivalence Relations, Partial and Total Ordering.

**Lattices & Boolean Algebra:** Lattices as Partially Ordered Sets, Properties of Lattices, Lattices as Algebraic Systems, Sublattices, Direct Product and Homomorphism, Boolean Algebra, Boolean Functions

**UNIT – III :**

**Algebraic Structures:** Algebraic Systems, Semigroups and Monoids, Groups, Subgroups and Homomorphisms, Normal Subgroups.

**Combinatorics:** The Fundamental Counting Principles, Permutations, Derangements, Combinations, Permutations and Combinations with Repetitions, The Binomial Theorem, The Generalized Inclusion- Exclusion Principle.

**UNIT – IV :**

**Induction and Algorithms:** The Division Algorithm, Divisibility Properties, Nondecimal Bases, Mathematical Induction, Algorithm Correctness, The Growth Functions, Complexity of Algorithms.

**Recursion:** Recursively Defined Functions, Solving Recurrence Relations, Generating Functions, Recursive Algorithms, Correctness of Recursive Algorithms, Complexities of Recursive Algorithms.

**UNIT – V :**

**Graphs:** Computer Representation of Graphs, Isomorphic Graphs, Paths, Cycles, and Circuits, Eulerian and Hamiltonial Graphs, Planar Graphs, Graph Coloring, Digraphs, Dags, Weighted Digraphs, DFS and BFS Algorithms,Cut vertices and Edges,Covering,Matching.

**Trees:** Trees, Spanning Trees, Minimal Spanning Trees, Kruskal's and Prim's Algorithm, Rooted Trees..

**Text Books :**

1. Discrete Mathematics with Applications, Thomas Koshy, Elsevier Academic Press.

**Reference Books :**

1. Discrete and Combinatorial Mathematics, Fifth Edition, R. P. Grimaldi, B.V. Ramana, Pearson

2. Discrete Mathematics Theory and Applications, D.S Malik and M.K. Sen, Cengage Learning

3. J .L.Mott, A.Kandel, T.P .Baker, Discrete Mathematics for Computer Scientists and Mathematicians,
second edition 1986, Prentice Hall of India

4. C.L.Liu, Elements of Discrete Mathematics, Second Edition 1985, McGraw-Hill Book Company.Reprinted 2000

5. Discrete Mathematics, Norman L. Biggs, Second Edition, OXFORD Indian Edition.

6. K.H.Rosen, Discrete Mathematics and applications, 5th Edition 2003, TataMcGraw Hillpublishing Company

7. Graph Theory with Applications to Engineering & Computer Science: Narsingh Deo, PHI (2004)

8. "Discrete Mathematical Structures" Jayant Ganguly, Sanguine

9. 2. Discrete Mathematical Structures with Applications to Computer Science, J.P. Tremblay and R. Manohar,TMH

10.Digramatic Representation And Inference :"John.D.Lee".

II B.Tech II Sem

## 15ACS12-DATABASE MANAGEMENT SYSTEMS

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**Course Objective:**

- To create database and query it using SQL queries, design forms and generate reports.
- Learn to use integrity constraints, referential integrity constraints, triggers, assertions

**Course Outcomes**

- Design databases
- Retrieve information from data bases
- Use procedures to program the data access and manipulation

Create user interfaces and generate reports

**UNIT I**

**The Worlds of Database Systems** – file system VS a DBMS – Advantages of DBMS – Levels of abstraction in DBMS, Data Independency, Queries in DBMS

**The Entity-Relationship Model** – Database design and ER diagrams – Elements of ER models –Additional features ER models.

**The Relational Data Model** – Basics of the Relational Model –Integrity constraints over relations, From E/R Diagrams to Relational Designs – Introduction to views.

**UNIT II**

**Relational Algebra and Calculus** – Preliminaries, Relational algebra: Selection and Projection, Set Operations, Renaming, Joins, Division - Relational Calculus – Expressive power of Algebra and Calculus.

**The Database Language SQL** – Simple Queries in SQL –UNION, INTERSECT, EXCEPT– Nested queries, Aggregate operators.

**UNIT III**

**Constraints and Triggers** – Keys and Foreign keys – Constraints on Attributes and Tuples, Schema level Constraints and Triggers.

Functional Dependencies – Rules about Functional Dependencies- Normal Forms based on FDs – 1NF, 2NF, 3NF, BCNF, Multivalve Dependencies, 4NF, 5NF.

**UNIT IV**

Transaction Management: Transactions, ACID properties, Serializability, Other isolation levels.

**Concurrency Control** – Serializability and Recoverability, Introduction to Lock management-Concurrency Control without Locking.

**UNIT V**

**Index Structures** – Indexes on Sequential Files – Secondary Indexes – B-Trees, B+ Trees – Hash Based Indexing.

**Introduction to Query Optimization.**

Crash Recovery: Introduction to ARIES- The Log- other Recovery- Related Structures-Checkpoints-Recovery from a System Crash.

**Text Books:**

1. **"Data base Management Systems",** Raghu Rama Krishnan, Johannes Gehrke, 3rd Edition, McGraw Hill Education (Indian) Edition 2014.

2. **"Database Systems, The Complete Book",** Hector Garcia-Molina, Jeffrey D. Ullman and Jennifer Widom, 6th impression, 2011, Pearson.

**Reference Books:**

1. "Fundamentals of Database Systems", Elmasri Navrate, 6th edition, 2013, Pearson.

2. "Data base Systems design", Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.

3. "Introduction to Database Systems", C.J.Date, Pearson Education.

4. "Data base System Concepts", Silberschatz, Korth, McGraw Hill, V edition.

(refer Raghu Rama Krishnan text book latest version and frame new syllabus)

II B.Tech II Sem

## 15ACS13-FORMAL LANGUAGES AND AUTOMATA THEORY

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**Course Objective**

The course aims to introduce the basic methods and conclusions of the Theory of Computation. At the end of the course, students learn to apply these methods to problems from different fields and be guided by the results in searching for computational solutions to the problems.

1. Understand formal definitions of machine models.
2. Classify machines by their power to recognize languages.
3. Understanding of formal grammars, analysis
4. Understanding of hierarchical organization of problems depending on their complexity
5. Understanding of the logical limits to computational capacity
6. Understanding of undecidable problems

**UNIT - I :**

**Introduction:** Basics of set theory, Relations on sets, Types of Formal Proof, Deductive proofs, Functions, Types of functions, Proofing Techniques, proof by Contrapositive, Proof by contradiction, Counter examples, Fundamentals of Automata Theory:- Alphabets, Strings, Languages, Problems, Grammar formalism, Chomsky Hierarchy

**Finite Automata:** An Informal picture of Finite Automata, Deterministic Finite Automata (DFA), Non Deterministic Finite Automata (NFA), Finite Automata with Epsilon transitions (ϵ-NFA or NFA- ϵ ), Finite Automata with output, Conversion of one machine to another, Minimization of Finite Automata, Myhill-Nerode Theorem.

**UNIT – II:**

**Regular Languages:** Regular Expressions (RE), Finite Automata and Regular Expressions, Applications of Regular Expressions, Algebraic laws for Regular Expressions, The Arden's Theorem, Using Arden's theorem to construct RE from FA, Pumping Lemma for RLs, Applications of Pumping Lemma, Equivalence of Two FAs, Equivalence of Two REs, Construction of Regular Grammar from RE, Constructing FA from Regular Grammar, Closure properties of RLs, Decision problems of RLS, Applications of REs and FAs

**UNIT – III :**

**Context Free Grammars and Languages:** Definition of Context Free Grammars (CFG), Derivations and Parse trees, Ambiguity in CFGs, Removing ambiguity, Left recursion and Left factoring, Simplification of CFGs, Normal Forms, Linear grammars, Closure properties for CFLs, Pumping Lemma for CFLs, Decision problems for CFLs, CFG and Regular Language

**UNIT – IV :**

**Push Down Automata (PDA):** Informal introduction, The Formal Definition, Types of PDA, Graphical notation, Instantaneous description, The Languages of a PDA, Equivalence of PDAs and CFGs, Deterministic Push Down Automata, Two Stack PDA.

**UNIT – V :**

**Turing Machines and Undecidability:** Basics of Turing Machine (TM), Transitional Representation of TMs, Instantaneous description, Non Deterministic TM, Conversion of Regular Expression to TM, Two stack PDA and TM, Variations of the TM, TM as an integer function, Universal TM, Linear Bounded Automata, TM Languages, Unrestricted grammar ,

Properties of Recursive and Recursively enumerable languages, Undecidability, Reducibility, Undeciadable problems about TMs, Post's Correspondence Problem(PCP), Modified PCP.

**Text Books :**

1."Introduction to Automata Theory, Languages, and Computation", Third Edition, John E.Hopcroft, Rajeev Motwani, Jeffery D. Ullman, PEARSON.

**Reference Books :**

1. "Introduction To Languages And The Theory of Computation", John C Martin, The McGraw-Hill Companies, Third Edition. (TATA McGRAW HILL)
2. "Theory of Computation", Vivek Kulkarni, OXFORD.
3. Introduction to the Theory of Computation., Michel Sipser, 2nd Edition, Cengage Learning
4. "Theory of computer Science Automata, Languages and Computation", K.L.P. Mishra, N.Chandrasekaran, PHI, Third Edition.
5. "Fundamentals of the Theory of Computation, Principles and Practice", Raymond Greenlaw, H. James Hoover, MK(MORGAN KAUFMANN)
6. Finite Automata and Formal Language A Simple Approach, A.M. Padma Reddy, Pearson

II B.Tech II Sem

## 15ACS14-INTERNET TECHNOLOGIES

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### UNIT – I

Generics: What are generics, A simple generic example, a generic class with two type parameters, the general form of a generic class.

Java Collections Framework: Collection Overview, The collection interfaces – The collection interfaces, the list interface, the set interface, the socket set interface. The collection classes – The arraylist class, the linked list class, the hashset class, the linked hashset class, the treeset class. Accessing a collection via an iterator using an iterator, the for-each alternative to iterative. Working with maps – The map interfaces, the map classes. Using a comparator.

### UNIT – II

Java Beans: What is a java beans, advantages of java beans, introspection, java beans API, A bean example.

JDBC Objects: The concept of JDBC, JDBC Driver Types, JDBC Packages, A brief overview of the JDBC Process, Database Connection, Associating the JDBC/ODBC Bridge with the database, Statement Objects, Resultset, Transaction Processing, Metadata, Model Programs, Tables, and Indexing, Inserting data into tables, selecting data from a table, updating tables, deleting data from a table.

### UNIT – III

HTML, XML and XHTML: HTML – Basic Concepts of HTML, The Skeleton of a web page, creating a form, tables, XML, XHTML. Parsing XML.

Java Servlets: Java servlets and common gateways interface programming, A simple java servlet, anatomy of a java servlet.

Java ServerPages: JSP – Installation, JSP Tags – Variables and objects, methods, control statements, loops, Tomcat, Request String, User sessions, Cookies, Session objects,

### UNIT – IV

Java Script: Introduction to Java Script – What is dynamic HTML? Java Script, JavaScript Basics, Variables, String Manipulation, Mathematical functions, statements, operators, arrays, functions.

Objects in Java Script: Data and objects in java scripts, Regular expressions, exception handling, built-in objects, cookies, events.

Dynamic HTML with JavaScript: Data Validation, Opening a new window, messages and confirmation, the statusbar, writing to a different frame, rollover buttons, moving images, multiple pages in a single download, a text only menu system, floating logo.

**UNIT – V**

Accessing a Database: Accessing a database from a JSP page – Application architecture example, table example, the data source interface and jdbc drivers reading and storing information in a database, generating html from a query result, searching for rows based on partial information, deleting database information, displaying data over multiple pages, validation complex input without a bean, using transactions, application specific database actions.

**Text Books:**

1. Java The complete Reference, Herbert Schildt, 9th Edition, Oracle Press (Unit No: 1)
2. The Complete Reference J2EE, Jim Keogh, McGraw-Hill/Osborne. (Unit No: 2, 3)
3. Web Programming: Building Internet Applications, Chris Bates, 3rd Edition, Welly – 2006. (Unit No: 4)
4. JavaServer Pages, Hans Bergsten, 2nd Edition, O'Reilly Media – 2002 (Unit No: 5)

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II B.Tech II Sem

## 15ACS15-DATABASE MANAGEMENT SYSTEMS LAB

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**Course Objective:**

- To create a database and query it using SQL, design forms and generate reports.
- Understand the significance of integrity constraints, referential integrity constraints, triggers, assertions.

**Learning Outcome:**

- Design databases
- Retrieve information from data bases
- Use procedures to program the data access and manipulation
- Create user interfaces and generate reports

**List Of Experiments:**

1. Practice session: Students should be allowed to choose appropriate DBMS software, install it, configure it and start working on it. Create sample tables, execute some queries, use SQLPLUS features, use PL/SQL features like cursors on sample database. Students should be permitted to practice appropriate User interface creation tool and Report generation tool.
2. A college consists of number of employees working in different departments. In this context, create two tables **employee** and **department**. Employee consists of columns empno, empname, basic, hra, da, deductions, gross, net, date-of-birth. The calculation of hra,da are as per the rules of the college. Initially only empno, empname, basic have valid values. Other values are to be computed and updated later. Department contains deptno, deptname, and description columns. Deptno is the primary key in department table and referential integrity constraint exists between employee and department tables. Perform the following operations on the the database:
   - ✓ Create tables department and employee with required constraints.
   - ✓ Initially only the few columns (essential) are to be added. Add the remaining columns separately by using appropriate SQL command
   - ✓ Basic column should not be null
   - ✓ Add constraint that basic should not be less than 5000.
   - ✓ Calculate hra,da,gross and net by using PL/SQL program.
   - ✓ Whenever salary is updated and its value becomes less than 5000 a trigger has to be raised preventing the operation.
   - ✓ The assertions are: hra should not be less than 10% of basic and da should not be less than 50% of basic.
   - ✓ The percentage of hra and da are to be stored separately.

- ✓ When the da becomes more than 100%, a message has to be generated and with user permission da has to be merged with basic.
- ✓ Empno should be unique and has to be generated automatically.
- ✓ If the employee is going to retire in a particular month, automatically a message has to be generated.
- ✓ The default value for date-of-birth is 1 jan, 1970.
- ✓ When the employees called daily-wagers are to be added the constraint that salary should be greater than or equal to 5000 should be dropped.
- ✓ Display the information of the employees and departments with description of the fields.58
- ✓ Display the average salary of all the departments.
- ✓ Display the average salary department wise.
- ✓ Display the maximum salary of each department and also all departments put together.
- ✓ Commit the changes whenever required and rollback if necessary.
- ✓ Use substitution variables to insert values repeatedly.
- ✓ Assume some of the employees have given wrong information about date-of-birth. Update the corresponding tables to change the value.
- ✓ Find the employees whose salary is between 5000 and 10000 but not exactly 7500.
- ✓ Find the employees whose name contains _en'.
- ✓ Try to delete a particular deptno. What happens if there are employees in it and if there are no employees.
- ✓ Create alias for columns and use them in queries.
- ✓ List the employees according to ascending order of salary.
- ✓ List the employees according to ascending order of salary in each department.
- ✓ Use _&&' wherever necessary
- ✓ Amount 6000 has to be deducted as CM relief fund in a particular month which has to be accepted as input from the user. Whenever the salary becomes negative it has to be maintained as 1000 and the deduction amount for those employees is reduced appropriately.
- ✓ The retirement age is 60 years. Display the retirement day of all the employees.
- ✓ If salary of all the employees is increased by 10% every year, what is the salary of all the employees at retirement time.
- ✓ Find the employees who are born in leap year.
- ✓ Find the employees who are born on feb 29.
- ✓ Find the departments where the salary of atleast one employee is more than 20000.
- ✓ Find the departments where the salary of all the employees is less than 20000.
- ✓ On first January of every year a bonus of 10% has to be given to all the employees. The amount has to be deducted equally in the next 5 months. Write procedures for it.
- ✓ As a designer identify the views that may have to be supported and create views.
- ✓ As a designer identify the PL/SQL procedures necessary and create them using cursors.

- ✓ Use appropriate Visual programming tools like oracle forms and reports, visual basic etc to create user interface screens and generate reports.

**Note**: As a designer identify other operations that may be required and add to the above list. The above operations are not in order. Order them appropriately. Use SQL or PL/SQL depending on the requirement.

3. Students may be divided into batches and the following experiments may be given to them to better understand the DBMS concepts. Students should gather the required information, draw ER diagrams, map them to tables, normalize, create tables, triggers, procedures, execute queries, create user interfaces, and generate reports.
   - ✓ Student information system
   - ✓ APSRTC reservation system
   - ✓ Hostel management
   - ✓ Library management
   - ✓ Indian Railways reservation
   - ✓ Super market management
   - ✓ Postal system
   - ✓ Banking system
   - ✓ Courier system
   - ✓ Publishing house system
4. Design of user interfaces and generation of reports

**References:**

1. "Learning Oracle SQL and PL/SQL", Rajeeb C. Chatterjee, PHI.
2. "Oracle Database 11g PL/SQL Programming", M.Mc Laughlin,TMH.
3. "Introduction to SQL", Rick F.Vander Lans, Pearson education.
4. "Oracle PL/SQL", B.Rosenzweig and E.Silvestrova, Pearson education

II B.Tech II Sem

## 15ACS16-Internet Technologies Lab

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1. To create web pages with home page and login page for an online book store HTML
2. To create web pages with cart page and registration page for an online book store.
3. To validate name, pwd and Email id of the registration page.
4. To create a web page using CSS (cascading style sheets)
5. Write an XML file which will display the book information.
6. Write a java script to perform the following
   a. Addition of two numbers
   b. Concatenation of two strings
   c. Compute area of ring with function
   d. Compute sign of a number
7. Write a Java Program to execute select query using JDBC.
8. Write a Java Program to update customer information using JDBC.
9. Write a Java Servlet Program to generate a Plain text.
10. Write a Java Servlet Program to display cookie id.
11. Write a JSP Program to perform basic arithmetic operations.
12. Write a JSP Program to display the strings and to create check boxes.
13. Write A program to implement visual bean in Java beans.
14. Write a java program JDBC and ODBC connection.

**Text Books:**


1. Java The complete Reference, Herbert Schildt, 9th Edition, Oracle Press (Unit No: 1)
2. The Complete Reference J2EE, Jim Keogh, McGraw-Hill/Osborne. (Unit No: 2, 3)
3. Web Programming: Building Internet Applications, Chris Bates, 3rd Edition, Welly – 2006. (Unit No: 4)
4. JavaServer Pages, Hans Bergsten, 2nd Edition, O'Reilly Media – 2002 (Unit No: 5)

Service Course to CSE

R-15

**III B.Tech I Semester**

**15AEC32-MICROPROCESSORS & MICROCONTROLLERS**

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***Course Objectives:*** *This subject deals about the basic 16-bit (8086) processor and an 8-bit (8051) controllers, their architecture, internal organization and their functions, interfacing an external device with the processors/ controllers.*

**UNIT-I: Introduction**

Microprocessor based personal computer system, 8085 Micro Processors: Architecture, Register Organizing, Addressing modes, interrupts, Instruction set, Bus Timings, T state Calculations.
8086 Micro Processors: Programmer's model for 8086, memory organization of 8086, Addressing modes, Instruction set of 8086, Assembly language programming.

**UNIT- II: Interfacing with 8086 –Part 1**

Pin diagram detail of 8086, Minimum and Maximum mode of operations, Bus timing, Memory interface to 8086, DMA Controller: 8257 and 8237 their interfacing to 8086.

**UNIT-III: Interfacing with 8086 – Part 2**

Parallel and serial data transfer methods, I/O interface method, 8255 PPI chip, Interfacing with 7 segment LEDs, Interfacing with keyboards, Interfacing with ADCs, Interfacing with DACs, Interfacing with Stepper Motor.

**UNIT-IV: Interfacing with 8086 – Part 3**

Interrupts of 8086, Programming with DOS and BIOS function calls, 8259 interrupt controller and its interfacing with 8086, cascade mode of operation of 8259.

**UNIT–V: Introduction to Microcontrollers**

8051 Micro Controllers: Architecture, Registers Organization, Memory Organization, Pin Description, Connections, I/O Ports, Timers and their modes of operations, Serial Communication, Addressing Modes, Instruction Set, Assembly directives, Simple assembly software programs with 8051, Interfacing:LEDs, LCDs and switches.

***Course Outcomes:*** *Students can able to*

a. *Recall and apply a basic concept of digital fundamentals to Microprocessor based personal computer system.*
b. *Understand architecture and working of basic microprocessor and Microcontrollers.*
c. *Understand the detailed s/w & h/w structure of the Microprocessor.*
d. *Illustrate how the different peripherals (8255, 8253 etc.) are interfaced with Microprocessor.*
e. *Write Assembly level language programming for basic microprocessor and microcontrollers.*
f. *Analyze the data transfer process through serial & parallel ports.*

Service Course
HOCSE
R-15

**TEXT BOOKS:**

1. Ramesh Gaonkar, "Microprocessor Architecture, Programming and Applications with the 8085," 6th Edition, Penram International Publishing, 2013
2. Douglas V Hall, S. S. SP Rao, "Microprocessors and Interfacing," 3rd Edition, Tata McGraw Hill, 2012.
3. M.A. Mazidi& J.C. Mazidi Microcontroller and Embedded systems using Assembly & C, 2nd Edition, Pearson Education, 2007.

**REFERENCES:**

1. A.K.Ray, K.M.Bhurchandi, "Advanced Microprocessors and Peripherals," 3rd Edition, Tata McGraw Hill, 2006.
2. Kenneth J Ayala, "The 8051 Microcontroller," 3rd Edition, Thomson Delmar Learning, 2004.

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**III B.Tech I Semester**

## 15ACS19-DESIGN AND ANALYSIS OF ALGORITHMS

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***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.*

**UNIT-I**

Introduction to Algorithm, Algorithm specification , performance analysis, Asymptotic Notations **Divide andConquer**:General Method, Binary search, finding the maximum and minimum ,merge sort, Quick sort ,Selection , Stressen's matrix multiplication ,Analysis of Divide and Conquer run time Recurrence Relations-Master's Method.

**UNIT-II**

**Greedy Method:** General Method ,Knapsack problem , job scheduling with deadlines, minimum cost spanning trees-Prim's and Kruskal's Algorithm, Optimal storage on tapes ,single source shortest paths- Dijkastra's ,Bell Man ford And Wars hall's Algorithm.

**Dynamic Programming:** General Method, Multi stage graphs , All-pairs shortest paths, optimal binary search trees,0/1 knapsack ,the travelling sales person problem.

**UNIT-III**

Basic Traversal and search techniques: Techniques for binary trees, techniques for graphs ,AND/OR Graphs, connected components and spanning trees, Bi-Connected components and DfsBack tracking: General Method,8-queens problem ,sum of subsets problem, graph coloring and Hamiltonian cycles, knapsack problem.

**UNIT-IV**

Branch bound: The method,Travelling salesperson,0/1 knapsack problem, efficiency considerations

Lower Bound Theory: Comparison trees of sorting and Searching, Lower bound through reductions-multiplying triangular matrices,inverting a lower traingermatrix,computing the transitive closure.

**UNIT-V**

Network Flow Problems:

NP-Hard and NP-Complete problems:Np Hardness,Scheduling Problems ,NP-Completeness, Cook's theorem (without proof),Reductions for clique Decision problem ,Chromatic number decision problem .

***Course Outcomes:***

*Students who complete the course will have demonstrated the ability to do the following:*

- *Argue the correctness of algorithms using inductive proofs and invariants.*
- *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. Recite algorithms that employ this paradigm. Synthesize divide-and-conquer algorithms. Derive and solve recurrences describing the performance of divide-and-conquer algorithms.*
- *Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize dynamic-programming algorithms, and analyze them.*
- *Describe the greedy paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize greedy algorithms, and analyze them.*
- *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*

**TEXT BOOKS:**

1. "Fundamentals of computer Algorithms:,EllisHorowitz,s.satrajsahani and raja sekharan,2nd edition,university press.
2. Algorithm design –Jon Kleinberg and Eva Tardos,pearson.
3. AnanyLevitin, "Introduction to the Design and Analysis of Algorithms", Third Edition, Pearson Education, 2012.

**REFERENCES:**

1. Design and Analysis of algorithms",Aho,Ullman and Hopcroft,pearson education.
2. "Algorithms"-Richard Johnson baugh and Marcus Schaefer,pearson Education.
3. Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction toAlgorithms", Third Edition, PHI Learning Private Limited, 2012.
4. Donald E. Knuth, "The Art of Computer Programming", Volumes 1& 3 Pearson Education, 2009. Steven S. Skiena, "The Algorithm Design Manual", Second Edition, Springer, 2008.

**III B.Tech I Semester**

## 15ACS20-COMPUTER NETWORKS

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***Course Objectives:***

- *Study the evolution of computer networks and future direction*
- *Study the concepts of computer networks from layered perspective*
- *Study the issues open for research in computer networks*

**UNIT -I**

Data Communications, Network, Business and Home applications of Computer Network, Internet history, Standards and Administration, Network hardware, Network Software: Protocol Hierarchies- Design Issues for the Layers- Connection-Oriented Versus Connectionless Service, Reference Models. Data and Signals, Periodic Analog Signals, Digital Signals, Transmission Impairment, Data rate Limits, Performance, Circuit-Switched Networks, Packet Switching, Guided Transmission Media.

**UNIT -II**

Data Link Layer Design Issues, Error Detection and Correction, Elementary Data Link Protocols, Sliding Window Protocols, The Channel Allocation Problem, Multiple Access Protocols, Ethernet

**UNIT -III**

Data Link Layer Switching, Routing algorithms: The Optimality Principle-Shortest path Algorithm-Flooding-Distance Vector Routing-Link State Routing-Hierarchical RoutingBroadcast Routing-Multicast Routing-Anycast Routing, Congestion Control Algorithms.

**UNIT -IV**

Internetworking, The Network Layer in the Internet: The IP Version 4 Protocol- IP AddressesIP Version 6- Internet Control Protocols- Label Switching and MPLS-OSPF-BGP, Elements of Transport Protocols, Congestion Control: Desirable bandwidth Allocation-Regulating the Sending Rate.

**UNIT –V**

The Internet Transport Protocols: UDP, The Internet Transport Protocols: TCP, World Wide Web and HTTP, FTP, Electronic Mail, TELNET, Secure Shell (SSH), Domain Name System (DNS).

***Course Outcomes**:*

- *Use appropriate transmission media to connect to a computer network and Internet*
- *Work on the open issues for their project*
- *Start using the Internet effectively*

*Able to design new protocols for computer network*

**TEXT BOOKS:**

1. Andrew S. Tanenbaum, David J.Wetherall, "Computer Networks", Pearson Education, 5th ed., ISBN 978-81-317-8757-1
2. Behrouz A. Forouzan, "Data Communications and Networking", McGraw Hill Education, 5th ed., ISBN 978-1-25-906475-3.

**REFERENCES:**

1. Douglas E. Comer, "Internetworking with TCP/IP – Principles, protocols, and architecture- Volume 1", 5th ed., PHI
2. Peterson, Davie,"Computer Networks", 5th ed., Elsevier.
3. Chawan- Hwa Wu, Irwin,"Introduction to Computer Networks and Cyber Security", CRC Publications. Computer Networks and Internets with Internet Applications, Comer

**III B.Tech I Semester**

## 15ACS21-SOFTWARE ENGINEERING

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***Course Objectives:***

- *To understand the software life cycle models.*
- *To understand the software requirements and SRS document.*
- *To understand the importance of modeling and modeling languages.*
- *To design and develop correct and robust software products.*
- *To understand the quality control and how to ensure good quality software.*
- *To understand the planning and estimation of software projects.*
- *To understand the implementation issues, validation and verification procedures.*
- *To understand the maintenance of software*

**UNIT I**

Software and Software Engineering: The Nature of Software, The Unique Nature ofWebApps, Software Engineering, Software Process, Software Engineering Practice, Software Myths.

**Process Models:** A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, The Unified Process, Personal and Team Process Models, Process Terminology, Product and Process, Agile Process model, Extreme Programming, A comparison of different process models.

**UNIT II**

**Software Project Planning and Management:** Responsibilities of a Software Project Manager, Project Planning, Metrics for Project Size Estimation, Project Estimation Techniques, Empirical Estimation Techniques, COCOMO-A Heuristic Estimation Technique, Halstead's Software Science-An Analytical Technique, Staffing Level Estimation, Scheduling, Organization and Team Structures, Staffing, Risk Management, Software Configuration Management.

**UNIT III**

**Understanding Requirements**: Requirements Engineering, Establishing the Groundwork, Eliciting Requirements, Requirements Analysis, Structured Analysis, Data Oriented Analysis, Object oriented AnalysisDeveloping Use Cases, Building the Requirements Model, NegotiatingRequirements, and Validating Requirements.

**Requirements Modeling**: Requirements Analysis, Scenario-Based Modeling, UML Models That Supplement the Use Case, Data Modeling Concepts, Class-Based Modeling.

**UNIT IV**

**Design Concepts**: Design within the Context of Software Engineering, Design Process, Design Concepts, The Design Model, Function oriented software design, Object oriented software development.

**Architectural Design:** Software Architecture, Architectural Genres, Architectural Styles,Architectural Design.

**Component-Level Design:** What is a Component, Designing Class-Based Components, Conducting Component-Level Design, Component-Level Design for WebApps

**UNIT V**

**User Interface Design:** The Golden Rules, User Interface Analysis and Design, InterfaceAnalysis, Interface Design Steps, Design Evaluation.

**Coding and Testing:** Coding, Code Review, Software Documentation, Testing, Testing in the Large versus Testing in the Small, Unit Testing, Black-Box Testing, White-Box Testing, Debugging, Program Analysis Tools, Integration Testing, Testing Object-Oriented Programs, System Testing, Some General Issues Associated with Testing.

**Software Maintenance:** Characteristics of Software Maintenance, Software Reverse Engineering, Software Maintenance Process Models, Estimation of Maintenance cost.

***Course Outcomes:***

- *Define and develop a software project from requirement gathering to implementation.*
- *Obtain knowledge about principles and practices of software engineering.*
- *Focus on the fundamentals of modeling a software project.*
- *Obtain knowledge about estimation and maintenance of software systems*

**TEXT BOOKS :**


1. Software Engineering A practitioner" s Approach, Roger S. Pressman, Seventh Edition, 2009,McGrawHill International Edition.
2. Fundamentals of Software Engineering, Rajib Mall, Fourth Edition, 2014, PHI.
3. Software Engineering: Concepts & Practices- UgrasenSuman, CengageLearningpublications


**REFERENCE BOOKS:**


1. Software Engineering, Ian Sommerville, Ninth edition, Pearson education.
2. Software Engineering : A Primer, Waman S Jawadekar, Tata McGraw-Hill, 2008
3. Software Engineering, A Precise Approach, PankajJalote, Wiley India,2010.
4. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press.
5. Software Engineering1: Abstraction and modeling, Diner Bjorner, Springer InternationalEdition, 2006.
6. Software Engineering2: Specification of systems and languages, Diner Bjorner, Springer International edition, 2006.
7. Software Engineering Foundations, Yingxu Wang, Auerbach Publications,2008.
8. Software Engineering Principles and Practice, Hans Van Vliet,3rd edition, John Wiley &SonsLtd.
9. Software Engineering 3:Domains,Requirements,and Software Design, D.Bjorner, Springe International Edition.
10. Introduction to Software Engineering, R.J.Leach, CRC Press.

**III B.Tech I Semester**

## 15ACS22-DATA WAREHOUSING AND DATA MINING

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***Course Objectives:***

1. *Be familiar with mathematical foundations of data mining tools.*
2. *Understand and implement classical models and algorithms in data warehouses and data mining.*
3. *Characterize the kinds of patterns that can be discovered by association rule mining, classification and clustering.*
4. *Master data mining techniques in various applications like social, scientific and environmental context.*
5. *Develop skill in selecting the appropriate data mining algorithm for solving practical problems.*
6. *Be familiar with the process of data analysis, identifying the problems, and choosing the relevant models and algorithms to apply.*

**UNIT I: Introduction To Data Warehousing**

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

**UNIT II :Data Warehouse Process And Architecture**

Types of OLAP servers, 3–Tier data warehouse architecture, distributed and virtual data warehouses. Data warehouse implementation, tuning and testing of data warehouse. Data Staging (ETL) Design and Development, data warehouse visualization, Data Warehouse Deployment, Maintenance, Growth, Business Intelligence Overview- Data Warehousing and Business Intelligence Trends - Business Applications- tools-SAS.

**UNIT III: Introduction To Data Mining**

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

**UNIT IV: Classification and Clustering**

Decision Tree Induction - Bayesian Classification – Rule Based Classification –Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods - Clustering techniques – , Partitioning methods- k-means Hierarchical Methods - distance-based agglomerative and divisible clustering, Density-Based

Methods – expectation maximization -Grid Based Methods – Model-Based Clustering Methods – Constraint – Based Cluster Analysis – Outlier Analysis.

**UNIT V: Data Warehousing and Data Mining Software's andApplications**

Mining complex data objects, spatial databases, temporal databases, Multimedia databases, Time series and Sequence data; Text Mining –Graph mining-web mining-Application and Trends in data mining.

***Course Outcomes:***

*After completing this course the student must demonstrate the knowledge and ability to:*

1. *Learn data warehouse principles, data mining concepts and working.*
2. *Understand various data preprocessing procedures and their application scenarios.*
3. *Discuss the data-mining tasks like classification, regression, clustering, association mining.*
4. *Understand the impact of machine learning solutions on the society and also the contemporaryissues.*
5. *Analyze and choose a suitable data mining task to the problem.*
6. *Visualize and interpret the results produced by data mining.*
7. *Build statistical predictive models using various techniques such as neural networks, decision trees and logistic regression.*
8. *Solve real-world problems in business and scientific information using data mining.*
9. *Acquire hands-on experience with key components of an integrated data warehousing and business intelligence system using a leading industry commercial application package.*

**TEXT BOOKS:**

1. Jiawei Han and MichelineKamber, "Data Mining: Concepts and Techniques", MorganKaufmann Publishers, third edition2011, ISBN: 1558604898.
2. Alex Berson and Stephen J. Smith, " Data Warehousing, Data Mining & OLAP", TataMcGraw Hill Edition, Tenth Reprint 2007.
3. G. K. Gupta, "Introduction to Data Min Data Mining with Case Studies", EasterEconomyEdition, Prentice Hall of India, 2006.

**REFERENCES:**

1. Mehmedkantardzic,"Dataminingconcepts,models,methods, and lgorithms", Wiley Interscience, 2003.
2. Ian Witten,. Eibe Frank, Data Mining; Practical Machine Learning Tools and Techniques,third edition, Morgan Kaufmann, 2011.
3. George M Marakas, Modern Data Warehousing, Mining and Visualization, Prentice Hall,2003.

**III B.Tech I Semester**

## 15AHS07-MANAGEMENT SCIENCE

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***Course Objectives:***

- *To analyze the characteristics and contributions of enterprising people*
- *To assess their own entrepreneurial and enterprising potential To develop an understanding of the general role of Small Business Enterprises*
- *To develop skills to start, run and manage SMEs*
- *Understand the role of entrepreneurship in economic development.*
- *Identify the general characteristics of entrepreneurs.*
- *Know the differences between entrepreneurial and managerial type jobs.*
- *Understand the significance and sources of capital. Participate in the preparation of a complete business plan.*
- *Have an understanding of individual personalities and interpersonal skills needed for effective communications in a diverse business environment.*

**UNIT I**

**INTRODUCTION TO MANAGEMENT:**

Concepts of Management Nature - importance and Functions of Management, Taylor's Scientific Management Theory, Fayol's Principles of Management, Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Leadership Styles, Social responsibilities of Management.

**DESIGNING ORGANIZATIONAL STRUCTURES:**

Basic concepts related to Organisation - Departmentation and Decentralization, Types of mechanistic and organic structures of organization (Line organization, Line and staff organization, functional organization, Committee organization, matrix organization, team structure) their merits, demerits and suitability.

**UNIT II**

**OPERATIONS MANAGEMENT:**

Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production), Work Study. Statistical Quality Control:*c* chart, *p* chart, (simple Problems) Deming's contribution to quality.

**MATERIALS MANAGEMENT:** EOQ, ABC Analysis, Purchase Procedure and Stores Management. Inventory — functions. Types, inventory classification techniques.

**Marketing:** Functions of Marketing, Marketing Mix, and Marketing Strategies based on Product Life Cycle, Channels of distribution.

**UNIT III**

**HUMAN RESOURCES MANAGEMENT (HRM):**

Concepts of HRM ,Personnel Management and Industrial Relations (PMIR), Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Placement, Wage and Salary Administration, Promotion, Transfer, Separation, Performance Appraisal, Grievance Handling and Welfare Administration, Job Evaluation, Merit Rating and methods.

**UNIT IV**

**STRATEGIC MANAGEMENT:**

Vision, Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of Corporate Planning Process, Environmental Scanning, Value Chain Analysis, SWOT Analysis, Steps in Strategy Formulation and Implementation, Generic Strategy alternatives.

**PROJECT MANAGEMENT (PERT/CPM):**

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

**UNIT V**

**CONTEMPORARY MANAGEMENT PRACTICES:**

Basic concepts of MIS, Materials Requirement Planning (MRP), Just-In-Time (JIT) System, Total Quality Management (TQM), Six sigma concept, Supply Chain Management, Enterprise Resource Planning (ERP), Performance Management, Business Process outsourcing (BPO), Business Process Re-engineering and Bench Marking, Balanced Score Card.

**Assignments, case studies and mini project.**

***LEARNING OUTCOMES***

- *Equipping engineers for a lifelong career addressing the critical technical and managerial needs of private and public organizations.*
- *Exploring and developing analytic abilities, making better decisions, developing and executing strategies while also leading people who innovate.*
- *Cultivating the technical skills as well as the behavioral challenges of running organizations and complex systems.*
- *Emphasizing quantitative analytic skills and an entrepreneurial spirit*
- *Have an introductory understanding of global entrepreneurship concepts.*
- *Understand the concept & process of entrepreneurship- its contribution & role in the growth & development of individual & the nation.*

**TEXT BOOKS:**

1. Management Science,Aryasri: TMH, 2004.
2. Management ,Stoner, Freeman, Gilbert, , 6th Ed, Pearson Education,New Delhi, 2004.

**REFERENCES:**

1. Marketing Mangement ,Kotler Philip & Keller Kevin Lane: 12/e, PHI,2005.
2. Essentials of Management ,Koontz&Weihrich:, 6/e, TMH, 2005.
3. Management—Principles and Guidelines, Thomas N.Duening& John M.Biztantra, 2003.
4. Production and Operations Management, KanishkaBedi, , Oxford University Press, 2004.
5. Personnel Management ,Memoria&S.V.Gauker, , Himalaya, 25/e, 2005
6. Modern Management ,Samuel C.Certo:, 9/e, PHI, 2005
7. Business Policy and Strategic Management, Lawrence R Jauch, R.Gupta&William F.Frank Bros., 2005.

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Service course to ECE

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**III B.Tech I Semester**

**15AEC37-MICROPROCESSORS & MICROCONTROLLERS LAB**

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***Course Objectives:***

1. *To become skilled in 8086 Assembly Language programming.*
2. *To understand programmable peripheral devices and their Interfacing.*
3. *To understand and learn 8051 microcontroller.*
4. *To learn 8051 assembly Language programming*

**Minimum Ten Experiments to be conducted (Five from each section)**

**I) 8086 Microprocessor Programs using MASM/8086 kit.**

1. Introduction to MASM Programming.
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, Length of the string, String comparison.

**Interfacing:**

5. 8259 – Interrupt Controller and its interfacing programs
6. A /D Interfacing
7. D /A Interfacing
8. Stepper Motor.

**II) Microcontroller 8051 Trainer kit**

1. Arithmetic operation – Multi byte Addition and Subtraction, Multiplication and Division – Signed and unsigned Arithmetic operation.
2. Logic operations – Shift and rotate.
3. Sorting- Ascending and descending order.

**Interfacing using 8051 Trainer kit:**

4. A/D Interfacing
5. D /A Interfacing
6. Switch Interfacing
7. Relay Interfacing

***Course Outcomes:***

a. *Able to write8086 Assembly Language programs.*
b. *Able to understand programmable peripheral devices and their Interfacing.*
c. *Able to write 8051 assembly Language programs.*

Head of Electronics & Communication Engineering Dept
JNTU College of Engineering
PULIVENDULA - 516 390

**III B.Tech I Semester**

## 15ACS23-DATA WAREHOUSING AND DATA MINING LAB

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**Course Objectives:** *The student should be made to:*

- *Be familiar with the algorithms of data mining,*
- *Be acquainted with the tools and techniques used for Knowledge Discovery in Databases.*
- *Be exposed to web mining and text mining*

**LIST OF EXPERIMENTS:**

1. Demonstration of pre-processing on dataset student.arff
2. Demonstration of pre-processing on dataset labor.arff
3. Demonstration of Association rule process on dataset contactlenses.arffusingapriori algorithm
4. Demonstration of Association rule process on dataset test.arff using apriori algorithm
5. Demonstration of classification rule process on dataset student.arff using j48 algorithm
6. Demonstration of classification rule process on dataset employee.arff using j48 algorithm
7. Demonstration of classification rule process on dataset employee.arff using id3 algorithm
8. Demonstration of classification rule process on dataset employee.arff using naïve bayes algorithm
9. Demonstration of clustering rule process on dataset iris.arff using simple k-means
10. Demonstration of clustering rule process on dataset student.arff using simple k means
11. Creationof a Data Warehouse.
12. Apriority Algorithm.
13. FP-Growth Algorithm.
14. K-means clustering.
15. One Hierarchical clustering algorithm.
16. Bayesian Classification.
17. Decision Tree.
18. Support Vector Machines.
19. Applications of classification for web mining.
20. Case Study on Text Mining or any commercial application.

**III B.Tech I Semester**

**15AHS06 - ADVANCED ENGLISH LANGUAGE COMMUNICATION SKILLS LAB**

(Common for ME, ECE and CSE)

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## 1. INTRODUCTION

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

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

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

## 2. OBJECTIVES:

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

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

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

### UNIT-I: COMMUNICATIVE COMPETENCY

1. Reading Comprehension – Techniques-Book Review
2. Listening comprehension – Video Talks-Eminent speeches
3. Verbal Competency - Vocabulary - Spotting Errors- Aptitude Tests

### UNIT-II: TECHNICAL WRITING

1. Essentials of writing -Technical Paper/ Report writing-Concise writing
2. Administrative / Business Documentation – Circular Writing -Meeting – Agenda – Minutes-Resolutions

3. Project Writing – Framing Outline – Finding Problem- Documentation-Citation

**UNIT-III: PRESENTATIONAL SKILLS**

1. Oral presentations – Public Speaking –Paper & Seminar Presentation
2. Digital Presentations -Power point - Video Presentation -Poster presentation
3. Stage Dynamics – Body Language – Para Language

**UNIT-IV: CORPORATE SKILLS**

1. Etiquettes -Dress - Dining – Net Etiquettes
2. Telephonic skills –Mobile Etiquettes
3. Soft Skills – Intra – Inter Personal Skills

**UNIT-V: GETTING READY FOR JOB**

1. Before Interview -Curriculum vitae/ Resume-Covering letter-E-mail writing
2. During Interview – G.D-Mock Interviews– Psychometric Tests – Follow up
3. After interview - Excelling in Profession– Team spirit– Work culture

**4. LEARNING OUTCOMES:**

- Acquiring extensive range of vocabulary and its proper use contextually
- Flair in Writing and felicity in written expression.
- Enhanced job prospects / Employability skills /developing organizational abilities in tune with corporate requirement
- Effective Speaking Abilities

**5. MINIMUM REQUIREMENT:**

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

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

**6. SUGGESTED SOFTWARE:**

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

1. K-VAN SOLUTIONS-Advanced communication lab
2. DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.
3. TOEFL & GRE( KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
4. Train2success.com

**7. BOOKS RECOMMENDED:**

1. Objective English for Competitive Exams, HariMohana Prasad, 4th edition, Tata McGraw Hill.
2. Effective Technical Communication, AshrifRizvi, TataMcGrahill, 2011.

3. Technical Communication, Meenakshi Raman &Sangeeta Sharma, O U Press 2009.
4. Books on TOEFL/GRE/GMAT/CAT/IELTS, Barron's/DELTA/Cambridge University Press.2012.
5. Soft Skills for Everyone, Butterfield Jeff, Cengage Publications, 2011.
6. Ultimate Psychometric Tests: Mike Bryon,VinodVasishtha for Kogan Page India Pvt. Ltd, New Delhi.
7. Soft Skills- Know Yourself And Know The World, Dr.K.Alex, Chand Publications ,Third revised edition 2014.
8. Management Shapers Series , Universities Press (India) Pvt Ltd., Himayatnagar, Hyderabad 2008.
9. Word Power Made Handy, ShaliniVerma, S Chand Publications, 2011.

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**III B.Tech II Semester**

## 15ACS31-COMPILER DESIGN

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***Course Objective:***

*This course is a de facto capstone course in Computer Science, as it combines skills in software design, programming, data structures and algorithms, theory of computing, documentation, and machine architecture to produce a functional compiler.*

- *Realize that computing science theory can be used as the basis for real applications Introduce the major concept areas of language translation and compiler design. Learn how a compiler works*
- *Know about the powerful compiler generation tools and techniques, which are useful to the other non-compiler applications*
- *Know the importance of optimization and learn how to write programs that execute faster*

**UNIT – I**

**Overview of Compilation and Language processing**:Preprocessor-Compiler-assembler-interpreters-pre-processors-linkers and loaders-structure of a compliler[1]- Phases of Compilation– Lexical Analysis, Regular Grammar andregular expression for common programming language features, pass and Phases of translation, interpretation, bootstrapping, data structures in compilation – LEX lexical analyzer generator.

**UNIT – II**

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

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

**UNIT – III**

**Semantic analysis :**Intermediate forms of source Programs–abstract syntax tree, polishnotation and three address codes. Attributed grammars, Syntax directed translation, Conversion of popular

Programming languages language Constructs into Intermediate code forms, Type checker.

**UNIT – IV**

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

**Intermediate code Generation**: Intermediate languages, Declarations, Assignment statements, Boolean expressions, Backpatching

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

**UNIT – V**

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

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

***Course Outcomes :***

- *Able to design a compiler for a simple programming language*
- *Able to use the tools related to compiler design effectively and efficiently*
  *Can write an optimized code*

**TEXT BOOKS:**

1. Principles of compiler design -A.V. Aho .J.D.Ullman; Pearson Education. (Text book edition)
2. Modern Compiler Implementation in C- Andrew N. Appel, Cambridge University Press.
3. Compilers Principles, Techniques and Tools-Alfred V.Aho, Ravi Sethi, JD Ullman, Pearson Education, 2007.

**REFERENCES:**

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

**III B.Tech II Semester**

**15ACS32-OBJECT ORIENTED ANALYSIS AND DESIGN**

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***Course Objectives:***

a. *To understand how to solve complex problems*
b. *Analyze and design solutions to problems using object oriented approach*
c. *Study the notations of Unified modeling language*

**UNIT I: Introduction to UML Basics:**

Importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, Architecture, Software Development Life Cycle.

Basic Structural Modeling: Classes, Relationships, commonMechanisms, and diagrams.Advanced Structural Modeling: Advanced classes, advancedrelationships, Interfaces, Types and Roles, Packages.

**UNIT II :Requirements& Modeling**

Object Constraint Language - Inception – Evolutionary Requirements– Domain Models – System Sequence Diagrams – Operation Contracts.

**UNIT III: Principles of Designing**

Requirements to Design –Design Patterns – Logical Architecture – Package diagram – Design patterns – Model, View, Control pattern – Detailed design – Object design with GRASP pattern – Detailed class diagram with Visibility.

**UNIT IV :Mapping to Code**

Mapping designs to code – Test Driven development and refactoring – UML Tools and UML as blueprint.

**Case Studies** – the Next Gen POS system, Online Bookshop - A Multi-Threaded Airport Simulation.

**UNIT V :Applying Design Patterns**

More Patterns – Analysis update – Objects with responsibilities – Applying design patterns – Architectural Analysis – Logical Architecture Refinement – Package Design –Persistence framework with patterns.

***Course Outcomes:***

a. *Find solutions to the complex problems using object oriented approach*
b. *Represent classes, responsibilities and states using UML notation*
c. *Identify classes and responsibilities of the problem domain.*

**TEXT BOOKS:**


1. The Unified Modeling Language User Guide, Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson Education.
2. UML 2 Toolkit, Hans-Erik Eriksson, Magnus Penker, Brian Lyons,DavidFado, WILEY-Dreamtech India Pvt. Ltd.
3. MichaelBlaha and James Rumbaugh, "Object-oriented modeling and design with UML",Prentice-Hall of India, 2005.
4. Craig Larman. "Applying UML and Patterns – An introduction to Object-Oriented Analysisand Design and Iterative Development", 3rd ed, Pearson Education, 2005.


**REFERENCES:**


1. Ali Bahrami, "Object Oriented Systems Development", McGraw-Hill, 1999.
2. Booch, Grady. Object Oriented Analysis and Design. 2nd ed. Pearson Education 2000.
3. Fowler, Martin. UML Distilled. 3rd ed. Pearson Education. 2004.
4. Lunn, Ken. Software development with UML. Palgrave Macmillan. 2003.
5. O'Docherty, Mike. Object-Oriented Analysis &Design.Wiley. 2005.


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**III B.Tech II Semester**

## 15ACS33-MOBILE APPLICATION DEVELOPMENT

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**Course Objectives:**

1. This program provides career options for our students in the emerging technology sector of Mobile Applications. The students will possess the competent knowledge and skills to seek jobs in this sector.
2. The course provides comprehensive knowledge, technical expertise and hands-on experience in the mobile application sector.
3. This course provides students with an understanding of all aspects of mobile technologies. Students will have an in-depth knowledge of Android and iphone (iOS) application development.
4. At the end of this course, the student will be able to understand the basics concepts of mobile networks, architecture and application development, comprehend the features of iOS, Objective C and Android. He/she will also implement Application Development Concepts and Techniques of Android and iOS

**UNIT - I :**

**Small computing Technology:** Wireless Technology, Radio Data Networks, Microwave Technology, Mobile Radio Networks, Messaging, Personal Digital Assistants.

**J2ME Architecture and Development Environment:** J2ME Architecture, Small Computing Device Requirements, Run – Time Environment, MIDlet programming, Java Language for J2ME, J2ME Software Development Kits, Hello World J2ME Style, Multiple MIDlets in a MIDlet Suite, J2ME wireless Toolkit.

**UNIT – II:**

**Introduction Android Programming**: What is Android, Activities, Linking Activities Using Intents, Fragments, Calling Built – in Applications using Intents, Displaying Notifications.

**Android User Interface**: Understanding the Components of a Screen, Adapting to Display Orientation, Managing Changes to Screen Orientation, Utilizing the Action Bar, Listening for UI Notifications.

**UNIT – III:**

**Designing User Interface with Views**: Basic Views, Picker Views, Using List Views to Display Long Lists.

**Displaying pictures and menus with views and Data Persistence**: Views to Display pictures, menus with views, additional views, saving and loading user preferences, persisting data to files, creating and using databases.

**UNIT–IV:**

**Content Providers:** Sharing data in android, using a content provider, creating your own content providers.

**Messaging and Networking**: SMS Messaging, Sending E-Mail, Networking

**Location-Based Services**: Displaying Maps, Getting Location Data.

**UNIT – V:**

**Beginning Swift Programming:** Introduction to swift, Data types, Strings and Characters, Basic Operators, Functions, Collections, Control flow and looping, structures and classes, inheritance, closures, protocols and delegates, generics.

**Course Outcomes:**

1. The course integrates the mobile application principles with the real-world experience.
2. The course's learning outcomes arm the students with technical expertise and mobile application development experience.
3. Industry leaders support the course by providing valuable industry inputs and invaluable insight into the process of developing cutting edge mobile applications.

**TEXT BOOKS :**

1. J2ME: The Complete Reference, James Keogh, TMH.
2. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India
3. Beginning Swift Programming, Wei-Meng Lee, December 2014, ISBN: 978-1-119-00931-3

**REFERENCE BOOKS:**

1. Enterprise J2ME: Developing Mobile Java Applications, Michael Juntao Yuan, Pearson Education, 2004.
2. Android Application Development for Java programming by James C. Sheusi, Cengage Learning
3. Android A Programmers Guide by Jerome DiMargio, TMH.

**III B.Tech II Semester**

## 15ACS34-MULTIMEDIA APPLICATION DEVELOPMENT

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***Course Objectives:***

- *Understand the relevance and underlying infrastructure of the multimedia systems.*
- *Understand core multimedia technologies and standards (Digital Audio, Graphics, Video, Text, Animation)*
- *Be aware of factors involved in multimedia systems performance, integration and evaluation*

**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**

**Action Script**: ActionScript Features, Object-Oriented ActionScript, Datatypes and Type Checking, Classes, Authoring an ActionScript Class.

Action Script-II: Inheritance, Authoring an ActionScript 2.0 Subclass, Interfaces,Packages, Exceptions.

**UNIT-III**

Introduction to Adobe photoshop, Getting started with photoshop, creating and saving document in photoshop, page layout and back ground, photoshop program window-title bar, menu bar,option bar, image window, image title bar,status bar, ruler, palettes, tool box, screen modes, saving files, reverting files, closing files.

**UNIT –IV**

**Images:** working with images, image size and resolution ,imageediting,colour modes and adjustments , Zooming & Panning an Image,, , Rulers, Guides & Grids- Cropping & Straightening an Image,image backgrounds ,making selections. Working with tool box: working with pen tool, save and load selection-working with erasers-working with text and brushes-Colour manipulations: colour modes- Levels – Curves - Seeing Colour accurately - Patch tool – Cropping-Reading your palettes - Dust and scratches- Advanced Retouching- smoothing skin.

**UNIT-V**

**Layers:** Working with layers- layer styles- opacity-adjustment layers Filters: The filter menu, Working with filters- Editing your photo shoot, presentation –how to create adds, artstic filter, blur filter, brush store filter, distort filters, noice filters, pixelate filters, light effects, difference clouds, sharpen filters, printing.

***Course Outcomes:***

- *Students are able to understand Multimedia projects & Applications.*
- *Students are able to utilize the multimedia technologies to develop multimedia project.*
- *Can deal with all multimedia facts for fulfillment of all day to day multimedia requirements.*

**TEXT BOOKS:**

1. Fudamentals of Multimedia by Ze-Nian Li and Mark S. Drew PHI/Pearson Education.
2. Essentials Action Script 2.0, Colin Moock, SPD O,REILLY.
3. Adobe Photoshop Class Room in a Book by Adobe Creative Team.
4. Photoshop: Beginner's Guide for Photoshop - Digital Photography, Photo Editing, Color Grading & Graphic...19 February 2016 by David Maxwell

**REFERENCES:**

1. Digital Multimedia, Nigel chapman and jenny chapman, Wiley-Dreamtech
2. Macromedia Flash MX Professional 2004 Unleashed, Pearson.

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**III B.Tech II Semester**

**15ACS38-OBJECT ORIENTED ANALYSIS AND DESIGN & COMPILER DESIGN LAB**

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*Course Objectives:*

- *Practice the notation for representing various UML diagrams*
- *Analyze and design the problem by representing using UML diagrams*
- *Become familiar with all phases of OOAD.*
- *Design, develop and test software systems for engineering applications.*
- *Analyze technical solutions to computational problems and develop efficient algorithms.*

**Problems that may be considered are**

1. College information system
2. Hostel management
3. ATM system
4. Library management system
5. Passport Automation System
6. Political Administration System.

**Compiler Design Experiments**

1. Design a lexical analyzer for given language and the lexical analyzer should ignore redundant spaces, tabs and new lines. It should also ignore comments. Although the syntax specification states that identifiers can be arbitrarily long, you may restrict the length to some reasonable value. Simulate the same in C language.
2. Write a C program to identify whether a given line is a comment or not.
3. Write a C program to recognize strings under 'a', 'a*b+', 'abb'.
4. Write a C program to test whether a given identifier is valid or not.
5. Write a C program to simulate lexical analyzer for validating operators.
6. Implement the lexical analyzer using JLex, flex or other lexical analyzer generating tools.
7. Write a C program for implementing the functionalities of predictive parser for the mini Language specified
8. (a) Write a C program for constructing of LL (1) parsing.
   (b) Write a C program for constructing recursive descent parsing.
9. Write a C program to implement LALR parsing.
10. (a) Write a C program to implement operator precedence parsing.
    (b) Write a C program to implement Program semantic rules to calculate the expression that takes an expression with digits, + and * and computes the value.
11. Convert the BNF rules into Yacc form and write code to generate abstract syntax tree for the mini
12. Write a C program to generate machine code from abstract syntax tree generated by the parser.

***Course Outcomes:***

- *Find solutions to the problems using object oriented approach*
- *Represent using UML notation and interact with the customer to refine the UML diagrams*
  - *(i) Use Case Diagram.*
  - *(ii) Class Diagram.*
  - *(iii) Sequence Diagram.*
  - *(iv) Collaboration Diagram.*
  - *(v) State Diagram*
  - *(vi) Activity Diagram.*
  - *(vii) Component Diagram*
  - *(viii) Deployment Diagram.*
  - *(ix) Test Design.*

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**III B.Tech II Semester**

## 15ACS39- MOBILE APPLICATION DEVELOPMENT & MULTI MEDIA APPLICATION DEVELOPMENT LAB

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### PART-A: MOBILE APPLICATION DEVELOPMENT LAB

**Pre-requisities:**

- ✓ Jdk 1.8
- ✓ J2ME SDK, Wireless toolkit
- ✓ Android studio
- ✓ iPhone Simulator
- ✓ Xcode IDE
- ✓ Swift Language

1. Installation of JDK 1.8, J2ME SDK, Wireless toolkit.
2. Write a J2ME program to implement the login validation.
3. Install Android Studio and run sample android programs.
4. Write an Android program using intents.
5. Write an android application using fragments.
6. Write an android application to implement alarm application.
7. Write an android application to implement views.
8. Write a program for Login, Registration using SharedPreferences.
9. Write an android program to implement CRUD operations of the database.
10. Write an android application to implement GPS location.
11. Write an android application to implement send and receive messages.
12. Installation of iOS and run sample programs
13. Write a swift program to implement control flow and looping, arrays.
14. Write a swift program to implement Functions
15. Write a swift program to implement structures and classes
16. Write a swift program to implement inheritance, closures
17. Write a swift program to implement generics.

**III B.Tech II Semester**

**15ACS39- MOBILE APPLICATION DEVELOPMENT & MULTI MEDIA APPLICATION DEVELOPMENT LAB**

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## PART-B: MULTIMEDIA APPLICATION DEVELOPMENT LAB

**Student Activity:**

1. Design a poster for technical paper presentation.
2. Create a digital scrap book.

**i. Action Script**

1. Assigning Actions to an object and button
2. Assigning Actions with mouse events
3. Tinting a Movie Clip's Color
4. Calculating the Distance Between Two Points
5. Controlling a movie clips color with sliders
6. Create a text filed and password input field

**ii. Photo Shop Lab**

1. Create your Visiting card
2. Create Cover page for any text book
3. Create a Paper add for advertising of any commercial agency
4. Design a Passport photo
5. Create a Pamphlet for any program to be conducted by an organization
6. Create Broacher for you college
7. Create Titles for any forthcoming film
8. Custom shapes creation
9. Create a Web template for your college
10. Convert color photo to black and white photo
11. Enhance and reduce the given Image size
12. Background changes
13. Design Box package cover
14. Design Texture and patterns
15. Filter effects & Eraser effects

**IV B.Tech I Semester**

## 15ACS51-SOFTWARE TESTING

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***Course Objectives***

1. *To study fundamental concepts in software testing, including software testing objectives, process, criteria, strategies, and methods.*
2. *Analysis of various testing methodologies and procedure to design test cases.*

**UNIT I**

**Introduction:** Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs.

**Flow graphs and Path testing**: Basics concepts of path testing, predicates, path predicates and Achievable paths, path sensitizing, path instrumentation, application of path testing.

**UNIT II**

Introduction to Testing Design Strategies – The Smarter Tester – Test Case Design Strategies

**Test Case DesignBlack-Box Approach** - Using Black Box Approach to Test Case Design Random Testing – Requirements based testing –Boundary Value Analysis – decision tables - Equivalence Class Partitioning- statebased testing– cause effect graphing – error guessing - compatibility testing – user documentation testing – domain testing.

**UNIT III**

**Test Case DesignWhite–Box Approach**-Using White–Box Approach to Test design – Test Adequacy Criteria – static testing vs. structural testing – code functional testing - Coverage and Control Flow Graphs – Covering Code Logic – Paths – Their Role in White–box Based Test Design – code complexity testing – Evaluating Test Adequacy Criteria.

**UNIT IV**

**Paths, Path products and Regular expressions**: path products & path expression, reduction Procedure, applications, regular expressions & flow anomaly detection. **Logic Based Testing**: overview, decision tables, path expressions, kv charts, specifications.

**UNIT V**

**State, State Graphs and Transition testing**: state graphs, good & bad state graphs, state testing, Testability tips. **Graph Matrices and Application**: Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools. (Student should be given an exposure to tools like Win runner, QTP, Selenium, Jmeter).

*Course Outcomes*

1. *Analyze requirements to determine appropriate testing strategies.*
2. *Apply a wide variety of testing techniques in an effective and efficient manner*
3. *Compute test coverage and yield according to a variety of criteria*
4. *Evaluate the limitations of a given testing process and provide a succinct summary of those limitations*

**TEXT BOOKS:**

1. Software Testing techniques, Boris Beizer, Dreamtech, Second Edition
2. SrinivasanDesikan and Gopalaswamy Ramesh, "Software Testing – Principles and Practices", Pearson education, 2006.
3. Software Testing Tools, Dr.K.V.K.K.Prasad, Dreamtech.

**REFERENCES:**

1. The craft of software testing - Brian Marick, Pearson Education.
2. Software Testing, Third Edition, P.C.Jorgensen, Aurbach Publications (Dist.by SPD).
3. Software Testing, N.Chauhan, Oxford University Press.
4. Introduction to Software Testing, P.Ammann and J.Offutt, Cambridge Univ. Press.
5. Effective methods of Software Testing, Perry, John Wiley, Second Edition, 1999.
6. Software Testing Concepts and Tools, P.NageswaraRao, Dreamtech Press.
7. Software Testing, M.G.Limaye, TMH.
8. Software Testing, Desikan, G.Ramesh, Pearson.
9. Foundations of Software Testing, D.Graham and Others, Cengage Learning.
10. Foundations of Software Testing, A.P.Mathur, Pearson.
11. Ilene Burnstein, "Practical Software Testing", Springer International Edition, Chennai, 2003

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**IV B.Tech I Semester**

## 15ACS52-ADVANCED COMPUTER NETWORKS

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*Course Objectives:*

1. *To give the student ideas and insights on important design issues associated with computer networks.*
2. *This course aims to provide advanced background on relevant computer networking topics to have a comprehensive and deep knowledge in computer networks.*

**UNIT-I**

**Review of Computer Networks and the Internet:**
What is the Internet, The Network core, Access Networks and Physical media, ISPs and Internet Backbones, Delay andLossin Packet-Switched Networks, History of Computer Networking and the Internet.

**Foundation of Networking Protocols:** TCP/IP Model, Internet Protocols and Addressing, Equal-Sized Packets Model: ATM

**UNIT-II**

**NetworkingDevices:**Multiplexers,ModemsandInternetAccessDevices,SwitchingandRoutingDevices,Devices in different layers, RouterStructure.

**TheLinkLayerandLocalAreaNetworks:**Link Layer: IntroductionandServices,Error-DetectionandError-Correctiontechniques, MultipleAccessProtocols,PPP:The Point-to-PointProtocol.

**UNIT-III**

**Routing and Internetworking:** Network– Layer Routing, Least-Cost-Path algorithms, Non-Least-Cost-Pathalgorithms,IntradomainRoutingProtocols,InterdomainRoutingProtocols, CongestionControlatNetwork Layer.

**InternetProtocol:** Internet working,IPv4, IPv6,Transition fromIPv4toIPv6.

**MulticastingTechniquesandProtocols:** Basic Definition sand Techniques,Intradomain Multicast Protocols, InterdomainMulticastProtocols, Node-LevelMulticastalgorithms.

**UNIT-IV**

**Transport and End-to-End Protocols:** Transport Layer, Transmission Control Protocol (TCP), User Datagram Protocol (UDP), Mobile Transport Protocols, TCP Congestion Control.

**Application Layer:** Principles of Network Applications, The Web and HTTP, File Transfer: FTP, Electronic Mail in the Internet, Domain Name System (DNS), P2P File Sharing.

**UNIT-V**

**Wireless Networks and Mobile IP**: Infrastructure of Wireless Networks, Wireless LAN Technologies, IEEE 802.11 Wireless Standard, Cellular Networks, Mobile IP, Types of Wireless networks.

**Mobile Adhoc Networks:** Overview of Wireless Ad-HocNetworks, Routing in Ad- Hoc Networks, Routing Protocols for Ad hoc Networks.

***Course Outcomes:***

1. *Understanding of holistic approach to computer networking.*
2. *Ability to understand the computer networks and their applications.*
3. *Ability to design simulation concepts related to packet forwarding in networks.*

**TEXT BOOKS:**

1. ComputerNetworking:ATop-DownApproachFeaturingtheInternet,*JamesF.Kurose,Keith W.Ross*, ThirdEdition, Pearson Education, 2007.
2. Computerand Communication Networks,*NaderF. Mir,*Pearson Education, 2007.

**REFERENCES:**

1. Data Communications and Networking, BehrouzA. Forouzan, FourthEdition, Tata McGraw Hill, 2007.
2.An EngineeringApproach to ComputerNetworking,S.Keshav,Pearson Education.
3. ComputerNetworks,AndrewS. Tanenbaum, Fourth Edition, PrenticeHall.
4. C.Sivaram Murthy, B.S.Manoj, "Ad hoc Wireless Networks – Architecture and Protocols", Second Edition, Pearson Education.

**IV B.Tech I Semester**

## 15ACS53-CLOUD COMPUTING

| L | T | P | C |
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***Course Objectives:***

1. *To provide detailed and ample knowledge of the Cloud Computing fundamental issues, technologies, applications and implementations.*
2. *To expose the students to the cutting edge areas of Cloud Computing*
3. *To provide practical in-sight to the students in developing cloud applications*
4. *To shed light on the Security issues in Cloud Computing.*

**UNIT I – Fundamentals of Distributed Computing and Cloud Evolution**

History of Centralized and Distributed Computing - Overview of Distributed Computing, Cluster computing, Grid computing. Technologies for Network based systems- System models for Distributed and cloud computing- Software environments for distributed systems and clouds.

**UNIT II – Introduction to Cloud Computing and Virtualization**

Introduction to Cloud Computing- Cloud issues and challenges - Properties - Characteristics - Service models, Deployment models. Cloud resources: Network and API - Virtual and Physical computational resources - Data-storage. Virtualization concepts - Types of Virtualization- Introduction to Various Hypervisors - High Availability (HA)/Disaster Recovery (DR) using Virtualization, load balancing and migration of VMs .

**UNIT III – Cloud Application Programming**

Cloud Programming and Software Environments- Parallel and Distributed Programming paradigms – Programming on Amazon AWS and Microsoft Azure – Programming support of Google App Engine- Aneka platform- Anatomy of Aneka Container- Building Aneka Clouds- Aneka SDK .

**UNIT IV - Concurrent Computing and Data-Intensive Computing**

**Concurrent Computing:**Introducing parallelism for single-machine computation, Programming applications with threads, Multithreading with aneka, Programming applications with aneka threads.

**Data-Intensive Computing:** What is data-intensive computing?,Technologies for data-intensive computingAnekaMapReduce programming.

**UNIT V- Cloud Security**

Cloud Access: authentication, authorization and accounting - Cloud Provenance and meta-data - Cloud Reliability and fault-tolerance - Cloud Security, privacy, policy and compliance- Cloud federation, interoperability and standards.

***Course Outcomes:*** *After successful completion of the course student will be able to:*

1. *Communicate the main concepts, key technologies, strengths, and limitations of cloud computing and the possible applications for state-of-the-art cloud computing*
2. *Categorise the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, etc.*
3. *Elucidate the core issues of cloud computing such as security, privacy, and interoperability.*
4. *Provide the appropriate cloud computing solutions and recommendations according to the applications used.*

**TEXT BOOKS:**

1. Kai Hwang, Geoffrey C. Fox and Jack J. Dongarra, "Distributed and cloud computing from Parallel Processing to the Internet of Things", Morgan Kaufmann, Elsevier – 2012
2. RajkumarBuyya, Christian Vecchiola, S.ThamaraiSelvi, "Mastering Cloud Computing: Foundations and Applications Programming" Morgan Kaufmann, Elsevier.
3. "Cloud Computing: A Hands-On Approach" by ArshdeepBahga And Vijay Madisetti

**REFERENCES:**

1. Barrie Sosinsky, " Cloud Computing Bible" John Wiley & Sons, 2010
2. Tim Mather, SubraKumaraswamy, and ShahedLatif, Cloud Security and Privacy An Enterprise Perspective on Risks and Compliance, O'Reilly 2009

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IV B.Tech I Semester

## 15ACS54-INTERNET OF THINGS
## (CBCC (DEPARTMENT SPECIFIC))

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*Course Objectives:*

- *To understand the fundamentals of Internet of Things.*
- *To build a small low cost embedded system using Arduino / Raspberry Pi or equivalent boards.*
- *To apply the concept of Internet of Things in the real world scenario.*

**UNIT I :Fundamentals of IOT**

Introduction – Characteristics-Physical Design - Protocols – Logical Design – Enabling technologies – IoT Levels – Six Levels of IoT - Domain Specific IoTs.

**UNIT II: IOT and M2M**

M2M, IoTvs M2M, SDN and NFV for IoT, IOT system Management with NETCONF-YANG.

**UNIT III: IoTDesign Methodology**

IoT Systems Management – IoT Design Methodology – Specifications Integration and Application Development.

**UNIT IV: Data Analytics for IoT**

Apache Hadoop, Using HadoopMapReduce for Batch Data Analysis, Apache Oozie, Apache Spark, Apache Storm, Using Apache Storm for Real-time Data Analysis.

**UNIT V :Tools for IoT**

Chef, Puppet, IOT code generator Case studies: Chef. Puppet – Multi-tier Deployment, NETCONF-YANG, Raspberry Pi.

*Course Outcomes:*

- *Design a portable IoT using Arduino/ equivalent boards and relevant protocols.*
- *Develop web services to access/control IoT devices.*
- *Deploy an IoT application and connect to the cloud.*
- *Analyze applications of IoT in real time scenario.*

**TEXT BOOKS:**

1. ArshdeepBahga, Vijay Madisetti, "Internet of Things – A Hands-on Approach", Universities Press, 2015.

**REFERENCES:**

1. Manoel Carlos Ramon, "Intel® Galileo and Intel® Galileo Gen 2: API Features and Arduino Projects for Linux Programmers", Apress, 2014.
2. Marco Schwartz, "Internet of Things with the Arduino Yun", Pack Publishing, 2014.

3. Simon Monk, "Programming the Raspberry Pi: Getting Started with Python", McGraw-Hill, 2013.
4. CharalamposDoukas,"Building Internet of Things With the Arduino", Second Edition, 2012.
5. Dr.John Bates, "Thingalytics: Smart Big Data Analytics for the Internet of Things", Software AG Publisher, 2015.

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**IV B.Tech I Semester**

## 15ACS55-NATURAL LANGUAGE PROCESSING
## (CBCC (DEPARTMENT SPECIFIC))

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**Course Objectives:** Upon completion, students will be able to explain and apply fundamental algorithms and techniques in the area of natural language processing (NLP). In particular, students will:

- Understand approaches to syntax and semantics in NLP.
- Understand current methods for statistical approaches to machine translation.
- Understand language modeling.
- Understand machine learning techniques used in NLP.

**UNIT – I**

Introduction to Natural Language Understanding, Syntactic Processing: Grammars and Parsing

**UNIT-II:**

Features and Augmented Grammars, Toward Efficient Parsing, Ambiguity Resolution

**UNIT –III**

Statistical Methods: Probabilistic Context-Free Grammars, Best-First Parsing.

**UNIT-IV**

Semantic Interpretation: Linking Syntax and Semantics, Ambiguity Resolution, other Strategies for Semantic Interpretation.

**UNIT-V**

Context and World Knowledge: Using World Knowledge, Discourse Structure, Defining a Conversational Agent.

**TEXT BOOK:**

1. Natural Language Understanding – James Allen, Second Edition, Pearson Education.

**REFERENCE BOOKS:**

1. Speech and Language Processing – Daniel Jurafsky, James H.Martin.
2. Foundations of Statistical Natural Language Processing – Christopher Manning, HinrichSchutze, MITPress.
3. Charniack, Eugene, Statistical Language Learning, MIT Press, 1993.
4. Jurafsky, Dan and Martin, James, Speech and Language Processing, 2nd Edition, Prentice Hall,2013-2014,2008.
5. Manning, Christopher and Henrich, Schutze, Foundations of Statistical Natural Language Processing, MIT Press, 1999

**IV B.Tech I Semester**

**15ACS56-SOFTWARE PROJECT MANAGEMENT**
**(CBCC (DEPARTMENT SPECIFIC))**

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*Course objectives:*

1. *To edify the core concepts of Software project management such as scheduling a software project, effort estimation, cost estimation.*
2. *To enhance the skills of analysing, Planning, developing a cost effective software project*
3. *To implant strong professional qualities and team dynamics that enables an individual to work successfully in teams with a single point objective*

**UNIT I- Project Evaluation and Project Planning :**
Importance of Software Project Management – Activities Methodologies – Categorization of Software Projects – Setting objectives – Management Principles – Management Control – Project portfolio Management – Cost benefit evaluation technology – Risk evaluation – Strategic program Management – Stepwise Project Planning.

**UNITT II- Software Economics - Effort & Cost Estimation :**
**Evolution of Software Economics:** Software Economics, pragmatic software cost estimation
**Improving Software Economics:** Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.
**Estimation Techniques:** COSMIC Full function points, COCOMO II A Parametric Productivity Model Staffing Pattern.

**UNIT III - Activity Planning and Risk Management :**
Objectives of Activity planning – Project schedules – Activities – Sequencing and scheduling – Network Planning models – Forward Pass & Backward Pass techniques – Critical path (CRM) method – Risk identification – Assessment – Monitoring – PERT technique – Monte Carlo simulation – Resource Allocation – Creation of critical patterns – Cost schedules.

**UNIT IV- Tracking Workflow of The Software Project :**
**Work Flows of the process:** Software process workflows, Inter trans workflows.
**Checkpoints of the Process:** Major Mile Stones, Minor Milestones, Periodic status assessments.
**Iterative Process Planning:** Work breakdown structures, planning guidelines, cost and schedule estimating, Interaction planning process, Pragmatic planning.
**Project Organizations and Responsibilities:** Line-of-Business Organizations, Project Organizations, evolution of Organizations.
**Process Automation:** Automation Building Blocks, the Project Environment

**UNIT V- Staffing and Project Control :**

**Staffing-** Managing people – Organizational behavior – Best methods of staff selection – The Oldham Hackman job characteristic model – Ethical and Programmed concerns – Working in teams – Decision making – Team structures – Virtual teams – Communications genres – Communication plans

**Project Control and Process instrumentation:** The server care Metrics, Management indicators, quality indicators, life cycle expectations pragmatic Software Metrics, Metrics automation.

***Course outcomes:***

*After completion of this course, a student will be able to:*

1. *Gain knowledge on project planning and management, client management and project Scheduling and monitoring.*
2. *Analyze the testing based approach to development, team management and ongoing Project schedule tracking.*
3. *Apply Software Metrics for a given Project to calculate Cost estimation models.*
4. *Communicate effectively with IT-industries or organizations.*
5. *Engage in lifelong learning for effective project management and finance monitoring.*

**TEXTBOKS:**

1. Bob Hughes, Mike Cotterell and Rajib Mall: Software Project Management – Fifth Edition, Tata McGraw Hill, New Delhi, 2012.
2. Software Project Management, Walker Royce, Pearson Education.

**REFERENCES:**

1. Applied Software Project Management, Andrew Stellman& Jennifer Greene, O'Reilly, 2006
2. Head First PMP, Jennifer Greene & Andrew Stellman, O"Reilly,2007
3. Software Engineering Project Management, Richard H. Thayer & Edward Yourdon, second edition, Wiley India, 2004.
4. Agile Project Management, Jim Highsmith, Pearson education, 2004.

**IV B.Tech I Semester**

## 15ACS57-DISTRIBUTED SYSTEMS
## (CBCC (DEPARTMENT SPECIFIC))

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***Course Objectives:***

1. *To have a broad and up-to-date coverage of the principles and practice in the area of Distributed Systems.*
2. *To understand the heterogeneous systems such as computers, mobile phones, other devices and Internet) and their functionalities.*

**UNIT I Basic Concepts**

Definition of a distributed systems, Examples, Resource sharing and the Web, Challenges, System models, Architectural and fundamental models, Networking Interprocess communication, External data representation and marshalling, Client-server and Group communication.

**UNIT II Communication in Distributed System**

System Model – Inter process Communication – the API for internet protocols – External data representation and Multicast communication. Network virtualization: Overlay networks. Case study: MPI Remote Method Invocation And Objects: Remote Invocation – Introduction – Request-reply protocols – Remote procedure call – Remote method invocation. Case study: Java RMI – Group communication – Publish-subscribe systems – Message queues – Shared memory approaches -Distributed objects – Case study: Enterprise Java Beans -from objects to components

**UNIT III Peer to Peer Services and File System**

Peer-to-peer Systems – Introduction – Napster and its legacy – Peer-to-peer – Middleware – Routing overlays. Overlay case studies: Pastry, Tapestry- Distributed File Systems –Introduction – File service architecture – Andrew File system. File System: Features-File model -File accessing models – File sharing semantics Naming: Identifiers, Addresses, Name Resolution – Name Space Implementation – Name Caches – LDAP.

**UNIT IV Synchronization and Replication**

Introduction – Clocks, events and process states – Synchronizing physical clocks- Logical time and logical clocks – Global states – Coordination and Agreement – Introduction – Distributed mutual exclusion – Elections – Transactions and Concurrency Control– Transactions -Nested transactions – Locks – Optimistic concurrency control – Timestamp ordering – Atomic Commit protocols -Distributed deadlocks – Replication – Case study – Coda.

**UNIT V Process& Resource Management**

Process Management: Process Migration: Features, Mechanism – Threads: Models, Issues, Implementation. Resource Management: Introduction- Features of Scheduling Algorithms –Task Assignment Approach.

***Course Outcomes:***

*The primary learning outcome of the course is two-fold:*

1. *Students will identify the core concepts of distributed systems: the way in which severalmachines orchestrate to correctly solve problems in an efficient, reliable and scalableway.*
2. *Students will examine how existing systems have applied the concepts of distributedsystems in designing*

**TEXT BOOK:**

1. George Coulouris, Jean Dollimore and Tim Kindberg, "Distributed Systems Concepts and Design", Fifth Edition, Pearson Education, 2012.

**REFERENCES:**

1. Pradeep K Sinha, "Distributed Operating Systems: Concepts and Design", Prentice Hall of India, 2007.
2. Tanenbaum A.S., Van Steen M., "Distributed Systems: Principles and Paradigms", Pearson Education, 2007.
3. Liu M.L., "Distributed Computing, Principles and Applications", Pearson Education, 2004.
4. Nancy A Lynch, "Distributed Algorithms", Morgan Kaufman Publishers, USA, 2003.

**IV B.Tech I Semester**

## 15ACS58-ENTERPRISE APPLICATION SYSTEM
## (CBCC (DEPARTMENT SPECIFIC))

| L | T | P | C |
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| 3 | 1 | 0 | 3 |

***Course Objectives:***

1. *Describe approaches to enterprise application integration*
2. *Understand the integration middleware*
3. *Evaluate the integration approaches suitable for a given problem*

**UNIT I: Introduction**

Requirements for EAI - Challenges in EAI – Integration with legacy systems – Integration with partners - Heterogeneous environment – Implementation approaches – Web services, messaging, ETL, direct data integration – Middleware requirements – Approaches to integration – services oriented and messaging.

**UNIT II: Integration Patterns**

Introduction to integration patterns – Architecture for application integration – Integration patterns – Point to point, broker, message bus, publish/subscribe, Challenges in performance, security, reliability - Case studies

**UNIT III: Service Oriented Integration**

Business process integration - Composite applications-services – Web services – Service choreography and orchestration - Business process modeling - BPMN, Business process execution - BPEL – Middleware infrastructure - Case studies

**UNIT IV: Messaging Based Integration**

Messaging – Synchronous and asynchronous – Message structure – Message oriented middleware – Reliability mechanisms – Challenges – Messaging infrastructure – Java Messaging Services – Case studies

**UNIT V: Enterprise Service Bus**

Enterprise Service Bus – routing, scalable connectivity, protocol and message transformations, data enrichment, distribution, correlation, monitoring – Deployment configurations – Global ESB, Directly connected, Federated, brokered ESBs – Application server based – Messaging system based – Hardware based ESBs – Support to SOA, message based and event based integrations - Case studies.

***Course Outcomes:***

1. *Describe different approaches to integration enterprise applications*
2. *Analyse specifications and identify appropriate integration approaches*
3. *Develop a suitable integration design for a given problem*
4. *Identify appropriate integration middleware for a given problem*
5. *Evaluate the integration approaches against specified requirements*

**TEXT BOOKS:**

1. George Mentzas and Andreas Frezen (Eds), "Semantic Enterprise Application Integration for Business Processes: Service-oriented Frameworks", Business Science Reference, 2009
2. WaseemRoshen,"SOA Based Enterprise Integration", Tata McGraw Hill, 2009.
3. G Hohpe and B Woolf, "Enterprise Integration Patterns: Designing, Building, and Deploying Messaging Solutions", Addison Wesley Professional, 2003

**REFERENCES:**

1. D Linthicum, "Next Generation Application Integration: From Simple Information to Web Services", Addison Wesley, 2003
2. Martin Fowler, "Patterns of Enterprise Application Architecture", Addison- Wesley, 2003
3. Kapil Pant and MatiazJuric," Business Process Driven SOA using BPMN and BPEL: From Business Process Modelling to Orchestration and Service Oriented Architecture", Packet Publishing, 2008.

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IV B.Tech I Semester

## 15ACS59-SEMANTIC WEB
## (CBCC (DEPARTMENT SPECIFIC))

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*Course Objectives*

- *To learn Web Intelligence*
- *To learn Knowledge Representation for the Semantic Web*
- *To learn Ontology Engineering*
- *To learn Semantic Web Applications, Services and Technology.*

**UNIT I: Introduction**

Introduction to the Syntactic web and Semantic Web – Evolution of the Web – The visual and syntactic web – Levels of Semantics – Metadata for web information - The semantic web architecture and technologies –Contrasting Semantic with Conventional Technologies–Semantic Modeling -Potential of semantic web solutions and challenges of adoption.

**UNIT II: Ontological Engineering**

Ontologies – Taxonomies –Topic Maps – Classifying Ontologies - Terminological aspects: concepts, terms, relations between them – Complex Objects -Subclasses and Sub-properties definitions –Upper Ontologies – Quality – Uses - Types of terminological resources for – Methods and methodologies for building ontologies – Multilingual Ontologies-Ontology Development process and Life cycle – Methods for Ontology Learning – Ontology Evolution – Versioning.

**UNIT III :Structuring and Describing Web Resources**

Structured Web Documents - XML – Structuring – Namespaces – Addressing – Querying – Processing - RDF – RDF Data Model – Serialization Formats- RDF Vocabulary –Inferencing-RDFS – basic Idea – Classes – Properties- Utility Properties – RDFS ModellingforCombinations and Patterns- Transitivity.

**UNIT IV: Web Ontology Language**

OWL – Sub-Languages – Basic Notions -Classes- Defining and Using Properties – Domainand Range – Describing Properties - Data Types – Counting and Sets- Negative PropertyAssertions – Advanced Class Description – Equivalence – Owl Logic.

**UNIT V: Semantic Web Tools and Applications**

Development Tools for Semantic Web – Jena Framework – SPARL –Querying semantic web - Semantic Desktop – Semantic Wikis -Semantic Web Services – Application in Science – Business

*Course Outcomes:*

- *Understand the concept structure of the semantic web technology and how this technology revolutionizes the World Wide Web and its uses.*
- *Understand the concepts of metadata, semantics of knowledge and resource, ontology, and their descriptions in XML-based syntax and web ontology language (OWL).*
- *Describe logic semantics and inference with OWL.*
- *Use ontology engineering approaches in semantic applications*
- *Program semantic applications with Java API.*

**TEXT BOOKS:**

1. Liyang Yu, A Developer's Guide to the Semantic Web, Springer; 1st Edition.Edition, 2011.
2. John Hebeler, Matthew Fisher, Ryan Blace and Andrew Perez-Lopez, Semantic WebProgramming, Wiley; 1 edition, 2009.
3. Grigoris Antoniou, Frank van Harmelen, A Semantic Web Primer, Second Edition(Cooperative Information Systems) (Hardcover), MIT Press, 2008.
4. Robert M. Colomb, Ontology and the Semantic Web: Volume 156 Frontiers in ArtificialIntelligence and Applications (Frontier in Artificial Intelligence and Applications), IOSPress, 2007.
5. Dean Allemang and James Hendler, Semantic Web for the Working Ontologist: EffectiveModeling in RDFS and OWL, Morgan Kaufmann; 2 edition, 2011.

**REFERENCES:**

1. Michael C. Daconta, Leo J. Obrst and Kevin T. Smith, The Semantic Web: A Guide to theFuture of XML, Web Services, and Knowledge Management, Wiley; 1 edition 2003.
2. Karin Breitman, Marco Antonio Casanova and Walt Truszkowski, Semantic Web:Concepts, Technologies and Applications (NASA Monographs in Systems and SoftwareEngineering), Springer; Softcover, 2010.
3. VipulKashyap, ChristophBussler and Matthew Moran, The Semantic Web: Semanticsfor Data and Services on the Web (Data-Centric Systems and Applications), Springer,2008.

ENGINEERING COLLEGE PULIVENDULA

**IV B.Tech I Semester**

## 15ACS60-SOFTWARE TESTING LAB

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

**PRE-REQUISITES:**

- A Course on "Software Engineering" at UG Level.

***Course objectives:***

1. *To gain knowledge on practical concepts of Testing techniques, Virtualization& Cloud Technologies.*
2. *Can able to apply the testing techniques in real time.*
3. *To acquire skills on QTP, Load Runner, Windows Azure, SalesForce, VMware.*

**LABORATORY EXERCISES:**

**Testing:**

1. Take any system (e.g. ATM system) and study its system specifications and report the various bugs.
2. Write the test cases for any known application (e.g. Banking application)
3. Create a test plan document for any application (e.g. Library Management System)
4. Test the supplied project/Application through testing tool:Quick Test Professional by generating appropriate test cases.
5. Test the supplied project/Application through testing tool: LoadRunner by generating appropriate test cases.
6. Take any project (e.g. University admission, Placement Portal) and execute it. During the life cycle of the project create the various testing documents* and final test report document.
7. A program written in c language for matrix multiplication fails "Introspect the causes for its failure and write down the possible reasons for its failure".
8. Study the implementation of Win Runner and generate test report
9. Identify the usage of stubs or drivers in the context of an integrationtesting scenario
10. Generate test cases using Black box testing technique to Calculate Standard Deduction onTaxable Income. The standard deduction is higher for tax payers who are 65 or older or blind.

    Use the method given below to calculate tax.

    a) The first factor that determines the standard deduction is the filing status. The basicstandard deduction for the various filing status are:

       Single $4,750
       Married, filing a joint return $9,500
       Married, filing a separate return $7,000

    b) If a married couple is filing separate returns and one spouse is not taking standardDeduction, the other spouse also is not eligible for standard deduction.

c) An additional $1,000 is allowed as standard deduction, if either the filer is 65 yrs or thespouse is 65 yrs or older (the latter case applicable when the filing status is "Married" and filing "joint").

***Course outcomes**:*

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

1. *Gain Knowledge on the real time applications of Software Testing & Cloud (PO 1).*
2. *Analyse the software from the perspective of software tester (PO 2).*
3. *Get exposed to Testing & Cloud tools like QTP,Load runner, Windows Azure,SalesForce, VMware .*
4. *Recognize the need of Cloud Computing, Software Testing and can engage in lifelong learning by incorporating best practices of them.*

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R15

**B.Tech IV-ISem(R15)**

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

## 15ACS61 — CLOUD COMPUTING LAB

1.Illustrate the installation and configuration of aneka cloud.

2.Write a program to print "Hello World" using Aneka Thread Programming model use Single Thread?

3.Write a program to print "Hello World" based on Thread model and use threads also print the executor node information along with the Submission Time and Completion Time?

4. Find procedure to run the virtual machine of different configuration. Check how many virtual machines can be utilized at particular time.

5. Find procedure to attach virtual block to the virtual machine and check whether it holds the data even after the release of the virtual machine.

6. Install a C compiler in the virtual machine and execute a sample program.

7. Show the virtual machine migration based on the certain condition from one node to the other.

8. Find procedure to set up the one node Hadoop cluster.

9. Mount the one node Hadoop cluster using FUSE.

10. Write a program to use the API's of Hadoop to interact with it.

**IV B.Tech II Semester**

## 15ACS81-INFORMATION SECURITY

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

***Course Objectives:***

1. *To introduce students with basic concepts in information system and its relevance in modern society.*
2. *To understand several security requirements and operations - analysis, design, and implementation of the Security System Development Life Cycle (SecSDLC)*
3. *To understand and implement authentication, integrity and confidentiality along with related protocols*

**Prerequisites:**

Computer networks, software engineering

**UNIT- I:**

**Introduction**

History, critical characteristics, components, approaches of implementation, security systems development life cycle, security professionals.

**Security Issues:**

Need for security, threat, risk, attack, legal and ethical issues.Legal, Ethical and Professional Issues: law and ethics in information security, relevant u.s laws-international laws and legal bodies, ethics and information security.

**UNIT- II**

Security technology-firewalls and VPNs: physical design, firewalls, protecting remote connections.Planning for security: security policy, standards and practices, security blue print, security education, continuity strategies.

**UNIT- III**

**Security technology-intrusion detection**: access control and other security tools - intrusion detection and prevention systems, scanning and analysis tools, biometric access controls.**Cryptography:** foundations of cryptology, cipher methods, cryptographic algorithms, cryptographic tools, protocols for secure communications, attacks on cryptosystems.

**UNIT- IV**

**Electronic mail security:**

Pretty Good Privacy (PGP); S/MIME

**Security tools:**

Intrusion detection systems, honey pots, honey nets and padded cell systems, scanning and Analysis tools.

**UNIT- V**

**Implementing information security:** information security project management, technical topics of implementation, non-technical aspects of implementation, security certification and accreditation.

**Security and personnel:** positioning and staffing security function, credentials of information security professionals, internal control strategies.

Information security maintenance: security management models, the security maintenance model, digital forensics.

***Course Outcomes:***

1. *Aware of information security issues and understand its technologies.*
2. *Able to discover, analyse and deal with threads using advanced security issues and technologies.*
3. *Understand the current legal issues towards information security.*

**TEXT BOOKS:**

1. Michael e. Whitman, h j mattord , 2nd edition principals of information security,Thompson course technology, 2007.
2. Michael e. Whitman and hebert j mattord, "principles of information security", fourth edition, cengage learning 2011.
3. Behrouz a forouzan, debdeepmukhopadhyay, cryptography and network security, 2nd Edition, tatamcgraw hill education private limited , new delhi, 2012.

**REFERENCES:**

1. Thomas r peltier, justingpeltier, john blackley, "information security fundamentals", auerbacj publications 2010.
2. Detmar w straub, seymorgoodman, richard l baskerville, "information security policy proceses and practices", phi, 2008.
3. Marks merkow and jimbreithaupt, "information security principle and practices", pearson education, 2007.
4. Kaufman, perlman , speciner 'network security' phi ,india, 2nd ed. 2010
5. **Online references** : http://www.cryptogram.org

**IV B.Tech II Semester**

## 15ACS82-SCRIPTING LANGUAGES

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

***Course Objectives***

*The course demonstrates an in depth understanding of the tools and the scripting languages necessary for design and development of applications dealing with Bio-information/ Blo-data. The instructor is advised to discuss examples in the context of Bio-data/ Bio-information application development.*

**UNIT—I**

**Introduction to PERL and Scripting:** Scripts and Programs, Origin of Scripting , Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL- Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines.

**UNIT — II**

**Advanced pen:** Finer points of looping, pack and unpack, filesystem, eval, data structures, packages, modules, objects, interlacing to the operating system, Creating Internet ware applications, Dirty Hands Internet Programming, security Issues.

**PHP:** PHP Basics PHP Basics- Features, Embedding PHP Code in your Web pages, Outputting the data to the browser, Datatypes, Variables, Constants, expressions, string interpolation, control structures .Function, Creating a Function, Function Libraries, Arrays, strings and Regular Expressions.

**UNIT — III**

**Advanced PHP Programming**: PHP and Web Forms, Files, PHP Authentication and Methodologies -Hard Coded, File Based, Database Based, IP Based, Login Administration, Uploading Files with PHP, Sending Email using PHP, PHP Encryption Functions, the Mcrypt package, Building Web sites for the Worki.

**UNIT -IV**

**TCL:** TCL Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures, input/output, procedures , strings, patterns, files, Advance TCLeval, source, exec and uplevel commands, Name spaces, trapping errors, event driven programs, making applications Internet aware, Nuts and Bolts Internet Programming, Security Issues, C Interface. Tk-Visual Tool Kits, Fundamental Concepts of Tk, Tk by example, Events and Binding, PerI-Tk.

**UNIT-V**

**Java Script**: Introduction to Java Script,Basic Java Script: Values,Varianles and control Flow. Functions,Data Structures: Objects and Arrays.

*Course Outcomes*

- *Ability to understand the differences between scripting languages.*
- *Ability to apply your knowledge of the weaknesses of scripting languages to select implementation.*
- *Master an understanding of python especially the object oriented concepts.*

**TEXTBOOKS:**

- The World of Scripting Languages, David Barron,Wiley Publications.
- Python Web Programming , Steve Holden and David Beazley, New Riders Publications.
- Beginning PHP and MySQL, 3rd Edition , Jason Gilmore, Apress Publications (Dream tech.).

**REFERENCES:**

- Open Source Web Development with LAMP using Linux, Apache, MySQL, Pen and PHP, J.Lee and B.Ware(Addison Wesley) Pearson Education.
- Programming Python,M.Lutz,SPD.
- PHP 6 Fast and Easy Web Development, Julie Meloni and Matt Telles, Cengage Learning Publications.
- PHP 5.1, l.Bayross and S.Shah, The X Team, SPD.
- Core Python Programming, Chun, Pearson Education.

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**IV B.Tech II Semester**

## 15ACS83-BIG DATA ANALYTICS

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

***Course Objectives:***

*The objectives of this subject are to:*

1. *Introduce students the concept and challenge of big data (3 V's: volume, velocity, and variety).*
2. *Teach students in applying skills and tools to manage and analyze the big data*
3. *The students should acquire knowledge on how to design BI solutions for different BI targets and users.*

**UNIT-I**

Introduction to Big Data. What is Big Data? Why Big Data is Important. Meet Hadoop. Data.Data Storage and Analysis.Comparison with other systems.GridComputing ,Cloud Computing .A brief history of Hadoop.Apachehadoop and the HadoopEcoSystem.Linux refresher; VMWare Installation of Hadoop.

**UNIT-II**

The design of HDFS.HDFS concepts.Command line interface to HDFS.Hadoop File systems.Interfaces.Java Interface to Hadoop. Anatomy of a file read. Anatomy of a file writes. Replica placement and Coherency Model. Parallel copying with distcp, keeping an HDFS cluster balanced.

**UNIT-III**

Introduction. Analyzing data with unix tools. Analyzing data with hadoop. Java MapReduce classes (new API). Data flow, combiner functions, Running a distributed MapReduce Job. Configuration API.Setting up the development environment.Managing configuration .Writing a unit test with MRUnit.Running a job in local job runner.Running on a cluster.Launching a job.TheMapReduceWebUI.

**UNIT-IV**

Classic Mapreduce.Jobsubmission.JobInitialization.Task Assignment. Task execution .Progress and status updates. Job Completion. Shuffle and sort on Map and reducer side. Configuration tuning. Map Reduce Types. Input formats. Output formats, Sorting. Map side and Reduce side joins.

**UNIT-V**

The Hive Shell. Hive services. Hive clients. The meta store, Hive Architecture And Installation , Comparison with traditional databases. Hive Ql-Querying Data,Sorting And Aggregating . Hbasics.Concepts.Implementation. Java and Map reduce clients. Loading data, web queries, Include Pig tool .

***Course Outcomes:***

1. *Organizational and individual decision-making*
2. *Key concepts and current practices of business intelligence*
3. *The individual, organizational and societal impacts of BI systems*
4. *Analytical techniques used in business intelligence systems*
5. *Integration of business intelligence into decision-making processes*

**TEXT BOOKS:**

1. Tom White, Hadoop,"The Definitive Guide", 3rd Edition, O'Reilly Publications, 2012.
2. Dirk deRoos, Chris Eaton, George Lapis, Paul Zikopoulos, Tom Deutsch ,"Understanding Big Data Analytics for Enterprise Class Hadoop and Streaming Data", 1st Edition, TMH,2012.

**REFERENCES:**

1.Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk,Bruce Brown, Rafael Coss.

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# B.TECH - R15 REGULATIONS

# CHOICE BASED CREDIT COURSES (INTER DEPARTMENT)

# OFFERED

# IN

# II YEAR I SEMESTER

**w.e.f.**

# 2015 ADMITTED BATCH

**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**COLLEGE OF ENGINEERING (AUTONOMOUS) :: PULIVENDULA**

**PULIVENDULA – 516390, Y.S.R. (DIST), ANDHRA PRADESH, INDIA**

# ANNEXURE-I

**Choice Based Credit Course of Inter Department**
**offered in**

## B.TECH II YEAR I SEMESTER

| BRANCH | SUBJECT CODE | SUBJECT NAME |
|---|---|---|
| PHYSICS | 15ABS12 | Basics of Nano Science and Nano Technology |
| MATHEMATICS | 15ABS14 | Set Theory and Mathematical Logic |
| | 15ABS23 | Mathematical Modeling |
| CHEMISTRY | 15ABS15 | Green Chemistry and Catalysis for Sustainable Environment |
| | 15ABS16 | Instrumental Methods of Chemical Analysis |
| | 15ABS17 | Chemistry of Nano Material and Application |
| ENGLISH | 15AHS08 | Campus Recruitment Training & Soft Skills |
| | 15AHS09 | Competitive & Spoken English |
| CE | 15ACE09 | Green Buildings |
| | 15ACE10 | Disaster Management and Mitigation |
| | 15ACE11 | Water Harvesting and Conservation |
| ECE | 15AEC08 | Basic Electronics |
| | 15AEC09 | Fundamentals of Digital Electronics |
| | 15AEC10 | Electronic Measurements & Instrumentation |
| ME | 15AME11 | Robotics |
| | 15AME12 | Mechanical Manufacturing Process |
| | 15AME13 | Non-Conventional Sources of Energy |
| EEE | 15AEE08 | Principles of electrical engineering |
| | 15AEE01 | Electrical engineering materials |
| | 15AEE09 | Electrical measuring instruments |
| CSE | 15ACS04 | Data Structures |
| | 15ACS11 | Object oriented Programming |
| | 15ACS08 | Operating Systems |

II B.Tech – I Sem

**15ABS12-Basics of Nano science and Nanotechnology**

(Choice Based Credit Courses (Inter-department))

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

**OBJECTIVES:**

1. To understand the fundamentals of nanoscience and nanotechnology
2. To give a general introduction to different classes of nanomaterials
3. To impart basic knowledge on various synthesis and characterization techniques involved in Nanotechnology
4. To make the learner familiarize with nanotechnology potentialities.

**Unit-I Basics of Nanoscience:**

Introductory quantum mechanics for nano science- Historical back ground of nanoscience - Density of states for zero, one, two and three dimensional materials, Quantum confinement, Quantum wells, wires, dots, Factors affecting to particle size, Metal semiconductor (MS) and metal insulator (MI).

**Unit-II Properties of Nanomaterials:**

Mechanical, Thermal, Electrical, Optical, Magnetic and Structural properties, Carbon based materials- Fabrication, structure, electrical properties and mechanical properties.

**Unit-III Synthesis of Nanomaterials:**

**Physical methods:** Bottom up-Ball Milling, Physical vapour deposition, Laser pyrolysis, Sputter deposition.

**Chemical methods:** Hydrothermal, Sol-gel method, solution combustion method, Co-precipitation method.

**Unit-IV Characterization:**

Spectroscopic techniques: UV- Visible Spectroscopy, Fourier Transform infrared (FTIR) spectroscopy, Principles and analysis of X-ray diffraction (XRD); electron diffraction, Scanning Electron Microscope (SEM) – Transmission Electron Microscope (TEM).

**Unit –V Applications:**

Nano engineered materials – coatings – catalysts - nano scale thin films for water-repellent, antireflective and self cleaning surfaces. Communication systems, solar cells and energy storage applications.

**TEXT BOOKS**


1. ***A Textbook of Nanoscience and Nanotechnology,*** Pradeep T.,Tata Mc Graw Hill Education Pvt. Ltd., 2012.
2. Introduction to Nano Technology, Charles P. Poole Jr & Frank J. Owens. John Wiley and Sons, 2003.
3. The Chemistry of nanomaterials: Synthesis, Properties and Applications, C.N.R. Rao, A. Muller and A.K. Cheetham, Vol – 1, Wiley Online Library, 2005.
4. The Physics of Micro/Nano- Fabrication, Ivor Brodie & Julius J.Muray, Springer, 1992.

**REFERENCES**


1. ***Nanoscience: Nanotechnologies and Nanophysics,*** Dupas C., Houdy P., Lahmani M., Springer-Verlag Berlin Heidelberg, 2007.
2. Quantum Physics, A. Ghatak & S. Lokanathan, 5th Edition, Mac Millan India, 2004.
3. Nanophysics and Nanotechnology, Edward L. Wolf, Wiley-VCH, 2006.
4. Elements of X-ray Diffraction, B.D.Cullity, Addision Wesely, 1978.
5. Concise Encyclopedia of Materials Characterization, Robert Cahn, 2nd Edition (Advances in Materials Science and Engineering), Elsevier Publication, 2005.


**Outcomes:**

- Students will have the exposure to the multidisciplinary area of nanoscience.
- The necessary foundation for advanced materials engineering subject.
- Familiarity about the necessary characterization tools for nanoscale.
- Overview on the importance of nanoscience and nanotechnology through recent applications.

**II** B.Tech – **I Sem**

## 15ABS14- SET THEORY AND MATHEMATICAL LOGIC

**(Choice Based Credit Courses (Inter-department))**

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

**Objectives:**

- This course aims at providing the student with the concepts of statements, sets relations and Mathematical induction.

**UNIT – I**

Statement, truth values, negation, conjunction, disjunction, conditional and biconditional, contrapositive statement.

**UNIT – II**

Set, subset, superset, operations viz. union, intersection, complement etc. of sets; power set, cartesian product.

**UNIT – III**

Equivalence relations, equivalence classes, partition, fundamental theorem of equivalence relation, partial order relation, Poset, chain, upper & lower bounds in poset, greatest & least elements, maximal & minimal elements, supremum & infimum, Zorn's lemma, introduction to lattice theory. Functions, injection, surjection and bijection; image and pre-image of set under function and inverse mapping, composite mapping.

**UNIT – IV**

Peano's axioms, principle of mathematical induction, well ordering principle, axiom of choice.

**UNIT – V**

Finite and infinite sets, countable and uncountable sets, Schroeder Bernstein Theorem, Continuum hypothesis.

**TEXT BOOKS:**

1. P. R. Halmos, Naive Set Theory Springer, 2009.
2. Bartle, R. G. and Sherbert, D. R. Introduction to Real Analysis, (John Wiley and Sons, Third (Indian) Edition), 2007.

**REFERENCES:**

1. K. Hrbacek and T. Jech, Introduction to Set Theory , 3rd edition, CRC press, 1999.

**Outcomes:** The student will be able to analyze the Mathematical logical structures with the concepts of statements, sets, relations and Mathematical Induction.

2.7.18

**II** B.Tech – **I Sem**

## 15ABS23-Mathematical Modeling
## (Choice based Credit Course)

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

**Objectives:**

- This course aims at providing the basic knowledge to understand a Mathematical model and formulate a Mathematical model related to a real word problems of engineering, biological science etc.

**UNIT – I**

**Mathematical Modeling:** Need, Techniques, Classifications and Simple illustarations,
**Mathematical modeling Through Ordinary differential equations of First Order :** Mathematical modeling Through differential equations; Linear growth and decay models; Non-Linear Growth and Decay models; Mathematical modeling in dynamics through ordinary differential equations of first order.

**UNIT – II**

**Mathematical modeling Through System of Ordinary differential equations of First Order:** Mathematical modeling in population dynamics; Mathematical modeling of Epidemics through system of ordinary differential equations of first order; Compartment models through Systems of ordinary differential equations; Mathematical modeling in dynamics through systems of ordinary differential equations of first order.

**UNIT – III**

**Mathematical modeling Through Ordinary differential equations of Second Order:** Mathematical modeling of Planetary motion ; Mathematical modeling of Circular motion and motion of satellites; Mathematical modeling through linear differential equations of second order.

**UNIT – IV**

**Mathematical modeling Through Difference equations :** Need for Mathematical modeling Through Difference equations and simple models; Basic theory of Linear difference equations with constant coefficients; Mathematical modeling Through Difference equations in population dynamics and genetics; Mathematical modeling Through Difference equations in Probability theory.

**UNIT – V**

**Mathematical modeling Through Functional, Integral, Delay- Differential and Differential-Difference Equations:** Mathematical modeling Through Functional equations;
Mathematical modeling Through Integral equations; Mathematical modeling Through Delay-Differential and Differential-Difference Equations.

**TEXT BOOKS:**

1. J. N. Kapoor. Mathematical Modeling, NEW AGE INTERNATIONAL PUBLISHERS.

**REFERENCES:**

1. A. C. Fowler. Mathematical Models in Applied Sciences, Cambridge University Press.

**Outcomes:** The student will be able to analyze the real word problem through the technique of modeling of that problem to have better insight of the real word problem.

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**II** B.Tech – **I Sem**

**15ABS15-GREEN CHEMISTRY AND CATALYSIS FOR SUSTAINABLE ENVIRONMENT**

**(Choice Based Credit Courses (Inter-department))**

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

**Course Objectives:**

- Learn an interdisciplinary approach to the scientific and societal issues arising from industrial chemical production, including the facets of chemistry and environmental health sciences that can be integrated to promote green chemistry and the redesign of chemicals, industrial processes and products.
- Understand the use of alternatives assessments that combine chemical, environmental health, regulatory, and business considerations to develop safer products.

**UNIT 1: Principles And Concepts Of Green Chemistry**

Introduction, Green chemistry Principles, sustainable development and green chemistry, atom economy, atom economic: Rearrangement and addition reactions and un-economic reactions: Substitution, elimination and Wittig reactions, Reducing Toxicity. Waste - problems and Prevention: Design for degradation, Polymer recycling.

**UNIT 2: Catalysis And Green Chemistry**

Introduction to catalysis, Heterogeneous catalysts: Basics of Heterogeneous Catalysis, Zeolites and the Bulk Chemical Industry, Heterogeneous Catalysis in the Fine Chemical and Pharmaceutical Industries, Catalytic Converters, Homogeneous catalysis: Transition Metal Catalysts with Phosphine Ligands, Greener Lewis Acids, Asymmetric Catalysis, Heterogenising the Homogenous catalysts, Phase transfer catalysis: Hazard Reduction, C–C Bond Formation, Oxidation Using Hydrogen Peroxide, Bio-catalysis and photo-catalysis with examples.

**UNIT 3: Organic Solvents: Environmentally Benign Solutions**

Organic solvents and volatile organic compounds, solvent free systems, supercritical fluids: Super critical carbondioxide, super critical water and water as a reaction solvent: water based coatings, Ionic liquids as catalyst and solvent.

**UNIT 4: Emerging Greener Technologies And Alternative Energy Sources**

Biomass as renewable resource, Energy: Fossil Fuels, Energy from Biomass, Solar Power, Other Forms of Renewable Energy, Fuel Cells, Chemicals from Renewable feedstocks: Chemicals from Renewable Feedstocks: Chemicals from Fatty Acids, Polymers from Renewable Resources, Some Other Chemicals from Natural Resources, Alternative Economies: The Syngas Economy, The Biorefinery, Design for energy efficiency: Photochemical Reactions: Advantages of and Challenges Faced by Photochemical

Processes, Examples of Photochemical Reactions, Chemistry Using Microwaves: Microwave Heating, Microwave-assisted Reactions, Sonochemistry: Sonochemistry and Green Chemistry, Electrochemical Synthesis: Examples of Electrochemical Synthesis. Industrial applications of alternative environmentally benign catalytic systems for carrying out the important reactions such as selective oxidation, reduction and C-C bond formations (specific reactions).

**UNIT 5: Green Processes For Green Nanoscience**

Introduction and traditional methods in the nanomaterials synthesis, Translating green chemistry principles for practicing Green Nanoscience. Green Synthesis of Nanophase Inorganic Materials and Metal Oxide Nanoparticles: Hydrothermal Synthesis, Reflux Synthesis, Microwave-Assisted Synthesis, Other methods for Green synthesis of metal and metal oxide nanoparticles, Green chemistry applications of Inorganic nanomaterials

**Text Books :**


1. M. Lancaster, Green Chemistry an introductory text, Royal Society of Chemistry, 2002.
2. Paul T. Anastas and John C. Warner, Green Chemistry Theory and Practice, 4th Edition,

   Oxford University Press, USA


**References :**


1. Green Chemistry for Environmental Sustainability, First Edition, Sanjay K. Sharma and Ackmez Mudhoo, CRC Press, 2010.
2. Edited by Alvise Perosa and Maurizio Selva , Hand Book of Green chemistry Volume 8:

   Green Nanoscience, wiley-VCH, 2013.


**Course Outcomes:**

Upon completion of this course the students should recognize and acquire green chemistry concepts and apply these ideas to develop respect for the inter connectedness of our world and an ethic of environmental care and sustainability.

II B.Tech – I Sem

## 15ABS16-INSTRUMENTAL METHODS OF CHEMICAL ANALYSIS

(Choice Based Credit Courses (Inter-department))

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

**Course Objectives:**

- To understand the principles of different instruments
- To apply the instruments for analysis of various species in different matrices
- To apply instrumental methods for framing project works

**UNIT – I: Molecular Spectrophotometry**

Absorption spectra, Lamberts Law, Beer's Law - Combined law equation; Derivations from Beer's Law. Block diagram of a uv- visible spectrophotometer – quantitative analysis ; Direct method for the determination of metal ions; Chromium, Manganese, Iron etc in alloys.

**UNIT – II: Infrared Spectroscopy**

Interaction of infra-red radiation with molecules, Sources of IR Radiation ; Spectral regions; Block diagram of IR Spectrometer , Function of each component; Sampling Techniques; Application of IR Spectroscopy to functional group analysis ( -OH, $-NH_2$, -CHO, -CO-R, -CONH).

**UNIT III: Chromatography**

**Gas Chromatography**: Principles of Gas Chromatography, block diagram of gas chromatograph, Function of each component, Detectors (FID, ECD), stationary phase for column, mobile phase, chromatogram, qualitative analysis, quantitative analysis, retention time, retention volume, capacity factor, area., normalization method. Analysis of gaseous and volatile impurities.

**HPLC:** Principles of high performance liquid chromatography, Block diagram of HPCL, Systems, functions of each component, stationary phases, eluting solvents, pumps, detectors, quantitative applications of HPLC for environmental analysis.

**UNIT IV: Atomic Spectrophotometry**

Principle of atomization, atomic absorption spectrometer, applications for metal ions, Atomic emission, application and principle of ICP-OES, X-ray fluorescence spectrometry- Applications

**UNIT V: Thermal methods of analysis**

TGA- Thermo Gavimetry – Principle, instrumentation and applications
DTA- Differential Thermal Analysis- Principle, instrumentation and applications
DSC- Differential Scanning Coulometry- Principle, instrumentation and applications

**Text BOOK:**


1. Principles of Instrumental Analysis, 6th Edition, Douglas A. Skoog, James Holler. J, Stanley R. Crouch, Cengage Learning, New Delhi, 2014.
2. Instrumentaiotn methods of analysis, Chatwal & Anand, Himalaya Publ;ications, 2003

**REFERENCES:**


1. Instrumental methods of analysis, Willand merrit and dean, caps publications & Distribution, 1999.
2. Vogels Text book of Quantitative chemical analysis, 6th edition ,Mendham J, Denny R.C,Barnes J.D, Thomas M.J.K, pearson education, 2002.
3. Modern Analytical Chemistry, 1St edition, David Harvey, McGraw-Hill Higher Education, 2010.


**Course Outcomes:**

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

1. Differentiate between classical and instrumental methods of Chemical analysis.
2. Apply different types of Instrumental methods for analysis of various samples in water and other environmental samples

II B.Tech – I Sem

## 15ABS17-CHEMISTRY OF NANO MATERIALS AND APPLICATIONS

**(Choice Based Credit Courses (Inter-department))**

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

**Course Objectives:**

- To understand synthetic principles of Nanomaterials by various methods
- And also characterisae the synthetic nanomaterials by various instrumental methods
- To enumerate the applications of nanomaterials in engineering

**Unit I:**

Introduction:Scope of nanoscience and nanotecnology, nanoscience in nature, classification of nanostructured materials, importance of nano materials.

Synthetic Methods: Bottom-Up approach:- Sol-gel synthesis, microemulsions or reverse micelles, co-precipitation method, solvothermal synthesis, hydrothermal synthesis, microwave heating synthesis and sonochemical synthesis.

**UNIT-II**

Top-Down approach:- Inert gas condensation, arc discharge method, aerosol synthesis, plasma arc technique, ion sputtering, laser ablation, laser pyrolysis, and chemical vapour deposition method, electrodeposition method, high energy ball milling.

**UNIT-III**

Techniques for characterization: Diffraction technique, spectroscopy techniques, electron microscopy techniques for the characterization of nanomaterilas, BET method for surface area analysis, dynamic light scattering for particle size determination.

**UNIT-IV**

Studies of Nano-structured Materials: Synthesis, properties and applications of the following nanomaterials, fullerenes, carbon nanotubes, core-shell nanoparticles, nanoshells, self-assembled monolayers, and monolayer protected metal nanoparticles, nanocrystalline materials, magnetic nanoparticles and important properties in relation to nanomagnetic materials, thermoelectric materials, non-linear optical materials, liquid crystals.

**UNIT.V**

Engineering Applications of Nanomaterials

**TEXT BOOKS:**


1. NANO: The Essentials : T Pradeep, MaGraw-Hill, 2007.
2. Textbook of Nanoscience and nanotechnology: B S Murty, P Shankar, Baldev Rai, BB Rath and James Murday, Univ. Press, 2012.


**REFERENCE BOOKS:**


1. Concepts of Nanochemistry; Ludovico Cademrtiri and Geoffrey A. Ozin & Geoffrey A. Ozin, Wiley-VCH, 2011.

2. Nanostructures & Nanomaterials; Synthesis, Properties & Applications: Guozhong Cao, Imperial College Press, 2007.
3. Nanomaterials Chemistry, C. N. R. Rao, Achim Muller, K.Cheetham, Wiley-VCH, 2007.

**Course Out Come:** At the end of the course, the student will be able to:

- Understand the state of art synthesis of nano materials
- Characterize nano materials using ion beam, scanning probe methodologies, position sensitive atom probe and spectroscopic ellipsometry.
- Analyze nanoscale structure in metals, polymers and ceramics
- Analyze structure-property relationship in coarser scale structures
- Understand structures of carbon nano tubes

II B.Tech – **I Sem**

## 15AHS08-CAMPUS RECRUITMENT TRAINING & SOFT SKILLS

**(Choice Based Credit Courses (Inter-department))**

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**Objectives**:

1. To develop awareness in students of the relevance and importance of soft skills.
2. To provide students with interactive practice sessions to make them internalize soft skills.
3. To prepare the students for placements.
4. To train students to use language appropriately for interviews, group discussion and public speaking
5. To help the students to understand interpersonal skills.
6. To support them in building interpersonal skills.
7. To better the ability to work with others

**Outcome:**

After completing this course,

- The students would have Understood of what Soft Skills is,
- Understood the significance of soft skills in the working environment
- Turning out engineering students with a clear concept of soft skills and equipping them with readiness to implement them at work place.

**UNIT I:** Interview Dynamics-Preparation-Power Selling- Cracking the top Questions-Stress Control.

**UNIT II:** Intra Personal Skills: Knowing Strengths & Weaknesses – Goal Setting-Quotient Skills- Positive thinking- Problem Solving-analytical Skills.

**UNIT III:** Intra Personal Skills: Managerial Skills, Group dynamics- Negotiation Skills-Time Management.

**UNIT IV:** Verbal Skills: Dynamics of listening, Speaking, Reading & Writing skills- Email writing.

**UNIT V:** Non Verbal Skills: Body Language- Body Posture, Gestures, Eye Contact, Facial Expressions, Appearance, Space Distance /Proxemics , Touch/Haptics,. Para Language-Tone, Pace, Pause, Volume , Quality .

**REFERENCE BOOKS:**


1. M. Ashraf Rizvi: Effective Technical Communication, Tata McGraw Hill, New Delhi, 2014.
2. Alex.k, soft skills, 3rd ed. S. Chand Publication, New Delhi, 2014.
3. Technical Communication, Principle and Practice, Meenakshi Raman and Sangita Sharma, OUP, 2009.

4. Sherfield, M. Robert at al Cornerstone Developing Soft Skills, 4th ed. Pearson Publication,
New Delhi, 2014.
5. Shalini Varma, Body Language for your success mantra, 4th ed, S. Chand Publication, New Delhi, 2014.

II B.Tech – I Sem

**15AHS09-COMPETITIVE & SPOKEN ENGLISH**

**(Choice Based Credit Courses (Inter-department))**

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**Objectives:**

- To train students to use language effectively in everyday conversations, to participate in group discussions, to help them face interviews, and sharpen public speaking skills
- To help the second language learners to acquire fluency in spoken English and neutralize mother tongue influence.
- To enable them to learn better pronunciation through stress on word accent, intonation, and rhythm.
- To train students to use language appropriately for interviews, group discussion and public speaking
- To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.

**Expected Outcomes:**

- Becoming active participants in the learning process and acquiring proficiency in spoken English of the students.
- Speaking with clarity and confidence thereby enhancing employability skills of the students.
- Accomplishment of sound vocabulary and its proper use contextually
- Flair in Writing and felicity in written expression.
- Enhanced job prospects.
- Effective Speaking Abilities.

**UNIT I:** ~~Creating~~ cracking the unknowing passage-Reading Comprehension- Listening Comprehension.

**UNIT II:** Correction of the Sentences Nouns – Pronouns – Verbs- Tenses- Articles- Prepositions- Sentences.

**UNIT III:** Competitive Vocabulary – Word Building – Memory techniques

**UNIT IV:** Functional English – Sentences – Construction – Neutralization of accent – Intonation.

**UNIT V:** Dynamics of Speaking – Communication Skills – Speech Preparation – Speaking Practices.

**Reference books:**


1. M. Ashraf Rizvi: **Effective Technical Communication**, Tata McGraw Hill, New Delhi, 2014.
2. Wren and Martin, **High School English Grammar and Composition,** S. Chand Publication, New Delhi, 2014.
3. Hari Mohan Prasad, **Objective English for Competitive Examination,** Tata McGraw Hill, New Delhi, 2014.
4. R.S. Aggarwal , **Objective General English**, S. Chand Publication, New Delhi.
5. R.K Bansal, **Spoken English : Manual of Speech and Phonetics**,4th Edition, Orient Black swan Pvt Ltd.-New Delhi, 2013.

II B.Tech – I Sem

**15ACE09-GREEN BUILDINGS**

**(Choice Based Credit Courses (Inter-department))**

| L | T | P | C |
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**UNIT-I Introduction** :Concept of Green Building, Need for Green Building, Benefits of Green Buildings, Green Building Materials and Equipment in India, Key Requisites for Constructing a Green Building, Important Sustainable features for Green Building,

**UNIT-II Green Building Concepts and Practices** Indian Green Building Council, Green Building Moment in India, Benefits Experienced in Green Buildings, Launch of Green Building Rating Systems, Residential Sector, Market Transformation;
**Green Building Opportunities And Benefits**: Opportunities of Green Building, Green Building Features, Material and Resources, Water Efficiency, Optimum Energy Efficiency, Typical Energy Saving Approach in Buildings, LEED India Rating System and Energy Efficiency,

**UNIT-III Green Building Design** Introduction, Reduction in Energy Demand, Onsite Sources and Sinks, Maximise System Efficiency, Steps to Reduce Energy Demand and Use Onsite Sources and Sinks, Use of Renewable Energy Sources. Ecofriendly captive power generation for factory, Building requirement,

**UNIT-IV Air Conditioning** Introduction,CII Godrej Green business centre,Design philosophy,Design interventions,Energy modeling, HVAC System design,Chiller selection,pump selection,Selection of cooling towers,Selection of air handing units,Precooling of fresh air,Interior lighting system,Key feature of the building. Eco-friendly captive power generation for factory,Building requirement.

**UNIT-V Material Conservation** Handling of non process waste, waste reduction during construction,materials with recycled content,local materials,material reuse,certified wood ,Rapidly renewable building materials and furniture; Indoor Environment Quality And Occupational Health: Air conditioning, Indore air quality, Sick building syndrome, Tobacco smoke control, Minimum fresh air requirements avoid use of asbestos in the building, improved fresh air ventilation, Measure of IAQ, Reasons for poor IAQ, Measures to achieve Acceptable IAQ levels,

**Text Books**:

1. Handbook on Green Practices published by Indian Society of Heating Refrigerating and Air conditioning Engineers, 2009.

2. Green Building Hand Book by Tomwoolley and Samkimings, 2009.

**Reference Books**: 1. Complete Guide to Green Buildings by Trish riley
2. Standard for the design for High Performance Green Buildings by Kent Peterson, 2009

II B.Tech – I Sem

**15ACE10-DISASTER MANAGEMENT AND MITIGATION**

**(Choice Based Credit Courses (Inter-department))**

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**UNIT-I - Introduction To Disaster** :Meaning, Nature, Importance of Hazard, Risk, Vulnerability and Disaster- Dimensions & Scope of Disaster Management - India's Key Hazards – Vulnerabilities - National disaster management framework - Disaster Management Cycle.

**UNIT-II - Natural Disaster** :Natural Disasters- Meaning and nature of natural disaster; their types and effects. Floods, drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, Heat and cold waves, Climatic change: global warming, Sea level rise, ozone depletion.

**UNIT-III - Anthropogenic DisasteR** :Man Made Disasters- Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, air pollution, water pollution, deforestation and industrial waste water pollution.

**UNIT-IV - Approaches In Disaster Management** :Pre- disaster stage (preparedness) - Preparing hazard zonation maps, Predictability/ forecasting & warning - Preparing disaster preparedness plan - Land use zoning - Preparedness through Information, education. Emergency Stage - Rescue training for search & operation - Immediate relief - Assessment surveys. Post Disaster stage – Rehabilitation - Social Aspect - Economic Aspect and Environmental Aspect.

**UNIT-V - Disaster Mitigation** :Meteorological observatory - Seismological observatory - Hydrology Laboratory and Industrial Safety inspectorate. Technology in Disaster Management - Emergency Management Systems (EMS) in the Disaster Management Cycle - Remote Sensing and Geographic Information Systems(GIS) in Disaster Management. 2

**Text Book:**

1. Sharma.S.R, "Disaster management", A P H Publishers, 2011.

**REFERENCES:**

1. VenuGopalRao.K, "Geoinformatics for Disaster Management", Manglam Publishers and Distributors, 2010.
2. Singh.R.B, "Natural Hazards and Disaster Management: Vulnerability and Mitigation", Rawat Publications, 2006.

3. Gupta.H.K, "Disaster Management", University Press, India, 2003.
4. Gupta.M.C, "Manuals on Natural Disaster management in India", National Centre for Disaster Management,IIPA, New Delhi, 2001.

II B.Tech I-Sem

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**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY**
**COLLEGE OF ENGINEERING: PULIVENDULA (AUTONOMOUS)**

**II Year B.Tech (Civil Engineering) I Semester**

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15ACE11 – **WATER HARVESTING AND CONSERVATION**
(CBCC)

***OBJECTIVE***: *The course aims at bringing awareness about the need for conservation of Water. The student will be taught different methods of Water Harvesting and also the methods of Water Conservation. He will also learn the principles of Watershed Management.*

**UNIT – I**

Origin, Occurrence & Movement of Groundwater:-Introduction-sources of ground water – Hydro geological Cycle – Infiltration – natural openings in rocks – zones of aeration , saturation and water table – classification of ground water – laboratory and field methods of sampling ground water- aquifers – aquifuges- aquicludes – aquitards – ill effects due to lowering of water table -Artificial recharge.

**UNIT – II**

Water Harvesting: Principles of water harvesting-methods of rainwater harvestingdesign of rainwater harvesting structures-Purification Techniques for direct use-Harvesting of surface runoff-onsite detention basin - ponds - types - Recycling of harvested water

**UNIT – III**

Water Recovery and Reuse: Perspective on recycle and reuse- factors affecting the development of water reclamation and reuse criteria- elements/components of water reclamation and reuse criteria / guidelines- sewage irrigation- Waste water reclamation-waste water recharge for reuse – Treatment Requirements for Water Reuse-methods.

**UNIT – IV**

Sustainable Watershed Approach & Watershed Management Practices: Concept of watershed-Introduction to watershed management- Integrated water resources management- natural resources management-agricultural practices-integrated farming-Conjunctive use of water resources-Community participation-Watershed Management Practices in Arid and Semiarid Regions-Case studies-Short term and long term strategic planning.

**UNIT – V**

Soil and Water Conservation: Scope of soil and water conservation-Mechanics and types of erosion-their causes-Soil erosion control measures - bank protectionvegetative barriers-contour bund- contour trenches-contour stone walls-contour ditchesterraces-outlets and grassed waterways-Gully control structures - temporary and permanent - design of permanent soil conservation structures-Design of farm ponds and percolation ponds.

**TEXT BOOKS**:

1. Watershed Management by Murty, J.V.S, New Age Intl., New Delhi .
2. Water Resources Conservation and Management by Chatterjee, S. N.,Atlantic Publishers.
3. Ground Water by S.Ramakrishnan, SCITECH Publishers.

**REFERENCE BOOKS:**

1. Advances in Soil and Water Conservation by Pierce, F.J. and Frye, W. W. (1998):, Ann Arbor Press, Michigan.
2. Soil and Water Conservation Engineering, 4th Ed. By Schwab, G. O., Fangmeier, D. D., Elliot, W. J. and Frevert, R. K. (1993), John Wiley and Sons Inc., USA
3. Watershed Management in India by Murthy, J.V.S., Wiley Eastern, New Delhi, 1994 .
4. Irrigation Water Management - Principles and Practice by Dilip Kumar Majumdar,, PHI Pvt.Ltd.NewDelhi-1.
5. Irrigation and Water Power Engineering by Madan Mohan Das & Mimi Das Saikia, PHI learning Pvt. Ltd., NewDelhi-1

**Course Outcomes**: *On completion of the course, the student will be able to*

*a) Appreciate the importance of Water Conservation*
*b) Understand the methods of Water Harvesting*
*c) Understand the principles of Watershed Management and its importance in sustainability*

II B.Tech – **I Sem**

## 15AEC08-BASIC ELECTRONICS
**(Choice Based Credit Courses (Inter-department))**

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**UNIT – I:**
Semiconductor devices: Diode, BJT, their structures and principle of operations.
Amplifiers: Functionality, specifications-voltage gain, current gain, input resistance, output resistance, dynamic range, bandwidth, linearity, power efficiency

**UNIT- II:**
Power electronics: Half wave and full wave rectification, filtering, regulation with Zener diode and linear regulators.
Filters: Low pass, high pass, band pass and band stop filters, specifications-cutoff frequency, roll off.

**UNIT – III**
Feedback Amplifiers: Basic concept of negative and positive feedback, application of negative feedback in amplifiers, effect on gain, bandwidth, input resistance, output resistance and de-sensitivity to parameter variations.
Oscillators: Barkhausen criterion, RC phase shift, Wien bridge, Colpitts, Hartley and Crystal oscillators, applications of oscillators.

**UNIT – IV**
Operational amplifier: Differential mode of operation, common mode rejection, typical op-amp specifications-open loop gain, differential input resistance, unity gain-bandwidth, inverting amplifier, non-inverting amplifier, summing amplifier, Instrumentation Amplifier, concept of active filters.

**UNIT – V**
Digital electronics: Review of Boolean algebra and signed number representation schemes in binary, implementation of Boolean functions using various logic gates, concept of combinatorial and sequential circuits, registers and counters from functional viewpoint.

**Text Books:**


1. Electronics Devices and Circuits, J.Millman and Christos. C. Halkias, 3rd edition, Tata McGraw Hill, 2006.
2. Electronics Devices and Circuits Theory, David A. Bell, 5th Edition, Oxford University press., 2008.


**References:**


1. Electronics Devices and Circuits Theory, R.L.Boylestad,Lousis Nashelsky and K.Lal Kishore, 12th edition, 2006, Pearson, 2006.
2. Electronic Devices and Circuits, K. Lal Kishore, 3rd Edition, BSP, 2008.
3. Electronic Devices and Circuits, N.Salivahanan, and N.Suresh Kumar, 3rd Edition, TMH, 2012

II B.Tech – I Sem

## 15AEC09-FUNDAMENTALS OF DIGITAL ELECTRONICS
**(Choice Based Credit Courses (Inter-department))**

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**UNIT-I:**

**Binary Systems:** Introduction of Digital Computers and Digital Systems, Binary numbers, Base Conversion: Binary, Decimal, Hex, Octal. Complements: R's Complement, 2's and 10's Complement, (R-1)'s Complement, 1's and 9's Complement, Binary Codes: Decimal Codes, Error Detection codes, Reflected Code.

**UNIT-II:**

**Binary Logic And Boolean Algebra**: Basic Binary logic, Logic Gates: AND, OR, INVERTER, Postulates, Boolean algebra, Two value Boolean algebra, Basic theorems of Boolean algebra: De-Morgan's Theorems, Boolean functions Boolean forms: Canonical, Standard.

**UNIT-III:**

**Boolean Function Implementation:** Need for simplification, K–Map method: 2–Variable K–map, 3–Variable K–map, 4–variable K–map, K–Map using Don't care condition, Universal Gates: NAND, NOR, NAND Implementation, NOR Implementation.

**UNIT-IV:**

**Basic Combinational Logic:** Design procedure of combinational logic, Adder: Half Adder, Full Adder, Subtractor, Half Subtractor, Full Subtractor, Code Conversion, BCD – Excess-3 conversion.

**UNIT-V:**

**Combinational Logic Using MSI And LSI:** Binary Parallel Adder, Magnitude Comparator: 2 Input Comparator, Decoder: 2–4 Decoder, 3–8 Decoder, Encoder: 4–2 Encoder, 8–3 Encoder, Multiplexer: 4–1 multiplexer, Demultiplexers: 1–4 Demultiplexers.

**Text Book:**

1. Digital Design, M.Morris Mano & Michel D. Ciletti, 5th Edition, Pearson Education, 1999.
2. Switching theory and Finite Automata Theory, Zvi Kohavi and Nirah K.Jha, 2nd Edition, Tata McGraw Hill, 2005.

**Reference Books:**

1. Fundamentals of Digital Circuits, Anand Kumar, Prentice-Hall of India, Latest Edition
2. Digital electronics Principles, Malvino & Leech, Tata McGraw-Hills publication, Latest Edition.

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## 15AEC10-ELECTRONIC MEASUREMENTS & INSTRUMENTATION
**(Choice Based Credit Courses (Inter-department))**

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**Course objectives for electrical measurements and instrumentation:**

1. This course introduces the basic principles of different types of electrical instruments for the Measurement of voltage, current, power factor, power and energy.
2. It also explains the measurements of RLC parameters using bridge principles.
3. The principles of magnetic measurements are also explained.
4. The principle of working of CRO and its applications are explained.

**Course outcomes for electrical measurements and instrumentation:**

1. Use wattmeters, pf meters, and energy meters in a given circuit.
2. Extend the range of ammeters and voltmeters
3. Measure active power, reactive power, power factor, and energy in both 1-phase and 3-phase circuits
4. Determine the resistance values of various ranges, L and C values using appropriate a.c bridges

**UNIT – I:**

Fundamentals of Measurements: Introduction, types of measurements, static & dynamic characteristics of measurement system, types of Errors, error sources and remedies.
Multimeter: Principle of measurement of D.C. Voltage and current, A.C. Voltage and current, Resistance, AC and DC sensitivity, Specifications.

**UNIT – II:**

Fundamentals of Cathode Ray Oscilloscope: Block diagram, CRO probes, Delay line, types of Oscilloscopes. Measurement of: Signal voltage, Current, Phase & Frequency using Lissajous patterns, Industrial applications of CRO.

**UNIT – III:**

Review of DC Bridges: Wheatstone bridge, Wien Bridge, errors and precautions in using bridges,
AC bridges: Measurement of inductance-Maxwell's bridge, Anderson Bridge. Measurement of capacitance- Shearing Bridge. Kelvin Bridge, Q-meter.

**UNIT – IV:**

Signal generator-fixed and variable, AF oscillators, function generators, pulse, random noise, sweep waveform generators, and their standards, specifications and principles of working (Block diagram approach).

**UNIT – V:**

Sensors and Transducers: Active and passive transducers: Measurement of displacement (Resistance, capacitance, inductance; LVDT) Force (strain gauges) Pressure (piezoelectric

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transducers) Temperature (resistance thermometers, thermocouples, and thermistors), Velocity, Acceleration, Vibration, pH measurement Signal Conditioning Circuits.

**Text Books:**

1. A course in electrical & electronic measurements and instrumentation – AK Sawhney, Puneet Sawhney, 4th Edition, Dhanpat Rai & Sons Educational and technical publisher, 2012.
2. Modern Electronic Instrumentation and Measurement Techniques, Albert D.Helfrick and William D.Cooper, Pearson / Prentice Hall of India, 2007

**References:**

1. Measurement Systems- Application and Design, Ernest O. Doebelin, TMH, 2007.
2. Electronic Instrumentation, H.S.Kalsi, 2nd edition, Tata McGraw Hill, 2004.
3. Principles of Measurements and Instrumentation, Alan. S. Morris, 2nd Edition, Prentice Hall of India, 2003.

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II B.Tech – I Sem

## 15AME11-ROBOTICS

**(Choice Based Credit Courses (Inter-department))**

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**Course objectives**

- To design, develop and complete robotic activities and challenges
- This course aims at providing the students the fundamental knowledge of the various subscriptions such as kinematics, Dynamics, controls, sensors, actuators, etc.
- It is aimed to provide adequate background in both analysis and design of robots.

**UNIT – I**

**Fundamentals of Robots:** Introduction, definition, classification and history of robotics, robot characteristics and precision of motion, advantages, disadvantages and applications of robots. Introduction to matrix representation of a point in a space a vector in space, a frame in space, Homogeneous transformation matrices, representation of a pure translation, pure rotation about an axis.

**UNIT – II**

**Kinematics of robot:** Forward and inverse kinematics of robots- forward and inverse kinematic equations for position and orientation, Denavit-Hartenberg(D-H) representation of forward kinematic equations of robots, The inverse kinematic of robots, Degeneracy and Dexterity, simple problems with D-H representation.

**Differential motions and Velocities:** Introduction, differential relationship, Jacobian, differential motions of a frame-translations, rotation, rotating about a general axis, differential transformations of a frame. Differential changes between frames, differential motions of a robot and its hand frame, calculation of Jacobian, relation between Jacobian and the differential operator, Inverse Jacobian.

**UNIT – III**

**Control of Manipulators:** Open- and Close-Loop Control, the manipulator control problem, linear control schemes, characteristics of second-order linear systems, linear second-order SISO model of a manipulator joint, joint actuators, partitioned PD control scheme, PID Control Scheme, computer Torque control, force control of robotic manipulators, description of force-control tasks, force control strategies, hybrid position/force control, impedance force/torque control.

**UNIT – IV**

**Robot Vision:** Industrial applications of vision-controlled robotic systems, process of imaging, architecture of robotic vision system, Image acquisition, description of other components of vision system, image representation, image processing.

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**UNIT – V**

**Robot Cell Design and Programming:** Robot cell layouts-Robot centered cell, In-line robot cell, Considerations in work cell design, Work cell control, Inter locks, Error detection, Work cell controller.

Methods of robot programming, WAIT, SIGNAL, and DELAY commands, Robotic languages, VAL system.

**Text Books:**

1. Industrial Robotics – Mikell P. Groover and Mitchell Weiss, Roger N. Nagel,Nicholas G.Odrey – Mc Graw Hill, 1986.
2. Robotics and control – R K Mittal and I J Nagrath, - Tata Mc Graw Hill

**References:**

1. Introduction to Robotics – Analysis, System, Applications by Saeed B. Niku, PHI Publications
2. Robot Analysis and Control - H. Asada and J.J.E. Slotine John Willey & Sons.
3. Fundamentals of Robotics: Analysis and control, Robert J. Schilling, Prentice Hall, 1990.
4. A robot Engineering text book – Mohsen shahinpoor, Harper & Row Publishers,1987
5. Introduction to Robotics: Mechanics and Control, John.J.Craig, Addison- Wesley, 1999
6. Robotics: Control, sensing, vision, and intelligence – K.S. FU, R.C. Gonzalez and C.S.G Lee. Mc Graw Hill, 1987.
7. Robotic Engineering an integrated approach- Richard D. Klafter Thomas – PHI publications

**Course outcomes**

By studying this course, students will be

- Familiar with the history, concept development and key components of robotics technologies.
- Understand basic mathematic manipulation of spatial coordinate representation and transformation.
- Understand and able to solve basic robot forward and inverse kinematic problems.
- Understand and able to solve robotic dynamics, path planning and control problems.
- Able to undertake practical robotics experiments that demonstrate the above skills.

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**15AME12-MECHANICAL MANUFACTURING PROCESSES**

**(Choice Based Credit Courses (Inter-department))**

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**Objectives:**

The objectives of this course are to introduce to demonstrate the various manufacturing processes. To develop knowledge and importance of surface treatment, processing of powder metals, glass, ceramics plastics. To apply knowledge of basic mathematics to calculate the machining parameters for different machining processes and acquire knowledge on advanced manufacturing processes.

**UNIT – I**

**Surface treatment:** Scope, Cleaners, Methods of cleaning, Surface coating types, and ceramic and organic methods of coating, economics of coating. Electro forming, Chemical vapour deposition, thermal spraying, Ion implantation, diffusion coating, Diamond coating and cladding.

**UNIT – II**

**Processing of Powder metals, Glass and Superconductors**: Introduction, production of metal powders, compaction of metal powders, sintering, secondary and finishing operations, design considerations for powder metallurgy, Process capabilities, economics of powder metallurgy, forming and shaping of Glass, techniques for strengthening and treating Glass, design considerations for Glass, processing of superconductors.

**Processing of ceramics:** Applications, characteristics, classification .Processing of particulate ceramics, Powder preparations, consolidation, Drying , sintering, Hot compaction, Area of application , finishing of ceramics.

**UNIT – III**

**Fabrication of Microelectronic devices:** Crystal growth and wafer preparation, Film Deposition oxidation, lithography, bonding and packaging, reliability and yield, Printed Circuit boards, computer aided design in microelectronics, surface mount technology, Integrated circuit economics. E-Manufacturing, nanotechnology, and micromachining, High speed Machining

**UNIT – IV**

**Processing Of Plastics**, injection and blow moulding, calendaring, thermo forming, compression moulding, transfer moulding, High energy rate forming methods Rapid manufacturing: - Introduction - concepts of rapid manufacturing, information flow for rapid prototyping, classification of rapid prototyping process, sterer holography fused deposition modeling, selective laser sintering, Applications of rapid prototyping process

**UNIT – V**

**Processing of Composites:** Composite Layers, Particulate and fiber reinforced composites, Elastomers, Reinforced plastics, MMC, CMC, Polymer matrix composites.

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**Text Books:**

1. Manufacturing Engineering and Technology, Schmid and kalpakjin, Pearson Education.
2. Manufacturing Technology, Foundry forming and welding, Vol I , P.N. Rao,TMH
3. Rapid Prototyping Principles and Applications, RafiqNoorani, Wiely Pub

**Reference Books:**

1. Production Technology, R.K. Jain, Khanna Publishers,17th edition, 2012
2. Process and materials of manufacturing -Lindberg, PE
3. Principles of Metal Castings, Rosenthal.
4. Welding Process, Parmar, Khanna publication.
5. Manufacturing Technology, R.K. Rajput, Laxmi Pub

**Course Outcomes:**

After completion of this course student will be able to

- Understand the principles of processing of various powder metals, glass, ceramics and semiconductors.
- Understand the applications of rapid prototyping and processing of plastics

**Suggested Links:**

- www.casde.iitb.ac.in/store/events/2003/IAT-Pune.../DFMA.ppt
- www.rose-hulman.edu/~stienstr/ME470/DFA.ppt
- www.design4manufacturability.com/DFM_article.htm
- http://www.learnerstv.com/Free-Engineering-Video-lectures-ltv234-Page1.htm

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II B.Tech – I Sem

## 15AME13-NON-CONVENTIONAL SOURCES OF ENERGY

**(Choice Based Credit Courses (Inter-department))**

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**Course Objective:**

- To explain concept of various forms of renewable energy
- To outline division aspects and utilization of renewable energy sources for both domestics and industrial applications
- To analyse the environmental and cost economics of using renewable energy sources compared to fossil fuels.

**UNIT - I**

**Principles Of Solar Radiation**: Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

**UNIT-II**

**Solar Energy Collection**: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

**Solar Energy Storage And Applications** :

Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications solar heating technique, solar distillation and drying, photovoltaic energy conversion.

**UNIT-III**

**Wind Energy** : Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria

**Bio-Mass** : Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engineoperation and economic aspects.

**UNIT-IV**

**Geothermal Energy** : Resources, types of wells, methods of harnessing the energy, potential in India.

**Ocean Energy** : OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

**UNIT-V**

**Direct Energy Conversion**: Need for DEC, Carnot cycle, limitations, principles of DEC.

Thermo-electric generators, Seebeck, Peltier and Joule Thomson effects, Figure of merit, materials, applications, MHD generators, principles, dissociation and ionization, hall effect, magnetic flux,

MHD accelerator, MHD Engine, power generation systems, electron gas dynamic conversion,

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JNTUA College of Engineering,
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economic aspects.Fuel cells, principles, faraday's law's, thermodynamic aspects, selection of fuels and operating conditions.

**Text Books:**

1. Renewable energy resources, Tiwari and Ghosal, Narosa.
2. Non-Conventional Energy Sources ,G.D. Rai

**References :**

1. Renewable Energy Sources, Twidell& Weir
2. Solar Energy, Sukhatme
3. Solar Power Engineering,B.S.Magal Frank Kreith&J.F.Kreith.
4. Principles of Solar Energy, Frank Krieth& John F Kreider.
5. Non-Conventional Energy, Ashok V Desai, Wiley Eastern 6. Non-Conventional Energy Systems, K Mittal , Wheeler.

**Course Outcome:**

At the end of the course the student will

1. Have knowledge about various renewable energy sources
2. Be able to choose the appropriate renewable energy as an alternate for conventional power in any application.

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II B.Tech – **I Sem**

**15AEE08-PRINCIPLES OF ELECTRICAL ENGINEERING**

**(Choice Based Credit Courses (Inter-department))**

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

**Course objectives for Principles of Electrical Engineering:**

1. Students can learn about fundamental concepts circuits, DC, AC Machines.
2. Students can learn about Electrical instruments.
3. Student learn how to apply electrical principles in their applications.
4. Student can able verify theorems such as super position, thevinins and maximum power transfer and the measurements of RLC parameters using bridge principles

**UNIT I: Fundamentals of Electrical Circuits**

Circuit Concept–R-L-C Parameters -Kirchhoff's Laws – Network Reduction Techniques-Series, Parallel, Series Parallel, Star-to-Delta or Delta-to-Star Transformation. R.M.S, Average Values and Form Factor for Different Periodic Wave Forms – Sinusoidal Alternating Quantities – Phase and Phase Difference. Concept of Power Factor-Concept of Reactance, Impedance, Susceptance and Admittance-Real and Reactive Power, Complex Power. Examples. Star Delta Transformation Technique. Thevenin's, Norton's and Superposition Theorems for D.C Excitations.

**UNIT II: DC Machines**

Principle of Operation of DC Machines, Constructional features, EMF equation, Types of Generators, Magnetization and load characteristics of DC Generators.

DC motors, Types of DC Motors, Characteristics of DC Motors, Losses and Efficiency, Swinburne's Test, Speed control of DC Shunt and series Motors, Flux and Armature voltage control methods.

**UNIT III: Transformers & Induction machines**

Principle of Operation of Single Phase transformer, Types, Constructional Features, EMF equation, Phasor Diagrams for no load and loaded conditions, efficiency of Transformer and regulation, OC and SC Tests, predetermination of Efficiency and Regulation (Simple Problems). Concept of rotating field, Principle of Operation of induction motors.

**UNIT IV: Special Machines**

Principle of operation of Shaded pole motors, Capacitor motors, AC Servo motors, AC Tachometers, Synchros, Stepper motors and its characteristics.

V. Sara
BOS – chairman

**UNIT V: Electrical Measurements**

Moving Coil & Moving Iron Instruments (Ammeter & Voltmeter).Dynamometer Type Watt meters & Energy Meters(operating principles).

**Course outcomes for Principles of Electrical Engineering:**

1. Students able to demonstrate knowledge on fundamental concepts circuits, DC, AC Machines.
2. Students able to demonstrate knowledge on how to measure the electrical quantities using measuring instruments.
3. Students are able to apply electrical principles in their applications.
   Students are able to determine the RLC parameters using bridge principles.

**Text Books**

1. Network Analysis – A Sudhakar, Shyammohan S.Palli, 3 ed., 2009. TMH.
2. Introduction to Electrical Engineering – M.S.Naidu and S. Kamakshaiah, 2008, TMH.

**References:**

1. Electric Machines by I.J. Nagrath & D.P. Kothari, Tata Mc Graw – Hill Publishers, 3rd Edition, 2004.
2. Electrical & Electronic Measurement & Instruments by A.K.Sawhney Dhanpat Rai & Co.

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II B.Tech – **I Sem**

## 15AEE01-ELECTRICAL ENGINEERING MATERIALS

**(Choice Based Credit Courses (Inter-department))**

| L | T | P | C |
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| 3 | 1 | 0 | 3 |

**Course objectives for Electrical Engineering material:**

1. To aquire knowledge on general properties of different conductors.
2. To learn the fundamental properties of dielectric materials and high resistivity materials.
3. To gain knowledge on different insulating materials.
4. To learn about different types of wiring and wiring materials.

**UNIT-I Conducting Materials:**

Introduction – classification of materials – Metals and Non metals, physical, thermal, mechanical and electrical properties of materials – classification of electrical materials – concept of atom – electron configuration of atom, conductors, general properties of conductors, factors effecting resistivity of electrical materials –electrical/mechanical/thermal properties of copper, aluminum, iron, steel, lead, tin and their alloys – applications.

**UNIT-II Dielectric Materials And High Resistivity Materials :**

Introduction – solid, liquid and gaseous dielectrics, leakage current, permittivity, dielectric constant, dielectric loss – loss angle – loss constant, Breakdown voltage and dielectric strength of – solid, liquid and gaseous dielectrics, effect of break down– electrical and thermal effects ,Polarization – electric, ionic and dipolar polarization. Effect of temperature and Frequency on dielectric constant of polar dielectrics. High Resistivity materials – electrical / thermal / mechanical properties of Manganin, Constantan, Nichrome, Tungsten, Carbon and Graphite and their applications in electrical equipment.

**UNIT-III Insulating Materials-I:**

Introduction – characteristics of a good electrical insulating materials – classification of insulating materials – electrical, thermal, chemical and mechanical properties of solid insulating materials, electrical, thermal and mechanical properties of, Asbestos, Bakelite, rubber, plastics, thermo plastics. Resins, polystyrene, PVC, porcelain, glass, cotton and paper.

**UNIT-IV Insulating Materials-II:**

Liquid insulating materials – Mineral oils, synthetic liquids, fluorinated liquids – their Electrical, thermal and chemical properties – transformer oil – properties – effect of moisture on insulation properties Gaseous insulators – classification based on dielectric strength – dielectric loss, chemical stability properties and their applications .

BOS- chairman

**UNIT-V Domestic Wiring:**

Wiring materials and accessories – Types of wiring – Types of Switches - Specification of Wiring – Stair case wiring - Fluorescent lamp wiring-Godown wiring – Basics of Earthing – single phase wiring layout for a residential building

**Course outcomes for Electrical Engineering material**:

1. Able to demonstrate the knowledge on different types of electrical materials.
2. Able to evaluate the leakage current, loss angle, permittivity, dielectric constant and loss constant of different dielectrics.
3. Able to understand the fundamentals of different insulating materials

Able to demonstrate knowledge on types of switches and wiring.

**Text Books**:

1. Electrical engineering materials by G.K. Mittal, Khanna publication 2nd edition.
2. A course in Electrical Engineering Materials by R.K .RAJPUT, Laxmi publications.
3. Electrical technology volume-I by B.L. Theraja, SChand publications.

**Reference Books:**

1. "An Introduction to electrical engineering materials" by C.S. Indulkar and S. Thiruvengadam, SChand & Company.
2. "Electrical engineering Materials" by T.T.T.I, Madras, Tata McGraw Hill
3. "A course in electrical engineering materials" by S.P. Seth, Dhanapatrai & Sons, New Delhi

V. Seth
BOS-chairman

II B.Tech – I Sem

**15AEE09-ELECTRICAL MEASURING INSTRUMENTS**

**(Choice Based Credit Courses (Inter-department))**

| L | T | P | C |
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**Objective:**

Electrical measurements course introduces the basic principles of all measuring instruments. It also deals with the measurement of RLC parameters voltage, current Power factor, power, energy and magnetic measurements and Digital Meters

**UNIT- I Measuring Instruments**

Classification – Deflecting, Control and Damping Torques – Ammeters and Voltmeters – PMMC, Dynamometer, Moving Iron Type Instruments – Expression for the Deflecting Torque and Control Torque – Errors and Compensations, Extension of range using Shunt and Series Resistance. Cathode Ray Oscilloscope- Cathode Ray tube-Time base generator- Horizontal and Vertical Amplifiers – Application of CRO – Measurement of Phase , Frequency, Current & Voltage- Lissajous Patterns

**UNIT – II Measurement Of Power And Energy**

Single Phase Dynamometer Wattmeter, LPF and UPF, Double Element and Three Element Dynamometer Wattmeter, Expression for Deflecting and Control Torques. Types of P.F. Meters – Dynamometer and Moving Iron Type – 1-ph and 3-ph Meters. Single Phase Induction Type Energy Meter – Driving and Braking Torques – Errors and Compensations. Three Phase Energy Meter.

**UNIT – III Instrument Transformers And Potentiometers**

CT and PT – Ratio and Phase Angle Errors – Design Considerations.

**Potentiometers**: Principle and Operation of D.C. Crompton's Potentiometer – Standardization – Measurement of unknown Resistance, Current, Voltage.

A.C. Potentiometers: Polar and Coordinate types- Standardization – Applications.

**UNIT – IV D.C & A.C Bridges**

Method of Measuring Low, Medium and High Resistance – Sensitivity of Wheatstone's Bridge – Kelvin's Double Bridge for Measuring Low Resistance, Measurement of High Resistance – Loss of Charge Method. Measurement of Inductance - Maxwell's Bridge, Anderson's Bridge. Measurement of Capacitance and Loss Angle - Desauty Bridge. Wien's Bridge – Schering Bridge.

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**UNIT – V Magnetic Measurements**

Ballistic Galvanometer – Equation of Motion – Flux Meter – Constructional Details, Comparison with Ballistic Galvanometer. Determination of B-H Loop Methods of Reversals - Six Point Method – A.C. Testing – Iron Loss of Bar Samples.

**Text Books:**


1. Electrical & Electronic Measurement & Instruments by A.K.Sawhney Dhanpat Rai & Co. Publications.
2. Electrical Measurements and measuring Instruments – by E.W. Golding and F.C. Widdis, 5th Edition, Reem Publications.


**Reference Books:**


1. Electronic Instrumentation by H. S. Kalsi, Tata Grawhill Mc, 3rd Edition.
2. Electrical Measurements – by Buckingham and Price, Prentice – Hall
3. Electrical Measurements: Fundamentals, Concepts, Applications – by Reissland, M.U, New Age International (P) Limited, Publishers
4. Electrical & Electronic Measurement & Instrumentation by R. K. Rajput, 2nd Edition, S. Chand & Co.


V. Sarma
BOS - Chairman

II B.Tech – I Sem

**15ACS04-DATA STRUCTURES**

**(Choice Based Credit Courses (Inter-department))**

| L | T | P | C |
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**UNIT-I**

**Stacks & Queues:** stacks, stacks using dynamic arrays, Queues, circular queues using dynamic arrays, amazing problem, evaluation of expressions.

**Linked List:** single linked list and chains, representing chains in C, Linked stacks and queues, polynomials, additional list operations, equivalence classes, sparse matrices, double linked list.

**UNIT –II**

**Trees :** Introduction, Binary tree, Binary tree traversals , Additional binary tree operations, Threaded binary trees, Heaps, Binary search trees, Selection trees, Forests, Representation of disjoint sets, Counting binary trees.

**UNIT-III**

**Graphs:** The graph abstract datatype, Elementary graph operations, Minimam cost spanning trees, Shortest paths and transitive closure.

**Sorting:** Motivation, Insertion sort, Quick sort, Merge sort , Heap sort, sorting on several keys, list and table sorts, external sorting.

**UNIT –IV**

**Hashing:** Introduction, Static hashing, dynamic hashing, Bloom Filters.

**Priority Queues:** Single ended and double ended priority queues, leftist trees, Binominal Heaps, Fibonacci Heaps, Pairing Heaps, Symmetric Min-Max Heaps, and Interval Heaps.

**UNIT-V**

**Efficient binary search trees:** Optimal binary search trees, AVL Trees, RED Black Trees, Splay Trees, M- Way search trees, B-Trees, B+ -Trees.

**Text Books:**

1. Fundamentals of Data structures in C 2nd edition HOROWITZ , SAHNI, ANDERSON-FREED.

II B.Tech I Sem

R15

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANATHAPURAMU**
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**REGULATION - R15**

## 15ACS11– OBJECT ORIENTED PROGRAMMING (CBCC)

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**Learning Objectives:**

- This subject will help to improve the analytical skills of object oriented programming
- Overall development of problem solving and critical analysis
- Formal introduction to Java programming language

**Learning Outcomes**: On successful completion of this course, the student should be able to:

- Show competence in the use of the Java programming language in the development of small to medium-sized application programs that demonstrate professionally acceptable coding and performance standard
- Understand the basic principles of the object-oriented programming
- Demonstrate an introductory understanding of graphical user interfaces, multithreaded programming, and event-driven programming.

**Unit-I :**

**Introduction to Java** : Basics of Java programming, Data types, Variables, Operators, Control structures including selection, Looping, Java methods, Overloading, Math class, Arrays in java.

**Unit-II :**

**Objects and Classes** : Basics of objects and classes in java, Constructors, Finalizer, Visibility modifiers, Methods and objects, Inbuilt classes like String, Character, StringBuffer, File, this reference.

**Unit-III :**

Inheritance and Polymorphism : Inheritance in java, Super and sub class, Overriding, Object class, Polymorphism, Dynamic binding, Generic programming, Casting objects, Instance of operator, Abstract class, Interface in java, Package in java, UTIL package.

**Unit-IV :**

**Event and GUI programming** : Event handling in java, Event types, Mouse and key events, GUI Basics, Panels, Frames, Layout Managers: Flow Layout, Border Layout, Grid Layout, GUI components like Buttons, Check Boxes, Radio Buttons, Labels, Text Fields, Text Areas, Combo Boxes, Lists, Scroll Bars, Sliders, Windows, Menus, Dialog Box, Applet and its life cycle, Introduction to swing.

**Unit-V :**

**Multithreading in java** : Thread life cycle and methods, Runnable interface, Thread synchronization, Exception handling with try-catch-finally, Collections in java, Introduction to JavaBeans and Network Programming.

**Text Books:**

1 Introduction to Java Programming (Comprehensive Version), Daniel Liang, Seventh Edition, Pearson.

2 Programming in Java, Sachin Malhotra & Saurabh Chaudhary, Oxford University Press.

3 Murach's Beginning Java 2, Doug Lowe, Joel Murach and Andrea Steelman, SPD.

**Reference Books:**

4 Core Java Volume-I Fundamentals, Eight Edition, Horstmann& Cornell, Pearson Education.

5 The Complete Reference, Java 2 (Fourth Edition), Herbert Schild, TMH.

6 Java Programming, D. S. Malik, Cengage Learning.

**II** B.Tech – **I Sem**

## 15ACS08-OPERATING SYSTEMS

| L | T | P | C |
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**Course Objective**

- To make the students understand the basic operating system concepts such as processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystems and protection.
- To get acquaintance with the class of abstractions afford by general purpose operating systems that aid the development of user applications

**Course Outcomes**

- Understand what makes a computer system function and the primary PC components.
- Understand past and current trends in computer technology.
- Use basic software applications.
- Add functionality to the exiting operating systems
- Design new operating systems

**UNIT I**

**Operating Systems Overview:** Operating system functions, Operating system structure, operating systems Operations, protection and security, Kernel data Structures, Computing Environments, Open- Source Operating Systems

**Operating System Structure:** Operating System Services, User and Operating-System Interface, systems calls, Types of System Calls, system programs, operating system structure, operating system debugging, System Boot.

**Processes:** Process concept, process Scheduling, Operations on processes, Inter process Communication, Examples of IPC systems.

**UNIT II**

**Threads:** overview, Multicore Programming, Multithreading Models, Thread Libraries, Implicit threading, Threading Issues.

**Process Synchronization:** The critical-section problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic problems of synchronization, Monitors, Synchronization examples, Alternative approaches.

**CPU Scheduling:** Scheduling-Criteria, Scheduling Algorithms, Thread Scheduling, Multiple- Processor Scheduling, Real-Time CPU Scheduling, Algorithm Evaluation.

**UNIT III**

**Memory Management:** Swapping, contiguous memory allocation, segmentation, paging, structure of the page table.

**Virtual memory:** demand paging, page-replacement, Allocation of frames, Thrashing, Memory- Mapped Files, Allocating Kernel Memory

**Deadlocks:** System Model, deadlock characterization, Methods of handling Deadlocks, Deadlock prevention, Detection and Avoidance, Recovery from deadlock.

**UNIT IV**

**Mass-storage structure:** Overview of Mass-storage structure, Disk structure, Disk attachment, Disk scheduling, Swap-space management, RAID structure, Stable-storage implementation.

**File system Interface:** The concept of a file, Access Methods, Directory and Disk structure, File system mounting, File sharing, Protection.

**File system Implementation:** File-system structure, File-system Implementation, Directory Implementation, Allocation Methods, Free-Space management.

**UNIT V**

**I/O systems:** I/O Hardware, Application I/O interface, Kernel I/O subsystem, Transforming I/O requests to Hardware operations.

**Protection:** Goals of Protection, Principles of Protection, Domain of protection, Access Matrix, Implementation of Access Matrix, Access control, Revocation of Access Rights, Capability- Based systems, Language – Based Protection

**Security:** The Security problem, Program threats, System and Network threats, Cryptography as a security tool, User authentication, Implementing security defenses, Firewalling to protect systems and networks, Computer–security classifications.

**Text Books:**


1. Operating System Concepts, Abraham Silberschatz, Peter B. Galvin, Greg Gagne, Ninth Edition, 2012, Wiley.
2. Operating Systems: Internals and Design Principles, Stallings, Sixth Edition, 2009, Pearson Education.


**Reference Books:**


1. Modern Operating Systems, Andrew S Tanenbaum, Second Edition, PHI.
2. Operating Systems, S.Haldar, A.A.Aravind, Pearson Education.
3. Principles of Operating Systems, B.L.Stuart, Cengage learning, India Edition.
4. Operating Systems, A.S.Godbole, Second Edition, TMH.
5. An Introduction to Operating Systems, P.C.P. Bhatt, PHI.
6. Operating Systems, G.Nutt, N.Chaki and S.Neogy, Third Edition, Pearson Education.
7. Operating Systems, R.Elmasri, A,G.Carrick and D.Levine, Mc Graw Hill.

# B.TECH - R15 REGULATIONS

# CHOICE BASED CREDIT COURSES (INTER DEPARTMENT)

# OFFERED

# IN

# III YEAR II SEMESTER

**w.e.f.**

# 2015 ADMITTED BATCH


**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**COLLEGE OF ENGINEERING (AUTONOMOUS) :: PULIVENDULA**

**PULIVENDULA – 516390, Y.S.R. (DIST), ANDHRA PRADESH, INDIA**

# ANNEXURE-II

**Choice Based Credit Course of Inter Department**

**offered in**

## B.TECH III YEAR II SEMESTER

| BRANCH | SUBJECT CODE | SUBJECT NAME |
|---|---|---|
| MATHEMATICS | 15ABS18 | FUZZY SETS AND APPLICATIONS |
| | 15ABS19 | OPTIMIZATION TECHNIQUES |
| CHEMISTRY | 15ABS20 | CHEMISTRY ENERGY MATERIALS |
| | 15ABS21 | CHEMISTRY OF LIFE |
| | 15ABS22 | CHEMISTRY OF POLYMERS AND THEIR APPLICATIONS |
| CE | 15ACE35 | REMOTE SENSING & GIS |
| | 15ACE36 | ENVIRONMENTAL IMPACT ASSESTMENT & MANAGEMENT |
| | 15ACE37 | FINITE ELEMENT METHODS |
| EEE | 15AEE34 | RENEWABLE ENERGY SOURCES |
| | 15AEE19 | POWER ELECTRONICS |
| | 15AEE35 | UTILIZATION OF ELECTRICAL ENERGY |
| ME | 15AME35 | OPTIMIZATION TECHNIQUES BY MATLAB |
| | 15AME36 | MECHATRONICS & MEMS |
| | 15AME37 | AUTOMOTIVE ELECTRONICS |
| ECE | 15AEC34 | FUNDAMENTALS OF COMMUNICATION SYSTEMS |
| | 15AEC35 | INDUSTRIAL ELECTRONICS |
| | 15AEC36 | NEURAL NETWORKS & FUZZY LOGIC |
| CSE | 15ACS35 | MOBILE COMPUTING |
| | 15ACS36 | OPTIMIZATION TECHNIQUES |
| | 15ACS37 | MACHINE LEARNING |

**III B.Tech II Semester**

## 15ABS18-FUZZY SETS AND APPLICATIONS

**(Choice Based Credit Courses (Inter-department))**

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***Course Objectives:***

- *This course aims at providing the student with the basic concepts of Fuzzy sets, along with the properties and applications.*

**UNIT – I**

Fuzzy sets - basic definitions, α-level sets, convex fuzzy sets.

**UNIT – II**

Basic operations on fuzzy sets, types of fuzzy sets

**UNIT – III**

Cartesian products, algebraic products, bounded sum and difference, t-norms and t-conorms. Fuzzy sets in contrast of probability theory.

**UNIT – IV**

The extension principle - the Zadeh's extension principle, image and inverse image of fuzzy sets.

**UNIT – V**

Fuzzy numbers, elements of fuzzy arithmetic,Fuzzy relations and fuzzy graphs, composition of fuzzy relations, min-max composition and its properties, fuzzy equivalence relations, fuzzy relational equations, fuzzy graphs.

***Course Outcomes:*** *The student will be able to analyze several real time problems effectively, under fuzziness.*

**TEXT BOOKS:**

1. Klir, G. J. and Yuan, B. Fuzzy Sets and Fuzzy Logic : Theory and Applications, (Prentice Hall of India, New Delhi, 1997)

**REFERENCES:**

1. Zimmermann, H. J. Fuzzy set theory and its Applications (Allied publishers Ltd., New Delhi, 1991).
2. M.Ganesh, Introduction to Fuzzy sets and Fuzzy Logic (PHI Publications,2001)

27.7.18

**III B.Tech II Semester**

## 15ABS19-OPTIMIZATION TECHNIQUES

**(Choice Based Credit Courses (Inter-department))**

| L | T | P | C |
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| 3 | 1 | 0 | 3 |

*Course Objectives:*

- *This course aims at providing the student with the basic concepts and several methods of optimization .*

**UNIT – I**

**Linear programming I : Simplex Method**

Introduction , Applications of Linear Programming, Standard form of a Linear Programming Problem, Geometry of Linear Programming Problems, Basic Definitions in Linear Programming. Simplex Method, Simplex Algorithm and Two phase Simplex Method.

**UNIT – II**

**Linear programming II : Duality in Linear Programming**

Symmetric Primal-Dual Relations, General Primal-Dual Relations, Duality Theorem, Dual Simplex Method and Transportation Problem.

**UNIT – III**

**Non-linear programming: Unconstrained optimization techniques**

Introduction: Classification of Unconstrained minimization methods,

**Direct Search Methods :** Random Search Methods : Random jumping Method, Random Walk method. Grid Search Method

**UNIT – IV**

**Non-linear programming: Constrained optimization techniques**

Introduction , Characteristics of a constrained problem, Random Search Methods, complex method, Sequential linear programming, Basic approach in methods of Feasible directions, Zoutendijk's method of feasible directions: direction finding problem, determination of step length, Termination criteria.

**UNIT-V**

**Geometric Programming**

**Unconstrained Minimization Problems** : solution of unconstrained geometric programming using differential calculus and arithmetic-geometric inequality.

**Constrained minimization Problems :**Solution of a constrained geometric programming problem, primal-dual programming in case of less-than inequalities, geometric programming with mixed inequality constraints.

***Course Outcomes:*** *The student will be able to analyze optimization problems in engineering and technology using various elegant optimization technique.*

2.7.18

**TEXT BOOKS:**

Singiresu S Rao., Engineering Optimization: Theory and Practices, New Age Int. (P) Ltd. Publishers, New Delhi.

**REFERENCES:**


1. Chong, E.K.P.and Zak, S. H.. An Introduction to Optimization, John Wiley & Sons, N.Y.
2. Peressimi A.L., Sullivan F.E., Vhl, J.J..Mathematics of Non-linear Programming, Springer – Verlag.


2.7.18

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**III B.Tech II Semester**

## 15ABS20-CHEMISTRY ENERGY MATERIALS

**(Choice Based Credit Courses (Inter-department))**

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

***Course Objectives:***

- *To make the student understand basic electrochemical principles such as standard electrode potentials, emf and applications of electrochemical principles in the design of batteries.*
- *To understand the basic concepts of processing and limitations of fossil fuels and Fuel cells & their applications.*
- *To impart knowledge to the students about fundamental concepts of hydrogen storage in different materials and liquification method*
- *Necessasity of harnessing alternate energy resources such as solar energy and its basic concepts.*
- *To understand and apply the basics of calculations related to material and energy flow in the processes.*

**UNIT-1: Electrochemical Systems:** Galvanic cell, standard electrode potential, application of EMF, electrical double layer, dipole moments, polarization, Batteries-Lead-acid and Lithium ion batteries

**UNIT-2: Fuel Cells:** Fuel cell working principle, Classification of fuel cells, Polymer electrolyte membrane (PEM) fuel cells, Solid-oxide fuel cells (SOFC), Fuel cell efficiency, Basic design of fuel cell,.

**UNIT-3: Hydrogen Storage:** Hydrogen Storage, Chemical and Physical methods of hydrogen storage, Hydrogen Storage in metal hydrides, metal organic frame works (MOF), Carbon structures, metal oxide porous structures, hydrogel storage by high pressure methods. Liquifaction method.

**UNIT-4: Solar Energy:** Solar energy introduction and prospects, photo voltaic (PV) technology, concentrated solar power (CSP), Solar Fuels, Solar cells.

**UNIT-5:** Photo and Photo electrochemical Conversions: Photochemical cells and applications of photochemical reactions, specificity of photo electrochemical cell, advantage of photoelectron catalytic conversions.

***Course Outcome:***

- *Ability to perform simultaneous material and energy balances.*
- *Student learn about various electrochemical and energy systems*
- *Knowledge of solid, liquid and gaseous fuels*
- *To know the energy demand of world, nation and available resources to fulfill the demand*
- *To know about the conventional energy resources and their effective utilization*
- *To acquire the knowledge of modern energy conversion technologies*
- *To be able to understand and perform the various characterization techniques of fuels*
- *To be able to identify available nonconventional (renewable) energy resources and techniques to utilize them effectively*

**References :**


1. **Physical chemistry by** Ira N. Levine
2. **Essentials of Physical Chemistry,** Bahl and Bahl and Tuli.
3. **Inorganic Chemistry,** Silver and Atkins
4. **Fuel Cell Hand Book 7th Edition**, by US Department of Energy (EG&G technical services and corporation)
5. **Hand book of solar energy and applications** by Arvind Tiwari and Shyam.
6. **Solar energy fundamental, technology and systems** by Klaus Jagar et.al.
7. **Hydrogen storage** by Levine Klebonoff


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CBCC ANEXURE-II R-15

**III B.Tech II Semester**

**15ABS21-CHEMISTRY OF LIFE**

**(Choice Based Credit Courses (Inter-department))**

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

***Course objectives:***

- *To impart knowledge in chemistry to the students about Structure and function of bio-molecules such as protein & nucleic acid, metabolism, and regulation that are particularly relevant to the biological and life sciences.*

**UNIT-1: Cell Chemistry:**

Introduction to cell as the basic unit of Life; Types of cells; Procaryotes and Eucaryotes – examples; Characteristics of Plant & Animal cells; Structure of Cell and its Organelles and their functions;

A Chemical probe into the Cell: - Cell Walls composition - (G+) & (G-) Procaryotes, Plant and Animal cells i) Minerals ii) Carbohydrates iii) Proteins iv) Lipids v) Nucleic acids vi) Enzymes vii) Vitamins viii) Hormones, etc. their biological functions.

**UNIT -2: Lipids and Membranes:**

Introduction: Lipid Structure - Acyl glycerol, Phospho glycerides ( Phospholipids), ether lipids and sphingolipids. Bio-synthesis of lipids. Biological membranes – their role, structural complexity and compositions; Plasma membrane, Membrane lipids, Membrane proteins; Lipid bilayers, Fluid Mosaic Model of biological membrane. Dyanamic nature of lipid bilayers and membrane. Protein and Glycoprotein components of membrane. Membrane transport pores and channels, active transport and passive transport.

**UNIT -3: Enzyme, Catabolic and Anabolic processes:**

Definition, classification and nomenclature; Factors affecting the enzyme catalysed reactions. Advantages and limitations of enzymes in organic synthesis – mechanistic aspects of enzyme catalysis – Lock and Key mechanism, Induced – Fit mechanism, Desolvation and Solvation – substitution theory, Three- point attachment rule. Factors affecting the enzyme catalysed reactions. Enzyme selectivity – chemo, regio, diastereo and enatio selectivity – illustration with suitable examples. Regulation of enzyme activity – Allosteric enzymes. Enzyme inhibition – reversible inhibition – competitive, non-competitive and uncompetitive inhibition of enzymes. Immobilised enzymes – immobilization by physical and chemical methods. Co-Enzymes involved in Oxidation-Reduction processes. Role of metal ions in biological processes, physiology of digestion.

Catabolic and Anabolic processes: Energy transfer processes, role and significance of ATP; The electron transport system - Oxidative phosphorylation; Photosynthesis and its mechanism (cyclic and non-cyclic).

**UNIT -4: Bio-Chemistry of Carbohydrates, Respiration and Carbohydrate Metabolism:**

Bio-Chemistry of Carbohydrates: Classification of Carbohydrates; Stereoisomerism; Optical isomerism; Optical activity projection and perspective formulas; D-glyceride as a reference compound; Cyanohydrin synthesis; Structure of glucose; monosaccharides, disaccharides and polysaccharides; Polysaccharides and Glycoproteins in cells.

Respiration and Carbohydrate Metabolism: Glycolysis and Kreb's Cycle; Physiology of respiration in mammals, respiratory exchange and transport of respiration at cellular level. Interconversion of glycogen and glucose in liver and the role of insulin.

**UNIT -5: Chemistry and Bio-Chemistry of Amino Acids & Proteins:**

General properties of Amino acids; Proteins - Classification and Function; Structure of Proteins – Primary, Secondary, Tertiary and Quaternary Structure of Proteins. Synthesis of Peptides and Poly Peptides. Determination of Structure of Poly Peptides -N-terminal and C- terminal residue analysis.

Bio-Chemistry of Nucleic Acids: Introduction; Hydrolysis of Nucleic acids; Structure, Physical and Chemical properties of Heterocyclic bases - Adenine, Guanine, Uracil and Thymine; Structure of DNA: Primary, Secondary, Tertiary structures of DNA. A,B,C and Z forms of DNA. Structure of RNA – types of RNA – mRNA, rRNA and tRNA.; Definition and explanation of Replication, Transcription, Translation. Genetic Code – Codons – Protein synthesis.

***Course outcome:***

*Students will gain an understanding of:*

- *the chemical basis for biological phenomena and cellular structure*
- *how physiological conditions (esp. the chemistry of water) influence the structures and reactivities of biomolecules*
- *the chemical properties of amino acids, cofactors, and sugar*
- *the basic principles of protein and polysaccharide structure*
- *enzyme kinetics and their application to the elucidation of catalytic mechanisms*
- *constructing reasonable electron-pushing mechanisms for enzyme-catalyzed reactions*
- *the chemical logic of metabolism*
- *nucleic acid structure – building blocks of both DNA and RNA, secondary structures, tertiary structures and higher order packaging of genomic DNA*
- *translation – process for translation of messenger RNA into polypeptides, interpreting the genetic code, mechanism of ribosomal action*

**References:**

1. **"*Outlines of Bio-Chemistry*",** by E.E. Conn & Stumpf, John Wiley & Sons, New York, **(2000).**
2. **"*Text Book of Bio-Chemistry*",** by West, Todd et.al, Oxford and & BH Manohar Publishers & Distributers.
3. **"*Priciples of Bio-Chemistry*"** by White, Handler, Smith et.al.
4. **"*Bio-Chemistry*",** by Lehninger, W.H. Freeman and Companies, USA.
5. **" *Bio-Chemistry*"** by L.Stryer and W.H.Freeman and Companies, USA..
6. **"*Organic Chemistry*",** by R.T.Morison and R.N.Boyd, Allyn & Bacon Inc., (printed in Singapore) **(2001).**

**III B.Tech II Semester**

## 15ABS22-CHEMISTRY OF POLYMERS AND THEIR APPLICATIONS

**(Choice Based Credit Courses (Inter-department))**

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

***Course Objectives:***

*The objectives of this course are:*

- *To impart the students the knowledge of polymer materials, their formation mechanisms, properties and uses*
- *provides students with an opportunity to identify different types of polymers in our surrounding*
- *introduces hydrogels of polymer networks in drug delivery system and study of surface phenomenon.*
- *introduces students to the practical application of polymers*

**UNIT – 1 : Polymers-Basics and Characterization**

Basic concepts: monomers, degree of polymerization, linear, branched and network polymers, classification of polymers, Polymerization: condensation, addition and copolymerization, Mechanism of free radical, chain, ionic and coordination polymerization. Average molecular weight concepts: number, weight, viscosity average molecular weights, polydispersity and molecular weight distribution.

Measurement of molecular weight: End group, viscosity, light scattering, osmotic and ultracentrifugation methods, analysis and testing of polymers.

**UNIT – 2 : Synthetic Polymers**

Addition and condensation polymerization processes – Bulk, Solution, Suspension and Emulsion polymerization.

Preparation and significance, classification of polymers based on physical properties, Thermoplastics, Thermosetting plastics, Fibers and elastomers, General Applications.

Preparation, properties and applications of Polymers based on different types of monomers, Olefin polymers, Diene polymers, nylons,

Urea - formaldehyde, phenol - formaldehyde and melanine Epoxy and Ion exchange resins. Characterization of polymers by IR, NMR, GPC and XRD.

**UNIT – 3 : Natural Polymers & Modified cellulosics**

Natural Polymers: Chemical & Physical structure, properties, source, important chemical modifications, applications of polymers such as cellulose, lignin, starch, rosin, shellac, latexes, vegetable oils, gums and proteins.

Modified cellulosics: Cellulose esters and ethers such as Ethyl cellulose, CMC, HPMC, cellulose acetals, Liquid crystalline polymers; speciality plastics- PES, PAES, PEEK, PEAK.

**UNIT -4: Hydrogels of Polymer networks and Drug delivery**

Definitions of Hydrogel, polymer networks, Types of polymer networks, Methods involved in hydrogel preparation, Classification, Properties of hydrogels, Introduction to drug to drug delivery systems including, drug development, regulation, absorption and disposition, routes of administration and dosage forms. Advanced drug delivery systems and controlled release. Applications of hydrogels in drug delivery.

**UNIT – 5 : Surface phenomena**

Surface tension, adsorption on solids, electrical phenomena at interfaces including electrokinetics, micelles, reverse micelles, solubilization. Application of photoelectron spectroscopy, ESCA and Auger spectroscopy to the study of surfaces.

***Course outcome:***

*Upon successful completion of this course, the students will be able to:*

- *differentiate between natural and man-made polymers.*
- *explain polymerization methods*
- *understand polymerization kinetics*
- *understand drug and drug delivery systems and*
- *applications and uses of polymers.*

**References :**

1. A Text book of Polymer science, Billmayer
2. Organic polymer Chemistry, K.J.Saunders, Chapman and Hall
3. Advanced Organic Chemistry, B.Miller, Prentice Hall
4. Polymer Chemistry – G.S.Mishra
5. Polymer Chemistry – Vasant R. Gowariker, N. V. Viswanathan, Jayadev Sreedhar
6. Physical Chemistry –S. Glasston & K.J Laidler
7. Drug Delivery- Ashim K. Misra

**III B.Tech II Semester**

**15ACE35-REMOTE SENSING & GIS**

**(Choice Based Credit Courses (Inter-department))**

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

***Course objectives:***

- *To Know the concept of photogrammetry.*
- *Analysis of RS and GIS data and interpreting the data for modelling applications.*
- *To educate of GIS in civil engineering field.*

**UNIT I**

**INTRODUCTION TO PHOTOGRAMMETRY**:

Principles& types of aerial photograph, geometry of vertical aerial photograph, Scale & Height measurement on single vertical aerial photograph, Height measurement based on relief displacement, Fundamentals of stereoscopy, fiducially points, parallax measurement using fiducially line.

**UNIT II**

**REMOTE SENSING :**

Basic concepts and foundation of remote sensing – elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology and units. Energy resources, energy interactions with earth surface features and atmosphere, resolution, sensors and satellite visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of water bodies, introduction to digital data analysis.

**UNIT III**

**GEOGRAPHIC INFORMATION SYSTEM:**

Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS.

**TYPES OF DATA REPRESENTATION**:

Data collection and input overview, data input and output. Keyboard entry and coordinate geometry procedure, manual digitizing and scanning, Raster GIS, Vector GIS – File management, Spatial data – Layer based GIS, Feature based GIS mapping.

**UNIT IV**

**GIS SPATIAL ANALYSIS**:

Computational Analysis Methods(CAM), Visual Analysis Methods (VAM), Data storage-vector data storage, attribute data storage, overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data.

**UNIT V**

**WATER RESOURCES APPLICATIONS:**

Land use/Land cover in water resources, Surface water mapping and inventory, Rainfall – Runoff relations and runoff potential indices of watersheds, Flood and Drought impact assessment and monitoring, Watershed management for sustainable development and Watershed characteristics. Reservoir sedimentation, Fluvial Geomorphology, water resources management and monitoring, Ground Water Targeting, Identification of sites for artificial Recharge structures, Drainage Morphometry, Inland water quality survey and management, water depth estimation and bathymetry.

***Course Outcomes:***

*On completion of the course the students will have knowledge on*

- *Understanding the concept of photogrammetry.*
- *Analysis of RS and GIS data and interpreting the data for modelling applications.*
- *Understand Application of GIS in civil engineering field.*

**TEXT BOOKS:**

1. Remote Sensing and GIS by B.Bhatta, Oxford University Press,New Delhi.
2. Advanced surveying: Total station GIS and remote sensing – Satheesh Gopi – Pearson publication.

**REFERENCE BOOKS:**

1. Fundamentals of remote sensing by gorge Joseph , Universities press, Hyderabad.
2. Concepts & Techniques of GIS by C.P.Lo Albert, K.W. Yonng, Prentice Hall (India) Publications.
3. Basics of Remote sensing & GIS by S.Kumar, Laxmi Publications.
4. Remote sensing and GIS by M.Anji reddy ,B.S.Pubiliications,New Delhi.
5. *Remote Sensing and its applications by LRA Narayana University Press 1999.*
6. *GIS by Kang – tsung chang, TMH Publications & Co.,*
7. *Principals of Geo physical Information Systems – Peter A Burragh and Rachael Mc Donnell,Oxford Publishers 2004*

ENGINEERING COLLEGE PULIVENDULA

**III B.Tech II Semester**

**15ACE36-ENVIRONMENTAL IMPACT ASSESTMENT & MANAGEMENT**

**(Choice Based Credit Courses (Inter-department))**

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

***Course objectives:***

- *To apply knowledge acquired to the process of environmental impact modeling and prediction as a design tool with application to a number of case studies.*
- *To adapt skills in GIS to environmental management systems*

**UNIT I**

**INTRODUCTION:**

Basic concept of EIA : Initial environmental Examination, Elements of EIA, - factors affecting E-I-A Impact evaluation and analysis, preparation of Environmental Base map, Classification of environmental parameters.

**UNIT II**

**EIA METHODOLOGIES:**

E I A Methodologies: introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods and cost/benefit Analysis.

**UNIT III**

**IMPACT OF DEVELOPMENTAL ACTIVITIES AND LAND USE:**

Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives. Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures. E I A in surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, Air pollution sources, Generalized approach for assessment of Air pollution Impact.

**UNIT IV**

**ASSEMENT OF IMPACT ON VEGETATION AND WILDLIFE:**

Introduction - Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation – Causes and effects of deforestation.

**ENVIRONEMNTAL AUDIT:**

Introduction - Environmental Audit & Environmental legislation objectives of Environmental Audit, Types of environmental Audit, Audit protocol, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report.

**UNIT V**

**ENVIRONEMENTAL ACTS (PROTECTION AND PREVENTION):**

Post Audit activities, The Environmental protection Act, The water preventation Act, The Air (Prevention & Control of pollution Act.), Wild life Act.Case studies and preparation of Environmental Impact assessment statement for various Industries.

***Course outcomes***

- *an understanding of current EIA methods and the techniques and tools used.*
- *To develop an understanding of current assessment methods and legislation.*
- *To develop an understanding of current environmental monitoring systems.*

**Text Books:**

1. Environmental Impact Assessment Methodologies, by Y. Anjaneyulu, B.S. Publication, Sultan Bazar, Hyderabad.
2. Environmental Science and Engineering, by J. Glynn and Gary W. Hein Ke – Prentice Hall Publishers

**Reference Books:**

1. Environmental Science and Engineering, by Suresh K. Dhaneja – S.K.,Katari & Sons Publication.,New Delhi.
2. Environmental Pollution and Control, by Dr H.S. Bhatia – Galgotia Publication (P) Ltd, Delhi

ANANTAPUR ENGINEERING COLLEGE PULIVENDULA

**III B.Tech II Semester**

**15ACE37-FINITE ELEMENT METHODS (CBCC)**

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

***Course objectives:***

- *To know FEM Principles to displacement*
- *Students will apply matrix in constructions*

**UNIT –I**

**INTRODUCTION:** Concepts of FEM – Steps involved – merits & demerits – energy principles – Discretization – Rayleigh –Ritz method of functional approximation.

**UNIT –II**

**PRINCIPLES OF ELASTICITY:** Equilibrium equations – strain displacement relationships in matrix form – Constitutive relationships for plane stress, plane strain and Axi-symmetric bodies of revolution with axi-symmetric loading.

**UNIT –III**

**ONE DIMENSIONAL ELEMENTS:** Stiffness matrix for bar element – shape functions for one dimensional elements – one dimensional problems. Different types of elements for plane stress and plane strain analysis – Displacement models –generalized coordinates – shape functions – convergent and compatibility requirements– Natural coordinate system

**UNIT –IV**

**GENERATION OF ELEMENT :** Generation of element stiffness and nodal load matrices for 3-node triangular element and four noded rectangular elements. Concepts of, isoparametric elements for 2D analysis –formulation of CST element, 4 –Noded and 8-noded iso-parametric quadrilateral elements –Lagrangian and Serendipity elements.

**UNIT-V**

**AXI-SYMMETRIC ANALYSIS:** Basic principles-Formulation of 4-noded iso-parametric axi-symmetric element – Numerical Integration, Static condensation, assembly of elements and solution techniques for static loads.

***Course Outcomes:***

- *Students can understand FEM Principles*
- *Students can apply matrix in construction*

**TEXT BOOK:**

1. Finite Elements Methods in Engineering by Tirupati. R. Chandrnpatla and Ashok D. Belegundu – Pearson Education Publications.
2. Finite element analysis by S.S. Bhavakatti-New age internationalpublishers
3. Finite Element methods for Engineers by U.S.Dixit, Cengage Publishers, New Delhi.
4. Finite element analysis in Engineering Design by S.Rajasekharan, S.Chand Publications, New Delhi.
5. Finite Element analysis – Theory & Programming by C.S.Krishna Murthy- Tata Mc.Graw Hill Publishers

**REFERENCES:**

1. Concepts and Applications of Finite Element Analysis by Robert D.Cook, David S. Malkus and Michael E.Plesha. Jhon Wiley & Sons.
2. Finite element analysis by David V Hutton, Tata Mcgraw Hill, New Delhi
3. Applied Fem by Rammurthy, I.K.International Publishers PVt. Ltd., New Delhi.
4. Fem by J.N.Reddy, Mcjraw, TMH Publications, New Delhi.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR ENGINEERING COLLEGE PULIVENDULA

**III B.Tech II Semester**

**15AEE19-POWER ELECTRONICS**

**(Choice Based Credit Courses (Inter-department))**

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

***Course Objectives:***

- *The basic power semiconductor switching devices and their principles of operation..*
- *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 is also discussed in detail in this course.*

**UNIT – I POWER SEMI CONDUCTOR DEVICES**

Power Semiconductor Diodes, Thyristors – Silicon Controlled Rectifiers (SCR's) – BJT – Power Transistor - Power MOSFET – Power IGBT - TRIACs, GTOs - Characteristics and Principles of Operation and other Thyristors – Basic Theory of Operation of SCR – Static Characteristics – Turn On and Turn Off Methods- Dynamic Characteristics of SCR - Two Transistor Analogy – Triggering Circuits – Series and Parallel Connections of SCR's – Snubber Circuits – Specifications and Ratings of SCR's, BJT, IGBT - Numerical Problems –Commutation Circuits.

**UNIT – II PHASE CONTROLLED CONVERTERS**

Phase Control Technique – Single Phase Line Commutated Converters – Mid Point and Bridge Connections – Half Controlled Converters, Fully Controlled Converters with Resistive, RL and RLE loads– Derivation of Average Load Voltage and Current – Line Commutated Inverters - Active and Reactive Power Inputs to the Converters without and with Free Wheeling Diode, Effect of Source Inductance – Numerical Problems.

Three Phasé Line Commutated Converters – Three Pulse and Six Pulse Converters – Mid Point and Bridge Connections - Average Load Voltage with R and RL Loads – Effect of Source Inductance–Dual Converters (Both Single Phase and Three Phase) - Waveforms –Numerical Problems.

**UNIT – III DC – DC CONVERTERS**

Buck converters, boost converters and buck boost converters. Steady state analysis, voltage and current ripple, design of inductor and capacitor values.

**UNIT – IV INVERTERS**

Inverters – Single Phase Inverter – Basic Series Inverter – Basic Parallel Capacitor Inverter Bridge Inverter – Waveforms –sine-triangle PWM, Three Phase VSI in $120^0$ And $180^0$ Modes of Conduction. unipolar, bipolar inverter PWM techniques selective harmonic elimination - Voltage Control Techniques for Inverters Pulse Width Modulation Techniques – Numerical Problems.

**UNIT – V AC VOLTAGE CONTROLLERS & CYCLO CONVERTERS**

**AC Voltage Controllers** – Single Phase Two SCR's in Anti Parallel – With R and RL Loads – Modes of Operation of Triac – Triac with R and RL Loads – Derivation of RMS Load Voltage, Current and Power Factor Wave Forms – Firing Circuits -Numerical Problems - Thyristor Controlled Reactors; Switched Capacitor Networks.

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**Cyclo Converters** – Single Phase Mid Point Cyclo Converters With R and RL loads (Principle of Operation only) – Bridge Configuration Of Single Phase Cyclo Converter with R and RL loads (Principle of Operation only) – Waveforms

***Course Outcomes:***

- *Basic operating principles of power semiconductor switching devices*
- *The operation of power electronic converters, choppers, inverters, AC voltage controllers, and cycloconverters, and their control.*
- *To understand the working of inverters and application of PWM techniques for voltage control and harmonic mitigation.*
- *How to apply the learnt principles and methods to practical applications.*

**TEXT BOOKS:**

1. Power Electronics – by M. D. Singh & K. B. Kanchandhani, Tata Mc Graw – Hill Publishing Company, 1998.
2. Power Electronics : Circuits, Devices and Applications – by M. H. Rashid, Prentice Hall of India, 2nd edition, 1998

**REFERENCE BOOKS:**

1. Power Electronics – by P. S. Bimbra, Khanna Publications.
2. Power electronics, Essentials and applications – L. Umanand Wiley Publications
3. Power Electronics – by Vedam Subramanyam, New Age International (P) Limited, Publishers
4. Power Electronics - by V. R. Murthy , 1st edition -2005, OXFORD University Press
5. Power Electronics-by P. C. Sen, Tata Mc Graw-Hill Publishing.
6. The power electronics (hand book) : Timothy L. Skgarnina
7. Theory of Power Electronics- by KL Rao, Ch Sai Babu, S Chand Publications Revised Edition 2009

V. Sen
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ANANTAPUR ENGINEERING COLLEGE PULIVENDULA

**III B.Tech II Semester**

## 15AEE34-RENEWABLE ENERGY SOURCES

**(Choice Based Credit Courses (Inter-department))**

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***Course Objectives:***

***This course enables the students to***

- *Identify the use of renewable energy sources for electrical power generation*
- *Know the environmental effects of energy conversation*
- *Analyze the different types of turbines for ocean energy conversations*
- *Understand the concept of fuel cells and preventive measurements on pollution*

**UNIT-I:**

Photo voltaic power generation ,spectral distribution of energy in solar radiation, solar cell configurations, voltage developed by solar cell, photo current and load current, practical solar cell performance, commercial photo voltaic systems, test specifications for PV systems, applications of super conducting materials in electrical equipment systems.

**UNIT-II:**

Principles of MHD power generation, ideal MHD generator performance, practical MHD generator, MHD technology.

**Wind Energy conversion:** Power from wind, properties of air and wind, types of wind Turbines, operating characteristics.

**UNIT-III:**

Tides and tidal power stations, modes of operation, tidal project examples, turbines and generators for tidal power generation.

**Wave energy conversion:** properties of waves and power content, vertex motion of Waves, device applications. Types of ocean thermal energy conversion systems Application of OTEC systems examples,

**UNIT-IV:**

**Miscellaneous energy conversion systems:** coal gasification and liquifaction, biomass conversion, geothermal energy, thermo electric energy conversion, principles of EMF generation, description of fuel cells, Co-generation and energy storage, combined cycle co-generation, energy storage.

**Global energy position and environmental effects:** energy units, global energy position.

**UNIT-V:**

Types of fuel cells, $H_2$-$O_2$ Fuel cells, Application of fuel cells – Batteries, Description of batteries, Battery application for large power. Environmental effects of energy conversion systems, pollution from coal and preventive measures steam stations and pollution, pollution free energy systems.

V. Sarala
BOS-chairman

***Course Outcomes:***

*The student will have the knowledge on the following concepts*

- *Find different renewable energy sources to produce electrical power*
- *Solar radiation on earth surface and concept of photo voltaic cells.*
- *Find the various types of turbines and design of energy systems*
- *Estimate the global energy position on miscellaneous energy conversation systems.*

**TEXT BOOKS:**

1. "Energy conversion systems" by Rakosh das Begamudre, New age International publishers, New Delhi - 2000.
2. John twidell & wier, renewable energy sources, CRC press, 2009.
3. G. D. Rai – non conventional sources, Khanna Publishers.

**References books:**

1. D.P Kothari, Rakesh Ranjan, renewable energy sources and emerging technologies, PHI, 2009.
2. C.S Solaniki, solar Photo Voltaic- Fundamentals-Principals and applications, PHI 2009

V. Ferd
BOS- chairman

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CBCC ANEXURE-II R-15

**III B.Tech II Semester**

**15AEE35-UTILIZATION OF ELECTRICAL ENERGY**

**Choice Based Credit Courses (Inter-department))**

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

***Course Objectives:***

*This course enables the students to*

- *Understand different types of heating and welding techniques.*
- *Study the basic principles of illumination and its units of Illumination.*
- *Understand different lighting design schemes for various applications.*
- *Learn basic principles of traction system & speed time curves for different traction system.*
- *Understand the fundamentals of environmental aspects of hybrid electric vehicles.*
- *Study the concepts of economic aspects of utilizing electrical energy.*

**UNIT–I ILLUMINATION:**

Definition – Laws of Illumination–Polar Curves – Calculation of MHCP and MSCP. Lamps: Incandescent Lamp, Sodium Vapour Lamp, Fluorescent Lamp. Requirement of Good Lighting Scheme – Types, Design and Calculation of Illumination. Street Lighting and Factory Lighting – Numerical Problems.

**UNIT–II ELECTRIC HEATING & WELDING:**

**Electrical Heating**: Advantages. Methods of Electric Heating – Resistance, Arc, Induction and Dielectric Heating.

**Electric Welding**: Types – Resistance, Electric Arc, Gas Welding. Ultrasonic, Welding Electrodes of Various Metals, Defects in Welding.

Electrolysis - Faraday's Laws, Applications of Electrolysis, Power Supply for Electrolysis.

**UNIT–III INTRODUCTION TO HYBRID ELECTRIC VEHICLES:**

History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies.

**UNIT–IVELECTRIC TRACTION:**

Introduction – Systems of Electric Traction. Comparison Between A. C And D. C Traction – Special Features of Traction Motors - Methods of Electric Braking – Plugging, Rheostatic and Regenarative Types. Mechanics of Train Movement. Speed-Time Curves of Different Services – Trapezoidal and Quadrilateral, Speed-Time Curves – Numerical Problems. Calculations of Tractive Effort, Power, Specific Energy Consumption - Effect of Varying Acceleration and Braking Retardation, Adhesive Weight and Coefficient of Adhesion – Problems.

BOS-Chairman

**UNIT–V ECONOMIC ASPECTS OF UTILISING ELECTRICAL ENERGY:**

Power Factor Improvement, Improvement of Load Factor, Off Peak Loads- Use of Exhaust Steam, Waste Heat Stations, Pit Head Generation, Diesel Plant, General Comparison of Private Plant and Public Supply- Initial Cost and Efficiency, Capitalization of Losses, Choice of Voltage, Cost of Renewals.

***Course Outcomes:***

*The students will have knowledge on the following concepts to:*

- *Identify most appropriate heating & welding techniques for suitable applications*
- *Design the levels of illumination based on the applications*
- *Determine speed-time curves, acceleration & retardation of different traction services.*
- *Estimate energy consumption levels at various modes of operation in traction systems*
- *Identify the economic aspects of utilizing electrical energy*

**TEXT BOOKS:**

1. Utilization of Electric Energy – by E. Openshaw Taylor and V. V. L. Rao, Universities Press.
2. Art & Science of Utilization of electrical Energy – by Partab, Dhanpat Rai & Co.
3. Utilization of Electrical Energy & Traction – J.B.Gupta, Rajeev Manglik,Rohit Manglik – Published by S.K Kataria & 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. Utilization of Electrical Power – by R. K. Rajput, Laxmi Publications
3. Generation, distribution and utilization of electrical energy by C.L Wadhwa,wiley Eastern Limited-1993
4. Electrical Power,S.L Uppal Khanna Publisher – 1988.

ENGINEERING PULIVENDULA COLLEGE

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**III B.Tech II Semester**

**15AME35-Optimization Techniques by MATLAB**
**(Choice Based Credit Courses (Inter-department))**

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

***Course objective:***

*To engage in learning of optimization principles, be able to effectively setup and solve real-world optimization problems, and develop technical and communication skills. The course also aims to teach how to use computer programs such as MATLAB to solve mathematical models.*

**UNIT I**

**Introduction to MAT LAB:** Overview, MATLAB Preliminaries, Basics of MATLAB, Beyond the Basics of MATLAB, Popular Functions and Commands, Plotting using MATLAB, Optimization with MATLAB.

**UNIT II**

**Introduction to Optimization:** Statement of an optimization problem, Classifications of optimization Problems: Single variable optimization, Multi variable optimization with no constraints, Multi variable optimization with equality constraints, Multi variable optimization with inequality constraints, Convex and Concave programming.

**UNIT III**

**Single Variable Optimization:** Finite difference method, Central difference method, Runge-Kutta method, interval halving method, golden section method with MATLAB code.

**UNIT IV**

**Multi Variable Optimization:** Conjugate gradient method, Newton's method, Powell's method, Flectcher- Reeves method, Hook and Jeeves method, interior penalty function with MATLAB code.

**UNIT V**

**Evolutionary Algorithms:** Overview, Genetic Algorithms: Basics of Genetic Algorithms, Options in MATLAB, Multi Objective Optimization using Genetic Algorithms, Ant Colony Optimization, Simulated Annealing, Particle Swarm Optimization.

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Mechanical Engineering Department,
JNTUA College of Engineering,
PULIVENDULA - 516 390.

***Course Outcomes*:**

after completion of this course the student can be able to,

- Define and use optimization terminology and concepts, and understand how to classify an optimization problem.
- know the Application of Optimization Methods to Engineering Problems.
- implement basic optimization algorithms in a computational setting and apply existing optimization software packages (MATLAB) to solve engineering problems.

**Text books:**

1. "MATLAB An introduction with applications" Rao V.Dukkipati, New age international publications.
2. "Optimization in practice with MATLAB" Achille Messac, Cambridge University Press.
3. "Introduction to optimum design" Jasbir S Arora, Academic Press, Elsevier Publications.

**References:**

1. "MATLAB Optimization Techniques" Cesar Perez Lopez, Academic press, Springer publications.
2. "Applied Numerical Methods with MATLAB for Engineers and scientists" Steven C.Chapra. Mc,Graw Hill Publications.
3. "Nonlinear optimization" Benny Yakir, open source from net.

Head
Mechanical Engineering Department,
JNTUA College of Engineering,
PULIVENDULA - 516 390.

**III B.Tech II Semester**

## 15AME36-MECHATRONICS AND MEMS

**(Choice Based Credit Courses (Inter-department))**

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

***Course Objectives:***

- *To understand the technologies behind modern mechatronic systems.*
- *To provide methodological fundamentals for the development of fully automated system.*
- *To teach students how to develop a robotic or automated system project focusing on the hardware and software integration, and*
- *To apply the acquired knowledge for developing a mechatronic system.*

**UNIT – I**

**Introduction:** Definition of Mechatronics, Need for Mechatronics in Industry, Objectives of mechatronics, mechatronics design process, Mechatronics key elements, mechatronics applications – Computer numerical control (CNC) machines, Tool monitoring systems, Flexible manufacturing system (FMS), Industrial Robots, Automatic packaging systems, Automatic inspection systems.

**UNIT – II**

**Sensors:** Static characteristics of sensors, Displacement, Position and Proximity Sensors, Force and torque sensors, Pressure sensors, Flow sensors, Temperature sensors, Acceleration sensors, Level sensors, Light sensors, Smart material sensors, Micro and Nano sensors, Selection criteria for sensors.

**UNIT – III**

**Actuators:** Mechanical, Electrical, Hydraulic and Pneumatic Actuation systems, Characteristics and their limitations, Design of Hydraulic and Pneumatic circuits, Piezoelectric actuators, Shape memory alloys, Selection criteria for actuators.

**UNIT – IV**

**Microprocessors, Microcontrollers and Programmable Logic Controllers:** Architecture of of Microprocessor, Microcontroller and Programmable Logic Controller, PLC Programming using ladder diagrams, logics, latching, sequencing, timers relays and counters, data handling, Analog input/output, selection of -.

**UNIT – V**

**Micro Electro Mechanical Systems (MEMS):** History, Effect of scaling, Fabrication Techniques: Oxidation, Physical Vapor disposition, Chemical Vapor Deposition, Lithography, Etching, Wafer bonding, LIGA, DRIE, Applications: Lab on chip.

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***Course Outcomes***

*Upon successful completion of this unit, the student will be able to:*

- *Define the discipline of mechatronics.*
- *Identify examples of mechatronic systems that are encountered in real life.*
- *Identify the components of a typical mechatronic system.*

**Text books:**

1. Mechatronics, W.Bolton, Pearson Education
2. Mechatronic System Design, Devadas Shetty and Richard A Kolk, Cengage learning
3. Mechatronics an integrated approach, Clarence W. de Silva, CRC Press
4. Micro Electro Mechanical Systems Design, James J Allen, CRC Press Taylor & Francis group
5. Mechatronics, Ganesh S Hedge, Jones and Bartlett Publishers

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**III B.Tech II Semester**

## 15AME37-AUTOMOTIVE ELECTRONICS

**(Choice Based Credit Courses (Inter-department))**

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

*Course Objectives:*

- *To understand the use of electronics in the automobile.*
- *To appreciate the various electronic and the instrumentation systems used in automobile.*

**UNIT 1**

**Introduction to microcomputer**: Microcomputer: Buses, memory, timing, CPU registers; Microprocessor architecture: Initialization, operation codes, program counter, branch and jump instructions, subroutine. Analog to digital converters and Digital to analog converters, sampling, polling and interrupts, digital filters, lookup table.

**UNIT 2**

**Sensors and actuators:** Speed sensors, Pressure sensors: Manifold Absolute Pressure sensor, knock sensor, Temperature sensors: Coolant and Exhaust gas temperature, Exhaust Oxygen level sensor, Position sensors: Throttle position sensor, accelerator pedal position sensor and crankshaft position sensor, Air mass flow sensor. Solenoids, stepper motors and relays.

**UNIT 3**

**Electronic engine management system:** Electronic engine control: Input, output and control strategies, electronic fuel control system, fuel control modes: open loop and closed loop control at various modes, EGR control, Electronic ignition systems – Spark advance correction schemes, fuel injection timing control.

**UNIT 4**

**Electronic vehicle management system:** Cruise control system, Antilock braking system, electronic suspension system, electronic steering control, traction control system, Transmission control, Safety: Airbags, collision avoiding system, low tire pressure warning system.

**UNIT 5**

**Automotive instrumentation system:** Input and output signal conversion, multiplexing, fuel quantity measurement, coolant temperature and oil pressure measurement, display devices-LED, LCD, VFD and CRT, Onboard diagnostics(OBD), OBD-II, off board diagnostics.

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***Course outcomes:***

*After completion of this course the student can be able to:*

1. *Obtain an overview of automotive components, like sensors, actuators, communication protocols and safety systems employed in today's automotive industry .*
2. *Interface automotive sensors and actuators with microcontrollers.*
3. *Know, the various display devices that are used in automobiles.*

**Text Books:**

1. Understanding Automotive Electronics, William B Ribbens, Newne Butterworth-Heinermann, 6th edition 2003.
2. Crouse W H, Automobile Elctrical Equipment, McGraw Hill Book Co.Inc, Newyork 2005

**References:**

1. Bechhold "Understanding Automotive Electronics", SAE, 1998.
2. Robert Bosch "Automotive Hand Book", SAE (5th Edition), 2000.
3. Tom Denton,"Automobile Electrical and Electronic Systems" 3rd edition- Edward Arnold, London - 2004.
4. Eric Chowanietz - 'Automotive Electronics' - SAE International USA – 1995

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**III B.Tech II Semester**

## 15AEC34-FUNDEMENTALS OF COMMUNICATION SYSTEMS (QUALITATIVE TREATMENT ONLY)

**(Choice Based Credit Courses (Inter-department))**

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

***Course Objectives:***

1. *To study the fundamental concept of the analog communication systems.*
2. *To analyze various analog modulation and demodulation techniques.*
3. *To know the working of various transmitters and receivers.*
4. *To understand the influence of noise on the performance of analog communication systems, and to acquire the knowledge about information and capacity.*

**UNIT- I**

Elements of communication systems, need for Modulation, Modulation Methods, Baseband and carrier communication, Amplitude Modulation (AM), Generation of AM signals, Rectifier detector, Envelope detector, sideband and carrier power of AM, Double sideband suppressed carrier (DSB-SC) modulation & its demodulation, Switching modulators, Ring modulator, Balanced modulator, Single sideband (SSB) transmission, VSB Modulation.

**UNIT- II**

**Angle Modulation & Demodulation**: Concept of instantaneous frequency, Generalized concept of angle modulation, Bandwidth of angle modulated waves – Narrow band frequency modulation (NBFM); and Wide band FM (WBFM), Phase modulation, Pre-emphasis, & De-emphasis, Illustrative Problems.

**UNIT -III**

**Pulse Analog Modulation Techniques**

Pulse analog modulation techniques, Generation and detection of Pulse amplitude modulation, Pulse width modulation, Pulse position modulation.

**Multiple Access Techniques**

Introduction to multiple access techniques, FDMA, TDMA, CDMA, SDMA: Advantages and applications.

**UNIT IV**

**Digital Communication (Qualitative Approach only)**

Pulse Code Modulation, DPCM, Delta modulation, Adaptive delta modulation, Overview of ASK, PSK, QPSK, BPSK and M- PSK techniques

**Unit-V**

**Modern Communication Trends (Qualitative Approach only)**

Basics of Spectrum utilizations, Comparison of 2G, 3G, Types of Ethernet, Modems – Types of Modems, 100Mbps, 1Gbps modems, Role of IPV6 in Present trends.

***Course Outcomes:***

*This course provides the foundational education in Analog Communication systems, and applications. The students are provided the learning experience through class room teaching and solving assignment & tutorial problems. At the end of course, students should be able to:*

1. *Acquire knowledge on the basic concepts of Analog Communication Systems.*
2. *Analyze the analog modulated and demodulated systems.*
3. *Verify the effect of noise on the performance of communication systems.*
4. *Know the fundamental concepts of information and capacity.*

**TEXT BOOKS:**

1. Sham Shanmugam, "Digital and Analog Communication Systems", Wiley-India edition, 2006.
2. Wayne Tomasi, Electronic Communications System: Fundamentals Through Advanced, 2nd editions, PHI, 2001.

**REFERENCES:**

1. Simon Hakin, "Communication Systems," Wiley India Edition, 4th Edition, 2011.
2. Bruce Carlson, & Paul B. Crilly, "Communication Systems – An Introduction to Signals & Noise in Electrical Communication", 5th Edition, McGraw-Hill International Edition, 2010.

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**III B.Tech II Semester**

## 15AEC35-INDUSTRIAL ELECTRONICS

**(Choice Based Credit Courses (Inter-department))**

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

***Course Objective:***

1. *To get an overview of semi-conductor devices (such as PN junction diode & Transistor) and their switching characteristics.*
2. *To study the characteristics of AC to DC converters.*
3. *To know about the practical applications Electronics in industries.*

**UNIT – I:**

**SEMICONDUCTOR DEVICES:** Scope of industrial Electronics, Semiconductors, Merits of semiconductors, crystalline structure, Intrinsic semiconductors, Extrinsic semiconductors, current flow in semiconductor, Open-circuited p-n junction, Diode resistance, Zener diode, Photoconductors and junction photo diodes, Photo voltaic effect, Light emitting diodes (LED)

**UNIT – II:**

**JUNCTION TRANSISTORS:** Introduction, The junction transistor, Conventions for polarities of voltages and currents, Open circuited transistor, Transistor biased in the active region, Current components in transistors, Currents in a transistor, Emitter efficiency, Transport factor and transistor-α, Dynamic emitter resistance, Transistor as an amplifier, Transistor construction, Letter symbols for semiconductor Devices, Characteristic curves of junction transistor in common configuration, static characteristic curves of PNP junction transistor in common emitter configuration, The transistor in common collector Configuration.

**UNIT – III:**

**AC TO DC CONVERTORS:** AC to DC converters- Introduction, Classification of Rectifiers, Half wave Rectifiers, Full wave Rectifiers, Comparison of Half wave and full wave rectifiers, Bridge Rectifiers, Bridge Rectifier meter, Voltage multiplying Rectifier circuits, Capacitor filter, LC Filter, Metal Rectifiers, Regulated Power Supplies, Classification of Voltage Regulators, Short period Accuracy of Regulators, Long period Accuracy of Voltage Regulator, Principle of automatic voltage Regulator, Simple D.C. Voltage stabilizer using Zener diode, D.C. Voltage Regulators, Series Voltage Regulators, Complete series voltage regulator circuit, Simple series voltage regulator.

**UNIT – IV: INDUSTRIAL APPLICATIONS – I**

**Resistance welding controls:** Introduction, Resistance welding process, Basic Circuit for A.C. resistance welding, Types of Resistance welding, Electronic welding control used in Resistance welding, Energy storage welding.

**Induction heating:** Principle of induction heating, Theory of Induction heating merits of induction heating, Application of induction heating, High frequency power source of induction heating

**Dielectric heating**: Principle of dielectric heating, theory of dielectric heating, dielectric properties of typical materials, electrodes used in dielectric heating, method of coupling of electrodes to the R.F. generator, Thermal losses in Dielectric heating, Applications.

**UNIT – V: INDUSTRIAL APPLICATIONS - II**

**Ultrasonics:** Introduction, Generation of Ultrasonic waves, Application of Ultrasonic waves, Ultrasonic stroboscope, ultrasonic as means of communication, ultrasonic flaw detection, Optical image on non-homogeneities, ultrasonic study of structure of matter, Dispersive study of structure of matter, Dispersive and colloidal effect of Ultrasonic, Coagulating action of Ultrasonic, separation of mixtures by ultrasoni8c waves, cutting and machining of hard materials by ultrasonic vibrations, Degassing of liquids by ultrasonic waves, Physico-chemical effects of ultrasonics, chemical effects of ultrasonics, Thermal effects of Ultrasonics, soldering and welding by ultrasonics, Ultrasonic Drying

***Course Outcome:*** *After completion of the course the students will be able to*

a. *Get an overview of semi-conductor devices (such as PN junction diode & Transistor) and their switching characteristics.*
b. *Understand the characteristics of AC to DC converters.*
c. *Understand about the practical applications Electronics in industries.*

**Text Books:**

1. G. K. Mithal, "Industrial Electronics", Delhi, Khanna Publishers, 2000.
2. J.Gnanavadivel, R.Dhanasekaran, P.Maruthupandi, "Industrial Electronics", Anuradha Publications, 2011.

**Reference Books:**

1. F. D. Petruzulla, "Industrial Electronics", Singapore, McGraw Hill, 1996.
2. M. H. Rashid, "power Electronics Circuits, Devices and Application", 3rd edition, PHI, 2004.

**III B.Tech II Semester**

## 15AEC36-NEURAL NETWORKS & FUZZY LOGIC

**(Choice Based Credit Courses (Inter-department))**

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

***Course Objectives:***

1. To Know the basics of Neural Networks and essentials of Artificial Neural Networks with Single Layer and Multilayer Feed Forward and Feedback Networks
2. To understand the Applications of Neural Networks in pattern recognition, speech and decision making.
3. To study the basic concepts of Fuzzy Logic, Fuzzy sets and Fuzzy system design implementation.
4. To Know the Associate Memories , FAM neural networks and encoding Adaptive Resource theory- network for ART

**UNIT-I**

**Neural Networks Characteristics:** History of Development in neural networks, Artificial neural net terminology, model of a neuron, Topology, Types of learning. Supervised, Unsupervised learning. Basic Learning laws, Hebb's rule, Delta rule, widrow and Hoff LMS learning rule, correlation learning rule instar and ouster learning rules.

**UNIT-II**

**Unsupervised Learning:** Competitive learning, K-means clustering algorithm, Kohonen's feature maps. Radial Basis function neural networks- recurrent networks, Real time recurrent and learning algorithm. Introduction to Counter propagation Networks- CMAC Network, ART networks, Application of NN in pattern recognition, optimization, Control, Speech and decision making.

**UNIT-III**

**Neural Network models:** neural network models, layers in neural network and their connections. Instar, outstar, weights on connections, threshold function, application- Adaline and madaline. Back propagation: feed forward back propagation network- mapping, layout, training, BPN applications

**UNIT-IV**

**Fuzzy Logic:** Basic concepts of Fuzzy logic, Fuzzy vs Crisp set, Linguistic variables, membership functions, operations of Fuzzy sets, Fuzzy if-then rules, Variables inference techniques, defuzzification techniques, basic Fuzzy interference algorithm, application of fuzzy logic , Fuzzy system design implementation , useful tools supporting design.

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**UNIT-V**

Bidirectional Associative Memory (BAM), inputs and outputs, weights and training. FAM-fuzzy associative memory, association, FAM neural networks, encoding Adaptive Resource theory-network for ART, processing in ART

***Course Outcomes:*** After completion of the course, the student can able to

a. Comprehend the concepts of feed forward neural networks
b. Analyze the various feedback networks
c. Understand the concept of fuzziness involved in various systems and fuzzy set theory.
d. Comprehend the fuzzy logic control and adaptive fuzzy logic and to design the fuzzy control using genetic algorithm.
e. Analyze the application of fuzzy logic control to real time systems.

**Text Books:**

1. Berkin Riza C and Trubatch, "Fuzzy System design principles- Building Fuzzy IF-THEN rule bases", IEEE Press.
2. Yegna Narayanan, "Artificial Neural Networks". 8th Printing, PHI, 2003.

**Reference Books:**

1. Simon Haykin, "Neural Networks," Pearson Education.
2. Yen and Langari, "Fuzzy Logic: Intelligence, Control and Information", Pearson Education.

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**III B.Tech II Semester**

## 15ACS35- MOBILE COMPUTING

**(Choice based credit course of inter department)**

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

**Course Objective:**

- To make the students understand the basic information about mobile computing and its concepts such as Applications, Impediments, Architecture, New Data Services like GPRS, CSHSD, DECT,Mobile IP Networks, MANET's and Linux for Mobile devices.
- To get acquaintance with the class of abstractions offered by the mobile computing system that develops the User App applications

**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, CSHSD, DECT.

**UNIT–II**

**Medium Access Control in Wireless (MAC):** Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA. MAC protocols for GSM, Wireless LAN (IEEE802.11), Collision Avoidance (MACA, MACAW) Protocols. **Mobile IP Network Layer:** IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization,DHCP.

**UNIT–III**

**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, C–S Computing & Adaptation, Transactional Models, Query processing, Data Recovery Process & QoS Issues.

**UNIT–IV**

**Data Dissemination and Synchronization:** Communications Asymmetry, Classification of Data Delivery Mechanisms, Data Dissemination Broadcast Models, Selective Tuning and Indexing Methods, Digital Audio and Video Broadcasting (DAB & DVB). Data Synchronization –Introduction, Software, and Protocols

**UNIT-V**

**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, Java Card, Palm OS, Windows CE, Symbian OS, Linux for Mobile Devices.

**Course Outcome:**

•Students able to use mobile computing more effectively

• Developing mobile application programs to exploit the mobile operating system

**TEXTBOOKS:**

1. Raj Kamal, "Mobile Computing", Oxford University Press, 2007, ISBN: 0195686772

**REFERENCEBOOKS:**

1. Jochen Schiller, "Mobile Communications", Addison-Wesley, Second Edition, 2004.
2. Stojmenovic and Cacute, "Handbook ofWireless Networks and Mobile Computing", Wiley, 2002, ISBN0471419028.
3. Reza Behravanfar, "Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML", ISBN: 0521817331, Cambridge University Press,Oct 2004,

**III B.Tech II Semester**

## 15ACS36- OPTIMIZATION TECHNIQUES

**(Choice based credit course of inter department)**

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

**Course Objective:**

• To understand the theory of optimization methods and algorithms developed for solving various types of optimization problems.

• To develop and promote research interest in applying optimization techniques in problems of Engineering and Technology.

• To apply the mathematical results and numerical techniques of optimization theory to concrete Engineering problems.

**UNIT-I**

Introduction to optimization: Requirements for the Application of Optimization Methods, Applications of Optimization in Engineering, Structure of Optimization Problems, Functions of a Single Variable: Properties of Single-Variable Functions, Optimality Criteria, Region Elimination Methods, Polynomial Approximation or Point Estimation Methods.

**UNIT-II**

Functions of a Several Variables: Optimality Criteria, Direct-Search Methods, Gradient Based Methods, Comparison of Methods and Numerical Results.2013-2014

**UNIT-III**

Linear Programming: Formulation of Linear Programming Models, Graphical Solution of Linear Programming in Two Variables, Linear Programming in Standard Form, Principles of the SimplexMethod,Applications.

**UNIT-IV**

Constrained Optimality Criteria: Equality-Constrained Problems, Lagrange Multipliers, Economic Interpretation of Lagrange Multipliers, Kuhn-Tucker Conditions, Kuhn-Tucker Theorems, Saddle point Conditions, Second-Order Optimality Conditions, Generalized Lagrange Multiplier Method, and Generalization of Convex Functions.

**UNIT-V**

Transformation Methods: Penalty Concept, Algorithms, Codes, and Other Contributions, Method of Multipliers, Constrained Direct Search: Problem Preparation, Adaptations of Unconstrained Search Methods, Random-Search Methods.

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

• Use various optimization techniques such as Quadratic programming, Dynamic Programming and select the ones most suitable to the problem at hand.

• Subdivide a complex system in to smaller disciplinary models, manage their interfaces and reintegrate them in to an overall system model.

• Rationalize and quantify a system architecture or product design problem by selecting appropriate objective function, design variables, parameters and constraints.

- Interpret the mathematical conditions for optimality and give physical explanation.
- Make recommendations based on solutions, analysis and limitations of models.

**TEXTBOOKS:**

1. Engineering Optimization- Methods and Applications, A.Ravindran, K. M. Ragsdell, G.V. Reklaitis, Second Edition, Wiley India Edition.

2. Introductory Operation Research- Theory and Applications, H.S. Kasana, K.D. Kumar, Springer International Edition.

**REFERENCES:**

1. Optimization Methods in Operations Research and Systems Analysis, K.V. Mital and C. Mohan, New Age International (P)Limited, Publishers, Third Edition, 1996.
2. Operations Research, Dr. J.K.Sharma, Mc Millan.

3. Operations Research: An Introduction, H.A. Taha, PHI Pvt. Ltd.,

**III B.Tech II Semester**

## 15ACS37-MACHINE LEARNING

**(Choice based credit course of inter department)**

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

**Course Objectives:**

1. Machine Learning is the discipline of designing algorithms that allow machines (e.g.,a computer)
2. To learn patterns and concepts from data without being explicitly programmed.
3. This course will be an introduction to the design (and some analysis) of Machine Learning Algorithms, with a modern outlook focusing on recent advances, and examples of real-world applications of Machine Learning algorithms.

**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 and Their Remarks,

**UNIT II**

**Decision Tree learning** – Introduction, Decision tree representation, Appropriate problems and issues for decision tree learning, The basic decision tree learning algorithm, Hypothesis space search in decision tree learning,

**Artificial Neural Networks** – Introduction, Neural network representation, Appropriate problems for neural network learning, Perceptions, Multilayer networks and the back propagation algorithm with their Remarks.

**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 III**

**Bayesian learning** – Introduction, Bayes theorem and concept learning, Maximum likelihood and least squared error hypotheses, Maximum likelihood hypotheses for predicting probabilities, Minimum description length principle, Bayes optimal classifier, Gibs algorithm, Naïve Bayes classifier, An example learning to classify text, Bayesian belief networks The EM algorithm.

**Computational learning theory**–introduction: probably approximately correct (PAC) learning. Sample complexity: quantifying the number of examples needed to PAC learn. Computational complexity of training.Sample complexity for finite hypothesis spaces, kDNF, and kCNF. Sample complexity for infinite hypothesis spaces, Vapnik-Chervonenkis dimension

**Genetic Algorithms** – Motivation, Genetic Algorithms, An illustrative Example, Hypothesis Space Search, Genetic Programming, Models of Evolution and Learning, Parallelizing Genetic Algorithms

**UNIT IV**

**Learning Sets of Rules** – Introduction, Sequential Covering Algorithms, Learning Rule Sets: Summary, Learning First Order Rules, Learning Sets of First Order Rules: FOIL, Induction as Inverted Deduction, Inverting Resolution.

**Analytical Learning** - Introduction, Learning with Perfect Domain Theories: Prolog-EBG Remarks on Explanation-Based Learning, Explanation-Based Learning of Search Control Knowledge.

**UNIT V**

**Combining Inductive and Analytical Learning** – Motivation, Inductive-Analytical Approaches to Learning, Using Prior Knowledge to Initialize the Hypothesis, Using Prior Knowledge to Alter the Search Objective, Using Prior Knowledge to Augment Search Operators.

**Reinforcement Learning** – Introduction, The Learning Task, Q Learning, Non-Deterministic, Rewards and Actions, Temporal Difference Learning, Generalizing from Examples, Relationship to Dynamic Programming.

**Course Outcomes:**

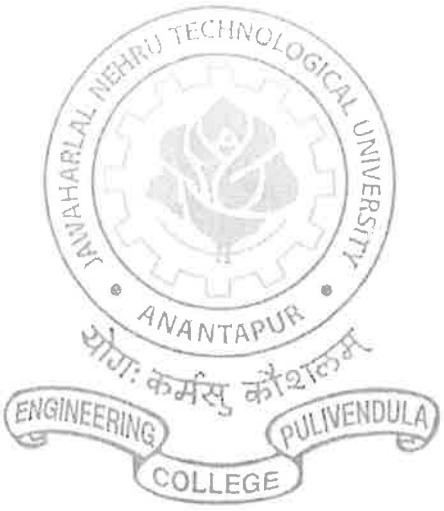
1. Develop an appreciation for what is involved in learning from data.
2. Understand a wide variety of learning algorithms.
3. Understand how to apply a variety of learning algorithms to data.
4. Understand how to perform evaluation of learning algorithms and model selection.

**TEXT BOOKS:**

1. Machine Learning – Tom M. Mitchell, - MGH.
2. Machine Learning: An Algorithmic Perspective, Stephen Marsland, Taylor & Francis (CRC)
3. Bishop.C(2006)pattern recognition and machine learning .Berlin:Springer-Verlag.

**REFERENCES:**

1. Machine Learning Methods in the Environmental Sciences, Neural Networks, William W Hsieh, Cambridge Univ Press.
2. Richard o. Duda, Peter E. Hart and David G. Stork, pattern classification, John Wiley & Sons Inc., 2001.
3. Chris Bishop, Neural Networks for Pattern Recognition, Oxford University Press, 1995.
4. Baldi.P and Brunak.S(2002) Bioinformatics : A Machine Learning Approach Cambridge:
5. HalDaumé III, A Course in Machine Learning, 2015




# Jawaharlal Nehru Technological University Anantapur College of Engineering

## Pulivendula –516 390 (A.P) India

## B.Tech. in Computer Science and Engineering

## Course Structure and Syllabi under R19 Regulations

## COMPUTER SCIENCE & ENGINEERING

| S.No | Course Name | Category | L-T-P-C |
|---|---|---|---|
| 1 | Physical Activities -- Sports, Yoga and Meditation, Plantation | MC | 0-0-6-0 |
| 2 | Career Counseling | MC | 2-0-2-0 |
| 3 | Orientation to all branches -- career options, tools, etc. | MC | 3-0-0-0 |
| 4 | Orientation on admitted Branch -- corresponding labs, tools and platforms | EC | 2-0-3-0 |
| 5 | Proficiency Modules & Productivity Tools | ES | 2-1-2-0 |
| 6 | Assessment on basic aptitude and mathematical skills | MC | 2-0-3-0 |
| 7 | Remedial Training in Foundation Courses | MC | 2-1-2-0 |
| 8 | Human Values & Professional Ethics | MC | 3-0-0-0 |
| 9 | Communication Skills -- focus on Listening, Speaking, Reading, Writing skills | BS | 2-1-2-0 |
| 10 | Concepts of Programming | ES | 2-0-2-0 |

### B.Tech I Year I Semester

| Semester - 1 | | | | | |
|---|---|---|---|---|---|
| **S.No** | **Course No** | **Course Name** | **Category** | **L-T-P** | **Credits** |
| **1** | 19ABS06 | Linear Algebra and Calculus | BS | 3-1-0 | 4 |
| **2** | 19ABS03 | Chemistry | BS | 3-0-0 | 3 |
| **3** | 19ACS01 | Problem Solving & Programming | ES | 3-1-0 | 4 |
| **4** | 19AME01 | Engineering Graphics | ES | 1-0-3 | 2.5 |
| **5** | 19AME02 | Engineering Workshop | LC | 0-0-3 | 1.5 |
| **6** | 19ABS04 | Chemistry Lab | BS | 0-0-3 | 1.5 |
| **7** | 19ACS02 | Problem Solving & Programming Lab | ES | 0-0-3 | 1.5 |
| | | | | **Total** | **18** |

### B.Tech I Year II Semester

| Semester – 2 | | | | | |
|---|---|---|---|---|---|
| **S.No** | **Course No** | **Course Name** | **Category** | **L-T-P** | **Credits** |
| 1 | 19ABEE01 | Basic Electrical and Electronics Engineering | ES | 3-0-0 | 3 |
| 2 | 19ABS07 | Differential Equations and Vector Calculus | BS | 3-1-0 | 4 |
| 3 | 19ABS09 | Applied Physics | BS | 3-0-0 | 3 |
| 4 | 19ACS05 | Data Structures | ES | 3-0-0 | 3 |
| 5 | 19AHS01 | Communicative English – I | HS | 2-0-0 | 2 |
| 6 | 19ACS07 | Computer Science and Engineering Workshop | LC | 0-0-2 | 1 |
| 7 | 19AHS02 | Communicative English - I Lab | HS | 0-0-2 | 1 |
| 8 | 19ABEE02 | Basic Electrical & Electronics Engineering Lab | ES | 0-0-3 | 1.5 |
| 9 | 19ABS10 | Applied Physics Lab | BS | 0-0-3 | 1.5 |
| 10 | 19ACS06 | Data Structures Lab | ES | 0-0-3 | 1.5 |
| | | | | **Total** | **21.5** |

BOS Chairman  Vice-principal  Principal

**B.Tech II Year I Semester**

| Semester – 3 | | | | | |
|---|---|---|---|---|---|
| **S. No** | **Course No** | **Course Name** | **Category** | **L-T-P** | **Credits** |
| 1 | 19ABS13 | Discrete Mathematics | BS | 3-0-0 | 3 |
| 2 | 19ACS08 | Database Management Systems | ES | 3-0-0 | 3 |
| 3 | 19ACS10 | Formal Languages and Automata Theory | ES | 3-0-0 | 3 |
| 4 | 19ACS11 | Design and Analysis of Algorithms | PC | 3-0-0 | 3 |
| 5 | 19ACS13 | Digital Logic Design | PC | 3-0-0 | 2 |
| 6 | 19ACS14 | Object Oriented Programming Concepts and Java Programming | PC | 2-0-0 | 2 |
| 7 | 19ACS12 | Design Thinking & Product Innovation Lab | PC | 0-0-3 | 1.5 |
| 8 | 19ACS09 | Database Management Systems Lab | ES | 0-0-3 | 1.5 |
| 9 | 19ACS15 | Object Oriented Programming Lab | PC | 0-0-3 | 1.5 |
| 10 | 19ACS16 | Free and Open-Source Software Lab | PC | 0-0-2 | 1 |
| 11 | 19AHS04 | Constitution of India | MC | 3-0-0 | 0 |
| | | **Total** | | | **21.5** |

**B.Tech II Year II Semester**

| Semester – 4 | | | | | |
|---|---|---|---|---|---|
| **S.No** | **Course No** | **Course Name** | **Category** | **L-T-P** | **Credits** |
| 1 | 19ABS15 | Numerical Methods, Probability & Statistics | BS | 3-0-0 | 3 |
| 2 | 19ACS20 | Compiler Design | PC | 3-0-0 | 3 |
| 3 | 19ACS21 | Computer Organization | ES | 3-0-0 | 3 |
| 4 | 19ACS25 | Operating Systems | PC | 3-0-0 | 3 |
| 5 | 19ACS23 | Software Engineering | PC | 3-0-0 | 3 |
| 6 | 19ACS26 | Computer Networks | ES | 3-0-0 | 3 |
| 7 | 19ACS27 | Computer Networks and Operating Systems Lab | PC | 0-0-3 | 1.5 |
| 8 | 19ACS24 | Software Engineering Lab | ES | 0-0-2 | 1 |
| 9 | 19ACS22 | Computer Organization Lab | ES | 0-0-2 | 1 |
| 10 | 19ABS14 | Environmental Science | MC | 3-0-0 | 0 |
| 11 | 19AHS03 | Universal Human Values | MC | 2-0-0 | 2 |
| | | | **Total** | | **23.5** |

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**B.Tech III Year II Semester** I

| Semester – 5 | | | | | |
|---|---|---|---|---|---|
| **S.No** | **Course No** | **Course Name** | **Category** | **L-T-P** | **Credits** |
| 1 | 19AHS12 | English Language Skills | HS | 2-0-0 | 2 |
| 2 | 19ACS51 | Internet of Things (IOT) | PC | 3-0-0 | 3 |
| 3 | 19ACS52 | Object Oriented Analysis, Design and Testing | PC | 3-0-0 | 3 |
| 5 | 19ACS53 | Data Mining | PC | 2-0-0 | 2 |
| 4 | 19ACS54 | Professional Elective I | PE | 3-0-0 | 3 |
| | 19ACS54a | Computer Graphics | | | |
| | 19ACS54b | Software Project Management | | | |
| | 19ACS54c | Web Technologies | | | |
| 6 | 19ACS55 | Open Elective - I(Inter disciplinary) - **ANNEXURE-I** | OE | 3-0-0 | 3 |
| 7 | 19ACS56 | Internet of Things(IOT) Lab | PC | 0-0-2 | 1 |
| 8 | 19AHS13 | English Language Skills Lab | HS | 0-0-3 | 1.5 |
| 9 | 19ACS57 | Data Mining Lab | PC | 0-0-2 | 1 |
| 10 | 19ACS58 | Object Oriented Analysis, Design and Testing Lab | PC | 0-0-2 | 1 |
| 11 | 19ACS59 | Socially Relevant Projects (30 hours/sem) | PR | - - - | 1 |
| 12 | 19AHS17 | Research Methodology | MC | 3-0-0 | 0 |
| | | | **Total :** | | **21.5** |

**B.Tech III Year II Semester**

| Semester - 6 | | | | | |
|---|---|---|---|---|---|
| **S.No** | **Course No** | **Course Name** | **Category** | **L-T-P** | **Credits** |
| 1 | 19ACS61 | Machine Learning | PC | 4-0-0 | 4 |
| 2 | 19ACS62 | Big data Analytics | PC | 3-0-0 | 3 |
| 3 | 19ACS63 | Cyber Security | PC | 3-0-0 | 3 |
| 4 | 19ACS64 | Professional Elective II | PE | 3-0-0 | 3 |
| | 19ACS64a | Scripting Languages | | | |
| | 19ACS64b | Mobile Computing | | | |
| | 19ACS64c | Software Architecture | | | |
| 5 | 19ACS65 | Open Elective-II (Inter Disciplinary)- **ANNEXURE-II** | OE | 3-0-0 | 3 |
| 6 | 19AHS14 | Humanities Elective I | HS | 3-0-0 | 3 |
| | 19AHS14a | MEFA | | | |
| | 19AHS14b | Entrepreneurship & Innovation Management | | | |
| 7 | 19ACS66 | Cyber Security Lab | PC | 0-0-2 | 1 |
| 8 | 19ACS67 | Machine Learning Lab | PC | 0-0-3 | 1.5 |
| 9 | 19AHS16 | Organizational Behaviors | MC | 3-0-0 | 0 |
| 10 | Industrial Training/Internship/Research Projects in National Laboratories/Academic Institutions | | PR | 4 Weeks Summer Internship | |
| | | | | **Total** | **21.5** |

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**B.Tech IV Year I Semester**

| Semester - 7 | | | | | |
|---|---|---|---|---|---|
| **S.No** | **Course No** | **Course Name** | **Category** | **L-T-P** | **Credits** |
| 1 | 19ACS71 | Cloud Computing | PC | 3-0-0 | 3 |
| 2 | 19ACS72 | Devops | PC | 2-0-0 | 2 |
| 3 | 19ACS74 | Professional Elective III | PE | 3-0-0 | 3 |
| | 19ACS74a | Human Computer Interaction | | | |
| | 19ACS74b | Data Science | | | |
| | 19ACS74c | Multimedia and Application Development | | | |
| 4 | 19ACS76 | Professional Elective IV | PE | 3-0-0 | 3 |
| | 19ACS76a | Natural Language Processing | | | |
| | 19ACS76b | Software Testing Methodologies | | | |
| | 19ACS76c | Adhoc Sensor Networks | | | |
| 5 | 19ACS75 | Open Elective -III - **ANNEXURE-III** | OE | 2-0-0 | 2 |
| 6 | 19AHS15 | Humanities Elective II | HS | 3-0-0 | 3 |
| | 19AHS15a | Management Science | | | |
| | 19AHS15b | Business Environment | | | |
| 7 | 19ACS77 | Cloud Computing Lab | PC | 0-0-1 | 1 |
| 8 | 19ACS73 | DevOps Lab | PC | 0-0-2 | 1.5 |
| 9 | 19ACS78 | Industrial Training/Internship/Research Projects in National Laboratories/Academic Institutions | PR | -------- | 2 |
| 10 | 19ACS79 | Project Stage –I | PR | ------ | 2 |
| | | | | **Total** | **22.5** |

**B.Tech IV Year II Semester**

| Semester - 8 | | | | | |
|---|---|---|---|---|---|
| **S.No** | **Course No** | **Course Name** | **Category** | **L-T-P** | **Credits** |
| 1 | 19ACS81 | Professional Elective V (MOOC) | PE | 3-0-0 | 3 |
| 2 | 19ACS82 | Open Elective IV (MOOC) | OE | 3-0-0 | 3 |
| 3 | 19ACS99 | Project Stage –II | PR | ------- | 6 |
| | | | | | **12** |

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# ANNEXURE – I

## Open Elective I (Interdisciplinary)

| Branch | Subject Code | Subject |
|---|---|---|
| Humanities | 19AHS10 | Campus Recruitment Training & Soft Skills |
| Mathematics | 19ABS20 | Mathematical Modeling |
| | 19ABS21 | Fuzzy Set Theory, Arithmetic and Logic |
| | 19ABS22 | Number Theory |
| Physics | 19ABS31 | Sensors and Actuators for Engineering Applications |
| | 19ABS32 | Physics of Electronic Materials |
| Chemistry | 19ABS41 | Chemistry of Energy Materials |
| | 19ABS42 | Advanced Polymers and Their Applications |
| | 19ABS43 | Marine Chemistry |
| CIVIL | 19ACE55a | Air Pollution and Control |
| | 19ACE55b | Green Buildings |
| | 19ACE55c | Basics of Civil Engineering Materials and Construction Practice |
| EEE | 19AEE55a | Basics of Non-Conventional Energy Sources |
| | 19AEE55b | Electrical Measurements & Sensors |
| | 19AEE55c | Electric Vehicle Engineering |
| ME | 19AME55a | Introduction to Hybrid and Electric Vehicles |
| | 19AME55b | Rapid Prototyping |
| | 19AME55c | Design for Manufacturing and Assembly |
| | 19AME55d | Power Plant Operation and Control |
| | 19AME55e | Smart Materials |
| | 19AME55f | Supply Chain Management |
| ECE | 19AEC55a | Fundamentals of Electronics and Communication Engineering |
| | 19AEC55b | Transducers and Sensors |
| | 19AEC55c | Principles of Communications |

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## ANNEXURE – II
## Open Elective II (Interdisciplinary)

| Branch | Subject Code | Subject Name |
|---|---|---|
| Humanities | 19AHS11 | Competitive &Spoken English |
| Mathematics | 19ABS23 | Integral Transforms And ITS Applications |
| | 19ABS24 | Numerical Analysis |
| | 19ABS25 | Optimization Techniques |
| Physics | 19ABS33 | Functional Nanomaterials For Engineers |
| | 19ABS34 | Materials Characterization Techniques |
| Chemistry | 19ABS44 | Green Chemistry and Catalysis for Sustainable Environment |
| | 19ABS45 | Chemistry of Nanomaterials and Applications |
| | 19ABS46 | Environmental Management and Audit |
| EEE | 19AEE65a | Energy Conservation and Management |
| | 19AEE65b | PLC & ITS Applications |
| | 19AEE65c | System Reliability Concepts |
| CIVIL | 19ACE65a | Remote Sensing and GIS |
| | 19ACE65b | Environmental Impact Assessment |
| | 19ACE65c | Disaster Management and Mitigation |
| ME | 19AME65a | Automobile Electronics, Sensors & Drives |
| | 19AME65b | Programming of Robots and Control |
| | 19AME65c | Sensors in Intelligent Manufacturing |
| | 19AME65d | Non-Conventional Sources of Energy |
| | 19AME65e | NEMS & MEMS |
| | 19AME65f | Optimization Techniques Through MAT lab |
| ECE | 19AEC65a | Introduction to Microcontrollers & Applications |
| | 19AEC65b | Principles of Digital Signal Processing |
| | 19AEC65c | Introduction to Image Processing |

## ANNEXURE – III Open Elective III

| Branch | Subject Code | Subject Name |
|---|---|---|
| CIVIL | 19ACE75a | Architecture and town planning |
| | 19ACE75b | Experimental stress analysis |
| | 19ACE75c | Finite element methods |
| EEE | 19AEE75a | Electrical engineering materials |
| | 19AEE75b | Digital signal processors and applications |
| | 19AEE75c | IOT applications in electrical engineering |
| ME | 19AME75a | Special types of vehicles |
| | 19AME75b | Six sigma and lean manufacturing |
| | 19AME75c | Reverse engineering |
| | 19AME75d | Energy auditing |
| | 19AME75e | Introduction to composite materials |
| | 19AME75f | Customer relationship management |
| ECE | 19AEC75a | Embedded systems & IOT |
| | 19AEC75b | Electronic instrumentation |
| | 19AEC75c | Basics of VLSI design |
| CSE | 19ACS75a | Mobile application development |
| | 19ACS75b | Real time operating systems and applications |
| | 19ACS75c | Fundamentals of block chain and applications |

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**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA**
**DEPARTMENT OF MATHEMATICS**
**I B.TECH – I SEMESTER (Common to all Branches of Engineering)**
**(THEORY)**

| Subject Code | Title of the Subject | L | T | P | C |
|---|---|---|---|---|---|
| | Linear Algebra and Calculus | 3 | 1 | - | 4 |

| COURSE OBJECTIVES | |
|---|---|
| 1 | This course will illuminate the students in the concepts of calculus and linear algebra. |
| 2 | To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications |

| COURSE OUTCOMES | |
|---|---|
| CO1 | develop the use of matrix algebra techniques that is needed by engineers for practical applications |
| CO2 | Utilize mean value theorems to real life problems |
| CO3 | familiarize with functions of several variables which is useful in optimization |
| CO4 | Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional coordinate systems |
| CO5 | Students will become familiar with 3- dimensional coordinate systems and also learn the utilization of special functions |

**Mapping between Course Outcomes and Programme Outcomes**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | | | | | | | |
| CO2 | | | | | | | | | | | | |
| CO3 | | | | | | | | | | | | |
| CO4 | | | | | | | | | | | | |
| CO5 | | | | | | | | | | | | |

## SYLLABUS

**Unit I: Matrix Operations and Solving Systems of Linear Equations** **10 hrs**

Rank of a matrix by echelon form, solving system of homogeneous and non-homogeneous equations linear equations. Eigen values and Eigen vectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem, diagonalization of a matrix, quadratic forms and nature of the quadratic forms, reduction of quadratic form to canonical forms by orthogonal transformation.

**Unit II: Mean Value Theorems** **06 hrs**

Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin's theorems with remainders (without proof);

**Unit III: Multivariable calculus** **08 hrs**

Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers for three variables

**Unit IV: Double Integrals** **08 hrs**

Double integrals, change of order of integration, change of variables, areas enclosed by plane curves

**Unit V: Multiple Integrals and Special Functions** **08 hrs**

Evaluation of triple integrals, change of variables between Cartesian, cylindrical and spherical polar co-ordinates, Beta and Gamma functions and their properties, relation between beta and gamma functions.

**Textbooks:**


1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.


**References:**


1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
3. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 201.


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**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) :: PULIVENDULA**
**DEPARTMENT OF MATHEMATICS**
**I B.TECH – II SEMESTER (Common to all Branches of Engineering)**
**(THEORY)**

| Subject Code | Title of the Subject | L | T | P | C |
|---|---|---|---|---|---|
| | Differential Equations and Vector Calculus | 3 | 1 | - | 4 |

| COURSE OBJECTIVES | |
|---|---|
| 1 | To enlighten the learners in the concept of differential equations and multivariable calculus |
| 2 | To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications. |

| COURSE OUTCOMES | |
|---|---|
| CO1 | solve the differential equations related to various engineering fields |
| CO2 | Identify solution methods for partial differential equations that model physical processes |
| CO3 | interpret the physical meaning of different operators such as gradient, curl and divergence |
| CO4 | estimate the work done against a field, circulation and flux using vector calculus |

**Mapping between Course Outcomes and Programme Outcomes**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | | | | | | | |
| CO2 | | | | | | | | | | | | |
| CO3 | | | | | | | | | | | | |
| CO4 | | | | | | | | | | | | |
| CO5 | | | | | | | | | | | | |

**SYLLABUS**

**UNIT I: Linear Differential Equations of Higher Order**

Definitions, complete solution, operator D, rules for finding complimentary function, inverse operator, rules for finding particular integral, method of variation of parameters.

**UNIT II: Equations Reducible to Linear Differential Equations and Applications**

Cauchy's and Legendre's linear equations, simultaneous linear equations with constant coefficients, Applications: Mass spring system and L-C-R Circuit problems.

**UNIT III: Partial Differential Equations** **08 hrs**

First order partial differential equations, solutions of first order linear and non-linear PDEs. Solutions to homogenous and non-homogenous higher order linear partial differential equations.

**UNIT IV: Multivariable Calculus (Vector differentiation)**

Scalar and vector point functions, gradient, divergent, curl and their properties (Identities and applications)

**UNIT V: Multivariable Calculus (Vector integration)**

Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof).

**Textbooks:**


1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.


**References:**


1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
2. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett, 2011.
3. Michael Greenberg, Advanced Engineering Mathematics, 2/e, Pearson, 2018
4. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
5. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.


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**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA**
**DEPARTMENT OF CHEMISTRY**
**I B.TECH – II SEMESTER (common to EEE, ECE & CSE)**
**(THEORY)**

| Subject Code | Title of the Subject | L | T | P | C |
|---|---|---|---|---|---|
| 19A53201 | Chemistry | 3 | | - | 3 |

| COURSE OBJECTIVES | |
|---|---|
| 1 | To familiarize engineering chemistry and its applications |
| 2 | To train the students on the principles and applications of electrochemistry and polymers |
| 3 | To introduce instrumental methods, molecular machines and switches |

| COURSE OUTCOMES | |
|---|---|
| CO1 | **apply** Schrodinger wave equation to hydrogen and particle in a box, **illustrate** the molecular orbital energy level diagram of different molecular species, **explain** the band theory of solids for conductors, semiconductors and insulators **discuss** the magnetic behaviour and colour of complexes. |
| CO2 | **apply** Nernst equation for calculating electrode and cell potentials, **differentiate** between pH metry, potentiometric and conductometric titrations, **explain** the theory of construction of battery and fuel cells, **solve** problems based on cell potential |
| CO3 | **explain** the different types of polymers and their applications, **explain** the preparation, properties and applications of Bakelite, Nylon-66, and carbon fibres, **describe** the mechanism of conduction in conducting polymers, **discuss** Buna-S and Buna-N elastomers and their applications |
| CO4 | **explain** the different types of spectral series in electromagnetic spectrum, **understand** the principles of different analytical instruments, **explain** the different applications of analytical instruments |
| CO5 | **explain** the band theory of solids for conductors, semiconductors and insulators, **explain**supramolecular chemistry and self assembly, **demonstrate** the application of Rotaxanes and Catenanes as artificial molecular machines |

**Mapping between Course Outcomes and Programme Outcomes**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | | | | | | | |
| CO2 | | | | | | | | | | | | |
| CO3 | | | | | | | | | | | | |
| CO4 | | | | | | | | | | | | |
| CO5 | | | | | | | | | | | | |

## SYLLABUS

### Unit 1: Structure and Bonding Models: (10 hrs)

Planck's quantum theory, dual nature of matter, Schrodinger Wave equation, significance of $\Psi$ and $\Psi^2$ , applications to hydrogen, particle in a box and their applications for conjugated molecules, molecular orbital theory – bonding in homo- and heteronuclear diatomic molecules – energy level diagrams of $O_2$ and CO, etc. $\pi$-molecular orbitals of butadiene and benzene, calculation of bond order, crystal field theory – salient features – splitting in octahedral and tetrahedral geometry,

magnetic properties and colour, band theory of solids – band diagrams for conductors, semiconductors and insulators, role of doping on band structures.

**Unit 2: Electrochemistry and Applications: (10 hrs)**

Electrodes – concepts, reference electrodes (Calomel electrode, Ag/AgCl electrode and glass electrode) electrochemical cell, Nernst equation, cell potential calculations, numerical problems, potentiometry- potentiometric titrations (redox titrations), concept of conductivity, conductivity cell, conductometric titrations (acid-base titrations), photovoltaic cell – working and applications, photogalvanic cells with specific examples. Electrochemical sensors – potentiometric sensors with examples, amperometric sensors with examples.

Primary cells – Zinc- $MnO_2$ battery ( Laclanche cell), Secondary cells – lead acid and lithium ion batteries- working of the batteries including cell reactions. Fuel cells, hydrogen-oxygen, methanol – oxygen fuel cells – working of the cells- Applications.

**Unit 3: Polymer Chemistry:(10 hrs)**

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, copolymerization (stereospecific polymerization) with specific examples and mechanisms of polymer formation.

Plastics - Thermoplastics and Thermosettings, Preparation, properties and applications of – Bakelite, carbon fibres, Biodegradable polymers, Conducting polymers – polyacetylene, polyaniline, mechanism of conduction and applications.

**Unt 4: Instrumental Methods and Applications: (10 hrs)**

Electromagnetic spectrum, Absorption of radiation: Principle and applications of UV-Visible, IR and Basic concepts of Chromatographic techniques and their applications. pH metry, potentiometry and conductometry,

**Unit 5: Advanced Engineering Materials:(10 hrs)**

(i) Concepts and terms of supra molecular chemistry, complementarity, Basic Lock and Key principle, examples of Supramolecules, Applications of Supra molecules (sensors, catalysts, gas storage, medical and molecular switches)

ii) Semiconducting and Super Conducting materials-Principles and some examples

iii) Electrical Insulators or Dielectric materials: Definition and classification, Characteristics of electrical insulators and applications of electrical insulating materials, Super capacitors.

(iv) Nanochemistry: Introduction, classification of nanomaterials properties and applications of Fullerenes, Carbon nano tubes and Graphines nanoparticles.

**Text Books:**


1. Engineering Chemistry by KNJayaveera, GVSubba Reddy and C. Ramachandraiah, McGraw Hill Higher Education, Foruth Edition, New Delhi
2. A Text Book of Enigneering Chemistry, Jain and Jain, Dhanapathi Rai Publications, New Delhi

References:

1. A Text book of Engineering Chemistry by K. Sesha Maheswaramma and Mridula Chugh, Pearson's Publications Pvt. Ltd., (PAN India Title)
2. A Text book of Engineering Chemistry by SS Dhara, S. Chand Publications, New Delhi
3. Engineering Chemistry by K.B.Chandra Sekhar, UN.Das and Sujatha Mishra, SCITECH Pubblications India Pvt Limited.
4. A Text book of Engineering Chemistry by Prasanta Rath, B. Rama Devi, Ch.Venkata Ramana Reddy and Subhendu Chakroborty, Cengage learning India Pvt.Ltd.
5. Chemistry of Engineering Materials, C.V.Agarwal, C.Parameswaramurthy and Andranaidu
6. Text Book of Engineering Chemistry, Shashichawla, Dhanapathirai Publications.

# Problem Solving and Programming

**(Common to All Branches of Engineering)**

**B. Tech – I Semester** **L-T-P-C**
**3-1-0-4**

**Course Objectives:**

1. Introduce the internal parts of a computer, and peripherals.
2. Introduce the Concept of Algorithm and use it to solve computational problems
3. Identify the computational and non-computational problems
4. Teach the syntax and semantics of a C Programming language
5. Demonstrate the use of Control structures of C Programming language
6. Illustrate the methodology for solving Computational problems

**Outcomes:**

Student should be able to

1. Identify the different peripherals, ports and connecting cables in a PC (L2)
2. Illustrate the working of a Computer (L3)
3. Select the components of a Computer in the market and assemble a computer (L4)
4. Solve complex problems using language independent notations (L3)

**Unit 1:**

**Computer Fundamentals:** What is a Computer, Evolution of Computers, Generations of Computers, Classification of Computers, Anatomy of a Computer, Memory revisited, Introduction to Operating systems, Operational overview of a CPU.

**Introduction to Programming, Algorithms and Flowcharts**: Programs and Programming, Programming languages, Compiler, Interpreter, Loader, Linker, Program execution, Fourth generation languages, Fifth generation languages, Classification of Programming languages, Structured programming concept, Algorithms, Pseudo-code, Flowcharts, Strategy for designing algorithms, Tracing an algorithm to depict logic, Specification for converting algorithms into programs.

**Unit 2:**

**Introduction to problem solving:** Introduction, the problem-solving aspect, Design and implementation of algorithms – Topdown design, Analysis of Algorithms, the efficiency of algorithms, the analysis of algorithms.

**Fundamental algorithms:** Exchanging the values of two variables, counting, summation of a set of numbers, factorial computation, sine function computation, generation of the Fibonacci sequence, reversing the digits of an integer.

**Learning Outcomes**: Student should be able to

1. Solve Computational problems (L3)
2. Apply Algorithmic approach to solving problems (L3)
3. Analyze the algorithms (L4)

**Unit 3:**

**Types, Operators, and Expressions:** Variable names, data types and sizes, constants, declarations, arithmetic operators, relational and logical operators, type conversions, increment and decrement operators, bitwise operators, assignment operators and expressions, conditional expressions precedence and order of evaluation.

**Input and output:** standard input and output, formatted output-Printf, formatted input-Scanf

**Control Flow:** Statements and blocks, if-else, else-if, switch, Loops-while and for, Loops-Dowhile, break and continue, goto and labels.

**Functions and Program Structure:** Basics of functions, functions returning non-integers, external variables, scope variables, header variables, register variables, block structure, initialization, recursion, the C processor.

**Learning Outcomes**: Student should be able to

1. Recognize the programming elements of C Programming language (L1)
2. Select the control structure for solving the problem (L4)
3. Apply modular approach for solving the problem (L3)

**Unit 4:**

**Factoring methods:** Finding the square root of a number, the smallest divisor of a number, the greatest common divisor of two integers, generating prime numbers.

**Pointers and arrays:** Pointers and addresses, pointers and function arguments, pointers and arrays, address arithmetic, character pointers and functions, pointer array; pointers to pointers, Multi-dimensional arrays, initialization of arrays, pointer vs. multi-dimensional arrays, command line arguments, pointers to functions, complicated declarations.

**Array Techniques:** Array order reversal, finding the maximum number in a set, removal of duplicates from an order array, finding the $k^{th}$ smallest element.

**Learning Outcomes**: Student should be able to

1. Solve mathematical problems using C Programming language (L3)
2. Structure the individual data elements to simplify the solutions (L6)
3. Facilitate efficient memory utilization (L6)

**Unit 5:**

**Sorting and Searching:** Sorting by selection, sorting by exchange, sorting by insertion, sorting by partitioning, binary search.

**Structures:** Basics of structures, structures and functions, arrays of structures, pointers to structures, self-referential structures, table lookup, typedef, unions, bit-fields.

**Some other Features**: Variable-length argument lists, formatted input-Scanf, file access, Error handling-stderr and exit, Line Input and Output, Miscellaneous Functions.

**Learning Outcomes**: Student should be able to

1. Select sorting algorithm based on the type of the data (L4)
2. Organize heterogeneous data (L6)
3. Design a sorting algorithm (L6)

**Text Books:**

1. Brian W. Kernighan, and Dennis M. Ritchie, "The C Programming Language", 2nd Edition, Pearson.
2. R.G. Dromey, "How to Solve it by Computer". 2014, Pearson.
3. Pradip Dey, and Manas Ghosh, "Programming in C", 2018, Oxford University Press.

**Reference Books:**

1. RS Bichkar "Programming with C", 2012, Universities Press.
2. Pelin Aksoy, and Laura Denardis, "Information Technology in Theory", 2017, Cengage
3. Byron Gottfried and Jitender Kumar Chhabra, "Programming with C", 4th Edition, 2019, McGraw Hill Education.

**Course Outcomes:**

1. Construct his own computer using parts (L6).
2. Recognize the importance of programming language independent constructs (L2)
3. Solve computational problems (L3)
4. Select the features of C language appropriate for solving a problem (L4)
5. Design computer programs for real world problems (L6)
6. Organize the data which is more appropriated for solving a problem (L6)

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**I YEAR I SEMESTER**

**ENGINEERING WORKSHOP (19AME02)**
**(Common to CE, MECH & CSE)**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 3 | 1.5 |

**Course Objectives:**

- To bring awareness about workshop practices for Engineers.
- To familiarize how wood working operations can be performed.
- To teach the practices for sheet metal operations.
- To develop the technical skills related to fitting and electrical wiring.

**Section 1 : Wood Working**

Familiarity with different types of woods and tools used in wood working and make following joints

a) Half – Lap joint
b) Mortise and Tenon joint
c) Corner Dovetail joint or Bridle joint

**Section 2 : Sheet Metal Working**

Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets

a) Tapered tray b) Conical funnel c) Elbow pipe d) Brazing

**Section 3 : Fitting**

Familiarity with different types of tools used in fitting and do the following fitting exercises

a) V-fit b) Dovetail fit c) Semi-circular fit
d) Bicycle tire puncture and change of two wheeler tyre

**Section 4 : Electrical Wiring**

Familiarities with different types of basic electrical circuits and make the following connections

a) Parallel and series b) Two way switch c) Godown lighting d) Tube light
e) Three phase motor f) Soldering of wires

**Text Books:**


1. K.Venkata Reddy., Workshop Practice Manual, 6/e BS Publications.
2. Kannaiah P. and Narayana K.L., Workshop Manual, 2/e, Scitech publishers.
3. John K.C., Mechanical Workshop Practice. 2/e, PHI 2010.


**Course Outcomes:**

At the end of this Course the student will be able to

- Apply wood working skills in real world applications. (L6)
- Apply fitting operations in various applications. (L6)
- Build different parts with metal sheets in real world applications. (L5)
- Demonstrate soldering and brazing. (L4)
- Apply basic electrical engineering knowledge for house wiring practice. (L6)

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA**
****** DEPARTMENT OF CHEMISTRY ******
**I B.TECH – II SEMESTER(common to EEE, ECE & CSE)**
**(CHEMISTRY LAB)**

| Subject Code | Title of the Lab | L | T | P | C |
|---|---|---|---|---|---|
| 19A53202 | Chemistry lab | - | - | 3 | 1.5 |

| COURSE OBJECTIVES | |
|---|---|
| 1 | Verify the fundamental concepts with experiments |

| COURSE OUTCOMES | |
|---|---|
| CO1 | **determine** the cell constant and conductance of solutions |
| CO2 | **prepare** advanced polymer materials |
| CO3 | **measure** the strength of an acid present in secondary batteries |
| CO4 | **analyse** the IR and NMR of some organic compounds |

**Mapping between Course Outcomes and Programme Outcomes**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | | | | | | | |
| CO2 | | | | | | | | | | | | |
| CO3 | | | | | | | | | | | | |
| CO4 | | | | | | | | | | | | |
| CO5 | | | | | | | | | | | | |

**LIST OF EXPERIMENTS**

1. Conductometric titration of strong acid vs strong base
2. Conductometric titration of weak acid vs. strong base
3. Determination of cell constant and conductance of solutions
4. Potentiometry - determination of redox potentials and emf
5. Estimation of Ferrous Iron by Dichrometry.
6. Determination of strength of an acid in Pb-Acid battery
7. Preparation of a polymer
8. Verify Lambert-Beer's law
9. Thin layer chromatography
10. Identification of simple organic compounds by IR
11. Separation of Organic mixtures by paper chromatography.
12. Preparation of Copper/Silver colloidal Nano materials

**TEXT BOOKS:**

1. Vogel's Text book of Quantitative Chemical Analysis, Sixth Edition – J. Mendham et al, Pearson Education.
2. Chemistry Practical – Lab Manual by Chandra Sekhar, GV Subba Reddy and Jayaveera

# Problem Solving and Programming Laboratory

**(Common to All Branches of Engineering)**

**B.Tech – I Semester** **L-T-P-C**
**0-0-3-1.5**

**Laboratory Experiments #**

1. Assemble and disassemble parts of a Computer
2. Design a C program which reverses the number
3. Design a C program which finds the second maximum number among the given list of numbers.
4. Construct a program which finds the $k^{th}$ smallest number among the given list of numbers.
5. Design an algorithm and implement using C language the following exchanges
   $a \leftarrow b \leftarrow c \leftarrow d$
6. Develop a C Program which counts the number of positive and negative numbers separately and also compute the sum of them.
7. Implement the C program which computes the sum of the first n terms of the series
   Sum = 1 – 3 + 5 -7 + 9
8. Design a C program which determines the numbers whose factorial values are between 5000 and 32565.
9. Design an algorithm and implement using a C program which finds the sum of the Infinite series $1 - x^2/2! + x^4/4! - x^6/6! + ....$
10. Design a C program to print the sequence of numbers in which each number is the sum of the three most recent predecessors. Assume first three numbers as 0, 1, and 1.
11. Implement a C program which converts a hexadecimal, octal and binary number to decimal number and vice versa.
12. Develop an algorithm which computes the all the factors between 1 to 100 for a given number and implement it using C.
13. Construct an algorithm which computes the sum of the factorials of numbers between m and n.
14. Design a C program which reverses the elements of the array.
15. Given a list of n numbers, Design an algorithm which prints the number of stars equivalent to the value of the number. The starts for each number should be printed horizontally.
16. Implement the sorting algorithms
    a. Insertion sort b. Exchange sort c. Selection sort d. Partitioning sort.
17. Illustrate the use of auto, static, register and external variables.
18. Design algorithm and implement the operations creation, insertion, deletion, traversing on a singly linked list.
19. Develop a C program which takes two numbers as command line arguments and finds all the common factors of those two numbers.
20. Design a C program which sorts the strings using array of pointers.

# The above list is not exhaustive. Instructors may add some experiments to the above list. Moreover, 50% of the experiments are to be changed every academic year. Instructors can choose the experiments, provided those experiments are not repetitions.

**Course outcomes:** Student should be able to

1. Construct a Computer given its parts (L6)
2. Select the right control structure for solving the problem (L6)
3. Analyze different sorting algorithms (L4)
4. Design solutions for computational problems (L6)
5. Develop C programs which utilize the memory efficiently using programming constructs like pointers.

**References:**


1. B. Govindarajulu, "IBM PC and Clones Hardware Trouble shooting and Maintenance", Tata McGraw-Hill, 2nd edition, 2002.
2. R.G. Dromey, "How to Solve it by Computer". 2014, Pearson.

Proposed

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING (AUTONOMOUS), PULIVENDULA
YSR (KADAPA) Dist 516 390, (A.P) INDIA

B.Tech – II Sem

L T P C

3 0 0 3

# Basic Electrical & Electronics Engineering

## Part A: Basic Electrical Engineering

**(Civil, Mechanical, CSE), ECE**

**Course Objectives:**

1. To introduce basics of electric circuits.
2. To teach DC and AC electrical circuit analysis.
3. To explain working principles of transformers and electrical machines.
4. To impart knowledge on low voltage electrical installations

**Unit 1 DC & AC Circuits:**

Electrical circuit elements (R - L and C) - Kirchhoff laws - Series and parallel connection of resistances with DC excitation. Superposition Theorem - Representation of sinusoidal waveforms - peak and rms values - phasor representation - real power - reactive power - apparent power - power factor - Analysis of single-phase ac circuits consisting of RL - RC - RLC series circuits.

**Unit Outcomes: Able to**

- Recall Kirchoff laws (L1)
- Analyze simple electric circuits with DC excitation (L4)
- Apply network theorems to simple circuits (L3)
- Analyze single phase AC circuits consisting of series RL - RC - RLC combinations (L4)

**Unit 2 DC & AC Machines:**

Principle and operation of DC Generator - EMF equations - OCC characteristics of DC generator – principle and operation of DC Motor – Performance Characteristics of DC Motor - Speed control of DC Motor – Principle and operation of Single Phase Transformer - OC and SC test on transformer - principle and operation of Induction Motor [ Elementary treatment only]

**Unit Outcomes: Able to**

- Explain principle and operation of DC Generator & Motor.
- Perform speed control of DC Motor (L2)
- Explain operation of transformer and induction motor. (L2)
- Explain construction & working of induction motor - DC motor

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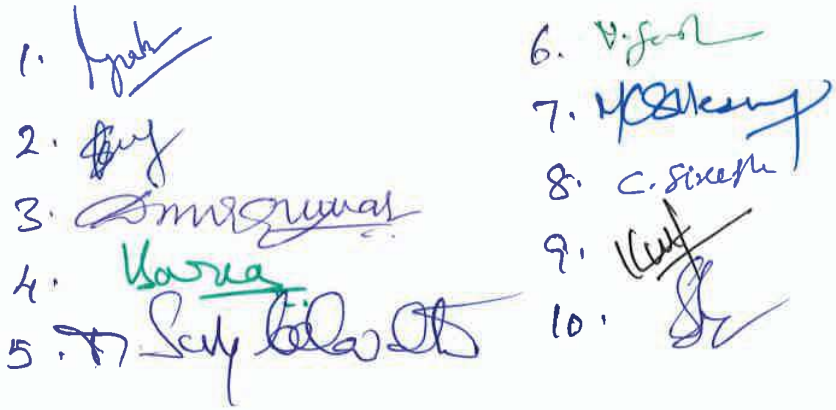
**Unit 3 Electrical Installations:**

Components of LT Switchgear: Switch fuse unit (SFU),MCB,ELCB,MCCB,Tpes of wires and cables,Earthing. Types of batteries,important Characteristics for Batteries. Elementary Calculations for energy consumption,power factor improvement and battery backup

**Unit Outcomes: Able to**

- Explain principle and operation of protecting equipments.
- Come to know different types of batteries and their usage.



I B.Tech II Sem

## COURSE NO. - Basic Electrical & Electronics Engineering

**(Common to Civil, Mechanical, CSE)**

**L T P C**
**3 1 0 4**

## Part B: Basic Electronics Engineering

**Course Objectives:**

- To provide comprehensive idea about working principle, operation and applications of PN junction & zener diodes, BJT, FET, MOSFET and operational amplifier
- To introduce fundamentals of digital electronics
- To educate on principles of various communication systems
- To teach efficacy of electronic principles which are pervasive in engineering applications

### UNIT I ANALOG ELECTRONICS

Overview of Semiconductors, PN junction diode, Zener diode, Applications of diode as switch and rectifier, Zener diode as regulator, special purpose diodes: schottky diode, tunnel diode, varactor diode, photodiode, phototransistor and LED.

BJT construction, operation, configuration and characteristics, JFET and MOSFET construction, operation, characteristics (CS configuration), applications.

Operational Amplifiers: Introduction, block diagram, basic op-amp circuits: Inverting, Non Inverting, summer, subtractor, voltage follower.

**Unit Outcomes:**

- Describe operation and characteristics of diodes and transistors
- Make use of diodes and transistors in simple, typical circuit applications
- Understand operation of basic op-amp circuits

### UNIT II DIGITAL ELECTRONICS

Introduction, Switching and Logic Levels, Digital Waveform, characteristics of digital ICs, logic gates, number systems, combinational circuits - adders, multiplexers, decoders; introduction to sequential circuits, flip flops, shift register, binary counter.

**Unit Outcomes:**

- Explain different logic gates using truth table
- Distinguish combinational and sequential circuits
- Analyze various combinational circuits such as adders, multiplexers and decoders
- Understand functionality of flip-flops, shift registers and counters

## UNIT III COMMUNICATION SYSTEMS

Introduction, Elements of Communication Systems, EM spectrum, basics of electronic communication, Amplitude and Frequency modulation, Pulse modulation, Communication receivers, Examples of communication systems: Microwave & Satellite, Fibre optic, Television, mobile communication (block diagram approach).

**Unit Outcomes:**

- Describe basic elements of a communication system
- Explain need for modulation and different modulation techniques
- Understand functioning of various communication systems

**TEXT BOOKS:**

1.D.P. Kothari, I.J.Nagrath, Basic Electronics, 2nd edition, McGraw Hill Education(India)Private Limited

2.S.K. Bhattacharya, Basic Electrical and Electronics Engineering, 2nd edition, Pearson India Private Limited.

**REFERENCES:**

1.R. Muthusubramanian, S. Salivahanan, "Basic Electrical and Electronics Engineering", Tata McGraw-Hill Education, Reprint 2012.

2.David Bell, Electronic Devices and Circuits: Oxford University Press, 5th EDn., 2008.

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PULIVENDULA - 516 390

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) :: PULIVENDULA**
**DEPARTMENT OF MATHEMATICS**
**I B.TECH – II SEMESTER (Common to all Branches of Engineering)**
**(THEORY)**

| Subject Code | Title of the Subject | L | T | P | C |
|---|---|---|---|---|---|
| | Differential Equations and Vector Calculus | 3 | 1 | - | 4 |

| COURSE OBJECTIVES | |
|---|---|
| 1 | To enlighten the learners in the concept of differential equations and multivariable calculus |
| 2 | To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications. |

| COURSE OUTCOMES | |
|---|---|
| CO1 | solve the differential equations related to various engineering fields |
| CO2 | Identify solution methods for partial differential equations that model physical processes |
| CO3 | interpret the physical meaning of different operators such as gradient, curl and divergence |
| CO4 | estimate the work done against a field, circulation and flux using vector calculus |

**Mapping between Course Outcomes and Programme Outcomes**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | | | | | | | |
| CO2 | | | | | | | | | | | | |
| CO3 | | | | | | | | | | | | |
| CO4 | | | | | | | | | | | | |
| CO5 | | | | | | | | | | | | |

**SYLLABUS**

**UNIT I: Linear Differential Equations of Higher Order**

Definitions, complete solution, operator D, rules for finding complimentary function, inverse operator, rules for finding particular integral, method of variation of parameters.

**UNIT II: Equations Reducible to Linear Differential Equations and Applications**

Cauchy's and Legendre's linear equations, simultaneous linear equations with constant coefficients, Applications: Mass spring system and L-C-R Circuit problems.

**UNIT III: Partial Differential Equations** **08 hrs**

First order partial differential equations, solutions of first order linear and non-linear PDEs. Solutions to homogenous and non-homogenous higher order linear partial differential equations.

**UNIT IV: Multivariable Calculus (Vector differentiation)**

Scalar and vector point functions, gradient, divergent, curl and their properties (Identities and applications)

**UNIT V: Multivariable Calculus (Vector integration)**

Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof).

**Textbooks:**


1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.


**References:**


1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
2. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett, 2011.
3. Michael Greenberg, Advanced Engineering Mathematics, 2/e, Pearson, 2018
4. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
5. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.


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**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA**
**DEPARTMENT OF PHYSICS**
**I B.TECH – II SEMESTER (common to EEE, ECE & CSE)**
**(THEORY)**

| Subject Code | Title of the Subject | L | T | P | C |
|---|---|---|---|---|---|
| | Applied Physics | 3 | 0 | - | 3 |

| COURSE OBJECTIVES | |
|---|---|
| 1 | To identify the importance of the optical phenomenon i.e. interference, diffraction and polarization related to its Engineering applications |
| 2 | To understand the mechanisms of emission of light, the use of lasers as light sources for low and high energy applications, study of propagation of light wave through optical fibres along with engineering applications. |
| 3 | To enlighten the concepts of Quantum Mechanics and to provide fundamentals of de'Broglie waves, quantum mechanical wave equation and its applications, the importance of free electron theory and semiconductors in the functioning of electronic devices. |
| 4 | To explain the significant concepts of dielectric and magnetic materials that leads to potential applications in the emerging micro devices |
| 5 | To give an impetus on the subtle mechanism of superconductors using the concept of BCS theory and their fascinating applications. Considering the significance of micro miniaturization of electronic devices and significance of low dimensional materials, the basic concepts of nanomaterials, their properties and applications in modern emerging technologies are to be elicited. |

| COURSE OUTCOMES | |
|---|---|
| CO1 | **Explain** the need of coherent sources and the conditions for sustained interference (L2). **Identify** engineering applications of interference including homodyne and heterodyne detection (L3). **Analyze** the differences between interference and diffraction with applications (L4). **Illustrate** the concept of polarization of light and its applications (L2). **Classify** ordinary polarized light and extraordinary polarized light (L2) |
| CO2 | **Explain** various types of emission of radiation (L2). **Identify** the role of laser in engineering applications (L3). **Describe** the construction and working principles of various types of lasers (L1). **Explain** the working principle of optical fibers (L2). **Classify** optical fibers based on refractive index profile and mode of propagation (L2). **Identify** the applications of optical fibers in medical, communication and other fields (L2). **Apply** the fiber optic concepts in various fields (L3). |
| CO3 | **Describes** the dual nature of matter (L1). **Explains** the significance of wave function (L2). **Identify** the role of Schrodinger's time independent wave equation in studying particle in one-dimensional infinite potential well (L3). **Identify** the role of classical and quantum free electron theory in the study of electrical conductivity (L3). **Classify** the energy bands of semiconductors (L2). **Outline** the properties of n-type and p-type semiconductors and charge carriers (L2). **Interpret** the direct and indirect band gap semiconductors (L2). **Identify** the type of semiconductor using Hall effect (L2). **Identify** applications of semiconductors in electronic devices (L2) |
| CO4 | **Explain** the concept of dielectric constant and polarization in dielectric materials (L2). **Summarize** various types of polarization of dielectrics (L2). **Interpret** Lorentz field and Claussius- Mosotti relation in dielectrics (L2). **Classify** the magnetic |

| | |
|---|---|
| | materials based on susceptibility and their temperature dependence (L2). **Explain** the applications of dielectric and magnetic materials (L2). **Apply** the concept of magnetism to magnetic devices (L3) |
| CO5 | **Explain** how electrical resistivity of solids changes with temperature (L2). **Classify** superconductors based on Meissner's effect (L2). **Explain** Meissner's effect, BCS theory& Josephson effect in superconductors (L2). **Identify** the nano size dependent properties of nanomaterials (L2). **Illustrate** the methods for the synthesis and characterization of nanomaterials (L2). **Apply** the basic properties of nanomaterials in various Engineering branches (L3). |

**Mapping between Course Outcomes and Programme Outcomes**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | | | | | | | |
| CO2 | | | | | | | | | | | | |
| CO3 | | | | | | | | | | | | |
| CO4 | | | | | | | | | | | | |
| CO5 | | | | | | | | | | | | |

## SYLLABUS OF APPLIED PHYSICS

### Unit-I: Physical Optics

**Interference**-Principle of superposition –Interference of light – Conditions for sustained interference- Interference in thin films (reflected light)- Newton's Rings: determination of wavelength - Engineering applications of Interference

**Diffraction**- Fraunhofer Diffraction-Single and Double slits - Diffraction Grating – Grating Spectrum - Engineering applications of diffraction.

**Polarization**-Polarization by double refraction-Nicol's Prism--Half wave and Quarter wave plates-Engineering applications of polarization.

### Unit-II: Lasers and Fiber optics

**Lasers:** Introduction – Characteristics of laser – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion – Pumping mechanisms – Nd:YAG laser – He-Ne laser – Applications of lasers.

**Fiber optics-** Introduction to Optical Fibers-Total Internal Reflection -Acceptance Angle-Numerical Aperture-Classification of fibers based on refractive index profile –Propagation of electromagnetic wave through optical fibers – Modes -Importance of V-number –Block diagram of fiber optic communication system– Applications

### Unit III: Quantum Mechanics, Free Electron Theory and Semiconductors

**Quantum Mechanics:** Dual nature of matter – de Broglie Hypothesis, Schrodinger's time independent wave equation – Significance of wave function – Particle in a one-dimensional infinite potential well.

**Free Electron Theory:** Classical free electron theory – Sources of electrical resistance – Equation for electrical conductivity – Quantum free electron theory– Fermi-Dirac distribution- Band theory of Solids.

**Semiconductors:** Origin of energy bands - Classification of solids based on energy bands – Intrinsic semiconductors – Intrinsic carrier concentration-Fermi energy – Electrical conductivity - extrinsic semiconductors P-type & N-type - Dependence of Fermi energy on carrier concentration and temperature- Direct and Indirect band gap semiconductors-Hall effect- Hall coefficient and its applications - Drift and Diffusion currents (Qualitative) - Continuity equation - Applications of Semiconductors.

**Unit-IV: Dielectric and Magnetic Materials**

**Dielectric Materials** -Dielectric polarization-Dielectric polarizability, Susceptibility and Dielectric constant- Types of polarizations: Electronic, Ionic and Orientation polarizations (Qualitative) - Lorentz (internal) field- Clausius-Mossotti equation-Applications of dielectrics: Ferroelectricity and Piezoelectricity.

**Magnetic Materials** - Introduction-Magnetic dipole moment-Magnetization-Magnetic susceptibility and permeability- Origin of permanent magnetic moment –Bohr Magneton, Classification of magnetic materials - Hysteresis - soft and hard magnetic materials-Applications

**Unit – V: Superconductors and Nanomaterials**

**Superconductors**: Properties of superconductors – Meissner effect– Type I and Type II superconductors – ac and dc Josephson effects – BCS theory (qualitative treatment) – Applications of superconductors.

**Nanomaterials**: Introduction – Surface to volume ratio and quantum confinement – Physical properties: optical, mechanical, electrical and magnetic- Synthesis of nanomaterials: Top-down: Ball Milling, Bottom-up: Chemical Vapour Deposition – Applications of nanomaterials.

**Text books:**


1. M. N. Avadhanulu, P.G.Kshirsagar& TVS Arun Murthy" A Text book of Engineering Physics"- S.Chand Publications, 11th Edition 2019.
2. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning, 2012.


**Reference Books:**


1. K Thyagarajan " Engineering Physics", Mc Graw Hill Publishing Company Ltd., 2016
2. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley &Sons
3. Shatendra Sharma, Jyotsna Sharma, " Engineering Physics", Pearson Education, 2018
4. T Pradeep "A Text book of Nano Science and Nano Technology"- Tata Mc Graw Hill, 2013
5. Engineering Physics - Sanjay D. Jain, D. Sahasrambudhe and Girish, University Press
6. Engineering Physics – D K Pandey, S. Chaturvedi, Cengage Learning
7. Semiconductor physics and devices- Basic principle – Donald A, Neamen, Mc Graw Hill
8. Introduction to Nanotechnology – C P Poole and F J Owens, Wiley


1. K Thyagarajan 4. 7.
2. M. Sai Shankar 5.
3. 6. Manorama

11. Study of Energy gap of a material using p-n junction diode
12. Study of variation of Magnetic field along the axis of a current carrying coil – Stewart-Gee's Method
13. Determination of mobility of charge carriers in semiconductor by Hall effect.
14. Measurement of resistance of a semiconductor with varying temperature
15. Measurement of magnetic susceptibility by Kundt's tube method.

**References:**


1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.
2. R. Padma Suvarna, K. Thyagarajan "Engineering Physics Practicals" – NU Age Publishing House.


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# Data Structures

**(Common to All Branches of Engineering)**

**B. Tech – II Semester** | **L-T-P-C** **3-0-0-3**

**Course Objectives:**

1. To teach the representation of solution to the problem using algorithm
2. To explain the approach to algorithm analysis
3. To introduce different data structures for solving the problems
4. To demonstrate modeling of the given problem as a graph
5. To elucidate the existing hashing techniques

**Unit – 1: Introduction**

Algorithm Specification, Performance analysis, Performance Measurement, Arrays: Arrays, Dynamically Allocated Arrays. Structures and Unions, Sorting: Motivation, Quick sort, how fast can we sort, Merge sort, Heap sort

**Learning Outcomes:**

Student should be able to

1. Analyze the given algorithm to find the time and space complexities (L4)
2. Select appropriate sorting algorithm (L4)
3. Design a sorting algorithm (L6)

**Unit – 2: Stack, Queue and Linked lists**

Stacks, Stacks using Dynamic Arrays, Queues, Circular Queues Using Dynamic Arrays, Evaluation of Expressions, Multiple Stacks and Queues. Linked lists: Singly Linked Lists and Chains, Representing Chains in C, Linked Stacks and Queues, Additional List Operations, Doubly Linked Lists.

**Learning outcomes:** Student should be able to

1. Evaluate expressions (L5)
2. Develop the applications using stacks and queues (L3)
3. Construct the linked lists for various applications (L6)

**Unit – 3: Trees**

Introduction, Binary Trees, Binary Tree Traversals, Additional Binary Tree Operations, Binary Search Trees, **Counting Binary Trees,** Optimal Binary search Trees, AVL Trees. B-Trees: BTrees, B + Trees.

**Learning outcomes**

1. Explain the concept of a tree (L2)
2. Compare different tree structures (L4)
3. Apply trees for indexing (L3)

**Unit – 4: Graphs and Hashing**

The Graph Abstract Data Type, Elementary Graph Operations, Minimum Cost Spanning Trees, Shortest Paths and Transitive Closure.

**Hashing**: Introduction to Hash Table, Static Hashing, Dynamic Hashing.

**Learning outcomes:**
Student should be able to
1. Recognize the importance of Graphs in solving real world problems (L2)
2. Apply various graph traversal methods to applications (L3)
3. Design a minimum cost solution for a problem using spanning trees (L6)
4. Select the appropriate hashing technique for a given application (L5)
5. Design a hashing technique (L6)

**Unit – 5: Files and Advanced Sorting & Searching**
**File Organization:** Sequential File Organization, Direct File Organization, Indexed Sequential File Organization.
**Advanced sorting and searching:** Sorting on Several keys, List and Table sorts, Summary of Internal sorting, External sorting.

**Learning outcomes:** Student should be able to
1. Organize data in the form of Files (L6)
2. Apply sorting on large amount of data (L3)

**Text Books:**
1. Ellis Horowitz, Sartaj Sahni and Susan Anderson Freed "Fundamentals of Data Structures in C", 2nd Edition, University Press, 2007.
2. Alan L. Tharp, "File Organization and Processing", Wiley and Sons, 1988.

**Reference Books:**
1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education.
2. D. Samanta, "Classic Data Structures", 2nd Edition, Prentice-Hall of India, Pvt. Ltd., India, 2012.
3. Peter Bras, "Advanced Data Structures", Cambridge University Press, 2016
4. Richard F.Gilberg, Behrouz A.Forouzan, "Data Structures A Pseudo code Approach with C", Second Edition, Cengage Learning 2005.

**Course Outcomes:**
Students should be able to
1. Select Appropriate Data Structure for solving a real world problem (L4)
2. Select appropriate file organization technique depending on the processing to be done (L4)
3. Construct Indexes for Databases (L6)
4. Analyze the Algorithms (L4)
5. Develop Algorithm for sorting large files of data (L3)

# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
## COLLEGE OF ENGINEERING (AUTONOMOUS), PULIVENDULA - 516390, A.P, INDIA.
### HUMANITIES & SOCIAL SCIENCES DEPARTMENT

## COMMUNICATIVE ENGLISH - 1

| Subject Code | Title of the Subject | L | T | P | C |
|---|---|---|---|---|---|
| | Communicative English - 1 | 2 | 0 | 0 | 2 |

| COURSE OBJECTIVES | |
|---|---|
| 1 | Facilitates effective listening skills for better comprehension of academic lectures and English spoken by native speakers. |
| 2 | Helps to improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations. |
| 3 | Imparts effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information. |
| 4 | Provides knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing. |

| COURSE OUTCOMES | |
|---|---|
| CO1 | Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English |
| CO2 | Apply grammatical structures to formulate sentences and correct word forms |
| CO3 | Analyze discourse markers to speak clearly on a specific topic in informal discussions |
| CO4 | Evaluate reading/listening texts and to write summaries based on global comprehension of these texts. |
| CO5 | Create a coherent paragraph interpreting a figure/graph/chart/table |

**Introduction**

The course is designed to train students in receptive (listening and reading) as well as productive and interactive (speaking and writing) skills by incorporating a comprehensive, coherent and integrated approach that improves the learners' ability to effectively use English language in academic/ workplace contexts. The shift is from *learning about the language* to *using the language*. On successful completion of the compulsory English language course/s in B.Tech., learners would be confident of appearing for international language qualification/proficiency tests such as IELTS, TOEFL, or BEC, besides being able to express themselves clearly in speech and competently handle the writing tasks and verbal ability component of campus placement tests. Activity based teaching-learning methods would be adopted to ensure that learners would engage in actual use of language both in the classroom and laboratory sessions.

**Unit 1**

**Lesson: On the Conduct of Life: William Hazlitt**

**Listening:** Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions. **Speaking:** Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others. **Reading:** Skimming to get the main idea of a text; scanning to look for specific pieces of information. **Reading for Writing :**Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph. **Grammar and Vocabulary:** Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns: countable and uncountable; singular and plural; basic sentence structures; simple question form - wh-questions; word order in sentences.

**Learning Outcomes**

At the end of the module, the learners will be able to

- understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information
- ask and answer general questions on familiar topics and introduce oneself/others
- employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information
- recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs
- form sentences using proper grammatical structures and correct word forms

**Unit 2**

**Lesson: The Brook: Alfred Tennyson**

**Listening:** Answering a series of questions about main idea and supporting ideas after listening to audio texts. **Speaking:** Discussion in pairs/small groups on specific topics followed by short structured talks. **Reading:** Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together. **Writing:** Paragraph writing (specific topics) using suitable cohesive devices; mechanics of writing - punctuation, capital letters. **Grammar and Vocabulary:** Cohesive devices - linkers, sign posts and transition signals; use of articles and zero article; prepositions.

**Learning Outcomes**

At the end of the module, the learners will be able to

- comprehend short talks on general topics
- participate in informal discussions and speak clearly on a specific topic using suitable discourse markers
- understand the use of cohesive devices for better reading comprehension
- write well structured paragraphs on specific topics
- identify basic errors of grammar/ usage and make necessary corrections in short texts

**Unit 3**

**Lesson: The Death Trap: Saki**

**Listening:** Listening for global comprehension and summarizing what is listened to. **Speaking:** Discussing specific topics in pairs or small groups and reporting what is discussed **Reading:** Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension. **Writing:** Summarizing - identifying main idea/s and rephrasing what is read; avoiding redundancies and repetitions. **Grammar and Vocabulary:** Verbs - tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes.

**Learning Outcomes**

At the end of the module, the learners will be able to

- comprehend short talks and summarize the content with clarity and precision
- participate in informal discussions and report what is discussed
- infer meanings of unfamiliar words using contextual clues
- write summaries based on global comprehension of reading/listening texts
- use correct tense forms, appropriate structures and a range of reporting verbs in speech and writing

**Unit4**

**Lesson: Inspiration: Chindu Yellamma**

**Listening:** Making predictions while listening to conversations/ transactional dialogues without video; listening with video. **Speaking:** Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions. **Reading:** Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data. **Writing:** Information transfer; describe, compare, contrast, identify significance/trends based on information provided in figures/charts/graphs/tables. **Grammar and Vocabulary:** Quantifying expressions - adjectives and adverbs; comparing and contrasting; degrees of comparison; use of antonyms

**Learning Outcomes**

At the end of the module, the learners will be able to

- infer and predict about content of spoken discourse
- understand verbal and non-verbal features of communication and hold formal/informal conversations
- interpret graphic elements used in academic texts
- produce a coherent paragraph interpreting a figure/graph/chart/table
- use language appropriate for description and interpretation of graphical elements

**Unit 5**
**Lesson: Politics and the English Language: George Orwell**

**Listening:** Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension. **Speaking:** Formal oral presentations on topics from academic contexts - without the use of PPT slides. **Reading:** Reading for comprehension. **Writing:** Writing structured essays on specific topics using suitable claims and evidences. **Grammar and Vocabulary:** Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)

**Learning Outcomes**
At the end of the module, the learners will be able to

- take notes while listening to a talk/lecture and make use of them to answer questions
- make formal oral presentations using effective strategies
- comprehend, discuss and respond to academic texts orally and in writing
- produce a well-organized essay with adequate support and detail
- edit short texts by correcting common errors

**Prescribed Text:**

1. English all round: Communication Skills for Undegurdation Learners Vol. I, Orient BlackSwan Publisers, First Edition 2019, Authored by Y.Prabhavathi, M.Lalitha Sridevi and Ruth Z Hauzel.

**Reference Books**


- Bailey, Stephen. *Academic writing: A handbook for international students*. Routledge, 2014.
- Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking.* Heinley ELT; 2nd Edition, 2018.
- Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
- Hewings, Martin. *Cambridge Academic English (B2)*. CUP, 2012.
- Oxford Learners Dictionary, 12th Edition, 2011.

**I Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ACS07-COMPUTER SCIENCE AND ENGINEERING WORKSHOP**

**(Common to All Branches of Engineering)**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 2 | 1 |

**Course Objectives:**

1. To provide Technical training to the students on Productivity tools like Word processors, Spreadsheets, Presentations
2. To make the students know about the internal parts of a computer, assembling a computer from the parts, preparing a computer for use by installing the operating system
3. Teach them how to connect two or more computers
4. Introduce to the Raspberry Pi board
5. Explain storytelling by creating Graphics, WebPages and Videos

**List of Experiments**

**Laboratory Experiments:**

**Task 1: Learn about Computer:** Identify the internal parts of a computer, and its peripherals.

Represent the same in the form of diagrams including Block diagram of a computer. Write specifications for each part of a computer including peripherals and specification of Desktop computer. Submit it in the form of a report.

**Task 2: Assembling a Computer:** Disassemble and assemble the PC back to working condition.Students should be able to trouble shoot the computer and identify working and non-working parts. Student should identify the problem correctly by various methods available (eg: beeps).

Students should record the process of assembling and trouble shooting a computer.

**Task 3: Install Operating system:** Student should install Linux on the computer. Student may install another operating system (including proprietary software) and make the system dual boot or multi boot. Students should record the entire installation process.

**Task 4**: **Operating system features**: Students should record the various features that are supported by the operating system(s) installed. They have to submit a report on it. Students should be able to access CD/DVD drives, write CD/DVDs, access pen drives, print files, etc. Students should install new application software and record the installation process.

**Productivity tools**

**Task 5: Word Processor:** Students should be able to create documents using the word processor tool. Some of the tasks that are to be performed are inserting and deleting the characters, words and lines, Alignment of the lines, Inserting header and Footer, changing the font, changing the color, including images and tables in the word file, making page setup, copy and paste block of 91 Page text, images, tables, linking the images which are present in other directory, formatting paragraphs, spell checking, etc. Students should be able to prepare project cover pages, content sheet and chapter pages at the end of the task using the features studied. Students should submit a user manual of the word processor considered.

**Task 6: Spreadsheet:** Students should be able to create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spreadsheet application considered.

**Task 7: Presentations:** creating, opening, saving and running the presentations, Selecting the style for slides, formatting the slides with different fonts, colours, creating charts and tables,

inserting and deleting text, graphics and animations, bulleting and numbering, hyperlinking, running the slide show, setting the timing for slide show. Students should submit a user manual of the Presentation tool considered.

**Networking**

**Task 8: Wired network**: Select a LAN cable, Identify the wires in the cable, Define the purpose of each wire, Study the RJ45 connecter, Use crimping tool to fix the cable to the connecter, Test the cable using LAN tester, Connect two or more computers using cross and straight cables, Configure the computers, share the data between the computers.

**Task 9: Wireless network** Connect the wireless LAN card or identify the built-in wireless LAN card, configure four computers using adhoc mode and share the data, connect four computers using infrastructure mode (Access point) and share the data.

**IoT**

**Task 10: Raspberry Pi**

Study the architecture of Raspberry pi, configure software, Install SD card, Connect the cables, Install Raspbian (or any other) operating system, Configure Wi-Fi, Remotely connect to your Raspberry Pi.

**Story Telling**

**Task 11: Storytelling**

Use Adobe spark or any other tool to create Graphics, Webpages, and Videos.

**Reference Books :**

1. B. Govindarajulu, "IBM PC and Clones Hardware Trouble shooting and Maintenance", 2nd edition, Tata McGraw-Hill, 2002.
2. "MOS study guide for word, Excel, Powerpoint & Outlook Exams", Joan Lambert, Joyce Cox, PHI.
3. "Introduction to Information Technology", ITL Education Solutions limited, Pearson Education.
4. Rusen, "Networking your computers and devices", PHI
5. Bigelows, "Trouble shooting, Maintaining & Repairing PCs", TMH.
6. https://www.adobe.com
7. https://www.raspberrypi.org

**Course Outcomes:**

- Construct a computer from its parts and prepare it for use **L2**
- Develop Documents using Word processors **L3**
- Develop presentations using the presentation tool **L3**
- Perform computations using spreadsheet tool **L4**
- Connect computer using wired and wireless connections **L5**
- Design Graphics, Videos and Web pages **L6**
- Connect things to computers **L5**

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**
**COLLEGE OF ENGINEERING (AUTONOMOUS), PULIVENDULA - 516390, A.P, INDIA.**
**HUMANITIES AND SOCIAL SCIENCES DEPARTMENT**

# COMMUNICATIVE ENGLISH - 1 LAB

| Subject Code | Title of the Subject | L | T | P | C |
|---|---|---|---|---|---|
| | **Communicative English - 1 Lab** | 0 | 0 | 2 | 1 |

| COURSE OBJECTIVES | |
|---|---|
| 1 | To expose the students to variety of self-instructional, learner friendly modes of language learning. |
| 2 | To help the students cultivate the habit of reading passages from the computer monitor. Thus providing them with the required facility to face computer based competitive exams like GRE, TOEFL, and GMAT etc. |
| 3 | To enable them to learn better pronunciation through stress, intonation and rhythm. |
| 4 | To train them to use language effectively to face interviews, group discussions, public speaking. |
| 5 | To initiate them into greater use of the computer in resume preparation, report writing, format making etc. |

| COURSE OUTCOMES | |
|---|---|
| CO1 | To remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills. |
| CO2 | To apply communication skills through various language learning activities. |
| CO3 | To analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension. |
| CO4 | To evaluate and exhibit acceptable etiquette essential in social and professional settings. |
| CO5 | To create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English. |

**Unit 1**

1. Phonetics for listening comprehension of various accents
2. Reading comprehension
3. Describing objects/places/persons

**Learning Outcomes**

At the end of the module, the learners will be able to

- understand different accents spoken by native speakers of English
- employ suitable strategies for skimming and scanning on monitor to get the general idea of a text and locate specific information
- learn different professional registers and specific vocabulary to describe different persons, places and objects

**Unit 2**

1. JAM
2. Small talks on general topics
3. Debates

**Learning Outcomes**

At the end of the module, the learners will be able to

- produce a structured talk extemporarily
- comprehend and produce short talks on general topics
- participate in debates and speak clearly on a specific topic using suitable discourse markers

**Unit 3**

1. Situational dialogues – Greeting and Introduction
2. Summarizing and Note making
3. Vocabulary Building

**Learning Outcomes**

At the end of the module, the learners will be able to

- Learn different ways of greeting and introducing oneself/others
- summarize the content with clarity and precision and take notes while listening to a talk/lecture and make use of them to answer questions
- replenish vocabulary with one word substitutes, homonyms, homophones, homographs to reduce errors in speech and writing

**Unit4**

1. Asking for Information and Giving Directions
2. Information Transfer
3. Non-verbal Communication – Dumb Charade

**Learning Outcomes**

At the end of the module, the learners will be able to

- Learn different ways of asking information and giving directions
- Able to transfer information effectively
- understand non-verbal features of communication

**Unit 5**

1. Oral Presentations
2. Précis Writing and Paraphrasing
3. Reading Comprehension and spotting errors

**Learning Outcomes**

At the end of the module, the learners will be able to

- make formal oral presentations using effective strategies
- learn different techniques of précis writing and paraphrasing strategies
- comprehend while reading different texts and edit short texts by correcting common errors

**Suggested Software**

- Young India Films
- Walden Infotech
- Orell

**Reference Books**


- Bailey, Stephen. *Academic writing: A handbook for international students*. Routledge, 2014.
- Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking.* Heinley ELT; 2nd Edition, 2018.
- Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
- Hewings, Martin. *Cambridge Academic English (B2)*. CUP, 2012.
- A Textbook of English Phonetics for Indian Students by T.Balasubramanyam

I B.Tech II Sem

## COURSE NO. - Basic Electrical & Electronics Engineering Lab

**(Common to Civil, Mechanical, CSE)**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 3 | 1.5 |

### PART A: ELECTRICAL ENGINEERING LAB

**Course Objectives:**

- To Verify Kirchoff's laws
- To verify Superposition theorem.
- To learn performance characteristics of DC Machines.
- To perform open circuit & Short Circuit test on 1- Phase Transformer.
- To Study the I – V Characteristics of Solar PV Cell

**List of experiments: -**

1. Verification of Kirchhoff laws.
2. Verification of Superposition Theorem.
3. Open circuit characteristics of a DC Shunt Generator.
4. Speed control of DC Shunt Motor.
5. OC & SC test of 1 – Phase Transformer.
6. Brake test on 3 - Phase Induction Motor.
7. I – V Characteristics of Solar PV cell
8. Brake test on DC Shunt Motor.

**Course Outcomes: Able to**

- Verify Kirchoff's Laws & Superposition theorem.
- Perform testing on AC and DC Machines.
- Study I – V Characteristics of PV Cell

### PART B: ELECTRONICS ENGINEERING LAB

**Course outcomes:**

- Describe construction, working and characteristics of diodes, transistors and operational amplifiers
- Demonstrate how electronic devices are used for applications such as rectification, switching and amplification
- Build different building blocks in digital electronics using logic gates
- Explain functionality of flip-flops, shift registers and counters for data processing applications

- Explain functioning of various communication systems

**LIST OF EXPERIMENTS:**

1. Draw and study the characteristics of Semi-conductor diode and Zener Diode
2. Draw and study the input and output characteristics of Transistor in Common Emitter configuration
3. Draw and study the static and transfer characteristics of FET in Common Source Configuration
4. Construct half wave and full wave rectifier circuits. Find ripple factor and plot their output waveforms with and without filters
5. Study the application of Op-amp as an Inverting amplifier, Non-inverting amplifier, Voltage follower, Summer and Subtractor
6. Realization of logic gates, AND, OR, NOT, NAND, NOR, XOR
7. Realization of Adders, Multiplexers and Decoders using logic gates.
8. Realization of flip-flops using logic gates.
9. Conduct an experiment on AM & FM modulation & demodulation, Plot the corresponding modulated and demodulated signals

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

# Applied Physics Laboratory

**(Common to I B.Tech II Semester ECE, EEE & CSE)**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 3 | 1.5 |

**Course Objectives:**

- Understands the concepts of interference, diffraction and their applications.
- Understand the role of optical fiber parameters in communication.
- Recognize the importance of energy gap in the study of conductivity and Hall Effect in a semiconductor.
- Illustrates the magnetic and dielectric materials applications.
- Apply the principles of semiconductors in various electronic devices.

**EXP No.1:** Determination of the thickness of thin object using wedge shape method

**Learning Outcomes:**

At the end of this experiment, the student will be able to

- **Operates** optical instrument like travelling microscope **L2**
- **Estimate** the thickness of the wire using wedge shape method **L2**
- **Identifies** the formation of interference fringes due to reflected light from non-uniform thin film. **L2**

**EXP No. 2 :** Determination of the radius of curvature of the lens by Newton's rings

**Learning Outcomes:**

At the end of this experiment, the student will be able to

- **Operates** optical instrument like travelling microscope. **L2**
- **Estimate** the radius of curvature of the lens **L2**
- **Identifies** the formation of interference fringes due to reflected light from non-uniform thin film. **L2**
- **Plots** the square of the diameter of a ring with no. of rings **L3**

**EXP No. 3:** Determination of wavelengths of various spectral lines of mercury source using diffraction grating in normal incidence method

**Learning Outcomes:**

At the end of this unit, the student will be able to

- **Operates** optical instrument like spectrometer. **L2**
- **Estimate** the wavelength of the given source **L2**
- **Identifies** the formation of grating spectrum due diffraction. **L2**

**EXP No. 4:** Determination of dispersive power of prism

**Content of the Unit – IV**

**Learning Outcomes:**

At the end of this unit, the student will be able to

- **Operates** optical instrument like spectrometer. **L2**
- **Estimate** the refractive index and dispersive power of the given prism **L2**
- **Identifies** the formation of spectrum due to dispersion. **L2**

**EXP No. 4:** Determination of dispersive power of prism.

**Learning Outcomes:**
At the end of this unit, the student will be able to

- **Operates** optical instrument like spectrometer. **L2**
- **Estimate** the refractive index and dispersive power of the given prism **L2**
- **Identifies** the formation of spectrum due to dispersion. **L2**

**EXP No. 5:** Determination of wavelength using diffraction grating by laser source.

**Learning Outcomes:**
At the end of this unit, the student will be able to

- **Operates** various instrument **L2**
- **Estimate** the wavelength of laser source **L2**
- **Identifies** the formation of grating spectrum due diffraction. **L2**

**EXP No. 6:** Determination of particle size by laser source

**Learning Outcomes:**
At the end of this unit, the student will be able to

- **Operates** various instrument **L2**
- **Estimate** the Particles size using laser **L2**
- **Identifies** the application of laser **L2**

**EXP No. 7:** Determination of numerical aperture and acceptance angle of an optical fiber

**Learning Outcomes:**
At the end of this unit, the student will be able to

- **Operates** various instruments and connect them as per the circuit. **L2**
- **Estimate** the numerical aperture and acceptance angle of a given optical fiber. **L2**
- **Identifies** the significance of numerical aperture and acceptance angle of an optical fiber in various engineering applications **L2**

**EXP No. 8:** Study of variation of Magnetic field along the axis of a current carrying coil – Stewart-Gee's Method.

**Learning Outcomes:**
At the end of this unit, the student will be able to

- **Operates** various instruments and connect them as per the circuit. **L2**
- **Estimate** the magnetic field along the axis of a circular coil carrying current. **L2**
- **Plots** the intensity of the magnetic field of circular coil carrying current with distance **L3**

**EXP No. 9:** Study of B-H curve of Ferromagnetic material.

**Learning Outcomes:**
At the end of this unit, the student will be able to

- **Operates** various instruments and connect them as per the circuit. **L2**
- **Estimate** the hysteresis loss, coercivity and retentivity of the ferromagnetic material **L2**
- **Classifies** the soft and hard magnetic material based on B-H curve. **L2**
- **Plots** the magnetic field H and flux density B **L3**

**EXP No. 10:** Study of Energy gap of a material using p**-**n junction diode

**Learning Outcomes:**

At the end of this unit, the student will be able to

- **Operates** various instruments and connect them as per the circuit. **L2**
- **Estimate** the hysteresis loss, coercivity and retentivity of the ferromagnetic material. (L2) **L2**
- **Classifies** the soft and hard magnetic material based on B-H curve. **L2**
- **Estimate** the energy gap of a semiconductor. **L2**
- **Illustrates** the engineering applications of energy gap. **L3**
- **Plots 1/T** with log R **L3**

**Reference Books:**


1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017
2. http://vlab.amrita.edu/index.php -Virtual Labs, Amrita University


**Course Outcomes:**

At the end of this Course the student will be able to

- **Operate** optical instruments like microscope and spectrometer **L2**
- **Determine** thickness of a hair/paper with the concept of interference **L2**
- **Estimate** the wavelength of different colors using diffraction grating and resolving power **L2**
- **Plot** the intensity of the magnetic field of circular coil carrying current with distance **L3**
- **Evaluate** the acceptance angle of an optical fiber and numerical aperture **L3**
- **Determine** the resistivity of the given semiconductor using four probe method **L3**
- **Identify** the type of semiconductor i.e., n-type or p-type using hall effect **L3**
- **Calculate** the band gap of a given semiconductor **L3**

# Data Structures Lab

**(Common to All Branches of Engineering)**

**B. Tech – II Semester** **L-T-P-C**
**0-0-3-1.5**

**Course Objectives:**

1. To introduce to the different data structures
2. To elucidate how the data structure selection influences the algorithm complexity
3. To explain the different operations that can be performed on different data structures
4. To introduce to the different search and sorting algorithms.

**Laboratory Experiments:**

1. String operations using array of pointers
2. Searching Algorithms (With the Number of Key Comparisons) Sequential, Binary and Fibonacci Search Algorithms.
3. Sorting Algorithms: Insertion Sort, Selection Sort, Shell Sort, Bubble Sort, Quick Sort, Heap Sort, Merge Sort, and Radix Sort. Using the system clock, compute the time taken for sorting of elements. The time for other operations like I/O etc should not be considered while computing time.
4. Implementation of Singly Linked List, Doubly Linked List, Circular Linked List
5. Stack implementation using arrays
6. Stack implementation using linked lists
7. Queue implementation using arrays. Implement different forms of queue.
   While implementing you should be able to store elements equal to the size of the queue.
   No positions should be left blank.
8. Queue implementation using linked lists
9. Creation of binary search tree, performing operations insertion, deletion, and traversal.
10. Breadth first search
11. Depth first search
12. Travelling sales man problem
13. File operations
14. Indexing of a file
15. Reversing the links (not just displaying) of a linked list.
16. Consider a linked list consisting of name of a person and gender as a node. Arrange the linked list using 'Ladies first' principle. You may create new linked lists if necessary.
17. An expression can be represented in three ways: infix, prefix and postfix. All the forms are necessary in different contexts. Write modules to convert from one form to another form.
18. A table can be defined as a collection of rows and columns. Each row and column may have a label. Different values are stored in the cells of the table.

The values can be of different data types. Numerical operations like summation, average etc can be performed on rows/columns which contain numerical data. Such operations are to be prevented on data which is not numeric. User may like to insert row/columns in the already existing table.
User may like to remove row/column. Create table data type and support different operations on it.

**Course Outcomes:**

At the end of the course students should be able to

1. Select the data structure appropriate for solving the problem (L5)
2. Implement searching and sorting algorithms (L3)
3. Design new data types (L6)
4. Illustrate the working of stack and queue (L4)
5. Organize the data in the form of files (L6)

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**
**COLLEGE OF ENGINEERING (AUTONOMOUS), PULIVENDULA**

**B.Tech – II-I SEM (R19)**

**L T P C**
**3 0 0 3**

## DISCRETE MATHEMATICS
## (CSE)

**Course Objectives**

- To explain about the Boolean Algebra, Graph theory and Recurrence relations.
- To demonstrate the application of basic methods of discrete mathematics in Computer Science problem solving.
- To elucidate solving mathematical problems from algorithmic perspective.
- To introduce the mathematical concepts which will be useful to study advanced courses
- Design and Analysis of Algorithms, Theory of Computation, Cryptography and Software Engineering etc.
- To reveal how solutions of graph theory can be applied to computer science problems

**UNIT- I**

**Statements and Notation, Connectives-** Negation, Conjunction, Disjunction, Conditional and Bi-conditional, Statement formulas and Truth Tables. Well-formed formulas, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications.

**Normal Forms:** Disjunctive Normal Forms, Conjunctive Normal Forms, Principal Disjunctive Normal Forms (PDNF), Principal Conjunctive Normal Forms (PCNF), Ordering and Uniqueness of Normal Forms.

**The Theory of Inference for the Statement Calculus:** Rules of Inference, Consistency of Premises and Indirect Method of Proof.

**The predicate Calculus, Inference theory of the Predicate Calculus.**

**Unit Outcomes:**

- Describe logical sentences in terms of predicates, quantifiers, and logical connectives
- Evaluate basic logic statements using truth tables and the properties of logic
- Apply rules of inference to test the consistency of premises and validity of arguments
- Verify the equivalence of two formulas and their duals
- Find the Principal Conjunctive and Principal Disjunctive Normal Forms of a statement formula

**UNIT-II**

**Set Theory:** Basic concepts of Set Theory, Representation of Discrete structures, Relations and Ordering, Functions, Recursion.

**Algebraic Structures:** Algebraic Systems: Examples and General Properties, Semi Groups, Monoids and Groups.

**Lattices and Boolean algebra:** Lattices as Partially Ordered Sets, Boolean algebra, Boolean Functions, Representation and Minimization of Boolean Functions.

Mercy
BOS Chairman

**Unit Outcomes:**

- Describe equivalence, partial order and compatible relations
- Compute Maximal Compatibility Blocks
- Identify the properties of Lattices
- Evaluate Boolean functions and simplify expression using the properties of Boolean algebra
- Infer Homomorphism and Isomorphism
- Describe the properties of Semi groups, Monoids and Groups

**UNIT-III**

**Elementary Combinatorics:** Basics of Counting, Combinations and Permutations, Enumeration of Combinations and Permutations, Enumerating Combinations and Permutations with repetitions, Enumerating Permutations and Combinations with constrained Representations, Binomial Coefficients, The Binomial and Multinomial Theorems, The Principle of Inclusion and Exclusion.

**Unit Outcomes:**

- Explain fundamental principle of counting.
- Examine the relation between permutation and combination.
- Solve counting problems by applying elementary counting techniques using the product and sum rules.
- Apply permutations, combinations, the pigeon-hole principle, and binomial expansion to solve counting problems.

**UNIT-IV:**

**Recurrence Relations:** Generating Functions of Sequences, Calculating Coefficients of Generating Functions, Recurrence Relations, Solving Recurrence Relations by Substitution and Generating Functions, The method of Characteristic Roots, Solution of Inhomogeneous Recurrence Relations.

**Unit Outcomes:**

- Find the generating functions for a sequence.
- Design recurrence relations using the divide-and-conquer algorithm.
- Solve linear recurrence relations using method of Characteristic Roots.
- Outline the general solution of homogeneous or Inhomogeneous Recurrence Relations using substitution and method of generating functions.
- Solve problems using recurrence relations and recursion to analyze complexity of algorithms.

**UNIT-V:**

**Graphs:** Basic Concepts, Isomorphism and Sub graphs, Trees and their Properties, Spanning Trees, Directed Trees, Binary Trees, Planar Graphs, Euler's Formula, Multi graphs and Euler Circuits, Hamiltonian Graphs, Chromatics Number, The Four-Color Problem.

**Unit Outcomes:**

- Investigate if a given graph is simple or a multigraph, directed or undirected, cyclic ora cyclic.
- Describe complete graph and complete bipartite graphs.
- Identify Euler Graphs, Hamilton Graph and Chromatic Number of a graph.
- Apply the concepts of functions to identify the Isomorphic Graphs.
- Apply depth-first and breadth-first search.
- Apply Prim's and Kruskal's algorithms to find a minimum spanning tree.

**Course Outcomes:**

After completion of this course the student would be able to

- Evaluate elementary mathematical arguments and identify fallacious reasoning.
- Understand the properties of Compatibility, Equivalence and Partial Ordering relations, Lattices and Hassee Diagrams.
- Understand the general properties of Algebraic Systems, Semi Groups, Monoids and Groups.
- Design solutions for problems using breadth first and depth first search techniques
- Solve the homogeneous and non-homogeneous recurrence relations.
- Apply the concepts of functions to identify the Isomorphic Graphs.
- Identify Euler Graphs, Hamilton Graph and Chromatic Number of a graph.

**Text Books:**


1. J P Trembly and R Manohar, "Discrete Mathematical Structures with Applications to Computer Science", 1st Edition, McGraw Hill, 2017(For Unit I&II).
2. Joe L. Mott. Abraham Kandel and Theodore P. Baker, "Discrete Mathematics for Computer Scientists & Mathematicians", 2nd Edition, Pearson, 2008. (for Units III to V).


**Reference Books:**


1. Kenneth H Rosen, "Discrete Mathematics and Its Applications (SIE)",7th Edition, MCGRAW-HILL.
2. Ralph P. Grimaldi and B.V. Ramana, "Discrete and Combinatorial Mathematics, an Applied Introduction", 5th Edition, Pearson, 2016.
3. Narsingh Deo, "Graph Theory with Applications to Engineering", Prentice Hall, 1979.
4. D.S. Malik and M.K. Sen, "Discrete Mathematics theory and Applications", Ist Edition, Cenegage Learning, 2012.
5. C L Liu and D P Mohapatra, "Elements of Discrete Mathematics, A computer Oriented approach", 4th edition, MCGRAW-HILL, 2018.

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## Database Management Systems

### UNIT-1:

**The Worlds of Database Systems** –file system VS a DBMS–Advantages of DBMS–Levelsof abstraction in DBMS, Data Independency, Queries in DBMS

**The Entity-Relationship Model** –Database design and ER diagrams–Elements of ER models - Additional features ER models.

**The Relational Data Model** –Basics of the Relational Model–Integrity constraints overrelations, From E/R Diagrams to Relational Designs – Introduction to views.

### UNIT II:

**Relational Algebra and Calculus** –Preliminaries, Relational algebra: Selection and Projection,Set Operations, Renaming, Joins, Division - Relational Calculus – Expressive power of Algebra and Calculus.

**The Database Language SQL** –Simple Queries in SQL–UNION, INTERSECT, EXCEPT– Nested queries, Aggregate operators.

### UNIT III:

**Database Normalization** – Rules about Functional Dependencies- Normal Forms based on FDs– 1NF, 2NF, 3NF, BCNF, Multivalve Dependencies, 4NF, 5NF.

**Index Structures** –Indexes on Sequential Files–Secondary Indexes–B-Trees, B+ Trees–Hash Based Indexing.

### UNIT IV:

**Transaction Management**: Transactions, ACID properties, Serializability, Other isolation levels.

**Concurrency Control and Database Recovery** – Serializability and Recoverability, Introduction to Lock management-Concurrency Control without Locking. Storage, Recovery and Atomicity, Recovery algorithm, Buffer management, Failure with loss of Non-Volatile storage.

**UNIT V:**

**Query Processing and Optimization**: Measures of Query cost, Selection operation, Sorting, Join operation, Evaluation of expressions, Query processing in memory. Transformation of Relational, Estimating Statistics of expression, Choice of evaluation plans.

**Text Books:**

1. **"Database Systems, The Complete Book",** Hector Garcia-Molina, Jeffrey D. Ullman and Jennifer Widom, 6th impression, 2011, Pearson.
2. **"Data base Management Systems",** Raghu Rama Krishnan, Johannes Gehrke, 3rd Edition,2003, McGraw Hill.

**Reference Books:**

1. "Fundamentals of Database Systems", ElmasriNavrate, 6th edition, 2013, Pearson.
2. "Data base Systems design", Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
3. "Introduction to Database Systems", C.J.Date, Pearson Education.
4. "Data base System Concepts", Silberschatz, Korth, McGraw Hill, V edition

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## Formal Languages and Automata Theory

**OBJECTIVE:**
This course is designed to:

1. Understand formal definitions of machine models.
2. Classify machines by their power to recognize languages.
3. Understanding of formal grammars, analysis
4. Understanding of hierarchical organization of problems depending on their complexity
5. Understanding of the logical limits to computational capacity
6. Understanding of un-decidable problems

**UNIT – I: Finite Automata**
Why Study Automata Theory? The Central Concepts of Automata Theory, Automation, Finite Automation, Transition Systems, Acceptance of a String by a Finite Automation, DFA, Design of DFAs, NFA, Design of NFA, Equivalence of DFA and NFA, Conversion of NFA into DFA, Finite Automata with Null-Transition, Minimization of Finite Automata, Mealy and Moore Machines, Applications and Limitation of Finite Automata.

**UNIT – II: Regular Expressions**
Regular Expressions, Regular Sets, Identity Rules, Equivalence of two Regular Expressions, Manipulations of Regular Expressions, Finite Automata and Regular Expressions, Inter Conversion, Equivalence between Finite Automata and Regular Expressions, Pumping Lemma, Closers Properties, Applications of Regular Expressions, Finite Automata and Regular Grammars, Regular Expressions and Regular Grammars.

**UNIT – III: Context Free Grammars**
Formal Languages, Grammars, Classification of Grammars, Chomsky Hierarchy Theorem, Context Free Grammar, Leftmost and Rightmost Derivations, Parse Trees, Ambiguous Grammars, Simplification of Context Free Grammars-Elimination of Useless Symbols, Null-Productions and Unit Productions, Normal Forms for Context Free Grammars-Chomsky Normal Form and Greibach Normal Form, Pumping Lemma, Closure Properties, Applications of Context Free Grammars.

**UNIT – IV: Pushdown Automata**
Pushdown Automata, Definition, Model, Graphical Notation, Instantaneous Description Language Acceptance of pushdown Automata, Design of Pushdown Automata, Deterministic

and Non – Deterministic Pushdown Automata, Equivalence of Pushdown Automata and Context Free Grammars Conversion, Two Stack Pushdown Automata, Application of Pushdown Automata.

**UNIT – V: Turing Machine**

Turing Machine, Definition, Model, Representation of Turing Machines-Instantaneous Descriptions, Transition Tables and Transition Diagrams, Language of a Turing Machine, Design of Turing Machines, Techniques for Turing Machine Construction, Types of Turing Machines, Church's Thesis, Universal Turing Machine, Restricted Turing Machine.

**Decidable and Un-decidable Problems**: NP, NP-Hard and NP-Complete Problems.

**TEXT BOOKS:**

1. Introduction to Automata Theory, Languages and Computation, J.E.Hopcroft, R.Motwaniand J.D.Ullman, 3rd Edition, Pearson, 2008.
2. Theory of Computer Science-Automata, Languages and Computation, K.L.P.Mishra and N.Chandrasekaran, 3rd Edition, PHI, 2007.

**REFERENCE BOOKS:**

1. Formal Language and Automata Theory, K.V.N.Sunitha and N.Kalyani, Pearson, 2015.
2. Introduction to Automata Theory, Formal Languages and Computation, ShyamalenduKandar, Pearson, 2013.
3. Theory of Computation, V.Kulkarni, Oxford University Press, 2013.
4. Theory of Automata, Languages and Computation, Rajendra Kumar, McGraw Hill, 2014.

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## Design and Analysis of Algorithms

**Course Outcomes:**

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

- For a given algorithms analyze worst-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms.
- Describe the greedy paradigm and explain when an algorithmic design situation calls for it. For a given problem develop the greedy algorithms.
- Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it.
- Synthesize divide-and-conquer algorithms. Derive and solve recurrence relation. Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it.
- For a given problems of dynamic-programming anddevelop the dynamic programming algorithms, and analyze it to determine its computational complexity.
- For a given model engineering problem model it using graph and write the corresponding algorithm to solve the problems.
- Explain the ways to analyze randomized algorithms (expected running time, probability of error).
- Explain what an approximation algorithm is. Compute the approximation factor of an approximation algorithm (PTAS and FPTAS).

**Unit-I:**

**Introduction:** Characteristics of algorithm. Analysis of algorithm: Asymptotic analysis of complexity bounds – best, average and worst-case behavior; Performance measurements of Algorithm, Time and space trade-offs, Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters' theorem.

**Unit-II:**

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

**Unit-III:**

**Graph and Tree Algorithms:** Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm.

**Unit-IV:**

**Tractable and Intractable Problems:** Computability of Algorithms, Computability classes – P, NP, NP complete and NP-hard. Cook's theorem, Standard NP-complete problems and Reduction techniques.

**Unit-V:**

**Advanced Topics:** Approximation Algorithms, Randomized Algorithms, Class of problem beyond NP-P SPACE

**Text books:**

1. Introduction to Algorithms, 4th Edition, Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein, MIT Press/McGraw-Hill.

2. Fundamentals of Algorithms – E. Horowitz et al.

**Reference books**:

1. Algorithm Design, 1ST Edition, Jon Kleinberg and ÉvaTardos, Pearson.

2. Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition, Michael T Goodrich and Roberto Tamassia, Wiley.

3. Algorithms -- A Creative Approach, 3RD Edition, UdiManber, Addison-Wesley, Reading, MA. Approximation factor of an approximation algorithm (PTAS and FPTAS).

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# Digital Logic Design

**UNIT – I:**
**Binary Systems:** Digital Systems, Binary Numbers, Number Base Conversions, Octal and Hexadecimal Numbers, Compliments, Signed Binary Numbers, Binary Codes, Binary Storage and Registers, Binary Logic.
**Boolean Algebra And Logic Gates:** Basic Definitions, Axiomatic Definition of Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Other Logic Operations, Digital Logic Gates, Integrated Circuits.

**UNIT – II:**
**Gate –Level Minimization:** The Map Method, Four Variable Map, Five-Variable Map, Product of Sums Simplification, Don't-Care Conditions, NAND and NOR Implementation, Other Two Level Implementations, EX-OR Function, Other Minimization Methods

**UNIT – III:**
**Combinational Logic:** Combinational Circuits, Analysis Procedure, Design Procedure, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers.

**UNIT – IV:**
**Synchronous Sequential Logic:** Sequential Circuits, Latches, Flip-Flops, Analysis of Clocked Sequential Circuits, State Reduction and Assignment, Design Procedure.
**Registers & Counters:** Registers, Shift Registers, Ripple Counters, Synchronous Counters.

**UNIT – V:**
**Memory and Programmable Logic:** Random access memory, memory decoding, Error Detection and Correction, Read-only Memory, Programmable Logic Array, Programmable Array Logic.

**Text Books:**


1. Digital Design, M.Morris Mano & Micheal D. Ciletti, Pearson, 5th Edition, 2013.
2. Digital Logic & State Machine Design, David J. Comer, Oxford University Press, 3rd Reprinted Indian Edition, 2012


**Reference Books:**


1. Digital Logic Design, R.D. Sudhakar Samuel, Elsevier
2. Fundamentals of Logic Design, 5/e, Roth, Cengage
3. Switching and Finite Automata Theory, 3/e,Kohavi, Jha, Cambridge.
4. Digital Logic Design, Leach, Malvino, Saha,TMH
5. Modern Digital Electronics, R.P. Jain, TMH

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## Object Oriented Programming Concepts and Java Programming

**UNIT I:**

**Object Oriented Programming Concepts:** Object, Class, Abstraction, Encapsulation, Inheritance, Polymorphism.

**Introduction to JAVA Programming:** How Java changed the Internet, The Java Buzzwords, The evolution of Java, Simple Java Program

**UNIT II:**

**Data Types, Variables, Operators, Control Structures, and Arrays.**

**Introducing Classes:** Class Fundamentals, Declaring Objects, Introducing Methods, Constructors, The this Keyword, The finalize( ) Method, A Stack Class.

Using Objects as Parameters, A Closer Look at Argument Passing, Understanding static, Introducing final, Introducing Nested and Inner Classes, Exploring the String Class, Using Command-Line Arguments, Var-args: Variable-Length Arguments, The Object Class.

**UNIT III:**

**Inheritance and Polymorphism:** Types of Inheritance, Dynamic method dispatch, Static and Dynamic Polymorphism

**Packages and interfaces:** Packages, Access Protection, Importing Packages, Interfaces, Default Interface Methods, Use static Methods in an Interface.

**Exception Handling:** Exception-Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch Clauses, Nested try Statements, throw, throws, finally, Java's Built-in Exceptions, Creating Your Own Exception Subclasses, Chained Exceptions, Three Recently Added Exception Features, Using Exceptions.

**UNIT IV:**

**Multithreaded Programming:** The Java Thread Model, The Main Thread, Creating a Thread, Creating Multiple Threads, Using isAlive( ) and join( ), Thread Priorities, Synchronization, Inter thread Communication, Suspending, Resuming, and Stopping Threads. Obtaining a Thread's State, Using Multithreading.

**UNIT V:**

**Advanced JAVA Concepts:** JDBC, Hibernate, Struts, JSP

**Text Books:**

1. Java The Complete Reference 9th edition, Herbert Schildt, Mc Graw Hill Education, 2014.
2. Programming with Java, E. Balagurusamy.

**Reference Books:**

1. J2SE Core Java, A.R.Kishore Kumar.

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## Design Thinking and Product Innovation Lab

**COURSE OBJECTIVES:**

**1.**To impart knowledge on analysis, design, implement in terms of design thinking process.

**2.** Develop a basic understanding of the building blocks of design thinking such as empathize, ideate, prototyping, testing and validation.

**3.** To provide skills on the applications of product design.

**COURSE OUTCOMES:** After successful completion of this course, the students will be able to:

**1:** Investigate the requirements of a problem by conducting surveys.

**2:** Create meaningful and actionable problem statements for creative problem solving.

**3:** Construct blueprints to visualize user attitudes and behavior for gaining insights of customers.

**4:** Design prototypes of innovative products or services for a customer base.

**5:** Develop relevant products or services by choosing good design and applying empathy tools for experiencing user requirements.

**6:** Work independently and communicate effectively in oral and written forms.

**List of Experiments:**

1. Conduct survey and identify the problem by either individual or group and framea problem statement.
2. Identify demographic or focus group for problem statement and create persona and explicitly define the characteristics of persona.

3. Build a Customer Journey Map (CJM) for any mock scenario or persona created during last experiment and frame 2-3 questions using HMW (How Might We) tool(CJM-Before-During-After).
4. Design service blueprint and identify touch points from previously designed CJM.
5. Story boarding design ideas: Consider a scenario and create user stories and storyboards to transform information about user needs into design concepts.
6. Take product/system to be designed from previously framed problem statement from experiment 1 and apply Combine, Rearrange and Enhance triggers in CREATE (Combine, Rearrange, Enhance, Adapt, Turnaround, Eliminate) tool. Draw product/system after applying triggers.
7. Develop a function map for persona designed from experiment 2 or any mock scenario. (Differently abled student: Enable him to move around campus on his own)
8. Identify the components to establish a banking system/new capital/company etc. through zap your logical brain and list the possible scenarios to analyze the components using what if tool.
9. Create an application prototype for product recommendation using Marvel POP Software or FIGMA.
10. Development of 3D prototype for kids' toys using tinker cad or fusion 360.

**REFERENCE BOOKS:**


1. S.Salivahanan, S.Suresh Kumar, D.Praveen Sam, "Introduction to Design Thinking",Tata Mc Graw Hill, First Edition,2019.
2. Kathryn McElroy,"Prototyping for Designers: Developing the best Digital and Physical Products",O'Reilly,2017.
3. Michael G. Luchs, Scott Swan , Abbie Griffin, "Design Thinking – New Product Essentials from PDMA",Wiley,2015.
4. Vijay Kumar, "101 Design Methods: A Structured Approach for Driving Innovation in Your Organization", 2012.

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**DATABASE MANAGEMENT SYSTEMS LAB**

**B.TECH II Year I sem (C.S.E)**

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***Course Objective:***

□□*To create a database and query it using SQL, design forms and generate reports.*

□□*Understand the significance of integrity constraints, referential integrity constraints, triggers, assertions.*

***Learning Outcome:***

□□*Design databases*

□□*Retrieve information from data bases*

□□*Use procedures to program the data access and manipulation*

□□*Create user interfaces and generate reports*

**LIST OF EXPERIMENTS:**

1. Practice session: Students should be allowed to choose appropriate DBMS software, install it, configure it and start working on it. Create sample tables, execute some queries, use SQLPLUS features, use PL/SQL features like cursors on sample database. Students should be permitted to practice appropriate User interface creation tool and Report generation tool.

2. A college consists of number of employees working in different departments. In this context, create two tables **employee** and **department**. Employee consists of columns empno, empname, basic, hra, da, deductions, gross, net, date-of-birth. The calculation of hra,da are as per the rules of the college. Initially only empno, empname, basic have valid values. Other values are to be computed and updated later. Department contains deptno, deptname, and description columns. Deptno is the primary key in department table and referential integrity constraint exists between employee and department tables. Perform the following operations on the the database:

□□Create tables department and employee with required constraints.

□□Initially only the few columns (essential) are to be added. Add the remaining columns separately by using appropriate SQL command

□□Basic column should not be null

□□Add constraint that basic should not be less than 5000.

□□Calculate hra,da,gross and net by using PL/SQL program.

□□Whenever salary is updated and its value becomes less than 5000 a trigger has to be raised preventing the operation.

□□The assertions are: hra should not be less than 10% of basic and da should not be less than 50% of basic.

□□The percentage of hra and da are to be stored separately.

□□When the da becomes more than 100%, a message has to be generated and with user permission da has to be merged with basic.

□□Empno should be unique and has to be generated automatically.

□□If the employee is going to retire in a particular month, automatically a message has to be generated.

□□The default value for date-of-birth is 1 jan, 1970.

□□When the employees called daily-wagers are to be added the constraint that salary should be greater than or equal to 5000 should be dropped.

□□Display the information of the employees and departments with description of the fields.

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□□Display the average salary of all the departments.

□□Display the average salary department wise.

□□Display the maximum salary of each department and also all departments put together.

□□Commit the changes whenever required and rollback if necessary.

□□Use substitution variables to insert values repeatedly.

□□Assume some of the employees have given wrong information about date-of-birth. Update the corresponding tables to change the value.

□□Find the employees whose salary is between 5000 and 10000 but not exactly 7500.

□□Find the employees whose name contains _en'.

□□Try to delete a particular deptno. What happens if there are employees in it and if there are no employees.

□□Create alias for columns and use them in queries.

□□List the employees according to ascending order of salary.

□□Basic column should not be null

□□Add constraint that basic should not be less than 5000.

□□Calculate hra,da,gross and net by using PL/SQL program.

□□Whenever salary is updated and its value becomes less than 5000 a trigger has to be raised preventing the operation.

□□The assertions are: hra should not be less than 10% of basic and da should not be less than 50% of basic.

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□□Find the employees whose name contains _en'.

□□Try to delete a particular deptno. What happens if there are employees in it and if there are no employees.

□□Create alias for columns and use them in queries.

□□List the employees according to ascending order of salary.

□□Postal system

□□Banking system

□□Courier system

□□Publishing house system

4. Design of user interfaces and generation of reports

***References:***


1. *"Learning Oracle SQL and PL/SQL", Rajeeb C. Chatterjee, PHI.*
2. *"Oracle Database 11g PL/SQL Programming", M.Mc Laughlin,TMH.*
3. *"Introduction to SQL", Rick F.Vander Lans, Pearson education.*
4. *"Oracle PL/SQL", B.Rosenzweig and E.Silvestrova, Pearson education*

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## Object Oriented Programming Lab

**Software's for Lab:**

1. JDK and JRE 1.8
2. Eclipse IDE (Integrated Development Environment)

**Week-1 (Basics)**

1. Use Eclipse or Net bean platform and acquaint with the various menus. Create a test project, add a test class, and run it. See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods, and classes. Try debug step by step with a small program of about 10 to 15 lines which contains at least one if else condition and a for loop.
2. Write a Java program that prints all real solutions to the quadratic equation $ax^2 + bx+c=0$. Read in a, b, c and use the quadratic formula. If the discriminant $b^2 - 4ac$ is negative, display a message stating that there are no real solutions.
3. Five Bikers Compete in a race such that they drive at a constant speed which may or may not be the same as the other. To qualify the race, the speed of a racer must be more than the average speed of all 5 racers. Take as input the speed of each racer and print back the speed of qualifying racers.
4. Write a Java program to search an element using binary search.

**Course Outcome:** To Understand basic OOPs concepts of Java programming

**Week-2 (Applets & Arrays)**

1. Write an applet program that displays a simple message
2. Write an applet to display a simple message on a colored background.
3. Write java program that inputs 5 numbers, each between 10 and 100 inclusive. As each number is read display it only if it's not a duplicate of any number already read display the complete set of unique values input after the user enters each new value.
4. Write a Java program for sorting a given list of names in ascending order?

**Course Outcome:** To develop GUI using Applets and implement arrays

**Week-3(Strings & Command-line arguments)**

1. A palindrome is a string that is spelled the same way backward and forward. For example, mom, dad, radar, 727 are all examples of palindromes. Write a program that lets the user type a word and then determ1nes whether the string 1s a palindrome.

2. Write a Java program that reads a line of integers and then displays each integer and the sum of all integers. (use StringTokenizer class)?
3. Write a program using command line argument to design an application to avail a ride of uber/ola cab using promo code. The user is required to provide current location address and destination address at command prompt?
4. Write a program in Java which enters five numbers in an array using command line arguments and print sum and average of the numbers.

**Course Outcome:** To understand Strings and command-line arguments in Java

**Week-4 (Class, objects and constructors)**

1. Write a program in Java to create a class ' Box' which contains three data members for holding width, height and length of box and two methods 'area' and 'volume' to calculate and return the area and volume of box. Create another class named 'BoxDemo' which uses Box class.
2. WAP that describes a class person. It should have instance variables to record name, age and salary. Create a person object. Set and display its instance variables.
3. Write a Java program that displays Student details by using default and parameterized constructors.

**Course Outcome:** To create a class, objects and constructors in Java Programming

**Week-5 (methods and Inner classes)**

1. Create class point with following instance variable and methods.
   Instance variable: private int x,y Constructors : public Point(), Point(int x, int y)
   Methods : public void setX(int x), setY(int y), setXY(int x, int y)
2. Write a Java program that creates Inner class.
3. Create a class and access the static variables and static methods in another class.

**Course Outcome:** To Implement methods and Inner classes

**Week-6 (Inheritance)**

1. Write java program to create a super class called Figure that receives the dimensions of two dimensional objects. It also defines a method called area that computes the area of an object. The program derives two subclasses from Figure. The first is Rectangle and second is Triangle. Each of the sub class overridden area() so that it returns the area of a rectangle and a triangle respectively.
2. Write a java program that implements educational hierarchy using inheritance.
3. Write a java program to find the details of the students eligible to enroll for the examination ( Students, Department combined give the eligibility criteria for the enrollement class) using interfaces

| Teaching Designition setvalue() | Non-Teaching Office Designition setvalue() | Salary: empno empname | getvalue() |
|---|---|---|---|

**Course Outcome:** To create Java program by using Inheritance

**Week-7 (Polymorphism and Interface)**

1. Write a Java program to implement method overloading and method overriding
2. Write an application that creates an interface‘ and implements it.
3. Define an interface using JAVA that contains a method to calculate the perimeter of an object. Define two classes circle and Rectangle with suitable fields and methods . Implement the interface "perimeter" in these classes. Write the appropriate main() method to create object of each class and test 'all the methods.

**Course Outcome:** To create Java program by using Polymorphism and Interface

**Week-8 (Packages)**

1. Write a JAVA program illustrate class path
2. Write a case study on including in class path in your os environment of your package.
3. Write an application that creates a package p1. Add some classes in it.
4. Write a JAVA program that import and use the defined your package in the previous Problem

**Course Outcome:** To create a package and understanding the classpath

**Week-9 (Exception handling mechanism)**

1. Write a java program that implements Array Index out of bound Exception using built-in-Exception.
2. An University has applied promotion criteria for students. According to criteria a student cannot promote to next academic year if he have less than 4.5 CGP A. A developer is trying to implement this situation using exception handling in JAVA. Write a correct Java code to help him.
3. Write a java program to identify the significance of finally block in handling exceptions.
4. Write a java program to generate multiple threads of creating clock pulses. (using runnable interface)

**Course Outcome:** To implement the Exception handling mechanism in Java

## Week-10 (Multi-threading)

1. Write a JAVA program that creates threads by extending Thread class .First thread display "Good Morning "every 1 sec, the second thread displays "Hello "every 2 seconds and the third display "Welcome" every 3 seconds ,(Repeat the same by implementing Runnable)
2. Write a program illustrating **isAlive** and **join ()**
3. Write a Program illustrating Daemon Threads.
4. Write a case study on thread Synchronization after solving the above producer consumer problem

**Course Outcome:** To implement and understanding the working of threads in Java

**B.Tech II Year I Semester**
**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**
**19ACS15-FREE AND OPEN SOURCE LAB**
**(Common to CSE)**

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**List of Experiments:**

1. Linux Installation
2. MySQL Installation
3. Apache Installation
4. PHP and MySQL Connectivity
5. Python Programming
    - 5.1 Download and install the python
    - 5.2 redirection, pipes, filters and job control
    - 5.3 file ownership, file permissions, links and file system hierarchy
    - 5.4 Python and learn the basic types and control flow statements
    - 5.5.1 Learn about functions - definition, default arguments, multiple return values, variable arguments.
    - 5.5.2 Learn Python's data structures - lists, dictionaries, and tuples, in detail.
6. PERL and CGI Script
7. NS2 Installation

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**
**College of Engineering (Autonomous), Pulivendula - 516390, A.P, INDIA.**

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# Constitution of India

## Course Objectives:

1. To enable the student to understand the importance of constitution.
2. To understand philosophy of fundamental rights and duties.
3. To understand the structure of executive, legislature and judiciary.
4. To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and election commission of India.
5. To understand the central and state relation financial and administrative.

## UNIT-I

Introduction to Indian Constitution: Constitution' meaning of the term, Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

**Learning Outcomes:**

At the end of this unit students will be able to:

1. Understand the concept of Indian constitution.
2. Apply the knowledge on directive principle of state policy.
3. Analyze the History, features of Indian constitution.
4. Evaluate Preamble Fundamental Rights and Duties.

## UNIT-II

Democratic forms of Constitution, Union Government and its Administration Structure of the Indian Union: Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions;

**Learning Outcomes:**

At the end of this unit students will be able to:

1. Understand the structure of Indian government.
2. Differentiate between the state and central government.
3. Explain the role of President and Prime Minister.
4. Know the Structure of supreme court and High court.

## UNIT-III

Federalism, Political relations, Financial relations of State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organisation, Structure and Functions.

**Learning Outcomes:**

At the end of this unit students will be able to:

1. Understand the structure of state government.
2. Analyze the role Governor and Chief Minister.
3. Explain the role of state Secretariat.
4. Differentiate between structure and functions of state secrateriate.

## UNIT-IV

A. Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation PachayatiRaj: Functions PRI: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy.

**Learning Outcomes:**

At the end of this unit students will be able to:

1. Understand the local Administration.
2. Compare and contrast district administration role and importance.
3. Analyze the role of Myer and elected representatives of Municipalities.
4. Evaluate Zilla panchayat block level Organisation.

## UNIT-V

Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate , State Election Commission, Supreme Court, High Court.

**Learning Outcomes:**

At the end of this unit students will be able to:

1. Know the role of Election Commission apply knowledge.
2. Contrast and compare the role of Chief Election commissioner and Commissiononerate.
3. Analyze role of state election commission.
4. Evaluate various commissions of viz SC/ST/OBC and women.

## REFERENCES:


1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd.. New Delhi.
2. Subash Kashyap, Indian Constitution, National Book Trust.
3. J.A. Siwach, Dynamics of Indian Government & Politics.
4. D.C. Gupta, Indian Government and Politics.
5. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication.
6. J.C. Johari, Indian Government and Politics Hans.


## Course Outcomes:

1. Understand historical background of the constitution making and its importance for building a democratic India.
2. Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
3. Understand the value of the fundamental rights and duties for becoming good citizen of India.
4. Analyze the decentralization of power between central, state and local self-government.
5. Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.
6. Know the sources, features and principles of Indian Constitution.
7. Learn about Union Government, State government and its administration.
8. Get acquainted with Local administration and Pachayati Raj.
9. Be aware of basic concepts and developments of Human Rights.
10. Gain knowledge on roles and functioning of Election Commission.

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**COLLEGE OF ENGINEERING (AUTONOMOUS), PULIVENDULA**
**B.Tech – II-II Sem (R19)**

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## Numerical Methods, Probability and Statistics
## (Common to CIVIL, ME, EEE& CSE)

**Course Objectives:**

1) To familiarize the students with numerical methods of solving the non-linear equations, interpolation, differentiation, integration, and ordinary differential equations.
2) To impart knowledge in basic concepts and few techniques in probability and statistics in various applications in engineering.

**Unit I: Solution to algebraic and transcendental equations& Interpolation**

Solution of algebraic and transcendental equations: bisection method, Newton-Raphson method and Regula-Falsi method, Finite differences, relation between operators, interpolation using Newton's forward and backward difference formulae. Interpolation with unequal intervals: Newton's divided difference and Lagrange's formulae.

**Learning Outcomes:**

After completion of this unit student able to

- find approximate roots of the an equation by using different numerical methods
- explain various discrete operators and find the relation among operators
- apply Newton forward and backward formulas for equal and unequal intervals

**Unit II: Numerical differentiation, integration & Solution of Initial Value Problems to Ordinary Differential Equations of first order.**

**Numerical Differentiation and Numerical integration**: Numerical differentiation using Newton's forward & backward interpolation formulae; Numerical Integration by trapezoidal rule, Simpson's $1/3^{rd}$ and $3/8^{th}$ rules.

**Numerical Solutions of Ordinary differential equation:** Solution by Taylor's series, Picard's method of successive approximations, Euler's method, modified Euler's method and Runge-Kutta method of fourth order.

**Learning Outcomes:**

After completion of this unit student able to

- find integration of a function by different numerical methods
- solve ordinary differential equations using different numerical schemes

**Unit III: Probability & Random Variables**

Probability axioms, addition law and multiplicative law of probability, conditional probability, Baye's theorem.

Random variables (discrete and continuous), probability distribution: Binomial - Poisson approximation to the binomial distribution and normal distribution-their properties. (All concepts without proofs)

**Learning Outcomes:**

At the end of this unit, the student will be able to

- explain the terms sample space, random variable, expected value
- apply probability theory via Baye's theorem
- identify the notations of discrete and continuous distribution functions
- evaluate Binomial and Poisson distributions
- explain the properties of normal distribution

**Unit IV: Testing of hypothesis**

Formulation of hypothesis, critical region, level of significance. Large sample tests: test for single proportion, difference of two proportions, test for single mean and difference of two means.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- explain the concept of testing of hypothesis
- apply the concept of hypothesis testing for large samples

**Unit V: Small Sample Tests**

Student t-distribution (single mean, two means and paired t-test), Testing of equality of variances (F-test), $\chi 2$ - test for independence of attributes and goodness of fit.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- apply the concept of testing hypothesis for small samples
- estimate the goodness of fit

**Text Books:**


1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2. Miller and Freunds, Probability and Statistics for Engineers,7/e, Pearson, 2008
3. S.S.Sastry, "Introductory methods of Numerical Analysis", 5th edition, PHI, 2012.


**References:**


1. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons publications, 2012.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9/e, John Wiley & Sons, 2006.
3. P. Kandasamy, K. Thilagavathy, S. Gunavathy, Numerical Methods, S. Chand & Company, 2nd Edition, Reprint 2012.


**Course Outcomes:**

Students will be able to

- apply different methods to find roots of the equations
- find approximate the solutions of ordinary differential equations
- apply the Laplace transform for solving differential equations
- explain the concepts of probability and their applications
- apply discrete and continuous probability distributions in practical problems
- use the statistical inferential methods based on small and large sampling tests

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# Compiler Design

**Semester- IV (R19) (CSE)** **L-T-P-C**
**3-0-0-3**

**COURSE OBJECTIVES:**

Course is designed to:

1. Teach the concepts related to assemblers, loaders, linkers and editors
2. Introduce the basic principles of the compiler construction
3. Explain the Concept of Context Free Grammars, Parsing and various Parsing Techniques.
4. Expose the process of intermediate code generation.
5. Instruct the process of Code Generation and various Code optimization techniques.
6. Explain need of Program verification

**UNIT – I**

**Overview of Compilation and Language processing**:Preprocessor-Compiler-assembler-interpreters-pre-processors-linkers and loaders-structure of a compiler- Phases of Compilation– Lexical Analysis, Regular Grammar and regular expression for common programming language features, pass and Phases of translation, interpretation, bootstrapping.

**UNIT – II**

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

**Bottom up Parsing:** Shift Reduce parsing, LR and LALR parsing, Error recovery in parsing, handling ambiguous grammar.

**UNIT – III**

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

**UNIT – IV**

**Symbol Tables:** Symbol table format, organization for block structures languages, hashing, tree structures representation of scope information.

**Intermediate code Generation**: Intermediate languages, Declarations, Assignment statements, Boolean expressions, Back patching.

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

**UNIT – V**

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

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

**TEXT BOOKS:**


1. Principles of compiler design -A.V. Aho, J.D.Ullman, Pearson Education.
2. Modern Compiler Implementation in C- Andrew N. Appel, Cambridge University Press.
3. Compilers Principles, Techniques and Tools-Alfred V.Aho, Ravi Sethi, JD Ullman, Pearson Education, 2007.


**REFERENCES:**


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

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**COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA**

## COMPUTER ORGANIZATION

**Semester- IV (R19) (CSE)** **L-T-P-C**
**3-0-0-3**

**Course Objective:**

- To gain methodical understanding of the basic structure and operation of a digital computer.
- To learn the fundamentals of computer organization and its relevance to classical and modern problems of computer design
- To make the students understand the structure and behavior of various functional modules of a computer.
- To explore the hardware requirements for cache memory and virtual memory for better understanding of memory management
- To understand the techniques that computers use to communicate with I/O devices
- To study the concepts of pipelining and the way it can speed up processing.
- To understand the basic characteristics of multiprocessors

**Course Outcomes:**

- Optimize the algorithms to exploit pipelining and multiprocessors
- Algorithm design for bit level arithmetic
- Ability to use memory and I/O devices effectively

**UNIT - I:**

**Introduction to Computer Organization and Architecture:**

Basic Computer Organization – CPU Organization – Memory Subsystem Organization and Interfacing – I/O Subsystem Organization and Interfacing – A Simple Computer Levels of Programming Languages, Assembly Language Instructions, Instruction Set Architecture Design, A simple Instruction Set Architecture

**UNIT – II:**

**Central Processing Unit:** Introduction, General Register Organization, Stack Organization, Instruction formats –Addressing Modes – Data Transfer and Manipulation – Program Control.

**Computer Arithmetic:** Addition and Subtraction – Multiplication Algorithms – Division Algorithms –Floating-Point Arithmetic Operations – Decimal Arithmetic unit

**UNIT – III:**

**Register Transfer:** Register Transfer Language – Register Transfer – Bus and Memory Transfers –Arithmetic Micro operations – Logic Micro operations – Shift Micro operations.

**Control Unit:** Control Memory – Address Sequencing – Micro program Example – Design of Control Unit

**UNIT – IV:**

**Memory Organization:** Memory Hierarchy – Main Memory – Auxiliary Memory – Associative Memory – Cache Memory – Virtual Memory.

**Input/output Organization:** Input-Output Interface – Asynchronous Data Transfer – Modes of Transfer– Priority Interrupt – Direct Memory Access (DMA).

**UNIT – V:**

**Pipeline:** Parallel Processing – Pipelining – Arithmetic Pipeline – Instruction Pipeline. **Multiprocessors:** Characteristics of Multiprocessors – Interconnection Structures – Inter Processor Arbitration – Inter Processor Communication and Synchronization

**Text Books:**


1. "Computer Systems Organization and Architecture", John D. Carpinelli, PEA, 2009.
2. "Computer Systems Architecture", 3/e, M. Moris Mano, PEA, 2007


**Reference Books:**


1. "Computer Organization", Carl Hamacher, ZvonksVranesic, SafeaZaky, 5/e, MCG, 2002.
2. "Computer Organization and Architecture", 8/e, William Stallings, PEA, 2010.
3. "Computer Systems Architecture a Networking Approach", 2/e, Rob Williams.
4. "Computer Organization and Architecture" Ghoshal, Pearson Education, 2011.
5. "Computer Organization and Architecture", V. Rajaraman, T. Radakrishnan.
6. "Computer Organization and Design", P. Pal Chaudhuri, PHI
7. "Structured Computer Organization", Andrew S. Janenbaum, Todd Austin

"Computer Architecture" Parahmi, Oxford University Press

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# Operating Systems

**Semester – IV (R19) (CSE)**

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**UNIT - I:**

**Operating Systems Overview:** Operating system functions, Operating system structure, protection and security, Kernel data Structures, Open- Source Operating Systems.

**Operating System Structure:** Operating System Services, User and Operating-System Interface, systems calls, system programs, operating system debugging, System Boot.

**Processes:** Process concept, Process Scheduling, Operations on processes, Inter process Communication.

**UNIT – II:**

**Threads:** Overview, Multicore Programming, Multithreading Models, Thread Libraries, Implicit threading, Threading Issues.

**Process Synchronization:** The critical-section problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Monitors.

**CPU Scheduling:** Scheduling-Criteria, Scheduling Algorithms, Thread Scheduling, Multiple-Processor Scheduling.

**UNIT – III:**

**Memory Management:** Swapping, contiguous memory allocation, segmentation, paging, structure of the page table.

**Virtual memory:** demand paging, page-replacement, Allocation of frames, Thrashing, Memory-Mapped Files, and Allocating Kernel Memory.

**Deadlocks:** System Model, deadlock characterization, Methods of handling Deadlocks-Deadlock prevention, Detection and Avoidance, Recovery from deadlock.

**UNIT – IV:**

**Mass-storage structure:** Overview of Mass-storage structure, Disk structure, Disk attachment, Disk scheduling, RAID structure.

**File system Interface:** The concept of a file, Access Methods, Directory and Disk structure, File system mounting, File sharing, Protection.

**File system Implementation:** File-system structure, File-system Implementation, Directory Implementation, Allocation Methods, Free-Space management.

**UNIT – V:**

**Case Studies:**
Mobile Operating System: Concepts, Structure, and Case Study.

**Text Books:**

**1.** Operating System Concepts, Abraham Silberschatz, Peter B. Galvin, Greg Gagne, Ninth Edition, 2012, Wiley.
**2.** Operating Systems: Internals and Design Principles, Stallings, Sixth Edition, 2009, Pearson Education.

**Reference Books:**

R1. Modern Operating Systems, Andrew S Tanenbaum, Second Edition, PHI.
R2. Operating Systems, S.Haldar, A.A.Aravind, Pearson Education.
R3. Principles of Operating Systems, B.L.Stuart, Cengage learning, India Edition.
R4. Operating Systems, A.S.Godbole, Second Edition, TMH.
R5. An Introduction to Operating Systems, P.C.P. Bhatt, PHI.
R6. Operating Systems, G.Nutt, N.Chaki and S.Neogy, Third Edition, Pearson Education.
R7. Operating Systems, R.Elmasri, A,G.Carrick and D.Levine, McGraw Hill.

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**COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA**

# SOFTWARE ENGINEERING

**Semester – IV (R19) (CSE)**

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**UNIT I:**

**Software and Software Engineering:** The Nature of Software, The Unique Nature of Web Apps, Software Engineering, Software Process, Software Engineering Practice, Software Myths. **Process Models:** A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, The Unified Process, Personal and Team Process Models, Process Terminology, Product and Process.

**UNIT II:**

**Software Project Planning and Management:** Responsibilities of a Software Project Manager, Project Planning, Metrics for Project Size Estimation, Project Estimation Techniques, Empirical Estimation Techniques, COCOMO-A Heuristic Estimation Technique, Halstead's Software Science-An Analytical Technique, Staffing Level Estimation, Scheduling, Organization and Team Structures, Staffing, Risk Management, Software Configuration Management

**UNIT III:**

**Understanding Requirements**: Requirements Engineering, Establishing the Groundwork, Eliciting Requirements, Requirements Analysis, Structured Analysis, Data Oriented Analysis, Object Oriented Analysis Developing Use Cases, Building the Requirements Model, Negotiating Requirements, and Validating Requirements.
**Requirements Modeling**: Requirements Analysis, Scenario-Based Modeling, UML Models That Supplement the Use Case.

**UNIT IV:**

**Design Concepts**: Design within the Context of Software Engineering, Design Process, Design Concepts, The Design Model, Function oriented software design, Object oriented software development.
**Architectural Design:** Software Architecture, Architectural Genres, Architectural Styles, Architectural Design.

**UNIT V:**

**User Interface Design:** The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps.
**Coding and Testing:** Coding, Code Review, Software Documentation, Testing, Testing in the

Large versus Testing in the Small, Unit Testing, Black-Box Testing, White-Box Testing, Debugging, Program Analysis Tools, Integration Testing.
**Software Maintenance:** Characteristics of Software Maintenance, Software Reverse Engineering, Software Maintenance Process Models, and Estimation of Maintenance cost.

**TEXT BOOKS:**


1. Software Engineering A practitioner's Approach, Roger S. Pressman, Seventh Edition, 2009, McGraw Hill International Edition.
2. Fundamentals of Software Engineering, Rajib Mall, Third Edition, 2009,PHI


**REFERENCE BOOKS:**


1. Software Engineering, Ian Sommerville, Ninth edition, Pearson education.
2. Software Engineering : A Primer, Waman S Jawadekar, Tata McGraw-Hill,2008
3. Software Engineering, A Precise Approach, PankajJalote, Wiley India, 2010.
4. Software Engineering, Principles and Practices, Deepak Jain, Oxford UniversityPress.
5. Software Engineering1: Abstraction and modeling, Diner Bjorner, Springer International edition,2006.
6. Software Engineering2: Specification of systems and languages, Diner Bjorner, Springer International edition ,2006.
7. Software Engineering Foundations, Yingxu Wang, Auerbach Publications,2008.
8. Software Engineering Principles and Practice, Hans Van Vliet, 3rd edition, John Wiley &SonsLtd.
9. Software Engineering 3: Domains, Requirements,and Software Design, D.Bjorner, Springer InternationalEdition.
10. Introduction to Software Engineering, R.J.Leach, CRCPress.

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COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA

# Computer Networks

**Semester – IV (R19) (CSE)**

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**Course Objectives:**

- Study the evolution of computer networks and future direction
- Study the concepts of computer networks from layered perspective
- Study the issues open for research in computer networks

**Course Outcomes:**

- Use appropriate transmission media to connect to a computer network and Internet
- Work on the open issues for their project
- Start using the Internet effectively
- Able to design new protocols for computer network

**UNIT –I:**

Data Communications, Network, Business and Home applications of Computer Network, Internet history, Standards and Administration, Network hardware, Network Software: Protocol Hierarchies- Design Issues for the Layers- Connection-Oriented Versus Connectionless Service, Reference Models. Data and Signals, Periodic Analog Signals, Digital Signals, Transmission Impairment, Data rate Limits, Performance, Circuit-Switched Networks, Packet Switching, and Guided Transmission Media.

**UNIT –II:**

Data Link Layer Design Issues, Error Detection and Correction, Elementary Data Link Protocols, Sliding Window Protocols, the Channel Allocation Problem, Multiple Access Protocols, Ethernet

**UNIT –III:**

Data Link Layer Switching, Routing algorithms: The Optimality Principle-Shortest path Algorithm-Flooding-Distance Vector Routing-Link State Routing-Hierarchical Routing Broadcast Routing-Multicast Routing-Anycast Routing, Congestion Control Algorithms.

**UNIT –IV:**

Internetworking, The Network Layer in the Internet: The IP Version 4 Protocol- IP Addresses IP Version 6- Internet Control Protocols- Label Switching and MPLS-OSPF-BGP, Elements of Transport Protocols, Congestion Control: Desirable bandwidth Allocation-Regulating the Sending Rate.

**UNIT –V:**

The Internet Transport Protocols: UDP, The Internet Transport Protocols: TCP, World Wide Web and HTTP, FTP, Electronic Mail, TELNET, Secure Shell (SSH), Domain Name System (DNS).

**TEXT BOOKS:**

1. Andrew S. Tanenbaum, David J.Wetherall, "Computer Networks", Pearson Education, 5th ed., ISBN 978-81-317-8757-1

2. Behrouz A. Forouzan, "Data Communications and Networking", McGraw Hill Education, 5th ed., ISBN 978-1-25-906475-3.

**REFERENCES:**

1. Douglas E. Comer, "Internetworking with TCP/IP – Principles, protocols, and architecture-Volume 1", 5th ed., PHI

2. Peterson, Davie,"Computer Networks", 5th ed., Elsevier.

3. Chawan- Hwa Wu, Irwin,"Introduction to Computer Networks and Cyber Security", CRC Publications. Computer Networks and Internets with Internet Applications, Comer

**B.Tech II Year II Semester**
**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**
**19ACS27-COMPUTER NETWORKS AND OPERATING SYSTEMS LABORATORY**

| L | T | P | C |
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**Course Objectives:** The objectives of the course are to make the students learn about
To gain methodical understanding of the basic structure and operation of a digital computer.
To learn the fundamentals of computer organization and its relevance to classical and modern problems of computer design
To make the students understand the structure and behavior of various functional modules of a computer.
To explore the hardware requirements for cache memory and virtual memory for better understanding of memory management
To understand the techniques that computers use to communicate with I/O devices
To study the concepts of pipelining and the way it can speed up processing.

**Computer Networks Experiments**

1. Write a C program to implement the data link layer farming methods such as bit stuffing.
2. Write a C program to implement the data link layer framing method such as character stuffing.
3. Write a C program to implement data link layer framing method character count.
4. Write a C program to implement on a data set characters the three CRC polynomials CRC 12, CRC 16, and CRC CCIP.
5. Write a C program to Implement Dijkstra's Algorithm to compute the shortest path through a given path.

**Operating Systems Experiments**

1. Simulate the following CPU scheduling algorithms
   a) Round Robin b) SJF c) FCFS d) Priority
2. Simulate all file allocation strategies
   a) Sequential b) Indexed c) Linked
3. Simulate MVT and MFT
4. Simulate all File Organization Techniques
   a) Single level directory b) Two level c) Hierarchical d) DAG
5. Simulate Bankers Algorithm for Dead Lock Avoidance
6. Simulate Bankers Algorithm for Dead Lock Prevention
7. Simulate all page replacement algorithms
   a) FIFO b) LRU c) LFU Etc. …
8. Simulate Paging Technique of memory management.

**B.Tech II Year II Semester**
**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**
**19ACS24-SOFTWARE ENGINEERING LAB**
**(Common to CSE)**

| L | T | P | C |
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**Course Objectives:** The objectives of the course are to make the students learn about
To gain methodical understanding of the basic structure and operation of a digital computer.
To learn the fundamentals of computer organization and its relevance to classical and modern problems of computer design
To make the students understand the structure and behavior of various functional modules of a computer.
To explore the hardware requirements for cache memory and virtual memory for better understanding of memory management
To understand the techniques that computers use to communicate with I/O devices
To study the concepts of pipelining and the way it can speed up processing.

**List of Experiments**

1. Identifying the Requirements from Problem Statements.
2. Estimation of Project Metrics.
3. Modeling UML Use Case Diagrams and Capturing Use Case Scenarios.
4. E-R Modeling from the Problem Statements.
5. Identifying Domain Classes from the Problem Statements.
6. State chart and Activity Modeling.
7. Modeling UML Class Diagrams and Sequence diagrams.
8. Modeling Data Flow Diagrams.
9. Estimation of Test Coverage Metrics and Structural Complexity.
10. Designing Test Suites.

**B.Tech II Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ACS22-COMPUTER ORGANIZATION LAB**

**(Common to CSE)**

| L | T | P | C |
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**Course Objectives:** The objectives of the course are to make the students learn about

To gain methodical understanding of the basic structure and operation of a digital computer.

To learn the fundamentals of computer organization and its relevance to classical and modern problems of computer design

To make the students understand the structure and behavior of various functional modules of a computer.

To explore the hardware requirements for cache memory and virtual memory for better understanding of memory management

To understand the techniques that computers use to communicate with I/O devices

To study the concepts of pipelining and the way it can speed up processing.

**List of Experiments**

1. Identifying the Requirements from Problem Statements.
2. Estimation of Project Metrics.
3. Modeling UML Use Case Diagrams and Capturing Use Case Scenarios.
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5. Identifying Domain Classes from the Problem Statements.
6. State chart and Activity Modeling.
7. Modeling UML Class Diagrams and Sequence diagrams.
8. Modeling Data Flow Diagrams.
9. Estimation of Test Coverage Metrics and Structural Complexity.
10. Designing Test Suites.

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA**
**DEPARTMENT OF CHEMISTRY**
**II B.TECH – I/II SEMESTER Mandate Course (MC)**
**(THEORY)**

| Subject Code | Title of the Subject | L | T | P | C |
|---|---|---|---|---|---|
| | **Environmental Science** | 3 | 0 | - | 0 |

| | COURSE OBJECTIVES |
|---|---|
| 1 | To make the student understand multi disciplinary nature of environment and its components. |
| 2 | To investigate the relationship between human life and environment from scientific prospective. |
| 3 | To impart knowledge to the students about fundamental concepts of Ecosystem and Biodiversity |
| 4 | Necessasity of analyzing regional, national and global environmental problems |
| 5 | To understand and apply the fundamentals of Environmental science to important local, regional, national and global environmental problems and potential issues |

| | COURSE OUTCOMES |
|---|---|
| CO1 | Able to solve the environmental problems based fundamental concepts of Environmental Science. |
| CO2 | Enable the students to understand the structure and function of significant environmental systems |
| CO3 | Knowledge of concepts makes them differentiate Natural and Polluted environment.. |
| CO4 | Enable to apply the Pyramid of number, mass and Energy, understand about Renweable energy resources.<br>Illustrate the Forest ecosystem, Discuss about Grass and Net biomass productivity |
| CO5 | Differentiate between Forest and desert Ecosystems, Critically evaluate arguments regarding environmental issues. Illustrate the Food chain and food web, Identify the applications of rain water harvesting, Interpret advantages of In-situ and Ex-situ conservation of biodiversity |

**Mapping between Course Outcomes and Programme Outcomes**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | | | | | | | |
| CO2 | | | | | | | | | | | | |
| CO3 | | | | | | | | | | | | |
| CO4 | | | | | | | | | | | | |
| CO5 | | | | | | | | | | | | |

## SYLLABUS

**UNIT-I:**

**i) Multidisciplinary** nature of environmental studies

The **Multidisciplinary** nature of environmental studies Definition; Scope and importance, Need for public awareness.

**ii) Natural Resources:**

Renewable and non-renewable resources: Natural resources and associated problems.

a) Forest resources: Use and Over-exploitation, deforestation, case studies. Dams, benefits and their effects on forests and tribal people.

b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water

**c) Earth: Geomorphology, Weathering, Structure of Earth - inner core, outer core, mantle and the crust, magma.**

**d)** Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

e) Food resources: World food problems, changes caused by agriculture, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

**UNIT-II:**

**i) 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.

Types of some ecosystems: -

a. Forest ecosystem b. Desert ecosystem

d. Aquatic ecosystems (ponds, rivers, oceans, estuaries).

**ii) Biodiversity and its Conservation**

Introduction-Definition: genetic, species and ecosystem diversity. Biogeographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values, India as a mega-diversity nation.

Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

**UNIT-III:**

Environmental Pollution and Disaster management:

**Definition** - Causes, effects and control measures of:

a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution

e. Noise pollution f. Thermal pollution g. Nuclear hazards

Disaster management: floods, earthquake, cyclone and landslides.

Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust.

**UNIT-IV:**

**Social Issues and the Environment**

From Unsustainable to Sustainable development. Water conservation, rain water harvesting, watershed management.

Resettlement and rehabilitation of people; its problems and concerns. Case studies.

Environment 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-V:**

**i) Human Population and the Environment**

Population growth, variation among nations. Population explosion-Family welfare Programme. Environment and human health, Women and Child Welfare, Role of information Technology in Environment and human health, Case Studies.

**ii) Field Work**

- Visit to a local area to document environmental assets-river/forest/grassland/ hill/mountain.
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural.
- Study of simple ecosystems-pond, river, hill slopes, etc.

**Text Books:**

1. Shashi Chawla, A Text Book of Environmental Studies, Mc Graw Hill Education, 4th edition, 2014

2. De A.K., Environmental Chemistry, Wiley Eastern Ltd , 2012

**Reference Books**

1. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad -380013, India, Email: mapin@icenet. net (R).

2. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p.

3. Cunningham, W.P.Cooper, T.H. Gorhani, E & Hepworth, M.T.2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING PULIVENDULA( AUTONOMOUS) -PIN: 516390(A.P.)

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## UNIVERSAL HUMAN VALUES

**OBJECTIVES**

- To create an awareness on Engineering Ethics and Human Values.
- To instill Moral and Social Values and Loyalty
- To appreciate the rights of Others

**Unit I: HUMAN VALUES**

Morals, Values and Ethics-Integrity-Work Ethic-Service learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty - Courage- Co Operation – Commitment – Empathy –Self Confidence Character – Self interest - Spirituality, Moral dilemmas- Consensus and controversy.

**Unit II: PERSONALITY DEVELOPMENT**

Concept of personality, types of personalities, Knowing of self(SWOT), improving personality – techniques, interpersonal skills, intrapersonal skills, building right attitude, developing the spirit of universal human goodness.

**Unit III: ENGINEERING AS SOCIAL EXPERIMENTATION AND**

Engineering As Social Experimentation – Framing the problem – Determining the facts – Codes of Ethics – Clarifying Concepts – Application issues – Common Ground - General Principles – Utilitarian thinking respect for persons.

**RESPONSIBILITY FOR SAFETY AND RISK**

Safety and risk – Assessment of safety and risk – Risk benefit analysis and reducing risk- Safety and the Engineer- Designing for the safety.

**UNIT IV:** UNDERSTANDING HARMONY IN THE FAMILY AND SOCIETY.

Understanding Harmony in the family – the basic unit of human interaction, Understanding the meaning of Vishwas; Difference between intention and competence, Understanding the harmony

in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals, Visualizing a universal harmonious order in society- Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha )- from family to world family.

**UINIT V: GLOBAL ISSUES**

Globalization – Cross culture issues- Environmental Ethics – Computer Ethics – Computers as the instrument of Unethical behavior – Computers as the object of Unethical acts – Autonomous Computers- Computer codes of Ethics – Weapons Development - Ethics and Research – Analyzing Ethical Problems in research – Intellectual property Rights( IPR).

## Outcomes:

- Identify and analyze an ethical issue in the subject matter under investigation or in a relevant field.
- Identify the multiple ethical interests at stake in a real-world situation or practice.
- Articulate what makes a particular course of action ethically defensible.
- Assess their own ethical values and the social context of problems.
- Identify ethical concerns in research and intellectual contexts, including academic integrity, use and citation of sources, the objective presentation of data, and the treatment of human subjects.
- Demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships, and field work.
- Integrate, synthesize, and apply knowledge of ethical dilemmas and resolutions in academic settings, including focused and interdisciplinary research.

## Text Books


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

7. **"Professional Ethics and Human Values"** by Prof.D.R.Kiran.

**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19AHS12-ENGLISH LANGUAGESKILLS**

**(Common to EEE , ECE & CSE)**

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**Course Objectives:**

- Facilitate active listening to enable inferential learning through expert lectures and talks
- Provide training and opportunities to develop fluency in English through participation in formal group discussions and presentations using audio-visual aids

**UNIT – I:** **12 Hrs**

**Listening**: Listening to famous speeches for structure and style

**Speaking:** Oral presentations on general topics of interest.

**Reading:** Reading for meaning and pleasure – reading between the lines.

**Writing:** Appreciating and analyzing a poem –Paraphrasing, note-taking.

**Grammar and Vocabulary: Tenses (Advanced Level)** Correcting errors in punctuation -Word roots and affixes.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the purpose of rhythm and rhyme and the use of figures of speech in making the presentation lively and attractive. **L1**
- Apply the knowledge of structure and style in a presentation, identify the audience and make note of key points. **L2**

**UNIT – II:** **12 Hrs**

**Listening:** Following the development of theme; answering questions on key concepts after listening to stories online.

**Speaking:** Narrating personal experiences and opinions.

**Reading:** Reading for summarizing and paraphrasing; recognizing the difference between facts and opinions.

**Writing:** Summarizing, precis writing, letter and note-making

**Grammar and Vocabulary:** Subject-verb agreement, noun-pronoun agreement, collocations.

**Learning Outcomes:**

- At the end of this unit, the student will be able to
- Make formal structured presentations on academic topics. **L1**
- Use correct English avoiding common errors in formal speech and writing. **L2**

**UNIT – III:** **12 Hrs**

**Listening:** Identifying views and opinions expressed by different speakers while listening to speeches.

**Speaking:** Small talks on general topics; agreeing and disagreeing, using claims and examples/ evidences for presenting views, opinions and position.

**Reading:** Identifying claims, evidences, views, opinions and stance/position.

**Writing:** Writing structured persuasive/argumentative essays on topics of general interest using suitable claims, examples and evidences.

**Grammar and Vocabulary:** The use of Active and passive Voice, vocabulary for academic texts.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Participate in group discussions using appropriate conventions and language. Strategies. **L1**
- Use appropriate vocabulary to express ideas and opinions. **L2**

**UNIT – IV** **12 Hrs**

**Listening:** Listening to identify important moments - Understanding inferences; processing of information using specific context clues from the audio.

**Speaking:** Group discussion; reaching consensus in group work (academic context).

**Reading:** Reading for inferential comprehension.

**Writing:** Applying for internship/ job - Writing one's CV/Resume and cover letter.

**Grammar and Vocabulary: Phrasal verbs, phrasal prepositions and technical vocabulary.**

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Express thoughts and ideas with acceptable accuracy and fluency **L1**
- Draw inferences and conclusions using prior knowledge and verbal cues **L2**

**UNIT – V** **12 Hrs**

**Listening:** Understanding inferences - processing of explicit information presented in the text and implicit information inferable from the text or from previous/background knowledge.

**Speaking:** Formal team presentations on academic/ general topics.

**Reading:** Intensive and extensive reading.

**Writing:** Structure and contents of a Report – Abstract – Project report features.

**Grammar and Vocabulary:** Correcting common errors, improving vocabulary and avoiding cliches and jargons.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Develop advanced listening skills for in-depth understanding of academic texts. **L1**
- Collaborate with a partner to make effective presentations. **L2**

**Text Books:**

1. "Forging Ahead": A Course Book for B.Tech Students. Orient BlackSwan,2020.
2. Meenakshi Raman &Sangeeta Sharma, "Technical Communication" O U Press2009.

**Reference Books:**

1. Bailey, Stephen. "Academic writing: A handbook for international students "Routledge, 2014.
2. Chase, Becky Tarver. Pathways: Listening, "Speaking and Critical Thinking". Heinley ELT; 2nd Edition,2018.
3. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
4. Hewings, Martin. "Cambridge Academic English" (B2). CUP, 2012. (Student Book, Teacher Resource Book, CD & DVD).

**Course Outcomes:**

- At the end of this Course the student will be able to
- Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English. **L1**
- Apply grammatical structures to formulate sentences and correct word forms **L2**
- Analyze discourse markers to speak clearly on a specific topic in informal discussions. **L3**
- Evaluate reading/listening texts and to write summaries based on global comprehension of the setexts. **L4**
- Create a coherent paragraph interpreting a figure/graph/chart/table. **L5**

**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ACS51-INTERNET OF THINGS**

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**Course Objectives:**

- Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design & develop IOT Devices.

**UNIT – I: Fundamentals of IoT** **8hrs**

Introduction – Characteristics-Physical Design - Protocols – Logical Design – Enabling technologies – IoT Levels – Six Levels of IoT - Domain Specific IoTs

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Able to understand the application areas of IOT **L2**
- Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks **L2**
- Able to understand building blocks of Internet of Things and characteristics. **L3**

**UNIT – II: IOT and M2M** **8hrs**

M2M, IoT vs M2M, SDN and NFV for IoT, IOT system Management with NETCONF-YANG.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Discuss the IOT and M2M **L3**
- Able to understand the IOT system Management with NETCONF-YANG **L3**

**UNIT – III: IoT Design Methodology** **8hrs**

IoT Systems Management – IoT Design Methodology – Specifications Integration and Application Development.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Able to understand the Specifications Integration and Application Development. **L4**
- Able to understand the IoT Design Methodology **L4**

**UNIT – IV: Sensors and Connectivity** **7 Hrs**

Sensors- Types of sensor nodes, Internet communications, IP addresses, MAC Address, TCP and UDP Ports, Application layer protocols

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Able to identify the sensors and its applications **L3**
- Able to use the sensors in different applications **L3**

**UNIT – V: IOT Applications**

IOT application for industry-Future factory concepts, Brownfield IoT, Smart objects, Smart applications, Study of existing IoT platforms/middleware, IoT- A, Hydra etc.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Able to identify the IOT applications **L5**
- Able to identify the IOT platforms **L5**

**Text Books:**

1. Arshdeep Bahga, Vijay Madisetti, "Internet of Things – A Hands-on Approach", Universities Press, 2015.

**Reference Books:**

1. Manoel Carlos Ramon, "Intel® Galileo and Intel® Galileo Gen 2: API Features and Arduino Projects for Linux Programmers", Apress, 2014.
2. Marco Schwartz, "Internet of Things with the Arduino Yun", Pack Publishing, 2014.
3. *Simon Monk, "Programming the Raspberry Pi: Getting Started with Python",* McGraw-Hill, *2013.*
4. Charalampos Doukas, "Building Internet of Things With the Arduino", Second Edition, 2012.
5. Dr. John Bates, "Thingalytics: Smart Big Data Analytics for the Internet of Things", Software AG Publisher, 2015.

**Course Outcomes:**

At the end of this Course the student will be able to

- Able to understand the application areas of IOT · Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks · **L3**
- Able to understand building blocks of Internet of Things and characteristics **L4**

**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ACS52-OBJECT ORIENTED ANALYSIS, DESIGN AND TESTING**

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**Course Objectives:**

- To understand the fundamentals of object modeling.
- To understand and differentiate Unified Process from other approaches.
- To design with static UML diagrams.
- To design with the UML dynamic and implementation diagrams.
- To improve the software design with design patterns.
- To test the software against its requirements specification.

## UNIT – I: UNIFIED PROCESS AND USE CASE DIAGRAMS

**8hrs**

Introduction to OOAD with OO Basics - Unified Process – UML diagrams – Use Case –Case study – the Next Gen POS system, Inception -Use case Modelling – Relating Use cases – include, extend and generalization – When to use Use-cases.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Express software design with UML diagram. **L2**
- Design software applications using OO concepts. **L2**
- Understand the various testing methodologies for OO software.

## UNIT – II: STATIC UML DIAGRAMS

**8hrs**

Class Diagram— Elaboration – Domain Model – Finding conceptual classes and description classes – Associations – Attributes – Domain model refinement – Finding conceptual class Hierarchies – Aggregation and Composition - Relationship between sequence diagrams and use cases – When to use Class Diagrams.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Identify various scenarios based on software requirements. **L3**
- Transform UML based software design into pattern based design using design patterns. **L3**

## UNIT – III: DYNAMIC OF UML DIAGRAMS

**8hrs**

Dynamic Diagrams – UML interaction diagrams - System sequence diagram – Collaboration diagram – When to use Communication Diagrams - State machine diagram and Modelling –When to use State Diagrams - Activity diagram – When to use activity diagrams .

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Describe interaction diagrams and their modeling techniques. **L4**
- Demonstrate activity diagram and their modeling techniques. **L4**

## UNIT – IV: IMPLEMENTAION OF UML DIAGRAMS

**7 Hrs**

Implementation Diagrams - UML package diagram - When to use package diagrams - Component and Deployment Diagrams – When to use Component and Deployment diagrams.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Demonstrate component and deployment diagram. **L3**
- Describe interaction diagrams and their modeling techniques. **L3**

**UNIT – V: TESTING**

Object Oriented Methodologies – Software Quality Assurance – Impact of object orientation on Testing – Develop Test Cases and Test Plans.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Describe the testing methodologies **L5**
- Able to develop the test cases **L5**
- Able to plan the test cases **L4**

**Text Books:**

1. Craig Larman, —Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development‖, Third Edition, Pearson Education, 2005.
2. Ali Bahrami - Object Oriented Systems Development - McGraw Hill International Edition – 1999.

**Reference Books:**

1. Erich Gamma, and Richard Helm, Ralph Johnson, John Vlissides, —Design patterns: Elements of Reusable Object-Oriented Software‖, Addison-Wesley, 1995.
2. Martin Fowler, —UML Distilled: A Brief Guide to the Standard Object Modeling Language‖, Third edition, Addison Wesley, 2003.

**Course Outcomes:**

At the end of this Course the student will be able to

- Express software design with UML diagrams. **L3**
- Design software applications using OO concepts. **L4**
- Identify various scenarios based on software requirements. **L5**
- Transform UML based software design into pattern based design using design pat **L4**
- Understand the various testing methodologies for OO software. **L5**

**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ACS53- DATA MINING**

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**Course Objectives:**

- Discuss classification algorithms learn how data is grouped using clustering techniques. To develop the abilities of critical analysis to data mining systems and applications.
- To implement practical and theoretical understanding of the technologies for data mining To understand the strengths and limitations of various data mining models.

**UNIT – I: Introduction to Data Mining** **8hrs**

Introduction, What is Data Mining, Definition, KDD, Challenges, Data Mining Tasks, Data Preprocessing, Data Cleaning, Missing data, Dimensionality Reduction, Feature Subset Selection, Discretization and Binaryzation, Data Transformation; Measures of Similarity and Dissimilarity-Basics.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand what Is Data Mining, what kinds of data can be mined, what kinds of patterns can be mined, and what kinds of applications are targeted. **L2**
- Explain major Issues in data mining. **L2**

**UNIT – II: Association Rules** **8hrs**

Problem Definition, Frequent Item Set Generation, The APRIORI Principle, Support and Confidence Measures, Association Rule Generation; APRIOIRI Algorithm, The Partition Algorithms, FP-Growth Algorithms, Compact Representation of Frequent Item Set- Maximal Frequent Item Set, Closed Frequent Item Set.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Apply Association rules in data mining applications. **L3**
- Ability to identify the association rules, classification and clusters in large data sets. **L3**

**UNIT – III: Classification** **8hrs**

Problem Definition, General Approaches to solving a classification problem , Evaluation of Classifiers , Classification techniques, Decision Trees-Decision tree Construction , Methods for Expressing attribute test conditions, Measures for Selecting the Best Split, Algorithm for Decision tree Induction ; Naive-Bayes Classifier, Bayesian Belief Networks; K- Nearest neighbor classification-Algorithm and Characteristics.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Ability to classify web pages, extracting knowledge from the web. **L4**
- Ability to classify the algorithms and Characteristics. **L4**

**UNIT – IV: Clustering** **7 Hrs**

Problem Definition, Clustering Overview, Evaluation of Clustering Algorithms, Partitioning Clustering-K-Means Algorithm,. Hierarchical Clustering-Agglomerative Methods and divisive methods, Density based Clustering.

**Learning Outcomes:**



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At the end of this unit, the student will be able to

- Ability to identify the problem definition. **L3**
- Ability to use the clustering algorithms. **L3**

**UNIT – V: Web and Text Mining**

Introduction, web mining, web content mining, web structure mining, we usage mining, Text mining –unstructured text, episode rule discovery for texts, hierarchy of categories, text clustering.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Ability to classify web pages, extracting knowledge from the web. **L5**
- Ability to solve real world problems in business and scientific information using data mining. **L5**

**Text Books:**

1. Data Mining- Concepts and Techniques- Jiawei Han, Micheline Kamber, Morgan Kaufmann Publishers,Elsevier, 2 Edition, 2006.
2. Introduction to Data Mining, Pang-Ning Tan, Vipin Kumar, Michael Steinbanch, Pearson Education.
3. Data mining Techniques and Applications.

**Reference Books:**

1. Data Mining Techniques, Arun K Pujari, 3rd Edition, Universities Press.
2. Data Mining Principles & Applications – T.V Sveresh Kumar, B.Esware Reddy, Jagadish S Kalimani, Elsevier.
3. Data Mining, Vikaram Pudi, P Radha Krishna, Oxford University Press.

**Course Outcomes:**

At the end of this Course the student will be able to

- Ability to identify the association rules, classification and clusters in large data sets. **L3**
- Ability to solve real world problems in business and scientific information using data mining. **L4**
- Ability to classify web pages, extracting knowledge from the web. **L5**

**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ACS54a-COMPUTER GRAPHICS**

**Professional Elective-1**

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**Course Objectives:**

- The main objective of this module is to introduce to the students the concepts of computer graphics. It starts with an overview of interactive computer graphics, two dimensional system and mapping, then it presents the most important drawing algorithm, two-dimensional transformation; Clipping, filling and an introduction to 3-D graphics.

**UNIT – I: 2D PRIMITIVES** **8hrs**

Elements of pictures created in computer graphics – Graphics input primitives and devices Drawing primitives in open GL and Basic open GL programming - open GL basic Graphics primitives – Output primitives – Line, Circle and Ellipse drawing algorithms – Attributes of output primitives.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the basics of computer graphics, different graphics systems and applications of computer graphics. **L2**
- Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis. **L2**

**UNIT – II: 2D GEOMETRIC TRANSFORMATIONS** **8hrs**

2D Viewing – Window-Viewport Transformation - Two dimensional Geometric transformations – Line, Polygon, Curve and Text clipping algorithms.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Use of geometric transformations on graphics objects and their application in composite form. **L3**
- Extract scene with different clipping methods and its transformation to graphics display device. **L3**

**UNIT – III: 3D CONCEPTS** **8hrs**

Requirements to Design –Design Patterns – Logical Architecture – Package diagram – Design patterns – Model, View, Control pattern – Detailed design – Object design with GRASP pattern– Detailed class diagram with Visibility

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explore projections and visible surface detection techniques for display of 3D scene on 2D screen. **L4**
- Render projected objects to naturalize the scene in 2D view and use of illumination models **L4**

**UNIT – IV: MULTIMEDIA BASICS** **7 Hrs**

Introduction and definitions – applications – elements – Animations – Compression – Types of Compressions: Lossless – Lossy – Video compression – Image Compression – Audio compression – Data and file format standards – Multimedia data structures: KD Trees –R trees.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the basics of Multimedia basics, different graphics systems and applications of computer graphics. **L3**
- Discuss various multimedia data structures. **L3**

**UNIT – V:. MULTIMEDIA AUTHORING AND APPLICATIONS**

Creating interactive multimedia – Multimedia Authoring Systems – Multimedia Authoring Software Applications – Video On demand – Virtual Reality – Augmented Reality – Content based retrieval in digital libraries.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the basics of Multimedia Authoring systems **L5**
- Understand the how videos are placed **L5**

**Text Books:**

1. F.S.Hill, —Computer Graphics using OPENGL‖, Second edition, Pearson Education, 2003.
2. Prabhat K Andleigh, Kiran Thakrar, —Multimedia systems design‖, First Edition, PHI, 2007

**Reference Books:**

1. F.S.Hill, —Computer Graphics using OPENGL‖, Second edition, Pearson Education, 2003.
2. Prabhat K Andleigh, Kiran Thakrar, —Multimedia systems design‖, First Edition, PHI, 2007.

**Course Outcomes:**

At the end of this Course the student will be able to

- Point-plotting techniques **L3**
- Two-dimensional transformation **L4**
- Clipping and drawing **L5**
- Polygon Filling **L5**
- Introduction to 3-dimensional graphics **L6**

**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ACS54b-SOFTWARE PROJECT MANAGEMENT**

**Professional Elective-1**

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**Course Objectives:**

- To outline the need for Software Project Management
- To highlight different techniques for software cost estimation and activity planning.

**UNIT – I: Project Evaluation and Project Planning** **8hrs**

Importance of Software Project Management – Activities Methodologies – Categorization of Software Projects – Setting objectives – Management Principles – Management Control – Project portfolio Management – Cost-benefit evaluation technology – Risk evaluation – Strategic program Management – Stepwise Project Planning.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Develop the model from the conventional software product to the modern. **L2**
- Analyze and design the software architecture. **L2**

**UNIT – II: Project Life Cycle and Effort Estimation** **8hrs**

Software process and Process Models – Choice of Process models - mental delivery – Rapid Application development – Agile methods – Extreme Programming – SCRUM – Managing interactive processes – Basics of Software estimation – Effort and Cost estimation techniques – COSMIC Full function points - COCOMO II A Parametric Productivity Model - Staffing Pattern.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Have an exposure for organizing and managing a software project. **L3**
- Apply, analyze, design and develop the software project. **L3**

**UNIT – III: Activity Planning and Risk Management** **8hrs**

Objectives of Activity planning – Project schedules – Activities – Sequencing and scheduling – Network Planning models – Forward Pass & Backward Pass techniques – Critical path (CRM) method – Risk identification – Assessment – Monitoring – PERT technique – Monte Carlo simulation – Resource Allocation – Creation of critical patterns – Cost schedules.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Design various estimation levels of cost and effort. **L4**
- Acquire the knowledge of managing, economics for conventional, modern and future software projects. **L4**

**UNIT – IV: Project Management and Control** **7hrs**

Framework for Management and control – Collection of data Project termination – Visualizing progress – Cost monitoring – Earned Value Analysis- Project tracking – Change control- Software Configuration Management – Managing contracts – Contract Management.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Categorize various peer instruction levels. **L3**

- Sketch various artifacts sets for better understanding of software development. **L3**

**UNIT – V: Staffing in Software Projects**

Managing people – Organizational behavior – Best methods of staff selection – Motivation – The Oldham-Hackman job characteristic model – Ethical and Programmed concerns – Working in teams – Decision making – Team structures – Virtual teams – Communications genres – Communication plans..

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Identify and describe the key phases of project management. **L5**
- Determine an appropriate project management approach through an evaluation of the business context and scope of the project. **L5**

**Text Books:**

1. Bob Hughes, Mike Cotterell and Rajib Mall: Software Project Management – Fifth Edition, Tata McGraw Hill, New Delhi, 2012.

**Reference Books:**

- Robert K. Wysocki "Effective Software Project Management" – Wiley Publication,2011.
- Walker Royce: "Software Project Management"- Addison-Wesley, 1998.
- Gopalaswamy Ramesh, "Managing Global Software Projects" – McGraw Hill Education (India), Fourteenth Reprint 2013.

**Course Outcomes:**

At the end of this Course the student will be able to

- At the end of the course the students will be able to practice Project Management principles while developing a software. **L3**
- Ability to solve real world problems in business and scientific information using data mining. **L4**
- Ability to classify web pages, extracting knowledge from the web. **L5**

**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ACS54C-WEB TECHNOLOGIES**

**Professional Elective-1**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

1. To introduce PHP language for server-side scripting
2. To introduce XML and processing of XML Data with Java
3. To introduce Server-side programming with Java Servlets and JSP
4. To introduce Client-side scripting with JavaScript and AJAX.

**UNIT – I: INTRODUCTION** **8hrs**

Introduction to PHP: Declaring variables, data types, arrays, strings, operators, expressions, control structures, functions, Reading data from web form controls like text boxes, radio buttons, lists etc., Handling File Uploads.

Connecting to database (MySQL as reference), executing simple queries, handling results, Handling sessions and cookies.

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

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the basics of computer graphics, different graphics systems and applications of computer graphics. **L2**
- Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis. **L2**

**UNIT – II: HTML Components** **8hrs**

HTML Common tags- List, Tables, images, forms, Frames; Cascading Style sheets;

XML: Introduction to XML, Defining XML tags, their attributes and values, Document Type Definition, XML Schemes, Document Object Model, XHTML Parsing XML Data – DOM and SAX Parsers in java.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Use of geometric transformations on graphics objects and their application in composite form. **L3**
- Extract scene with different clipping methods and its transformation to graphics display device. **L3**

**UNIT – III: SERVLETS** **8hrs**

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

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explore projections and visible surface detection techniques for display of 3D scene on 2D screen. **L4**

- Render projected objects to naturalize the scene in 2D view and use of illumination models . **L4**

**UNIT – IV: JSP** **7 Hrs**

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

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the basics of Multimedia basics, different graphics systems and applications of computer graphics. **L3**
- Discuss various multimedia datastructures. **L3**

**UNIT – V: JAVA SCRIPT**

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

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the basics of Multimedia Authoring systems. **L5**
- Understand the how videos are placed. **L5**

**Text Books:**

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

**Reference Books:**

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

**Course Outcomes:**

At the end of this Course the student will be able to

- Gain knowledge of client-side scripting, validation of forms and AJAX programming **L3**
- Understand server-side scripting with PHP language **L4**
- Understand what XML is and how to parse and use XML Data with Java **L5**
- To introduce Server-side programming with Java Servlets and JSP **L6**

**B.Tech III Year I semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19AHS10-CAMPUS RECRUITMENT TRAINING & SOFT SKILLS**

**(Open Elective-I)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- To prepare to face global competition for employment and excellence in profession.
- To help the students understand and build interpersonal and interpersonal skills that will enable them to lead meaningful professional life.

**UNIT – 1: SOFT SKILLS: INTRODUCTIUON**

Soft Skills: Definition-Meaning--Importance- Why skill gap -Analysis—Personality Developments. Soft Skills- Learning Methods.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Developing self-motivation, raised aspirations and belief in one's own abilities, defining and committing to achieving one's goals. **L1**
- Learning to keep going when things don't go according to plan, coping with the unfamiliar, managing disappointment and dealing with conflict **L2**

**UNIT – II: PERSONAL SKILLS**

**Intra-Personal:** Definition-Meaning-Importance-SWOT analysis- Goal Setting- Emotional Intelligence- Right thinking- Problem Solving-Time management.

**Inter-Personal:** Definition-Meaning-Importance-Communications skills- Team Work-Negotiation Skills-Leadership skills.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- A commitment to ethics and integrity in academic and professional relationships, within the community and the environment. **L1**
- Describe how good communication with other can influence our working relationships **L2**

**UNIT – III:VERBAL AND NON VERBAL SKILLS**

**Verbal Skills**: Definition and Meaning-Importance-Improving Tips for Listening, Speaking, Reading-Writing Skills.

**Non Verbal Skills**: Definition and Meaning-Importance- Dress Code- Facial Expressions- Eye Contact- Proxemics - Haptics-Posture-Kinetics- Para Language.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Compares verbal and nonverbal communication **L1**
- Understand the functions of nonverbal communication **L2**

**UNIT – IV: FINISHING SCHOOL**

**Before Interview**: Bridging between Campus and Corporate-Preparation of Resume-Cover Letter-Statement of Purpose-E-mail writing-Corporate Etiquettes.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Learner will be able to prepare his/ her own Resume and Cover letter. **L1**
- Learner will understand the importance of etiquettes and learn the nuances of expected behaviour within a group, a social class and society at general **L2**

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**UNIT – V: DURING INTERVIEW**

**Interview Skills**: Importance-Purpose- Types of interviews –Preparation for interviews - Top Questions- Body Language in Interview Room-Do's and Don't s of interview.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Learner will be able to face interview questions and effectively present his /her. skills **L1**
- Learner will manage how to plan and organize personal and professional life. **L2**

**Reference Books:**


1. Sherfield, M. Robert at al **CornerstoneDeveloping Soft Skills**, 4th ed. Pearson Publication,New Delhi, 2014.
2. Alka Wadkar, **Life Skills for Success,** Sage Publications India Private Limited; First edition (1 May 2016)
3. Sambaiah.M. **Technical English**, Wiley publishers India. New Delhi. 2014.
4. GANGADHAR JOSHI, **From Campus to Corporate**, SAGE TEXT.
5. Alex.K, **Soft Skills,** 3rd ed. S. Chand Publication, New Delhi, 2014.
6. Meenakshi Raman and Sangita Sharma, **Technical Communication: Principle and Practice**, Oxford University Press. 2009.
7. Shalini Varma, **Body Language for Your Success Mantra,** 4th ed, S. Chand Publication, New Delhi, 2014.
8. Stephen Covey, **Seven Habits of Highly Effective People**, JMD Book, 2013.


**Course Outcomes:**

At the end of this Course the student will be able to

- The students will be able to assimilate and understood the meaning and importance of soft skills and learn how to develop them. **L1**
- The students will understand the significance of soft skills in the working environment for professional excellence. **L2**
- The students will be prepared to undergo the placement process with confidence and clarity. **L3**
- The students will be ready to face any situation in life and equip themselves to handle them effectively. **L4**
- The students will understand and learn the importance of etiquettes in both professional and personal life **L5**

**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ABS20-MATHEMATICAL MODELING**

**(Open Elective -I)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- To provide the basic knowledge to understand a Mathematical model.
- To formulate a Mathematical model related to a real world problems of engineering, biological science etc.

**UNIT – 1: Mathematical Modeling & Mathematical modeling Through Ordinary differential equations of First Order :** **9 Hrs**

**Mathematical Modeling :** Need, Techniques, Classifications and Simple illustrations,

**Mathematical modeling Through Ordinary differential equations of First Order :**

Mathematical modeling Through differential equations; Linear growth and decay models; Non-Linear Growth and Decay models; Mathematical modeling in dynamics through ordinary differential equations of first order.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Learn various mathematical techniques in modeling a problem. **L2**
- Learn modeling in dynamics through ordinary differential equations of first order. **L3**

**UNIT – II: Mathematical modeling Through System of Ordinary differential equations of First Order:**

Mathematical modeling in population dynamics; Mathematical modeling of Epidemics through system of ordinary differential equations of first order; Compartment models through Systems of ordinary differential equations; Mathematical modeling in dynamics through systems of ordinary differential equations of first order.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Develop a modeling of Epidemics through system of ordinary differential equations of first order. **L4**
- Analyze a modeling in dynamics through systems of ordinary differential equations of first order. **L3**

**UNIT – III: Mathematical modeling Through Ordinary differential equations of Second Order:**

Mathematical modeling of Planetary motion; Mathematical modeling of Circular motion and motion of satellites; Mathematical modeling through linear differential equations of second order.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Evaluate a mathematical modeling of planetary motion. **L5**
- Analyze a mathematical modeling of Circular motion and motion of satellites **L3**

**UNIT – IV: Mathematical modeling Through Difference equations :**

Need for Mathematical modeling Through Difference equations and simple models; Basic theory of Linear difference equations with constant coefficients; Mathematical modeling Through Difference equations in population dynamics and genetics; Mathematical modeling Through Difference equations in Probability theory.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Analyze mathematical modeling through difference equations in population dynamics and genetics. **L4**
- Analyze mathematical modeling through difference equations in probability theory. **L4**

**UNIT – V: Mathematical modeling Through Functional, Integral, Delay- Differential and Differential-Difference Equations :**

Mathematical modeling Through Functional equations; Mathematical modeling Through Integral equations; Mathematical modeling Through Delay- Differential and Differential-Difference Equations.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Analyze a mathematical modeling through functional equations and integral equations. **L4**
- Analyze a mathematical modeling Through Delay- Differential and Differential-Difference Equations **L4**

**Text Books:**

1. J. N. Kapoor. Mathematical Modeling , New Age International Publishers.

**Reference Books:**

1. A. C. Fowler. Mathematical Models in Applied Sciences, Cambridge University Press.

**Course Outcomes:**

At the end of this Course the student will be able to

- Understand the basic concepts in mathematical modeling. **L1**
- Have better insight of the real word problems through mathematical modeling. **L2**
- Apply various concepts of mathematics in modeling. **L3**
- Analyze the real word problems through the techniques of modeling. **L4**
- Evaluate the real word problems through mathematical modeling. **L5**

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**B.Tech III year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ABS21-FUZZY SET THEORY, ARITHMETIC AND LOGIC**

**(Open Elective -I)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:** This course aims at providing

- the basic knowledge to understand Fuzzy set theory and Arithmetic. and
- Logic, related to a real word problems of engineering, Science etc.

**UNIT – 1: Classical (Crisp) Sets To Fuzzy Sets & Fuzzy Sets Versus Crisp Sets** **9 Hrs**

**Classical (Crisp) Sets To Fuzzy Sets:**

Introduction: Crisp Sets: An Overview, Fuzzy Sets: Basic Types, Fuzzy Sets: Basic Concepts, Characteristics and Significance of the Paradigm Shift.

**Fuzzy Sets Versus Crisp Sets:**

Alpha -Cuts :Additional Properties of alpha -Cuts, Representations of Fuzzy Sets, Extension Principle for Fuzzy Sets

**Learning Outcomes:**

At the end of this unit, the student will be able to

- The basic concepts of Sets and Fuzzy sets **L2**
- Analyze the Fuzzy Sets Versus Crisp Sets **L3**

**UNIT – II: Operations On Fuzzy Sets:**

Types of Operations, Fuzzy Complements, Fuzzy Intersections: t-Norms Fuzzy Unions: t- Conorms, Combinations of Operations, Aggregation Operations.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Do some operations on Fuzzy sets **L2**
- Assess t-Norms Fuzzy Unions **L3**

**UNIT – III: Fuzzy Arithmetic & Fuzzy Relations:**

**Fuzzy Arithmetic :**

Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals, Arithmetic Operations on Fuzzy Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations.

**Fuzzy Relations:**

Crisp versus Fuzzy Relations, Projections and Cylindric Extensions, Binary Fuzzy Relations, Binary Relations on a Single Set, Fuzzy Equivalence Relations, Fuzzy Compatibility Relations, Fuzzy Ordering Relations.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Perform arithmetic operations on Fuzzy numbers and equations. **L2**
- Analyze Fuzzy Relations, Projections and Cylindric Extensions etc. **L3**

**UNIT – IV: Fuzzy Relation Equations & Possibility Theory**

**Fuzzy Relation Equations:**

General Discussion ,Problem Partitioning , Solution Method , Fuzzy Relation Equations Based on Sup-i Compositions , Fuzzy Relation Equations Based on Inf- $\omega_i$ Compositions

**Possibility Theory:**

Fuzzy Measures, Evidence Theory, Possibility Theory, Fuzzy Sets and Possibility Theory, Possibility Theory versus Probability Theory.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Solve Fuzzy relation equations. **L3**
- Analyze Possibility Theory **L4**

**UNIT – V: Fuzzy logic**

Classical Logic: An Overview, Multivalued Logics, Fuzzy Propositions, Fuzzy Quantifiers, Linguistic Hedges, Inference from Conditional Fuzzy Propositions, Inference from Conditional and Qualified Propositions, Inference from Quantified Propositions.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the Fuzzy logic. **L1**
- Analyze the Inferences from Conditional, Qualified, and Quantified Propositions. **L4**

**Text Books:**

1. Fuzzy Sets and Fuzzy Logic, Geoge J. Klir and Bo Yuan

**Reference Books:**

1. Fuzzy Mathematical Models in Engineering and Management Science, A. Kaufmann and M.M. Gupta
2. Fuzzy Logic, Timothy J. Ross
3. Fuzzy Set Theory, H.J. Zimmermann
4. Introduction to Fuzzy Logic and Fuzzy Sets, J.J. Buckley and E. Eslami

**Course Outcomes:**

At the end of this Course the student will be able to

- Understand the basic concepts of Fuzzy sets and logic. **L1**
- Do some operations of Fuzzy sets. **L2**
- Solve Fuzzy relation equations. **L3**
- Analyze the Inferences from Conditional, Qualified, and Quantified Propositions. **L4**
- Analyze the real word problem through the technique of Fuzzy set theory and logic to have better insight of the real word problems. **L5**

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**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ABS22-NUMBER THEORY**

**(Open Elective -I)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:** This course aims at providing the basic knowledge

- To understand basic concepts of Number theory and
- To analyze the applications of Riemann Zeta Function and Dirichlet L Function of Number theory related to real word problems of engineering, biological science etc.

**UNIT – 1: Divisibility and Primes & Congruences** **9 Hrs**

**Divisibility and Primes:**

Division algorithm, Euclid's algorithm for the greatest common divisor- Linear Diophantine equations - Prime numbers, fundamental theorem of arithmetic, infinitude of primes- Distribution of primes, twin primes, Goldbach conjecture - Fermat and Mersenne primes - Primality testing and factorization.

**Congruences:**

Modular arithmetic- Linear congruences- Simultaneous linear congruences, Chinese Remainder Theorem- An extension of Chinese Remainder Theorem (with non-coprime moduli).

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Learn Division algorithm, Euclid's algorithm etc. **L2**
- Analyze linear congruences- Simultaneous linear congruences, and Chinese Remainder Theorem. **L3**

**UNIT – II: Congruences with a Prime-Power Modulus, Euler's Function and RSA Cryptosystem, and Units Modulo an Integer**

**Congruences with a Prime-Power Modulus:**

Arithmetic modulo p, Fermat's little theorem, Wilson's theorem - Pseudo-primes and Carmichael numbers- Solving congruences modulo prime powers.

**Euler's Function and RSA Cryptosystem:**

Definition of Euler function, examples and properties - Multiplicative property of Euler's function - RSA cryptography.

**Units Modulo an Integer:**

The group of units modulo an integer, primitive roots- Existence of primitive roots.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Analyze the Congruences with a Prime-Power Modulus **L3**
- Analyze the Euler's Function, RSA Cryptosystem and Units Modulo an Integer **L4**

**UNIT – III: Quadratic Residues and Quadratic Forms**

Quadratic residues, Legendre symbol, Euler's criterion- Gauss lemma, law of quadratic reciprocity- Quadratic residues for prime-power moduli and arbitrary moduli- Binary quadratic forms, equivalent forms- Discriminant, principal forms, positive definite forms, indefinite forms- Representation of a number by a form, examples- Reduction of positive definite forms, reduced forms- Number of proper representations, automorph, class number.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Analyze the Quadratic residues **L3**
- Analyze the Quadratic Forms **L4**

**UNIT – IV: Sum of Powers, Continued Fractions and Pell's Equation**

**Sum of Powers:**

Sum of two squares, sum of three squares, Waring's problem- Sum of four squares-Fermat's Last Theorem.

**Continued Fractions and Pell's Equation:**

Finite continued fractions, recurrence relation, Euler's rule- Convergents, infinite continued fractions, representation of irrational numbers- Periodic continued fractions and quadratic irrationals- Solution of Pell's equation by continued fractions.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Compute sum of powers and learn Fermat's last theorem. **L3**
- Solve Pell's equation by continued fractions **L4**

**UNIT – V: Arithmetic Functions, The Riemann Zeta Function and Dirichlet L Function**

**Arithmetic Functions:**

Definition and examples, multiplicative functions and their properties- Perfect numbers, Mobius function and its properties- Mobius inversion formula- Convolution of arithmetic functions.

**The Riemann Zeta Function and Dirichlet L Function:**

Historical background for the Riemann Zeta function, Euler product formula, convergence. - Applications to prime numbers- Dirichlet L-functions, Products of two Dirichlet L functions, Euler product formula.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Analyze the arithmetic functions **L3**
- Analyze the Riemann Zeta function and its Applications to prime numbers **L4**

**Text Books:**

1. G. A. Jones & J.M. Jones, Elementary Number Theory, Springer UTM, 2007.
2. Niven, H. S. Zuckerman & H.L. Montgomery, Introduction to the Theory of Numbers, Wiley, 2000.
3. D. Burton; Elementary Number Theory, McGraw-Hill, 2005

**Reference Books:**

1. Tom M. Apostol, Introduction to Analytical Number theory, Narosa Publishing house, 1998.
2. Elementary number theory and its applications, BEL laboratories.

**Course Outcomes:**

At the end of this Course the student will be able to

- Understand the basic concepts such as Learn Division algorithm, Euclid's algorithm etc. **L1**
- Analyze the Congruences with a Prime-Power Modulus and RSA Cryptosystem. **L2**
- Analyze the Quadratic residues and Quadratic forms. **L3**
- Solve Pell's equation by continued fractions **L4**
- Analyze the real word problem through the technique of Number theory. **L5**

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**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ABS31-SENSORS AND ACTUATORS FOR ENGINEERING APPLICATIONS**

**(Open Elective-I)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- To provide exposure to various kinds of sensors, actuators and their Engineering applications.
- Capable of understanding the principles and physics of various kinds of sensors from macro to micro/nano level.

**UNIT – 1: Introduction to sensors** **9 Hrs**

**Content of the Unit – I**

Sensors, Sensor systems, Nanosensors, -Types of sensors(based on Functions, temperature, pressure, strain, ranging and motion, time- active and passive sensors). Materials used and their fabrication process (Deposition, Pattern and Etching), General characteristics of sensors. Actuators, Functional diagram of actuators, Design of Actuators, Types of actuators (Hydraulic, Pneumatic, Mechanical, Electromagnetic, EAP and EM actuators). Applications of Actuators.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Classify different types of Sensors, Actuators and their characteristics
- Identifies the applications of Actuators in different fields
- Explain about different fabrication process of Sensors
- Illustrate functional diagram of Actuators

**UNIT – II: Mechanical sensors** **9 Hrs**

**Content of the Unit – II**

Principles of mechanical sensors (piezoresistivity, piezoelectricity, capacitive, inductive and resonant techniques), Displacement sensors, velocity sensors, Torque sensors, flow sensors, Micro and nanosensors, Multimodal nanosensors.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Summarize various types of Mechanical sensors
- Explain the working principle of different types mechanical sensors
- Identifies the applications of Mechanical sensors in different environmental conditions
- Understand the basic concepts of micro and nano sensors

**UNIT – III: Thermal sensors and Magnetic sensors** **9 Hrs**

**Content of the Unit – III**

Introduction – Principles of Thermal sensors, Thermocouples, Types of thermocouples, Bi-metallic thermometer, Resistance Temperature Detectors (RTD), Advantages and Applications of these temperature sensors.

Introduction, Difference between conventional and magnetic sensors, Types of magnetic sensors (Low field, Earth field and BIAS magnetic field sensors), Working of variable reluctance sensors, Inductive sensors (LVDT), Eddy current sensors, Hall effect sensors, Applications of magnetic sensors.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Analyse the difference between conventional sensors and magnetic sensors
- Explain the working principle of different magnetic sensors
- Identifies the applications of Thermal and Magnetic sensors
- Summarize various types of thermal and magnetic sensors

**UNIT – IV: Electronic and Optical Sensors-I** **9 Hrs**

**Content of the Unit – IV**

Introduction, Block diagram of electronic sensor system, Microelectronic sensors, semiconductor strain gauge, Gas sensors – Basic principle and working, Applications of electronic sensors – Electronic nose. Optical system components, Solid state optical systems, Optical radiation sources.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the working and principle of various electronic and optical sensors
- Explain the block diagram of electronic sensor system
- Identifies the applications Electronic sensors in various fields
- Identify the various optical, solid state system components

**UNIT – V: Electronic and Optical Sensors –II** **9 Hrs**

**Content of the Unit – V**

Optical system components, Solid state optical systems, Optical transmitter and filters type (Geometrical optics, Fiber optics, optical Filters), Solid state photoelectric sensors, Photoconductive cells, Photo junction sensors, photon couplers, Example: MEMS transducers, Sensors calibration and compensation.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the optical system components and solid state optical systems
- Classify different types of Optical filters
- Explain the solid state photoelectric sensors, photo junction sensors and photoconductive cells
- Understand basics of MEMS transducers, sensors calibration and compensation

**Text Books:**

1. Sensors and Signal Conditioning Wiley-Blackwell, 2008 Jacob Fraden,
2. Piezoelectric Sensors and Actuators: Fundamentals and Applications, Springer,2018Senturia S. D.

**Reference Books:**

1. Doebelin, "Measurement Systems: Application and Design", McGraw Hill Kogakusha Ltd.
2. Julian W. Gardner, Vijay K. Varadan, Osama O. Awadelkarim "Microsensors, MEMS and Smart Devices", New York: Wiley, 2001.
3. Henry Bolte, "Sensors – A Comprehensive Sensors", John Wiley.
4. Handbook of modern sensors, Springer, Stefan Johann Rupitsch.
5. Microsystem Design, Kluwer Academic Publisher, 2001 J.D. Plummer, M.D. Deal, P.G. Griffin

**Course Outcomes:**

At the end of this Course the student will be able to

- recognize the need of sensors
- types of sensors which they will able to utilize for the concerned engineering application

**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ABS32-PHYSICS OF ELECTRONIC MATERIALS**

**(Open Elective-I)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- Be able to explain the fundamentals of materials.
- Be able to explain the kinds of semiconductor materials, their physical properties, and their applications.
- Be able to explain the kinds of magnetic materials, their physical properties, advances and their applications.
- Be able to explain the kinds of dielectric materials, their physical properties, advances and their applications.

**UNIT – 1: Fundamentals of Materials** **9 Hrs**

**Content of the Unit – I**

Introduction, Phase rule, Phase Diagram, Elementary idea of Nucleation and Growth, Methods of crystal growth. Elementary idea of point, line and planar defects. Concept of thin films, preparation of thin films, Deposition of thin film using sputtering methods (RT and glow discharge).

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the basic concepts of Phase and Phase diagram
- Understand the straight forward information of Nucleation and Growth
- Explain the preparation and deposition of Thin film using various methods
- Illustrate the methods of Crystal growth
- Summarize the different defects in crystal growth

**UNIT – II: Semiconductors** **9 Hrs**

**Content of the Unit – II**

Introduction, charge carriers in semiconductors, effective mass, Diffusion and drift, diffusion length, diffusion and recombination. The Fermi level & Fermi dirac distribution, Temperature dependence of carrier concentration, Invariance of the Fermi level at equilibrium. Band structure, PN junctions and their typical characteristics under equilibrium and under bias, Transistors, MOSFETs.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the basics concepts regarding drift, diffusion, diffusion length and recombination.
- Classifies the energy bands of a Semiconductors
- Analyse how the position of the fermi level changes with carrier concentration and temperature.
- Explain the concepts regarding PN junctions, Transistors and MOSFETs.

**UNIT – III: Optoelectronics** **9 Hrs**

**Content of the Unit – III**

Introduction, Optoelectronic concepts, Hetrostructure p-n junction, Schottky junction and Ohmic contacts, Light emission and absorption, amplification and modulation in semiconductors, Semiconductor Light sources [Light emitting diodes (LEDs) , LASER, vertical cavity surface emitting laser (VCSEL), Quantum well laser {device structure – characteristics – Materials and applications}] and semiconductor Photo detectors [General Characteristics, Responsivity and Impulse response, photoconductors, semiconductor photodiodes].

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the basic concepts of PN junction and Schottky junction

- Explain about absorption, emission, amplification and modulation
- Illustrate various semiconductor light sources and their structure
- Identifies the characteristics and applications of optoelectronic devices
- Elucidate semiconductor photodetectors

**UNIT – IV: Dielectric Materials and their applications** **9 Hrs**

**Content of the Unit – IV**

Introduction, Dielectric properties, Electronic polarisability and susceptibility, dielectric constant and frequency dependence of polarization, Dielectric strength and dielectric loss, Piezoelectric properties.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the concepts of dielectric constant, polarisability, susceptibility
- Describe how the polarisation of the dielectric constant depends on the frequecy
- Explain about dielectric strength and dielectric loss
- Comprehend dielectric and piezoelectric properties

**UNIT – V: Magnetic Materials and their applications** **9 Hrs**

**Content of the Unit – V**

Introduction, Magnetism & various contributions to para and dia magnetism, Fero and Ferri magnetism and ferrites, concepts of Spin waves and Magnons, antiferromagnetism, domains and domain walls, coercive force, hysteresis, Nanomagnetism, Superparamagnetism – Properties and applications.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Differentiate different types of magnetic materials depending upon their properties
- Understand the concepts of Spin waves and Magnons
- Interpret the concepts of domains and domain walls
- Explain about the properties of Nanomagnetism, Super paramagnetism
- Identify the applications of magnetic materials

**Text Books:**

1. S.O. Kasap Principles of Electronic Materials and Devices, 3rd edition, McGraw-Hill Education (India) Pvt. Ltd., 2007.
2. Electrical Engineering Materials",by A.J. Dekker, PHI Pub.
3. "Electronic Components and Materials" Grover and Jamwal, DhanpatRai and Co.

**Reference Books:**

1. B.G. Streetman and S. Banerjee, Solid State Electronic Devices, 6th edition, PHI Learning,
2. Eugene A. Irene, Electronic Materials Science, Wiley, 2005
3. Wei Gao, Zhengwei Li, Nigel Sammes, An Introduction to Electronic Materials for Engineers, 2nd Edition, World Scientific Publishing Co. Pvt. Ltd., 2011
4. W D Callister, Materials Science and Engineering – An Introduction, Jr., John Willey and Sons, Inc, New York, 7th edition, 2007.
5. "A First Course In Material Science" by Raghvan, McGraw Hill Pub.
6. "Solid State Physics" by S.O.Pillai,New Age Publication.
7. 'The Science and Engineering of materials' by Donald R.Askeland,Chapman& Hall Pub.

**Course Outcomes:**

At the end of this Course the student will be able to

- Recognize the need of semiconductors
- Dielectric and magnetic materials which they will able to utilize for the concerned engineering application

**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ABS41-CHEMISTRY OF ENERGY MATERIALS**

**(Open Elective-I)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- To make the student understand basic electrochemical principles such as standard electrode potentials, EMF and applications of electrochemical principles in the design of batteries.
- To understand the basic concepts of processing and limitations of fossil fuels and Fuel cells & their applications.
- To impart knowledge to the students about fundamental concepts of hydrogen storage in different materials and liquefaction method
- Necessasity of harnessing alternate energy resources such as solar energy and its basic concepts.
- To understand and apply the basics of calculations related to material and energy flow in the processes.

**UNIT – 1: Electrochemical Systems** **9 Hrs**

Galvanic cell, standard electrode potential, application of EMF, Electrode mechanism, polarization, Batteries-Lead-acid and Lithium ion batteries.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Solve the problems based on electrode potential L3
- Describe the Galvanic Cell L2
- Differentiate between Lead acid and Lithium ion batteries L2
- Illustrate the electrical double layer L2

**UNIT – II: : Fuel Cells**

Basic design of fuel cell, Fuel cell working principle, Fuel cell efficiency Classification of fuel cells, Polymer electrolyte membrane (PEM) fuel cells, Solid-oxide fuel cells (SOFC), and their applications

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Describe the working Principle of Fuel cell L2
- Explain the efficiency of the fuel cell L2
- Discuss about the Basic design of fuel cells L3
- Classify the fuel cell L2

**UNIT – III: Hydrogen Storage**

Hydrogen Storage, Chemical and Physical methods of hydrogen storage, Hydrogen Storage in metal hydrides, metal organic frame works (MOF), Carbon structures (Carbon nano tubes, fullerenes), metal oxide porous structures, hydrogen storage by high pressure methods. Liquefaction method

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Differentiate Chemical and Physical methods of hydrogen storage L2
- Discuss the metal organic frame work L3
- Illustrate the carbon and metal oxide porous structures L2
- Describe the liquification methods L2

**UNIT – IV: Solar Energy**

Solar energy introduction and prospects, photovoltaic (PV) technology, concentrated solar power (CSP), Solar Fuels – Hydrogen: Ammonia& Hydrazine, Solar cells (Si-Te& Cd-Te), advantages and disadvantages.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Apply the photo voltaic technology L3
- Demonstrate about solar energy and prospects L2
- Illustrate the Solar cells L2
- Discuss about concentrated solar power L3

**UNIT – V: Photo and Photoelectrochemical Conversions**

Photochemical cells and applications of photochemical reactions, specificity of photo electrochemical cell, advantage of photoelectron catalytic conversions.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Differentiate between Photo and Photo electrochemical Conversions L2
- Illustrate the photochemical cells L2
- Identify the applications of photochemical reactions L3
- Interpret advantages of photoelectron catalytic conversion L2

**Text Books:**

1. Bahl and Bahl and Tuli, Essentials of Physical Chemistry, S. Chand Publications, New Delhi, 28th Edition, 2020.
2. US Department of Energy (EG&G technical services and corporation), Fuel Cell Hand Book 7th Edition, 2004.

**Reference Books:**

1. Ira N. Levine, Physical chemistry 6th Edition, McGraw Hills Education, New Delhi, 2009.
2. Silver and Atkins, Inorganic Chemistry, , 7th Edition, Oxford University Press, 2018.
3. Michael Hirscher, Hand book of Hydrogen Storage: New materials for future energy, storage, Wiley-VCH Verlag GmbH & Co. KGaA, 2010
4. Klaus Jagar et.al., Solar energy fundamental, technology and systems, UIT-Cambridge publishers, 2016

**Course Outcomes:**

At the end of this Course the student will be able to

- Understand to perform simultaneous material and energy balances **L1**
- Lists about various electrochemical and energy systems **L1**
- Classify solid, liquid and gaseous fuels **L3**
- Analyze the energy demand of world, nation and available resources to fulfill the demand **L3**
- Evaluate the conventional energy resources and their effective utilization **L3**
- To be able to understand and perform the various characterization techniques of fuels **L1**
- Explain knowledge of modern energy conversion technologies **L2**
- To be able to identify available nonconventional (renewable) energy resources and techniques to utilize them effectively **L1**

**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ABS42-ADVANCED POLYMERS AND THEIR APPLICATIONS**

**(Open Elective-I)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- To understand the basic principles of polymers
- To synthesize the different polymeric materials and their characterization by various instrumental methods.
- To impart knowledge to the students about fundamental concepts of Hydro gels of polymer networks, surface phenomenon by micelles
- To enumerate the applications of polymers in engineering

**UNIT – 1: Polymers-Basics and Characterization** **9 Hrs**

Basic concepts: monomers, repeat units, degree of polymerization, linear, branched and network polymers, classification of polymers, Polymerization mechanisms: condensation, addition, radical chain, ionic and coordination copolymerization, Zeigler-Natta and Ring opening metathesis polymerization. Average molecular weight concepts: number, weight and viscosity average molecular weights, polydispersity and molecular weight distribution. Measurement of molecular weight: end group, viscosity, light scattering, osmotic and ultracentrifugation methods, analysis and testing of polymers, Characterization of polymers by XRD, DSC.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Classify the polymers **L3**
- Explain polymerization mechanism **L2**
- Differentiate addition, condensation polymerizations **L2**
- Describe measurement of molecular weight of polymer **L2**

**UNIT – II: : Synthetic Polymers**

Polymerization processes – Bulk, Solution, Suspension and Emulsion polymerization. Preparation and significance, classification of polymers based on physical properties, Thermoplastics, Thermosetting plastics, Fibers and elastomers, General Applications.

Preparation of Polymers based on different types of monomers, Olefin polymers, Diene polymers, nylons, Urea - formaldehyde, phenol - formaldehyde and melamine Epoxy and Ion exchange resins

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Differentiate Bulk, solution, Suspension and emulsion polymerization **L2**
- Describe fibers and elastomers **L2**
- Identify the thermosetting and thermo polymers **L3**

**UNIT – III: Natural Polymers & Modified cellulosics**

Natural Polymers: Chemical & Physical structure, properties, source, important chemical modifications, applications of polymers such as cellulose, lignin, starch, rosin, shellac, latexes, vegetable oils and gums, proteins. Modified cellulosics: Cellulose esters and ethers such as Ethyl cellulose, CMC, HPMC, cellulose acetals, Liquid crystalline polymers; specialty plastics- PES, PAES, PEEK, PEA

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Describe the properties and applications of polymers **L2**

- Interpret the properties of cellulose, lignin, starch, rosin, latex etc., **L2**
- Discuss the special plastics of PES, PAES, PEEK etc., **L3**
- Explain modified cellulosics **L2**

**UNIT – IV: Hydrogels of Polymer networks and Drug delivery**

Definitions of Hydrogel, polymer networks, Types of polymer networks, Methods involved in hydrogel preparation, Classification, Properties of hydrogels, **Applications** of hydrogels in drug delivery. Introduction to drug systems including, drug development, regulation, absorption and disposition, routes of administration and dosage forms. Advanced drug delivery systems and controlled release.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Identify types of polymer networks **L3**
- Describe methods involve in hydrogel preparation **L2**
- Explain applications of hydrogels in drug delivery **L2**
- Demonstrate the advanced drug delivery systems and controlled release **L2**

**UNIT – V: Surface phenomena**

Surface tension, adsorption on solids, electrical phenomena at interfaces including electro-kinetics, micelles, reverse micelles, solubilization. XPS principle-application of photoelectron spectroscopy, ESCA and Auger spectroscopy to the study of surfaces.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Demonstrate electrical phenomena at interfaces including electrokinetics, miselles, reverse micelles etc., **L3**
- Explain photoelectron spectroscopy **L2**
- Discuss ESCA and Auger spectroscopy to the study of surfaces **L3**
- Differentiate micelles and reverse micelles **L2**

**Text Books:**

1. Fred W.Billmayer, A Text book of Polymer science, 3rd Edition, Wiley India, 2007.
2. K.J.Saunders, Organic polymer Chemistry, Chapman and Hall, 1973.

**Reference Books:**

1. B.Miller, Advanced Organic Chemistry, Prentice Hall, 2nd Edn, 2003.
2. Ambikanandan Misra, Aliasgar Shahiwala, Applications of polymers in Drug delivery system, Elsevier Pub., 2020.
3. Gowarikar, Polymer Chemistry –New Age International Publications, 2019.
4. Physical Chemistry , Samel Galsstone, Lan Caster Press, 1970.

**Course Outcomes:**

At the end of this Course the student will be able to

- Understand the state of art synthesis of Polymeric materials **L1**
- Understand the hydro gels preparation, properties and applications in drug delivery system. **L2**
- Characterize polymers materials using XPS. **L2**
- Analyze surface phenomenon of micelles and characterize using photoelectron spectroscopy, ESCA and Auger spectroscopy. **L3**

**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ABS43-Marine Chemistry**

**(Open Elective-I)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- To classify the different dissolved gases in sea water.
- To predict the role of biological processes in affecting oceanic carbonate system.
- To describe chemical and pharmacological properties of bioactive substances in marine organisms.
- To determine micro-nutrient elements (N, P, Si) in seawater.
- To identify dissolved elements in the estuary.

**UNIT – 1: Dissolved gases in seawater** **9 Hrs**

Dissolution of gases in seawater and their solubility; classification of dissolved gases and factors affecting their concentration in seawater; distribution of dissolved oxygen in seawater and affecting factors, Apparent Oxygen Utilization (AOU) and oxygen minimum zone formation in the ocean, origin and consequences of ocean hypoxia, Methane hydrate, clathrates

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the factors affecting on the dissolution of gases **L1**
- Understand apparent oxygen utilization and ozygen minimum zone formation in ocean. **L1**
- Compare the distribution of dissolved gaseous in sea water **L4**
- Analyze origin and consequences of ocean hypoxia, methane hydrate and clathrates **L3**

**UNIT – II: : Carbonate systems in the ocean**

Acid base equilibria in seawater, carbon dioxide system – absorption of carbon dioxide, carbon cycle; parameters of carbonate systems and their distribution in the ocean; role of biological processes in affecting oceanic carbonate system; precipitation and dissolution of calcium carbonate in seawater, lysocline and carbonate compensation depth; Ocean acidification

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the basic principle of acid-base equibria in sea water **L1**
- Explain the concept of carbon cycle **L1**
- Lists the various biological process in affecting oceanic carbonate, pptn and dissolution **L1**
- Analyze the parameters of carbonate system in oceanic water **L3**

**UNIT – III: Chemistry of marine natural products**

Biomedical aspects; chemical and pharmacological properties of bioactive substances in marine organisms, carbohydrates and their derivatives in red and brown algae, aliphatic acids and their derivatives in marine organisms, steroids and their use as biomarkers, nitrogenous compounds in invertebrates, nucleosides from sponges, biopolymer

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the chemical and pharmacological properties of bioactive substances in marine organism **L1**
- Explain the steroids and their use as biomarkers **L2**
- List the chemical properties in nitrogenous compounds in invertebrates **L1**

**UNIT – IV: Micronutrients in seawater**

Micro-nutrient elements (N, P, Si) in seawater, their forms, distribution and seasonal variation in the ocean. Stoichiometry of uptake and regeneration of nutrients elements and Apparent Oxygen Utilization (AOU)

**Learning Outcomes:**

At the end of this unit, the student will be able to

- List the micro-nutrients in sea water **L1**
- Understand the stoichiometry of uptake and regeneration of nutrients **L1**
- Differentiate the distribution of micronutrients with seasonal variation in the ocean **L2**

**UNIT – V: Estuarine chemistry**

Behavior of dissolved and particulate material during estuarine mixing, interaction among them and speciation of dissolved elements in the estuary; physico-chemical characteristics of estuarine sediment, anoxic sediments and pore water; heavy metals in estuaries and the processes affecting their distribution

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the behavior of dissolved and particulate matter in estuarine system **L1**
- Analyze the physicochemical characteristics of estuarine system **L3**
- Differentiate the effect of heavy metals in estuaries and affecting in distribution **L2**

**Text Books:**

1. Riley, J.P. and Chester, R., Introduction to Marine Chemistry, Academic Press, 1971.
2. Chester, R., Marine Geochemistry, Blackwell Science, 1990, 2000

**Reference Books:**

1. Riley, J.P., Skirrow, G, Chemical Oceanography (Vol.1,2, 3 ), Academic Press, 1975.
2. Horne, R.A, Marine Chemistry - The Structure of Water and the Chemistry of the Hydrosphere, 1969 Wiley- Interscience.
3. Seawater: Its composition, properties & behaviour, 2nd Edn, The Open University Team, 1989
4. Martin, D.F., Marcel Dekker, Marine Chemistry (Vol.2), 2nd Edition, Academic Press, NY, 1970.
5. Broecker and Peng, Tracers in the Sea, Lamont-Doherty Geological Observatory, 1982, NY.
6. Chemical Oceanography, 1992 – Millero, F. J. and Sohn, M.L., CRC Press
7. Burton et al., Dynamic processes in the chemistry of the upper ocean, Plenum Press, 1986.
8. Heinrich D Holland, The Chemistry of the Atmosphere and Oceans, John Wiley & sons Inc, 1978.

**Course Outcomes:**

At the end of this Course the student will be able to

- List the various dissolved gases in sea water and factors affecting their. **L1**
- Demonstrate knowledge of concepts and principles of ocean acidification. Analyse and evaluate biomedical aspects of marine natural products. **L2**
- Integrate and apply the knowledge of stoichiometry of uptake and regeneration of nutrients elements. **L3**
- Reflect on the influence heavy metals in estuaries. **L4**
- Evaluate total findings in marine chemistry to solve engineering problems **L3**

**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ACE55a-AIR POLLUTION AND CONTROL**

**(Open Elective-I)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:** The objectives of the course are to make the students learn about

- To teach the basics of air pollution
- To impart the behavior of air due to metrological influence
- To throw light on air quality management
- To teach the design of air pollution control methods

**UNIT – I:**

**INTRODUCTION :** Air Pollution – Definitions, Scope, Significance and Episodes, Air Pollutants – Classifications – Natural and Artificial – Primary and Secondary, point and Non- Point, Line and Areal Sources of air pollution- stationary and mobile sources.

**EFFECTS OF AIR POLLUTION :** Effects of Air pollutants on man, material and vegetation: Global effects of air pollution – Green House effect, Heat Islands, Acid Rains, Ozone Holesetc.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Learn the basics of air pollutants.
- Estimate the impact of air pollution

**UNIT – II:**

**THERMODYNAMIC OF AIR POLLUTION:** Thermodynamics and Kinetics of Air-pollution – Applications in the removal of gases like Sox, Nox, CO, HC etc., air-fuel ratio. Computation and Control of products of combustion.

**PLUME BEHAVIOUR :** Meteorology and plume Dispersion; properties of atmosphere; Heat, Pressure, Wind forces, Moisture and relative Humidity, Influence of Meteorological phenomena on Air Quality-wind rosediagrams.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Study properties of atmosphere
- Learn plume behavior in different environmental conditions
- Analyse and compute the parameters of air pollutants
- Evaluate procedures for control of pollution

**UNIT – III:**

**POLLUTANT DISPERSION MODELS :** Lapse Rates, Pressure Systems, Winds and moisture plume behaviour and plume Rise Models; Gaussian Model for Plume Dispersion.

**CONTROL OF PARTICULATES :** Control of particulates – Control at Sources, Process Changes, Equipment modifications, Design and operation of control, Equipment"s – Settling Chambers, Centrifugal separators, filters Dry and Wet scrubbers, Electrostatic precipitators.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Learn the design principles of particulate control.
- Learn and design pollutant dispersion models

**UNIT – IV:**

**CONTROL OF GASEOUS POLLUTANTS :**General Methods of Control of Nox and Sox emissions – In-plant Control Measures, process changes, dry and wet methods of removal and recycling.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Learn the design principles of gaseous control.
- Develop environmental friendly fuels and study their properties.

**UNIT – V:**

**AIR QUALITY MANAGEMENT :** Air Quality Management – Monitoring of SPM, SO; NO and CO Emission Standards.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Study the air quality management.
- Visualize emissions and their permissible standards

**Text Books:**

1. Air Quality by Thodgodish, Levis Publishers, Special India Edition, NewDelhi
2. Air pollution By M.N.Rao and H.V.N.Rao – Tata Mc.Graw HillCompany.
3. Air pollution by Wark and Warner.- Harper & Row, NewYork.

**Reference Books:**

1. An introduction to Air pollution by R.K. Trivedy and P.K. Goel, B.S.Publications
2. Air Pollution and Control by K.V.S.G.Murali Krishna, Kousal& Co. Publications, New Delhi.
3. Enivronmental meteorology by S.Padmanabhammurthy ,I.K.InternationalsPvtLtd,New Delhi

**Course Outcomes:**

At the end of this Course the student will be able to

- Evaluating the ambient air quality based on the analysis of air pollutants
- Design particulate and gaseous control measures for an industry
- Judge the plume behavior in a prevailing environmental condition
- Estimate carbon credits for various day to day activities

**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ACE55b-GREEN BUILDINGS**

**(Open Elective-I)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:** The objectives of the course are to make the students learn about

- Learn the principles of planning and orientation ofgreen buildings.
- Acquire knowledge on various aspects of green buildings

**UNIT – I:**

**Introduction**:ConceptofGreenBuilding,NeedforGreenBuilding,Benefitsof' Green Buildings, Green Building Materials and Equipment in India, Key Requisites for Constructing a Green Building, Important Sustainable features for Green Building,

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand need for green building
- Obtain knowledge on features of green building

**UNIT – II:**

**Green Building Concepts and Practices:** Indian Green Building Council,Green Building Moment in India, Benefits Experienced in Green Buildings, Launch of Green Building Rating Systems, Residential Sector, Market Transformation;

Green **Building** Opportunities And **Benefits:** Opportunities of Green Building, Green BuildingFeatures,MaterialandResources,WaterEfficiency,OptimumEnergyEfficiency, Typical Energy Saving Approach in Buildings, LEED India Rating System and Energy Efficiency,

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Knowledge on benefits and energy efficiency of green buildings
- Knowledge on practices and concepts of green buildings

**UNIT – III:**

**Green Building Design** Introduction, Reduction in Energy Demand, Onsite Sources and Sinks, Maximise System Efficiency, Steps to Reduce Energy Demand and Use Onsite Sources and Sinks, Use of Renewable Energy Sources. Ecofriendly captive power generation for factory, Building requirement,

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Learn steps in design of green buildings
- Learn how renewable energy resources are used in green buildings

**UNIT – IV:**

**Air Conditioning** Introduction, CII Godrej Green business centre, Design philosophy, Design interventions, Energy modeling, HVAC System design, Chiller selection,pump selection, Selection of cooling towers, Selection of air handing units, Precooling of fresh air, Interior lighting system, Key feature of the building. Eco- friendly captive power generation for factory, Building requirement.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Learn designing of air conditioning in green building

**UNIT – V:**

**Material Conservation** Handling of non process waste, waste reduction during construction, materials with recycled content, local materials, material reuse, certified wood, Rapidly renewable building materials and furniture; Indoor Environment Quality And Occupational Health: Air conditioning, Indoor air quality, Sick building syndrome, Tobacco smoke control, Minimum fresh air requirements avoid use of asbestos in the building, improved fresh air ventilation, Measure of IAQ, Reasons for poor IAQ, Measures to achieve Acceptable IAQ levels

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Suggest materials and technologies to improve energy efficiency of building.

**Text Books:**

1. Handbook on Green Practices published by Indian Society of Heating Refrigerating and Air conditioning Engineers,2009.
2. Green Building Hand Book by Tomwoolley and Samkimings,2009.

**Reference Books:**

1. Complete Guide to Green Buildings by Trish riley
2. Standard for the design for High Performance Green Buildings by Kent Peterson, 2009

**Course Outcomes:**

At the end of this Course the student will be able to

- Explain the principles of green buildings , its byelaws
- Understand the concepts of design of green buildings and material conversation in green buildings
- knowledge on rating systems of green buildings
- Suggest materials and technologies to improve energy efficiency of building.

**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ACE55c-BASICS OF CIVIL ENGINEERING MATERIALS AND CONSTRUCTION PRACTICE**

**(Open Elective-I)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:** The objectives of the course are to make the students learn about

- To provide an insight and inculcate the essentials of Civil Engineering discipline to the students of all branches of Engineering
- to provide the students an illustration of the significance of the Civil Engineering Profession in satisfying the societal needs.

**UNIT – I:**

**Introduction to Civil Engineering Building planning:** Introduction to types of buildings as per NBC; Selection of site for buildings. Components of a residential building and their functions. Introduction to industrial buildings- office / factory / software development office / power house / electronic equipment service centre

**Learning Outcomes:**

At the end of this unit, the student will be able to

- learn different types of buildings as per NBC and their components and function
- learn how to select different type of buildings sites

**UNIT – II:**

Site plan, Orientation of a building, Open space requirements, Position of doors and windows, Size of rooms; Preparation of a scaled sketch of the plan of a single storeyed residential building in a given site plan. Introduction to the various building area terms - Computation of plinth area/ built up area, Floor area / carpet area - for a simple single storeyed building; Setting out of a building.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- .learn site plans and orientation of buildings.
- learn setting out a building and preparation of scaled sketch of building plans

**UNIT – III:**

**Surveying** - Principles and objectives of surveying; Horizontal measurements – instruments used – tape, types of tapes; Ranging(direct ranging only) Theodolite and Total station-Principles

**Learning Outcomes:**

At the end of this unit, the student will be able to

- learn principles and objectives of surveying.
- learn instruments used in surveying and application in field

**UNIT – IV:**

**Building materials:** Bricks, cement blocks - Properties and specifications.Cement – OPC, properties, grades; other types of cement and its uses (in brief). Cement mortar – constituents, preparation. Concrete – PCC and RCC – grades. Steel - Use of steel in building construction, types and market forms.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- learn basic civil engineering materials (bricks, cement, cement mortar, cement concrete)
- learn about steel and use of steel in building construction

**UNIT – V:**

Building construction – Foundations; Bearing capacity of soil (definitiononly); Functions of foundations, Types - shallow and deep (sketches only).

Brick masonry – header and stretcher bond, English bonds – Elevation and plan (one brick thick walls only).

Roofs – functions, types, roofing materials (brief discussion only).

Floors – functions, types; flooring materials (brief discussion only).

Decorative finishes – Plastering – Purpose, procedure.

Paints and Painting – Purpose, types, preparation of surfaces for painting (brief discussion only).

**Learning Outcomes:**

At the end of this unit, the student will be able to

- learn foundations, SBC and theirs functions.
- learn about brick masonry(header, stretcher bond and english bond).
- learn roofs, floors and their materials

**Text Books:**

1. Rangwala, S. C., Essentials of Civil Engineering, Charotar Publishing House
2. Rangwala, S. C. and Dalal, K. B., Engineering Materials, Charotar Publishing house
3. Rangwala, S. C. and Dalal, K. B., Building Construction, Charotar Publishing house
4. Dr. K. R. Arora, "Surveying Volume-1", Standard book house, New Delhi, 13th Edition, 2012. 2. S. K. Duggal, "SurveyingVolume-2", Tata McGraw-Hill Education Private Limited, India,New Delhi, 3rd Edition, 2009.

**Reference Books:**

**Course Outcomes:**

At the end of this Course the student will be able to

- Recall the role of civil engineer in society and to relate the various disciplines of Civil Engineering.
- Explain different types of buildings, building components, building materials and building construction
- Describe the importance, objectives and principles of surveying.

**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19AEE55a- BASICS OF NON-CONVENTIONAL ENERGY SOURCES**

**(Open Elective-I)**

| L | T | P | C |
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**Course Objectives:** The objectives of the course are to make the students learn about

- Identify various sources of Energy and the need of Renewable Energy Systems
- Understand the concepts of Solar Radiation, Wind energy and its applications
- Distinguish between solar thermal and solar PV systems
- Interpret the concept of geo thermal energy and its applications
- Understand the use of biomass energy and the concept of Ocean energy and fuel cells.

**UNIT – I: Solar Energy** **10 Hrs**

Solar radiation - beam and diffuse radiation, solar constant, earth sun angles, attenuation and measurement of solar radiation, local solar time, derived solar angles, sunrise, sunset and day length. flat plate collectors, concentrating collectors, storage of solar energy thermal storage.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To understand about solar thermal parameters
- To distinguish between flat plate and concentrated solar collectors
- To know about thermal storage requirements
- To know about measurement of solar radiation

**UNIT – II: PV Energy Systems** **10 Hrs**

Introduction, The PV effect in crystalline silicon basic principles, the film PV, Other PV technologies, Electrical characteristics of silicon PV cells and modules, PV systems for remote power, Grid connected PV systems..

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the concept of PV effect in crystalline silicon and their characteristics
- Understand other PV technologies
- To know about electrical characteristics of PV cells & modules
- To know about grid connected PV systems

**UNIT – III: Wind Energy** **10 Hrs**

Principle of wind energy conversion; Basic components of wind energy conversion systems; wind mill components, various types and their constructional features; design considerations of horizontal and vertical axis wind machines: analysis of aerodynamic forces acting on wind mill blades and estimation of power output; wind data and site selection considerations

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To understand basics of wind energy conversion and system
- To distinguish between VAWT and HAWT systems
- To understand about design considerations
- To know about site selection considerations of WECS

**UNIT – IV: Geothermal Energy** **10 Hrs**

Estimation and nature of geothermal energy, geothermal sources and resources like hydrothermal, geo-pressured hot dry rock, magma. Advantages, disadvantages and application of geothermal energy, prospects of geothermal energy in India..

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the Geothermal energy and its mechanism of production and its Applications
- Analyze the concept of producing Geothermal energies
- To learn about disadvantages and advantages of Geo Thermal Energy Systems
- To know about various applications of GTES

**UNIT – V: Miscellaneous Energy Technologies** **10 Hrs**

**Ocean Energy**: Tidal Energy-Principle of working, performance and limitations. Wave Energy-Principle of working, performance and limitations.

**Bio mass Energy**: Biomass conversion technologies, Biogas generation plants, Classification, advantages and disadvantages, constructional details, site selection, digester design consideration

**Fuel cell**: Principle of working of various types of fuel cells and their working, performance and limitations.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Analyze the operation of tidal energy
- Analyze the operation of wave energy
- Analyze the operation of bio mass energy
- Understand the principle, working and performance of fuel cell technology
- Apply these technologies to generate power for usage at remote centres

**Text Books:**

1. Stephen Peake, "Renewable Energy Power for a Sustainable Future", Oxford International Edition, 2018.
2. G. D. Rai, "Non-Conventional Energy Sources", 4th Edition, Khanna Publishers, 2000.

**Reference Books:**

1. S. P. Sukhatme, "Solar Energy",3rd Edition, Tata Mc Graw Hill Education Pvt. Ltd,2008.
2. B H Khan , " Non-Conventional Energy Resources", 2nd Edition, Tata Mc Graw Hill Education Pvt Ltd, 2011.
3. S. Hasan Saeed and D.K.Sharma,"Non-Conventional Energy Resources",3rd Edition, S.K.Kataria& Sons, 2012.
4. G. N. Tiwari and M.K.Ghosal, "Renewable Energy Resource: Basic Principles and Applications", Narosa Publishing House, 2004.

**Course Outcomes:**

At the end of this Course the student will be able to

- To distinguish between various alternate sources of energy for different suitable application requirements
- To differentiate between solar thermal and PV system energy generation strategies
- To understand about wind energy system
- To get exposed to the basics of Geo Thermal Energy Systems
- To know about various diversified energy scenarios of ocean, biomass and fuel cells

**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19AEE55b- ELECTRICAL MEASUREMENTS & SENSORS**

**(Open Elective-I)**

| L | T | P | C |
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**Course Objectives:** The objectives of the course are to make the students learn about

- The basic principles of different types of electrical instruments for the measurement of voltage, current, power factor, power and energy.
- The measurements of RLC parameters using bridge principles.
- The principles of magnetic measurements.
- The principle of working of CRO and its applications.
- Extending the range of an Instrument.

**UNIT – I: Measuring Instruments** **10 Hrs**

Classification – Ammeters and Voltmeters – PMMC, Dynamometer, Moving Iron Types – Expression for the Deflecting Torque and Control Torque – Errors and their Compensation, Extension of range–Numerical examples

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the operation of different in struments.
- Know the different types of errors and their compensation

**UNIT – II: Measurement of Power, Power Factor and Energy** **10 Hrs**

Single Phase Dynamometer Wattmeter, LPF and UPF, Double Element and Three Elements, Expression for Deflecting and Control Torques; P.F. Meters: Dynamometer and Moving Iron Type–1-phand3-ph Power factor Meters. Single Phase Induction Type Energy Meter-Driving and Braking Torques–Errors and their Compensation, Three Phase Energy Meter-Numerical examples

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the working principles and construction of different types of Energy meters
- Distinguish between low and high power factor ranges in wattmeters

**UNIT – III: Instrument transformers, Potentiometers, and magnetic measurements** **10 Hrs**

Current Transformers and Potential Transformers – Ratio and Phase Angle Errors – MethodsforReductionofErrors-DesignConsiderations.DCPotentiometers: Principle and Operation of D.C. Crompton's Potentiometer –Standardization – Measurement of unknown Resistance, Currents and Voltages. A.C. Potentiometers: Polar and Coordinate types-Standardization – Applications. Determination of B-H Loop Methods of Reversals – Six Point magnetic measurement Method–A.C.Testing–Iron Loss of Bar Samples –Numerical Examples

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Distinguish between CTs and PTs
- Understand the principles and working of various measuring instruments used to detect electrical circuit parameters R,L,C

**UNIT – IV:** D.C & A.C Bridges **10 Hrs**

Method of Measuring Low, Medium and High Resistances – Sensitivity of Wheat stone's Bridge – Kelvin's Double Bridge for Measuring Low Resistance, Measurement of High Resistance –Loss of Charge Method. Measurement of Inductance-Maxwell's Bridge, Anderson's Bridge. Measurement of Capacitance and Loss Angle – DeSauty Bridge. Wien's Bridge –Schering Bridge–Numerical Examples

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the bridge configurations and their applications for various ranges of resistance measurement
- Compute the unknown parameters of Inductance and Capacitance using the bridges

**UNIT – V: CRO and Digital Meters** **10 Hrs**

Cathode Ray Oscilloscope-Cathode Ray Tube-Time Base Generator-Horizontal and Vertical Amplifiers–Applications of CRO–Measurement of Phase, Frequency, Current and Voltage-Lissajous Patterns. Digital Voltmeters – Successive Approximation, Ramp, and Integrating Type-Digital Frequency Meter-Digital Multimeter- Digital Tachometer.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the operation of CRO and its parts
- Know about Digital voltmeters and Distinguish between an along and digital meters

**Text Books:**

1. Electrical & Electronic Measurement & Instruments by A.K.Sawhney Dhanpat Rai & Co. Publications, 2007.
2. Electrical Measurements and measuring Instruments–by E.W.Golding and F.C.Widdis, 5th Edition, Reem Publications,2011.

**Reference Books:**

1. Electronic Instrumentation by H.S. Kalsi, Tata McGraw-Hill, 3rd Edition, 2011.
2. Electrical Measurements: Fundamentals, Concepts, Applications –by Reissland, M.U, New Age International (P) Limited,2010.
3. Electrical & Electronic Measurement & Instrumentation by R.K.Rajput,2nd Edition, S.Chand & Co., 2nd Edition,2013.

**Course Outcomes:**

At the end of this Course the student will be able to

- Understand the working of various instruments and equipments used for the measurement of various electrical engineering parameters like voltage, current, power, phase etc in industry as well as in power generation, transmission and distribution sectors **L1**
- Analyze and solve the varieties of problems and issues coming up in the vast field of electrical measurements. **L2**
- Analyze the different operation of extension range ammeters and voltmeters, **L3**
- Design and development of various voltage and current measuring meters. **L4**
- Analyze DC and AC bridges for measurement of parameters and different characteristics of periodic and a periodic signals using CRO. **L5**

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**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19AEE55c- ELECTRIC VEHICLE ENGINEERING**

**(Open Elective-I)**

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**Course Objectives:** The objectives of the course are to make the students learn about

- To get exposed to new technologies of battery electric vehicles, fuel cell electric vehicles
- To get exposed to EV system configuration and parameters
- To know about electro mobility and environmental issues of EVs
- To understand about basic EV propulsion and dynamics
- To understand about fuel cell technologies for EV and HVEs
- To know about basic battery charging and control strategies used in electric vehicles

**UNIT – I: Introduction to EV Systems and Parameters** **10 Hrs**

Past, Present and Future EV, EV Concept, EV Technology, State-of-the Art EVs, EV configuration, EV system, Fixed and Variable gearing, single and multiple motor drive, in-wheel drives, EV parameters: Weight, size, force and energy, performance parameters.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To know about past, present and latest technologies of EV **L1**
- To understand about configurations of EV systems **L1**
- To distinguish between EV parameters and performance parameters of EV systems **L2**
- To distinguish between single and multiple motor drive EVs **L4**
- To understand about in-wheel EV **L5**

**UNIT – II: EV and Energy Sources** **10 Hrs**

Electro mobility and the environment, history of Electric power trains, carbon emissions from fuels, green houses and pollutants, comparison of conventional, battery, hybrid and fuel cell electric systems

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To know about various types of EV sources **L1**
- To understand about e-mobility **L2**
- To know about environmental aspects of EV **L3**
- To distinguish between conventional and recent technology developments in EV systems **L4**

**UNIT – III: EV Propulsion and Dynamics** **10 Hrs**

Choice of electric propulsion system, block diagram, concept of EV Motors, single and multi motor configurations, fixed and variable geared transmission, In-wheel motor configuration, classification, Electric motors used in current vehicle applications, Recent EV Motors, Vehicle load factors, vehicle acceleration.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To know about what is meant by propulsion system **L1**
- To understand about single and multi motor EV configurations **L2**
- To get exposed to current and recent applications of EV **L3**
- To understand about load factors in vehicle dynamics **L4**
- To know what is meant acceleration in EV **L5**

**UNIT – IV: Fuel Cells** **10 Hrs**

Introduction of fuel cells, basic operation, model, voltage, power and efficiency, power plant system – characteristics, sizing, Example of fuel cell electric vehicle. Introduction to HEV, brake specific fuel consumption, comparison of series, series parallel hybrid systems, examples

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To know about fuel cell technology of EV **L1**
- To know about basic operation of FCEV **L2**
- To know about characteristics and sizing of EV with suitable example **L3**
- To get exposed to concept of Hybrid Electric Vehicle using fuel cells **L4**
- To know about the comparison of various hybrid EV systems **L5**

**UNIT – V: Battery Charging and Control** **10 Hrs**

Battery charging: Basic requirements, charger architecture, charger functions, wireless charging, power factor correction. Control: Introduction, modeling of electro mechanical system, feedback controller design approach, PI controllers designing, torque-loop, speed control loop compensation, acceleration of battery electric vehicle

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To understand about basic requirements of battery charging and its architecture **L1**
- To know about charger functions **L2**
- To get exposed to wireless charging principle **L3**
- To understand about block diagram, modeling of electro mechanical systems of EV **L4**
- To be able to design various compensation requirements **L5**

**Text Books:**

1. C.C Chan, K.T Chau: Modern Electric Vehicle Technology, Oxford University PressInc., New York 2001.
2. James Larminie, John Lowry, Electric Vehicle Technology Explained, Wiley, 2003.

**Reference Books:**

1. Electric and Hybrid Vehicles Design Fundamentals, Iqbal Husain, CRC Press 2005.
2. Ali Emadi, Advanced Electric Drive Vehicles, CRC Press, 2015.

**Course Outcomes:**

At the end of this Course the student will be able to

- To understand and differentiate between conventional and latest trends in Electric Vehicles **L1**
- To know about various configurations in parameters of EV system **L2**
- To know about propulsion and dynamic aspects of EV **L3**
- To understand about fuel cell technologies in EV and HEV systems **L4**
- To understand about battery charging and controls required of EVs **L5**

**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19AME55a – INTRODUCTION TO HYBRID AND ELECTRICAL VEHICLES**

*(Open Elective-I)*

| L | T | P | C |
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**Course Objectives:** The objectives of the course are to make the students learn about

- Provide good foundation on hybrid and electrical vehicles.
- To address the underlying concepts and methods behind power transmission in hybrid and electrical vehicles.
- Familiarize energy storage systems for electrical and hybrid transportation.
- To design and develop basic schemes of electric vehicles and hybrid electric vehicles.

**UNIT I: Electric Vehicle Propulsion And Energy Sources** **12 hours**

Introduction to electric vehicles, vehicle mechanics - kinetics and dynamics, roadway fundamentals propulsion system design - force velocity characteristics, calculation of tractive power and energy required, electric vehicle power source - battery capacity, state of charge and discharge, specific energy, specific power, Ragone plot. Battery modeling - run time battery model, first principle model, battery management system- soc measurement, battery cell balancing. Traction batteries - nickel metal hydride battery, Li-Ion, Lipolymer battery.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Summaries the concepts of electrical vehicle propulsion and energy sources. **L2**
- Identify the types of power sources for electrical vehicles **L3**
- Demonstrate the design considerations for propulsion system. **L2**
- Solve the problems on tractive power and energy required. **L3**

**UNIT II: Electric Vehicle Power Plant And Drives** **10 hours**

Introduction electric vehicle power plants. Induction machines, permanent magnet machines, switch reluctance machines. Power electronic converters-DC/DC converters - buck boost converter, isolated DC/DC converter. Two quadrant chopper and switching modes. AC drives- PWM, current control method. Switch reluctance machine drives - voltage control, current control.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Choose a suitable drive scheme for developing electric vehicles depending on resources. **L1**
- List the various power electronic converters. **L1**
- Describe the working principle DC/DC converters and buck boost convertor. **L2**
- Explain about AC Drives. **L2**

**UNIT III: Hybrid And Electric Drive Trains** **10 hours**

Introduction hybrid electric vehicles, history and social importance, impact of modern drive trains in energy supplies. Hybrid traction and electric traction. Hybrid and electric drive train topologies. Power flow control and energy efficiency analysis, configuration and control of DC motor drives and induction motor drives, permanent magnet motor drives, switch reluctance motor drives, drive system efficiency.

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**Learning Outcomes:**
At the end of this unit, the student will be able to

- Identify the social importance of hybrid vehicles. **L3**
- Discus impact of modern drive trains in energy supplies. **L6**
- Compare hybrid and electric drive trains. **L2**
- Analyze the power flow control and energy efficiency. **L6**

**UNIT IV: Electric And Hybrid Vehicles - Case Studies** **8 hours**

Parallel hybrid, series hybrid -charge sustaining, charge depleting. Hybrid vehicle case study –Toyota Prius, Honda Insight, Chevrolet Volt. 42 V system for traction applications. Lightly hybridized vehicles and low voltage systems. Electric vehicle case study - GM EV1, Nissan Leaf, Mitsubishi Miev. Hybrid electric heavy duty vehicles, fuel cell heavy duty vehicles

**Learning Outcomes:**
At the end of this unit, the student will be able to

- List the various electric and hybrid vehicles in the present market. **L1**
- Discuss lightly hybridized vehicle and low voltage systems. **L6**
- Explain about hybrid electric heavy duty vehicles and fuel cell heavy duty vehicles. **L2**

**UNIT V: Electric And Hybrid Vehicle Design** **8 hours**

Introduction to hybrid vehicle design. Matching the electric machine and the internal combustion engine. Sizing of propulsion motor, power electronics, drive system. Selection of energy storage technology, communications, supporting subsystem. Energy management strategies in hybrid and electric vehicles - energy management strategies- classification, comparison, implementation.

**Learning Outcomes:**
At the end of this unit, the student will be able to

- Illustrate matching the electric machine and the internal combustion engine. **L2**
- Select the energy storage technology. **L3**
- Select the size of propulsion motor. **L3**
- Design and develop basic schemes of electric and hybrid electric vehicles. **L3**

**Text Books:**

1. Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, 2/e, CRC Press, 2003.
2. Amir Khajepour, M. Saber Fallah, Avesta Goodarzi, Electric and Hybrid Vehicles: Technologies, Modeling and Control - A Mechatronic Approach, illustrated edition, John Wiley & Sons, 2014
3. Mehrdad Ehsani, YimiGao, Sebastian E. Gay, Ali Emadi, Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design, CRC Press, 2004.

**Reference Books:**

1. James Larminie, John Lowry, Electric Vehicle Technology Explained, Wiley, 2003.
2. John G. Hayes, G.Abas Goodarzi, Electric Powertrain: Energy Systems, Power Electronics and Drives for Hybrid, Electric and Fuel Cell Vehicles, 1/e, Wiley-Blackwell, 2018.

**Course Outcomes:**
At the end of this Course the student will be able to

- Explain the working of hybrid and electric vehicles. **L2**
- Choose a suitable drive scheme for developing hybrid and electric vehicles depending on resources. **L3**
- Develop the electric propulsion unit and its control for application of electric vehicles. **L3**
- Choose proper energy storage systems for vehicle applications. **L3**
- Design and develop basic schemes of electric vehicles and hybrid electric vehicles. **L3**

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**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

## 19AME55b – RAPID PROTOTYPING

*(Open Elective-I)*

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**Course Objectives:** The objectives of the course are to make the students learn about

- Familiarize techniques for processing of CAD models for rapid prototyping.
- Explain fundamentals of rapid prototyping techniques.
- Demonstrate appropriate tooling for rapid prototyping process.
- Focus Rapid prototyping techniques for reverse engineering.
- Train Various Pre – Processing, Processing and Post Processing errors in RP Processes

**UNIT I** **12 Hours**

**Introduction:** Introduction to Prototyping, Traditional Prototyping Vs. Rapid Prototyping (RP), Need for time compression in product development, Usage of RP parts, Generic RP process, Distinction between RP and CNC, other related technologies, Classification of RP.

**RP Software:** Need for RP software, MIMICS, Magics, SurgiGuide, 3-matic, 3D-Doctor, Simplant, Velocity2, VoXim, SolidView, 3DView, etc., software, Preparation of CAD models, Problems with STL files, STL file manipulation, RP data formats: SLC, CLI, RPI, LEAF, IGES, HP/GL, CT, STEP.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain prototyping process. **L2**
- Classify different Rapid Prototyping Processes. **L2**
- Summarize RP software's and Represent a 3D model in STL format, other RP data formats. **L2**

**UNIT II** **10 Hours**

Solid and Liquid Based RP Systems: Stereolithography (SLA): Principle, Process, Materials, Advantages, Limitations and Applications. Solid Ground Curing (SGC): Principle, Process, Materials, Advantages, Limitations, Applications. Fusion Deposition Modeling (FDM): Principle, Process, Materials, Advantages, Limitations, Applications. Laminated Object Manufacturing (LOM): Principle, Process, Materials, Advantages, Limitations, Applications.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the principles, advantages, limitations and applications of Solid and Liquid based AM systems. **L2**
- Identify the materials for Solid and Liquid based AM systems. **L2**

**UNIT III** **8 Hours**

Powder Based RP Systems: Principle and Process of Selective Laser Sintering (SLS), Advantages, Limitations and Applications of SLS, Principle and Process of Laser Engineered Net Shaping (LENS), Advantages, Limitations and Applications of LENS, Principle and Process of Electron Beam Melting (EBM), Advantages, Limitations and Applications of EBM.

Other RP Systems: Three Dimensional Printing (3DP): Principle, Process, Advantages, Limitations and Applications. Ballastic Particle Manufacturing (BPM): Principle, Process, Advantages, Limitations, Applications. Shape Deposition Manufacturing (SDM): Principle, Process, Advantages, Limitations, Applications.

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**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the principles, advantages, limitations and applications of powder based AM systems. **L2**
- Understand the principles, advantages, limitations and applications of other Additive Manufacturing Systems such as 3D Printing, Ballistic Particle Manufacturing and Shape Deposition Modeling. **L2**

**UNIT IV** **8 hours**

Rapid Tooling: Conventional Tooling Vs. Rapid Tooling, Classification of Rapid Tooling, Direct and Indirect Tooling Methods, Soft and Hard Tooling methods.

Reverse Engineering (RE): Meaning, Use, RE – The Generic Process, Phases of RE Scanning, Contact Scanners and Noncontact Scanners, Point Processing, Application Geometric Model, Development.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Classify Rapid Tooling methods. **L2**
- Explain the concepts of reverse engineering and scanning tools. **L2**

**UNIT V** **8 Hours**

Errors in RP Processes: Pre-processing, processing, post-processing errors, Part building errors in SLA, SLS, etc.

RP Applications: Design, Engineering Analysis and planning applications, Rapid Tooling, Reverse Engineering, Medical Applications of RP.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Identify various Pre – Processing, Processing and Post – Processing errors in RP processes. **L2**
- Apply of RP in engineering design analysis and medical applications. **L3**

**Text Books:**

1. Chua C.K., Leong K.F. and Lim C.S., Rapid Prototyping: Principles and Applications, 2/e Edition, World Scientific Publishers, 2003.
2. Ian Gibson, David W. Rosen, Brent Stucker, Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing, 1st Edition, Springer, 2010.
3. Rafiq Noorani, Rapid Prototyping: Principles and Applications in Manufacturing, John Wiley & Sons, 2006.

**Reference Books:**

1. Liou W. Liou, Frank W., Liou, Rapid Prototyping and Engineering Applications: A Tool Box for Prototype Development, CRC Press, 2007.
2. Pham D.T. and Dimov S.S., Rapid Manufacturing; The Technologies and Application of RPT and Rapid tooling, Springer, London 2001.
3. Gebhardt A., Rapid prototyping, Hanser Gardener Publications, 2003.
4. Hilton P.D. and Jacobs P.F., Rapid Tooling: Technologies and Industrial Applications, CRC Press, 2005.

**Course Outcomes:**

At the end of this Course the student will be able to

- Use techniques for processing of CAD models for rapid prototyping. **L3**
- Understand and apply fundamentals of rapid prototyping techniques. **L3**
- Use appropriate tooling for rapid prototyping process. **L3**
- Use rapid prototyping techniques for reverse engineering. **L3**
- Identify Various Pre – Processing, Processing and Post Processing errors in RP processes. **L3**



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**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19AME55c – DESIGN FOR MANUFACTURING AND ASSEMBLY**

*(Open Elective – I)*

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**Course Objectives:** The objectives of the course are to make the students learn about

- Discuss various factors influencing the manufacturability of components and use of tolerances in manufacturing
- Explain various considerations in casting, welding, forging and machining processes.
- Demonstrate on the design factors dependent on the assembly methods.
- Teach the principles and rules of design for assembly.
-

**UNIT I: INTRODUCTION TO DFM** **12 Hours**

Significance of design, qualities of a designer and Design factors, Systematic working plan, The engineering problem to be solved, The basic design, Factors influencing choice of materials and the factors influencing manufacturing Process Capability Mean, Median, Variance, Mode, Standard Deviation, Normal Distribution and Process capability metrics, Process Capability, Tolerances-symbols and definition, Tolerances relevant to manufacturing, assembly and material condition, Tolerance stack-effects on assembly with examples, Methods of eliminating tolerance stack with examples.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the desirable qualities of a designer. **L2**
- List various factors influencing the choice of materials. **L1**
- Recall the concepts of Mean, Median, Variance and Mode. **L1**
- Discuss the methods of eliminating tolerance stack with examples. **L2**

**UNIT II: FORM DESIGN-CASTING AND WELDING** **10 Hours**

Influence of loading, Materials, Production methods on form design, Casting considerations, Grey iron castings, Steel castings, Aluminum Casting Requirements and rules for casting, Form design of pressure die castings, Welding considerations welding Processes, Requirements and rules for welding, Redesign of components for casting-pattern-mould- Parting Line, Redesign of components for welding, Case studies in form design-simple problems in form design.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Recall the function of various components (pattern, mould, parting line, etc) in casting **L1**
- Explain the various production methods on form design. **L2**
- Understand the requirements and rules for casting and welding. **L2**
- Make use of case studies to understand redesign of the components. **L3**

**UNIT III: FORM DESIGN-FORGING AND MACHINING** **8 Hours**

Forging considerations hammer forging drop forging, Requirements and rules for forging, Choice between casting, forging and welding, Machining considerations Drills, Milling-Keyways, Dwells and Dwelling Procedure Countersunk Head screws Requirements and rules for Machining considerations and Reduction of machined areas Redesign of components for Forging, Redesign of components for Machining, Simplification by separation and Simplification by amalgamation, Case studies.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Choose the manufacturing process depending upon the shape and size of the product. **L3**



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- Classify various machining processes **L2**
- Discuss the rules and design considerations of forging **L2**
- Recall the redesign concepts of forging and machining. **L1**

**UNIT IV: INTRODUCTION TO DFA** **8 hours**

DFA, Introduction, Distinction between assembly methods and processes, Factors Determining assembly methods and processes, Success and failure-Causes of failure, Product Design factors independent of methods and processes , Introduction-Number of operations in the product, Assembly Precedence, Standardization, Design factors dependent on Assembly methods , Introduction-Single Station Assembly Line Assembly, Hybrid Systems, Manual Assembly lines, Flexible Assembly lines, Design factors dependent on Assembly processes, Factors Influencing Production rate to Facility Ratio- Parts Presentation, Manual Assembly, Dedicated Assembly, Transportation, Separation and Orientation-Flexible Assembly, Gripping, Transferring, Part Insertion, Failures and Error Recovery

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Illustrate manual assembly lines and flexible assembly lines. **L2**
- Explain the product design factors independent of methods and processes **L2**
- Discuss the importance of standardization in design for assembly. **L2**
- List the design factors that are dependent and independent on the Assembly processes. **L1**

**UNIT V: DESIGN FOR ASSEMBLY METHODS** **8 Hours**

Approaches to design for assembly and Introduction, Approaches based on design principles and rules, Example DFA method using Design Principles, DFA Systems employing Quantitative evaluation procedures, IPA Stuttgart Method, DFA Methods employing a Knowledge based approach, Knowledge representation Computer Aided DFA methods, Part model, Feature, Processing. Assembly measures like Qualitative and Quantitative measures, Boothroyd and Dewhurst DFA method. Redesign of a simple product , Small consumer product and Fastener solution redesign using symmetry, Case Studies Designing of a disposal valve, Design of a lever-arch file mechanism

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain various approaches to design for assembly. **L2**
- Demonstrate on DFA systems employing quantitative evaluation procedures. **L2**
- Discuss DFA methods employing a knowledge based approach. **L2**
- Understand the qualitative and quantitative measures in assembly. **L2**

**Text Books:**

1. Harry Peck., "Design for Manufacture", Pittman Publications, 1983.
2. Alan Redford and chal, "Design for Assembly-Principles and Procedures", McGraw Hill International Europe, London, 1994.

**Reference Books:**

1. Robert Matousek, "Engineering Design A Systematic Approach", Blackie &sons Ltd., 1963
2. James G.Bralla, "Hand Book of Product design for Manufacturing", McGraw Hill Co., 1986
3. Swift, K.G., "Knowledge Based Design for Manufacture", Kogan Page Ltd., 1987

**Course Outcomes:**

At the end of this Course the student will be able to

- Recall the importance of Design for Manufacturing and Assembly. **L1**
- Explain the form design factors with the help of Case study. **L2**
- Evaluate how the factor of redesign affects the product life cycle. **L5**
- Make use of DFA methods proposed by Boothroyd and Dewhurst. **L3**

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**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19AME55d – POWER PLANT OPERATION AND CONTROL**

*(Open Elective-I)*

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:** The objectives of the course are to make the students learn about

- Familiarize with various methods of power generation.
- Outline the working components of power plants.
- Expose the students measuring of various controllable and uncontrollable factors in power plants.
- Explain the concepts of boiler and turbine control.

**UNIT I : OVERVIEW OF POWER GENERATION** **12 Hours**

Survey of methods of power generation: Hydro, thermal, nuclear, solar and wind power - Importance of instrumentation in power generation - Thermal power plant - Building blocks - Combined cycle systems - Combined heat and power system - sub critical and supercritical boilers.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- List the various types of power plants. **L1**
- Illustrate the importance of instrumentation in power generation. **L4**
- Compare subcritical and supercritical boilers. **L2**

**UNIT II: MEASUREMENTS IN POWER PLANTS** **10 Hours**

Measurement of feed water flow, air flow, steam flow and coal flow – Drum level measurement – Steam pressure and temperature measurement – Turbine speed and vibration measurement – Flue gas analyzer – Fuel composition analyzer

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Describe turbine speed and vibration measurements. **L2**
- Determine the steam flow and coal flow in power plants. **L3**
- Appraise the importance of flue gas and fuel composition analyzer in power plants. **L5**
- Illustrate the various controllable and uncontrollable factors that can be measure in power plants. **L2**

**UNIT III : BOILER CONTROL – I** **8 Hours**

Combustion of fuel and excess air – Firing rate demand – Steam temperature control – Control of deaerator– Drum level control – Single, two and three element control – Furnace draft control – implosion – flue gas dew point control – Trimming of combustion air – Soot blowing.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- List the various boiler control methods. **L1**
- Describe the steam temperature control and drum level control. **L2**
- Demonstrate furnace draft control and drum level control. **L2**

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**UNIT IV : BOILER CONTROL – II** **8 hours**

Burners for liquid and solid fuels – Burner management – Furnace safety interlocks – Coal pulverizer control – Combustion control for liquid and solid fuel fired boilers – air/fuel ratio control – fluidized bed boiler – Cyclone furnace.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Identify the burners for liquid and solid fuels. **L3**
- Describe the working principle of coal pulverizer control. **L2**
- Explain combustion control for liquid and solid fuel fired boiler. **L2**

**UNIT V :CONTROL OF TURBINE** **8 Hours**

Types of steam turbines – impulse and reaction turbines – compounding – Turbine governing system – Speed and Load control – Transient speed rise – Free governor mode operation – Automatic Load Frequency Control – Turbine oil system – Oil pressure drop relay – Oil cooling system – Turbine run up system.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- List the various types of steam turbines. **L1**
- Compare impulse and reaction turbines. **L2**
- Describe turbine governing system for speed and load control. **L2**
- Explain about oil cooling system in turbine. **L2**

**Text Books:**

1. Sam Dukelow, Control of Boilers, Instrument Society of America, 1991.
2. Everett Woodruff , Herbert Lammers, Thomas Lammers, Steam Plant Operation,9th Edition McGraw Hill, 2012.
3. Rajput R.K. A Text book of Power plant Engineering. 5th Edition, Lakshmi Publications, 2013.

**Reference Books:**

1. Liptak B.G., Instrumentation in Process Industries, Chilton Book Company, 2005.
2. Jain R.K., Mechanical and Industrial Measurements, Khanna Publishers, New Delhi, 1999.
3. P.K.Nag, Powerplant Engineering, Tata McGraw-Hill Education, 3rd edition, 2007.
4. Tamilmani, Power plant instrumentation, Sams Publishers, 2011.
5. Krishnaswamy.K and Ponnibala.M., Power Plant Instrumentation, PHI Learning Pvt.Ltd., New Delhi, 2011.

**Course Outcomes:**

At the end of this Course the student will be able to

- Outline sources of energy for various power plants. **L2**
- Explain boiler and turbine control. **L2**
- Describe working components of a steam power plant. **L2**
- Illustrate the working mechanism of Diesel and Gas turbine power plants. **L2**
- Summarize types of measuring parameters for controlling the power plant. **L2**
- Demonstrate the working principle of nuclear power plants. **L4**

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**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19AME55e – SMART MATERIALS**

*(Open Elective-I)*

| L | T | P | C |
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**Course Objectives:** The objectives of the course are to make the students learn about

- Familiarize the smart materials and its role in developing intelligent systems.
- Introduce the students with HBLS and LBHS smart materials.
- Expose the students in smart systems development and uses.
- Understand the working principle of smart actuators and smart sensors.

**UNIT I** **12 Hours**

**Introduction to Smart Materials**: What is Intelligence? Artificial intelligence Vs. embedded Intelligence, Definition of smart material, need for smart materials, classifications of smart systems, components of a smart systems, smart system applications, the role of Smart Materials in developing Intelligent Systems and Adaptive Structures.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Recall what is intelligence. **L1**
- Define smart materials. **L1**
- Describe the role of smart materials in development of intelligent systems and adaptive structures. **L2**
- Illustrate the applications of smart systems. **L2**

**UNIT II: High bandwidth - Low strain generating (HBLS) Smart Materials** **10 Hours**

**Piezoelectric Materials** – constitutive relationship, electromechanical coupling coefficients, piezoelectric constants, piezoceramic materials, variation of coupling coefficients in hard and soft piezoceramics, polycrystalline vs single crystal piezoelectric materials, polyvinyldene fluoride, piezoelectric composites.

**Magnetostrictive Materials** – constitutive relationship, magneto-mechanical coupling coefficients, Joule Effect, Villari Effect, Matteuci Effect, Wiedemann effect, Giant magnetostriction in Terfenol-D, Terfenol-D particulate composites, Galfenol and Metglas materials.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Describe the constitutive relationship of piezoelectric materials. **L2**
- Compare polycrystalline and single crystal piezeoelectric materials. **L2**
- Explain concepts of Joule effect, Villari effect, Matteuci effect, Wiedemann effect. **L2**
- Discuss Galfenol and Metglas materials. **L6**

**UNIT III** **8 Hours**

**Low bandwidth - High strain generating (LBHS) materials**: Shape Memory Alloys (SMA) – Introduction, Phenomenology, Influence of stress on characteristic temperatures, Modelling of shape memory effect. Vibration control through shape memory alloys. Design considerations, multiplexing embedded NiTiNOL actuators. Electro-active Polymers (EAP)- Introduction, Phenomenology, Influence of stress on characteristic temperatures

**Learning Outcomes:**

At the end of this unit, the student will be able to

- List various types of LBHS smart materials. **L1**
- Identify the influence of stress on characteristic temperatures in SMA and EAP. **L3**



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- Explain the concept of vibration control through shape memory alloys. **L2**
- Discuss design considerations of shape memory alloy. **L6**

**UNIT IV: Smart actuators** **8 hours**

**Based on HBLS smart materials:** Piezoelectric Actuators – Induced Strain actuation model, Unimorph and Bimorph Actuators, Actuators embedded in composite laminate, Impedance matching in actuator design, Feedback Control, Pulse Drive, Resonance Drive. Magnetostrictive Actuators – Magnetostrictive Mini Actuators, Thermal instabilities, Discretely distributed actuation, Manetostrictive Composites.

**Based on LBHS Smart Materials** - Shape Memory Alloy based actuators for Shape Control, Electro-active Polymers for Work-Volume Generation

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Recall working principle of actuators. **L1**
- Explain impedance matching in actuator design, feedback control, pulse drive and resonance. **L2**
- Describe the working principle of Piezoelectric Actuators & Magnetostrictive Actuators. **L2**
- Discuss the concepts of actuators based on HBLS and LBHS. **L6**

**UNIT V: Smart sensors** **8 Hours**

**Sensors based on HBLS Smart Materials** - Piezoelectric Sensors Magnetostrictive Sensors Techniques of Self Sensing MEMS Sensors.

**Sensors based on LBHS Smart Materials** - EAP based sensors, SMA based encoders, Optical Fibre based Sensing.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Select the type of sensor required for smart systems. **L1**
- Explain techniques of self sensing MEMS sensors. **L2**
- Discuss EPA based and SMA based sensors. **L6**
- Explain optical based sensing system. **L2**

**Text Books:**

- M.V. Gandhi, B.D. Thompson" Smart Materials and Structures" Springer Science & Business Media, 31-May-1992.

**Reference Books:**

1. Brian Culshaw, Smart Structures and Materials, Artech House, 2000.
2. Gauenzi, P., Smart Structures, Wiley, 2009.
3. Cady, W. G., Piezoelectricity, Dover Publication

**Course Outcomes:**

At the end of this Course the student will be able to

- Describe the role of smart materials in development of intelligent systems and adaptive structures. **L2**
- Compare polycrystalline and single crystal piezoelectric materials. **L2**
- Identify the influence of stress on characteristic temperatures in SMA and EAP. **L3**
- Explain techniques of self sensing MEMS sensors. **L2**

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**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19AME55f – SUPPLY CHAIN MANAGEMENT**

*(Open Elective-I)*

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:** The objectives of the course are to make the students learn about

- Explain the basics of supply chain management.
- Familiarize inventory management techniques and models to ensure EOQ batch size under risk management.
- Demonstrate various distribution strategies for shipment of products.
- Focus on evaluating of strategic alliance partners and understanding of RDBMS.

**UNIT I** **12 Hours**

**Understanding the supply chain:** What is SCM? Why SCM? The Complexity, Key issues in SCM Logistics network - Introduction, Data Collection, Transportation, Ware house Management, Strategic location of ware houses, Demand forecasting, Role of aggregate planning, MRP, ERP, Managing variability, Key features of Network configuration.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the strategic importance of SCM and how operations relate to other business functions. **L2**
- Summarize working knowledge of the concepts and methods of SCM **L2**
- Apply concepts for continuous improvement for practical problems **L3**

**UNIT II** **8 Hours**

**Inventory management:** Concepts of Materials Management, Economic lot size model, Effect of Demand uncertainly, Fixed order costs, Variable lead frames, Inventory under certainly & uncertainty, Risk Management

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain why companies keep inventory and costs of inventory for inventory decisions. **L2**
- Outline the key elements and relationship with customer service. **L2**
- Determine the appropriate reorder point in a continuous inventory system based on a target service level. **L3**
- Apply the order quantity estimate for a periodic inventory system. **L3**

**UNIT III** **8 Hours**

**Distribution strategies:** Introduction, Centralized vs Decentralized control, Direct shipment, Cross Docking, Push based vs Pull based supply chain.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Discuss outsourcing as a strategic decision. **L3**
- Classify the distribution strategies, systems and processes **L2**
- Analyze issues and trends in the supply chain **L4**

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**UNIT IV** **8 hours**

**Strategic alliances:** Third party Logistics (3PL), Retailer – supplier relationship issues, requirements, success & failures, Distributor integration Types & issues.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the third party logistics **L2**
- Develop retailer supplier relationship issues **L2**
- Compare distribution integration types and issues **L2**

**UNIT V** **10 hours**

**MIS & SCM:** Relational Data Base Management (RDBMS), System Architecture, Communications, and Implementation of ERP, Decision support systems for SCM: Analytical tools, Presentation tools, Smooth production flow Current issues & directing challenges for future, e-Commerce strategies and world class supply chain management.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Interpret the basic modes of RDBMS for communication and ERP implementation. **L5**
- Identify support systems for supply chain management **L3**
- Explain the analytical and presentation tools **L2**
- Outline E-commerce strategies for world class SCM **L2**

**Text Books:**

1. Sunil Chopra, Peter Meindl, Supply Chain Management: Strategy, Planning, and Operation, 4/e, Pearson, 2010.
2. David N. Burt, Donald W. Dobler , World Class Supply Management: The Key to Supply Chain Management, 2/e, McGraw-Hill/Irwin, 2003

**Reference Books:**

1. John Joseph Coyle, Edward J. Bardi, C. John Langley, The Management of Business Logistics: A Supply Chain Perspective, South-Western/Thomson Learning, 2003.
2. Upendra Kachru, Logistics and Supply Chain Management, Excel Books, 2009.

**Course Outcomes:**

At the end of this Course the student will be able to

- Apply the concepts of supply chain management for demand forecasting. **L3**
- Make use of SCM and inventory management for procurement. **L3**
- Analyze the shipment activities and related issues. **L4**
- Build third party alliances. **L5**
- Adapt the RDBMS data for communications and analyzing future challenges and understand e-commerce strategies. **L6**

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**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19AEC55a- FUNDAMENTALS OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**(Open Elective-I)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:** The objectives of the course are to make the students learn about

- To study the basic principle, construction and operation of semiconductor devices.
- To learn the real time applications of semiconductor devices.
- To introduce binary number systems, logic gates and digital logic circuits.
- To get an idea about the basic principles of communication systems and their applications.
- To learn the measurement of physical parameters using Sensors and Transducers.

**UNIT – I:**

**Introduction to Electronics Engineering:** Overview, scope and objective of studying Electronics Engineering. Introduction to semiconductor devices: Bond structure of semiconductors, intrinsic and extrinsic semiconductors; Basic principle and operation of semiconductor devices – diode, bipolar junction transistor, field effect transistors; Introduction to VLSI.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the basic principle, construction and operation of semiconductor devices. **L2**
- Learn about the diode, bipolar junction transistor and field effect transistors. **L1**

**UNIT – II:**

**Applications of semiconductor devices:** Basic concepts of rectifiers, voltage regulators, amplifiers and oscillators; Basic concepts of operational amplifier and their applications.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To learn the real time applications of semiconductor devices.(L1) **L1**
- To understand the basic concepts of operational amplifier and their applications.(L2) **L2**

**UNIT – III:**

**Introduction to digital systems:** Binary number system, Boolean algebra, Logic gates, adders, one-bit memory, flip-flops (SR, JK), shift registers, Asynchronous counter.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the binary number systems, Boolean algebra and working of logic gates. **L2**
- Know the working and applications of digital logic circuits. **L1**

**UNIT – IV:**

**Introduction to Communication Systems:** Elements of a communication system – transmitter and receiver; Signal types in communication; FDM and TDM; Processing of signals for transmission – basic concepts of amplitude and frequency modulation; Examples of telecommunication systems – telephone, radio, television, mobile communication and satellite communication.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Identify the basic elements of a communication system. **L2**
- Understand various examples of telecommunication systems. **L2**

**UNIT – V:**

**Sensors and Transducers** - Active and passive transducers: Measurement of displacement (Resistance, capacitance, inductance; LVDT) Force (strain gauges) Pressure (piezoelectric transducers) Temperature (resistance thermometers, thermocouples and thermistors), Velocity, Acceleration, Vibration, pH measurement Signal Conditioning Circuits.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the basic working principle and applications of different sensors and transducers. **L2**
- Measure physical parameters using different types of sensors and transducers. **L3**

**Text Books:**

1. Millman J, Halkias C.C andJit S, "Electronic Devices and Circuits", Tata McGraw-Hill, 2nd 2007 Edition.
2. Mano M.M., "Digital Design", Prentice-Hall, 3rd Edition. 2002
3. A.K. Sawhney, "A course in Electrical and Electronics Measurements and Instrumentation", Dhanpat Rai& Co. 3rd edition Delhi, 2010.
4. Kennedy G. and Davis B., "Electronic Communication Systems", Tata McGraw-Hill, 4th 2008 Edition.

**Reference Books:**

1. Tomasi W., "Advanced Electronic Communication Systems", Pearson/Prentice-Hall, 6th 2004 Edition.
2. Boylstead R.L. andNashelsky L., "Electronic Devices and Circuit Theory", Pearson, 10th 2009 Edition.

**Course Outcomes:**

At the end of this Course the student will be able to

- Understand the basic principle, construction and operation of semiconductor devices. **L2**
- Learn the real time applications of semiconductor devices. **L1**
- Comprehend the binary number systems, logic gates and digital logic circuits. **L1**
- Understand the basic principles of communication systems and their applications. **L2**
- Measure the physical parameters using Sensors and Transducers. **L3**

**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19AEC55b- TRANSDUCERS AND SENSORS**

**(Open Elective-I)**

| L | T | P | C |
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**Course Objectives:** The objectives of the course are to make the students learn about

- To study about the characteristics of instrumentation system and transducers.
- To know the operation of different types of Temperature Transducers.
- To learn the operation of different types of Flow Transducers.
- To understand the working and operation of different types of Pressure Transducers.
- To gain the knowledge on working of Force and Sound Transducers.

**UNIT – I:**

**Introduction:** General Configuration and Functional Description of measuring instruments, Static and Dynamic Characteristics of Instrumentation System, Errors in Instrumentation System, Active and Passive Transducers and their Classification.

**Motion Transducers:** Resistive strain gauge, LVDT, RVDT, Capacitive transducers, Piezo-electric transducers, seismic displacement pick-ups, vibrometers and accelerometers.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Learn the characteristics of instrumentation system and transducers. **L1**
- Measure motion using different motion transducers. **L3**

**UNIT – II:**

**Temperature Transducers:** Standards and calibration, fluid expansion and metal expansion type transducers - bimetallic strip, Thermometer, Thermistor, RTD, Thermocouple and their characteristics.

Hall effect transducers, Digital transducers, Proximity devices, Bio-sensors, Smart sensors, Piezo-electric sensors.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the working principle of temperature transducers. **L2**
- Study about different types of bio sensors and smart sensors. **L1**

**UNIT – III:**

**Flow Transducers:** Bernoulli's principle and continuity, Orifice plate, Nozzle plate, Venture tube, Rotameter, Anemometers, Electromagnetic flow meter, Impeller meter and Turbid flow meter.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the Bernoulli's principle and continuity. **L2**
- Learn how to measure flow using different types of flow meters. **L1**

**UNIT – IV:**

**Pressure Transducers:** Standards and calibration, different types of manometers, elastic transducers, diaphragm bellows, bourdon tube, capacitive and resistive pressure transducers, high and low pressure measurement.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Work with different types of manometers. **L3**
- Use different types of pressure transducersto measure pressure. **L3**

**UNIT – V:**

**Force and Sound Transducers:** Proving ring, hydraulic and pneumatic load cell, dynamometer and gyroscopes. Sound level meter, sound characteristics, Microphone.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Learn how to measure force using force transducers. **L1**
- Understand the working and operation of sound transducers. **L2**

**Text Books:**

1. A.K. Sawhney, "A course in Electrical and Electronics Measurements and Instrumentation", Dhanpat Rai& Co. 3rd edition Delhi, 2010.
2. Rangan C.S, Sarma G.R and Mani V S V,"Instrumentation Devices and Systems", TATA McGraw Hill publications, 2007.

**Reference Books:**

1. Doebelin. E.O, "Measurement Systems Application and Design",McGraw Hill International, New York, 2004.
2. Nakra B.CandChaudharyK.K , "Instrumentation Measurement and Analysis", Second Edition, Tata McGraw-Hill Publication Ltd.2006.

**Course Outcomes:**

At the end of this Course the student will be able to

- Understand the characteristics of instrumentation system and transducers **L2**
- Know the operation of different types of Temperature Transducers. **L1**
- Compare the operation of different types of Flow Transducers. **L2**
- Correlate the working and operation of different types of Pressure Transducers. **L4**
- Gain the knowledge on working of Force and Sound Transducers. **L1**

**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19AEC55c- PRINCIPLES OF COMMUNICATIONS**

**(Open Elective-I)**

| L | T | P | C |
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**Course Objectives:** The objectives of the course are to make the students learn about

- To understand the importance of modulation and Amplitude modulation.
- To know about the frequency modulation and phase modulation.
- To study different types of pulse analog modulation techniquesand multiple access techniques.
- To gain knowledge on pulse code modulation and different waveform coding techniques.
- To comprehend the wireless communication systems, their evolution and standards.

**UNIT – I:**

**Analog communication-I:** Elements of communication systems need for Modulation, Modulation Methods, Baseband and carrier communication Amplitude Modulation(AM),Generation of AM signals, Rectifier detector, Envelope detector, sideband and carrier power of AM, Double side band suppressed carrier(DSB-SC) modulation & its demodulation, Switching modulators, Ring modulator, Balanced modulator, Single sideband(SSB) transmission, VSB Modulation.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the basic elements of communication systems. **L2**
- Compare the performance of analog modulation schemes. **L2**

**UNIT – II:**

**Analog communication-II : Angle Modulation & Demodulation:** Concept of instantaneous frequency Generalized concept of angle modulation, Bandwidth of angle modulated waves- Narrow band frequency modulation (NBFM); and Wide band FM (WBFM),Phase modulation, Pre-emphasis & De-emphasis, Illustrative Problems.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Compare the performance of different frequency modulated schemes. **L2**
- Learn about the Pre-emphasis & De-emphasis circuits in frequency modulation. **L1**

**UNIT – III:**

**Digital communications-I (Qualitative Approach only) :Pulse Analog Modulation Techniques :** Pulse analog modulation techniques, Generation and detection of Pulse amplitude modulation, Pulse width modulation, Pulse position modulation

**Multiple Access Techniques:** Introduction to multiple access techniques, FDMA,TDMA, CDMA, SDMA: Advantages and applications

**Learning Outcomes:** At the end of this unit, the student will be able to

- Analyze the performance of different pulse modulation techniques. **L4**
- Understand the basic principles of Multiple Access Techniques. **L2**

**UNIT – IV:**

**Digital communications-II (Qualitative Approach only) :**Pulse Code Modulation, DPCM, Delta modulation, Adaptive delta modulation, Overview of ASK, PSK, QPSK, BPSK and M-PSK techniques.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the performance of different types of digital modulation schemes. **L2**
- Explain different types of waveform coding techniques and their applications. **L1**

**UNIT – V:**

**Wireless communications (Qualitative Approach only)** : Introduction to wireless communication systems, Examples of wireless communication systems, comparison of 2G and 3G cellular networks, Introduction to wireless networks, Differences between wireless and fixed telephone networks, Introduction to Global system for mobile(GSM),GSM services and features.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand various types of wireless communication systems. **L1**
- Explain GSM services and features. **L2**

**Text Books:**

1. H Taub, D. Schilling and Gautam Sahe, "Principles of Communication Systems", TMH, 2007, 3rd Edition
2. George Kennedy and Bernard Davis, "Electronics & Communication System", 4th Edition, TMH 2009
3. Wayne Tomasi, "Electronic Communication System: Fundamentals Through Advanced",2nd editions,PHI,2001.

**Reference Books:**

1. Simon Haykin, "Principles of Communication Systems", John Wiley, 2nd Edition.
2. Sham Shanmugam," Digital and Analog communication Systems",Wiley-India edition,2006.
3. Theodore. S.Rapport, "Wireless Communications",Pearson Education,2nd Edition,2002.

**Course Outcomes:**

At the end of this Course the student will be able to

- Understand the importance of modulation and Amplitude modulation. **L2**
- Summarize the frequency modulation and phase modulation methods. **L2**
- Explain about different types of pulse analog modulation techniquesand multiple access techniques. **L3**
- Acquire knowledge on pulse code modulation and different waveform coding techniques. **L1**
- Comprehend the wireless communication systems, their evolution and standards. **L1**

**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ACS56-INTERNET OF THINGS LAB**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 2 | 1 |

**LIST OF EXPERIMNENTS:**

1.Start Raspberry Pi and try various Linux commands in command terminal window: ls, cd, touch, mv, rm, man, mkdir, rmdir, tar, gzip, cat, more, less, ps, sudo, cron, chown, chgrp, ping etc.

2. Run some python programs on Pi like:

Read your name and print Hello message with name

Read two numbers and print their sum, difference, product and division.

Word and character count of a given string

Area of a given shape (rectangle, triangle and circle) reading shape and appropriate valuesfrom standard input

Print a name 'n' times, where name and n are read from standard input, using for and while loops.

Handle Divided by Zero Exception.

Print current time for 10 times with an interval of 10 seconds.

Read a file line by line and print the word count of each line.

3. Write a program to blink LED by using Switch.

4. Write a program to read the LDR values and based on the value control the intensity of LED

5. Get input from two switches and switch on corresponding LEDs

6. Flash an LED at a given on time and off time cycle, where the two times are taken from a file.

7. Write a program to toggle 2 LED's alternatively with a delay of 1 second.

8. Write a program to control the servo motor.

B.Tech III Year I Semester

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19AHS13-ENGLISH LANGUAGE SKILLS LAB**

**(Common to EEE, ECE & CSE)**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 3 | 1.5 |

**Course Objectives:**

- Students will cultivate the habit of reading passages from the computer monitor. Thus providing them with the required facility to face computer based competitive exams like GRE, TOEFL and GMAT etc.
- students will be trained to use language effectively to face interviews, group discussions, public speaking

**UNIT – I:** **12Hrs**

1. Phonetics for listening comprehension of various accents -2
2. Formal Presentations using PPT slides without Graphic Elements.
3. Paraphrasing.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand different accents spoken by native speakers of English **L1**
- Make formal structured presentations on general topics using PPT slides without graphical elements **L2**

**UNIT – II:** **12Hrs**

1. Debate – 2 (Following Argument).
2. Listening to short speeches/ short stories for note-making and summarizing.
3. E-mail Writing.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Participate in formal discussions and speak clearly on a specific topic using suitable discourse markers. **L1**
- Make formal structured presentations on academic topics using ppt slides with relevant graphical elements. **L2**

**UNIT – III** **12Hrs**

1. Listening for Discussions.
2. Group Discussions.
3. Writing Persuasive/argumentative essays on general topics.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Participate in group discussions using appropriate conventions and language strategies. **L1**
- Produce logically coherent persuasive/argumentative essays. **L2**

**UNIT – IV** **12Hrs**

1. Reviewing film/book.
2. Group Discussions – reaching consensus in Group Work.
3. Resume Writing – Cover Letter – Applying for Internship.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Express thoughts and ideas with acceptable accuracy and fluency with a view to reach consensus in group discussions **L1**
- Prepare a CV and write a cover letter to seek internship/job **L2**

1/10/21

**UNIT – V** **12Hrs**

1. Writing Project Reports.
2. Editing Short Texts.
3. Answering FAQs in Interviews.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Collaborate with a partner to make effective presentations. **L1**
- Understand the structure and produce an effective project report. **L2**

**Suggested Software**

- Walden Infotech English Language Communication Skills.
- iTell- Orell Digital Language Lab.
- Digital Teacher.
- LES(Learn English Select) by British council.
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS).
- DELTA's key to the Next Generation TOEFL Test: Advanced Skills Practice.
- Lingua TOEFL CBT Insider, by Dreamtech.
- English Pronunciation in Use (Elementary, Intermediate, Advanced)CUP.
- Cambridge Advanced Learners' English Dictionary withCD.

**Reference Books:**


1. Meenakshi Raman &Sangeeta Sharma, "Technical Communication" O U Press2009.
2. Barron's Books on TOEFL/GRE/GMAT/CAT/IELTS /DELTA/Cambridge University Press.2012
3. Butterfield Jeff, "Soft Skills for Everyone", Cengage Publications,2011.
4. "Practice Psychometric Tests": How to familiarize yourself with genuine recruitment tests, 2012.
5. David A McMurrey & Joanne Buckely "Handbook for Technical Writing" CENGAGE Learning2008.
6. "A Textbook of English Phonetics for Indian Students", 2nd Edition, T.Balasubramanyam. (Macmillan),2012.
7. "A Handbook for English Laboratories", E. Suresh Kumar, P. Sreehari, Foundation Books, 2011.
8. Sambaiah.M. ***Technical English***, Wiley publishers India. New Delhi. 2014.


**Course Outcomes:**

At the end of this Course the student will be able to

- Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills. **L1**
- Apply communication skills through various language learning activities. **L2**
- Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension. **L3**
- Evaluate and exhibit acceptable etiquette essential in social and professional settings **L4**
- Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English. **L5**

**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ACS57-DATA MINING LAB**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 2 | 1 |

**Course Objectives:**

- Emphasize hands-on experience working with all real data sets.

**LIST OF EXPERIMNENTS:**

Task 1: Credit Risk Assessment Description:

The business of banks is making loans. Assessing the credit worthiness of an applicant is of crucial importance. You have to develop a system to help a loan officer decide whether the credit of a customer is good, or bad. A bank's business rules regarding loans must consider two opposing factors. On the one hand, a bank wants to make as many loans as possible. Interest on these loans is the banks profit source. On the other hand, a bank cannot afford to make too many bad loans. Too many bad loans could lead to the collapse of the bank. The bank's loan policy must involve a compromise: not too strict, and not too lenient. To do the assignment, you first and foremost need some knowledge about the world of credit. You can acquire such knowledge in a number of ways.

Task 1: Credit Risk Assessment Description:

The business of banks is making loans. Assessing the credit worthiness of an applicant is of crucial importance. You have to develop a system to help a loan officer decide whether the credit of a customer is good, or bad. A bank's business rules regarding loans must consider two opposing factors. On the one hand, a bank wants to make as many loans as possible. Interest on these loans is the banks profit source. On the other hand, a bank cannot afford to make too many bad loans. Too many bad loans could lead to the collapse of the bank. The bank's loan policy must involve a compromise: not too strict, and not too lenient. To do the assignment, you first and foremost need some knowledge about the world of credit. You can acquire such knowledge in a number of ways.

1. Knowledge Engineering. Find a loan officer who is willing to talk. Interview her and try to represent her knowledge in the form of production rules.
2. Books. Find some training manuals for loan officers or perhaps a suitable textbook on finance. Translate this knowledge from text form to production rule form.
3. Common sense. Imagine yourself as a loan officer and make up reasonable rules which can be used to judge the credit worthiness of a loan applicant.
4. Case histories. Find records of actual cases where competent loan officers correctly judged when, and when not to, approve a loan application.

The German Credit Data:

Actual historical credit data is not always easy to come by because of confidentiality rules. Here is one such dataset, consisting of 1000 actual cases collected in Germany. Credit dataset (original) Excel spreadsheet version of the German credit data.

In spite of the fact that the data is German, you should probably make use of it for this assignment. (Unless you really can consult a real loan officer!) A few notes on the German dataset

1. DM stands for Deutsche Mark, the unit of currency, worth about 90 cents Canadian (but looks and acts like a quarter).
2. owns_telephone. German phone rates are much higher than in Canada so fewer people own telephones.
3. foreign_worker. There are millions of these in Germany (many from Turkey). It is very hard to get German citizenship if you were not born of German parents.
4. There are 20 attributes used in judging a loan applicant. The goal is to classify the applicant into one of two categories, good or bad.

**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ACS58-OBJECT ORIENTED ANALYSIS, DESIGN AND TESTING LAB**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 2 | 1 |

**LIST OF EXPERIMNENTS:**

Draw standard UML diagrams using an UML modeling tool for a given case study and map design to code and implement a 3 layered architecture. Test the developed code and validate whether the SRS is satisfied.

1. Identify a software system that needs to be developed.
2. Document the Software Requirements Specification (SRS) for the identified system.
3. Identify use cases and develop the Use Case model.
4. Identify the conceptual classes and develop a Domain Model and also derive a Class Diagram from that.
5. Using the identified scenarios, find the interaction between objects and represent them using UML Sequence and Collaboration Diagrams.
6. Draw relevant State Chart and Activity Diagrams for the same system.
7. Implement the system as per the detailed design.
8. Test the software system for all the scenarios identified as per the use-case diagram.
9. Improve the reusability and maintainability of the software system by applying appropriate design patterns.
10. Implement the modified system and test it for various scenarios.

**SUGGESTED DOMAINS FOR MINI-PROJECT:**

1. Passport automation system
2. Book bank
3. Exam Registration
4. Stock maintenance system
5. Online course reservation system
6. Student Information System
7. Library Management System
8. BPO Management System
9. Conference Management System
10. Foreign trading system
11. Recruitment system
12. e-book management system
13. Credit card processing
14. Software personnel management system
15. Airline/Railway reservation system

**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19AHS17-RESEARCH METHODOLOGY**

**(Common to EEE, ECE & CSE)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 0 |

**Course Objectives:**

- Students should understand a general definition of research design.
- Students should be able to identify the overall process of designing a research study from its inception to its report.

**UNIT – 1:**

Meaning of Research — Objectives of Research — Types of Research — Research Approaches — Guidelines for Selecting and Defining a Research Problem — research Design — Concepts related to Research Design — Basic Principles of Experimental Design.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the concept of research and its process. **L1**
- Explain various types of research. **L2**

**UNIT – II:**

Sampling Design — steps in Sampling Design —Characteristics of a Good Sample Design — Random Sampling Design. Measurement and Scaling Techniques-Errors in Measurement — Tests of Sound Measurement — Scaling and Scale Construction Techniques — Time Seri. Analysis — Interpolation and Extrapolation. Data Collection Methods — Primary Data — Secondary data — Questionnaire Survey and Interviews.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the concept of sampling and sampling design. **L1**
- Explain various techniques in measurement and scaling. **L2**

**UNIT – III:**

Correlation and Regression Analysis — Method of Least Squares — Regression on Correlation — Correlation on Determination — Types of Correlations and Their Applications.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Know the association of two variables. **L1**
- Understand the importance of correlation and regression. **L2**

**UNIT – IV:**

Statistical Inference: Tests of Hypothesis — Hypothesis Testing Procedure — Sampling Theory — Sampling Distribution — Chi-square Test — Multi-variate Analysis.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Know the statistical inference. **L1**
- Understand the hypothesis testing procedure. **L2**

**UNIT – V:**

Report Writing and Professional Ethics: Interpretation of Data — Report Writing — Layout of a Research Paper — Techniques of Interpretation- Making Scientific Presentations in Conferences and Seminars — Professional Ethics in Research.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Learn about report writing. **L1**
- Understand how to write research paper. **L2**

**Text Books:**

1. C.R.Kothari, "Research Methodology: Methods and Techniques",2nd edition, New Age International Publishers.
2. A Step by Step Guide for Beginners, "Research Methodology":Ranjit Kumar, Sage Publications.

**Reference Books:**

1. P.Narayana Reddy and G.V.R.K.Acharyulu, "Research Methodology and Statistical Tools", 1st Edition, Excel Books, New Delhi.
2. Donald R. "Business Research Methods", Cooper & Pamela S Schindler, 9th edition.
3. S C Gupta, "Fundamentals of Statistics", 7th edition Himalaya Publications.
4. Dr. P.Satyanarayana, "a Companion to Literary Research", 1st edition 2020, HSRA publications.

**Course Outcomes:**

At the end of this Course the student will be able to

- Develop understanding on various kinds of research, objectives of doing research, research process, research designs and sampling. **L1**
- Identify and discuss the complex issues inherent in selecting a research problem, selecting an appropriate research design, and implementing a research project. **L2**
- Have basic knowledge on qualitative research techniques. **L3**
- Identify and discuss the concepts and procedures of sampling, data collection, analysis and reporting. **L4**
- Have basic awareness of data analysis-and hypothesis testing procedures. **L5**

**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ACS61-MACHINE LEARNING**

| L | T | P | C |
|---|---|---|---|
| 4 | 0 | 0 | 4 |

**Course Objectives:**

- To be able to formulate machine learning problems corresponding to different applications.
- To understand a range of machine learning algorithms along with their strengths and weaknesses.
- To understand the basic theory underlying machine learning.

**UNIT – I: Introduction** **8hrs**

An illustrative learning task, and a few approaches to it. What is known from algorithms? Theory, Experiment. Biology. Psychology. Overview of Machine learning, related areas and applications. Linear Regression, Multiple Regression, Logistic Regression, logistic functions. Concept Learning: Version spaces. Inductive Bias. Active queries. Mistake bound/ PAC model. basic results. Overview of issues regarding data sources, success criteria.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain Machine Learning concepts, classifications of Machine Learning and write simple programs using python. **L2**
- Describe Supervised Learning concepts. **L3**

**UNIT – II: Decision Tree Learning** **8hrs**

Minimum Description Length Principle. Occam's razor. Learning with active queries Introduction to information theory, Decision Trees, Cross Validation and Over fitting. Neural Network Learning: Perceptions and gradient descent back propagation, multilayer networks and back propagation.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain Support Vector Machine concepts **L3**
- Describe unsupervised learning concepts and dimensionality reduction techniques. **L4**

**UNIT – III: Sample Complexity and Over fitting** **8hrs**

Errors in estimating means. Cross Validation and jackknifing VC dimension. Irrelevant features: Multiplicative rules for weight tuning. Support Vector Machines: functional and geometric margins, optimum margin classifier, constrained optimization, Lagrange multipliers, primal/dual problems, KKT conditions, dual of the optimum margin classifier, soft margins, and kernels. Bayesian Approaches: The basics Expectation Maximization. Bayes theorem, Naïve Bayes Classifier, Markov models, Hidden Markov Models.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Discuss simple Machine Learning applications in a range of real-world applications using Python programming **L4**

**UNIT – IV: Instance-based Techniques** **7 Hrs**

Lazy vs. eager generalization. K nearest neighbor, case- based reasoning. Clustering and Unsupervised Learning: K-means clustering, Gaussian mixture density estimation, model selection

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Describe unsupervised learning concepts and dimensionality reduction techniques. **L3**

- Ability to identify the characteristics of datasets and compare the trivial data and big data for various applications. **L5**

**UNIT – V: Genetic Algorithms**

Different search methods for induction - Explanation-based Learning: using prior knowledge to reduce sample complexity. Dimensionality reduction: feature selection, principal component analysis, linear discriminant analysis, factor analysis, independent component analysis, multidimensional scaling, manifold learning

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Ability to select and implement machine learning techniques and computing environment that are suitable for the applications under consideration. **L3**
- Ability to solve problems associated with batch learning and online learning, and the big data characteristics such as high dimensionality, dynamically growing data and in particular scalability issues. **L4**

**Text Books:**

1. Tom Michel, Machine Learning, McGraw Hill, 1997
2. Trevor Has tie, Robert Tibshirani & Jerome Friedman. The Elements of Statically Learning, Springer Verlag, 2001

**Reference Books:**

1. Machine Learning Methods in the Environmental Sciences, Neural Networks, William W Hsieh, Cambridge Univ Press.
2. Richard o. Duda, Peter E. Hart and David G. Stork, pattern classification, John Wiley & Sons Inc.,2001 3. Chris Bishop, Neural Networks for Pattern Recognition, Oxford University Press, 1995

**Course Outcomes:**

At the end of this Course the student will be able to

- Student should be able to understand the basic concepts such as decision trees and neural networks. **L4**
- Ability to formulate machine learning techniques to respective problems. **L3**
- Apply machine learning algorithms to solve problems of moderate complexity **L5**

**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ACS62-BIG DATA ANALYTICS**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- Master the concepts of HDFS and Map Reduce framework.
- Understand Hadoop Architecture.
- Setup Hadoop Cluster and write Complex Map Reduce programs.
- Perform Data Analytics using Hive.
- Implement HBase and Map Reduce Integration.
- Implement best Practices for Hadoop Development.
- They will understood about R analytics Based on big data.

**UNIT – I: Introduction to Big Data** **8hrs**

What is Big Data. Why Big Data is Important. Meet Hadoop. Data. Data Storage and Analysis. Comparison with other systems. Grid Computing. A brief history of Hadoop. Apache hadoop and the Hadoop EcoSystem. Linux refresher; VMWare Installation of Hadoop.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Student will be able to know where the Big data is used and its importance. **L2**
- Students will be able to know how the Big data will be handled and its problems. **L2**

**UNIT – II: The design of HDFS** **8hrs**

HDFS concepts. Command line interface to HDFS.Hadoop File systems. Interfaces. Java Interface to Hadoop. Anatomy of a file read. Anatomy of a file writes. Replica placement and Coherency Model. Parallel copying with distcp, Keeping an HDFS cluster balanced.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Students will be able to learn the importance of Hadoop. **L2**
- Students will be able to know about Doug Cutting and how the Hadoop came into existence. **L2**

**UNIT – III:** **8hrs**

Introduction. Analyzing data with unix tools. Analyzing data with hadoop. Java MapReduce classes (new API). Data flow, combiner functions, Running a distributed MapReduce Job. Configuration API. Setting up the development environment. Managing configuration. Writing a unit test with MRUnit. Running a job in local job runner. Running on a cluster.Launching a job. The MapReduce WebUI.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Students will be able to know about Doug Cutting and how the Hadoop came into existence. **L3**
- Student will be able to know about HDFS, MapReduce and Hadoop releases. **L4**

**UNIT – IV: Sensors and Connectivity** **7 Hrs**

Classic Mapreduce. Job submission. Job Initialization. Task Assignment. Task execution .Progress and status updates. Job Completion. Shuffle and sort on Map and reducer side. Configuration tuning. Map Reduce Types. Input formats. Output formats, Sorting. Map side and Reduce side joins.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Student will be able to know about HDFS, MapReduce and Hadoop releases. **L3**
- Students will be able to know how to write a program in Hadoop **L4**

**UNIT – V: The Hive Shell**

Hive services. Hive clients. The meta store. Comparison with traditional databases. Hive Ql. Hbasics. Concepts. Implementation. Java and Map reduce clients. Loading data, web queries.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Students will be able to know how to write a program in Hadoop **L4**
- Students will be able to know how Map and Reduce done in Hadoop **L5**
- Students will be able to know how to view information about jobs in web browser **L5**

**Text Books:**

1. Tom White, Hadoop,"The Definitive Guide", 3rd Edition, O'Reilly Publications, 2012.
2. Dirk deRoos, Chris Eaton, George Lapis, Paul Zikopoulos, Tom Deutsch ,"Understanding Big Data Analytics for Enterprise Class Hadoop and Streaming Data", 1st Edition, TMH,2012.

**Reference Books:**

1. Hadoop for Dummies by Dirk deRoos ,Paul C.Zikopoulos,Roman B.MelnyK,Bruce Brown,Rafael Coss.

**Course Outcomes:**

At the end of this Course the student will be able to

- Student will be able to know where the Big data is used and its importance. **L2**
- Students will be able to know how the Big data will be handled and its problems. **L3**
- Students will be able to learn the importance of Hadoop. **L3**
- Students will be able to know about Doug Cutting and how the Hadoop came into existence. **L4**
- Student will be able to know about HDFS, MapReduce and Hadoop releases. **L3**
- Students will be able to know how to write a program in Hadoop **L5**
- Students will be able to know how Map and Reduce done in Hadoop. **L5**
- Students will be able to know how to view information about jobs in web browser. **L6**

**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ACS63-CYBER SECURITY**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- To familiarize various types of cyber-attacks and cyber-crimes.
- To give an overview of the cyber laws
- To study the defensive techniques against these attacks

**UNIT – I: Introduction to Cyber Security** **8hrs**

Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, Comprehensive Cyber Security Policy.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Protect and defend computer systems and networks from cybersecurity attacks. **L2**
- Characterize privacy, legal and ethical issues of information security. **L3**
- Identify vulnerabilities critical to the information assets of an organization. **L3**

**UNIT – II: Cyber Forensics** **8hrs**

Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Define the security controls sufficient to provide a required level of confidentiality, integrity, and availability in an organization's computer systems and networks **L2**
- Diagnose and investigate cyber security events or crimes related to computer systems and digital evidence. **L3**

**UNIT – III: Cybercrime: Mobile and Wireless Devices** **8hrs**

Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Attacks on Mobile/Cell Phones.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Diagnose attacks on an organization's computer systems and networks. **L2**
- Propose solutions including development, modification and execution of incident response plans. **L3**

**UNIT – IV: Cyber Security: Organizational Implications** **7 Hrs**

Introduction, cost of cybercrimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Apply critical thinking and problem-solving skills to detect current and future attacks on an organization's computer systems and networks. **L4**

**UNIT – V: Privacy Issues: Basic Data Privacy Concepts**

Fundamental Concepts, Data Privacy Attacks, Data linking and profiling, privacy policies and their specifications

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Communication orally and in writing, proposed information security solutions to technical and non Apply business principles to analyze and interpret data for planning, decision. **L4**

**Text Books:**

1. Nina Godbole and SunitBelpure, Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley
2. B. B. Gupta, D. P. Agrawal, Haoxiang Wang, Computer and Cyber Security: Principles, Algorithm, Applications, and Perspectives, CRC Press, ISBN 9780815371335, 2018.

**Reference Books:**

1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press.
2. Introduction to Cyber Security, Chwan-Hwa(john) Wu,J. David Irwin, CRC Press T&F Group.

**Course Outcomes:**

At the end of this Course the student will be able to

- To understand cyber-attacks, types of cybercrimes, cyber laws and also how to protect them self and ultimately the entire Internet community from such attacks. **L4**

**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ACS64a-SCRIPTING LANGUAGES**

**Professional Elective-II**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- The course demonstrates an in depth understanding of the tools and the scripting languages necessary for design and development of applications dealing with Bio-information/ Blo-data.
- The instructor is advised to discuss examples in the context of Bio-data/ Bio-information application development.

**UNIT – I: Introduction to PERL and Scripting** **8hrs**

Scripts and Programs, Origin of Scripting , Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL-Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Ability to understand the differences between scripting languages. **L2**
- Master an understanding of python especially the object oriented concepts. **L3**

**UNIT – II: Advanced perl & PHP** **8hrs**

**Advanced perl:** Finer points of looping, pack and unpack, file system, eval, data structures, packages, modules, objects, interlacing to the operating system, Creating Internet ware applications, Dirty Hands Internet Programming, security Issues.

**PHP Basics-** Features, Embedding PHP Code in your Web pages, Outputting the data to the browser, Data types, Variables, Constants, expressions, string interpolation, control structures .Function, Creating a Function, Function Libraries, Arrays, strings and Regular Expressions.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Ability to apply your knowledge of the weaknesses of scripting languages to select implementation. **L3**
- Ability to understand the differences between scripting languages. **L4**

**UNIT – III: Advanced PHP Programming** **8hrs**

PHP and Web Forms, Files, PHP Authentication and Methodologies -Hard Coded, File Based, Database Based, IP Based, Login Administration, Uploading Files with PHP, Sending Email using PHP, PHP Encryption Functions, the Mcrypt package, Building Web sites for the World.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Ability to understand the differences between scripting languages. **L3**
- Master an understanding of python especially the object oriented concepts. **L5**

**UNIT – IV: TCL** **7 Hrs**

TCL Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures, input/output, procedures , strings, patterns, files, Advance TCLeval, source, exec and uplevel commands, Name spaces, trapping errors, event driven programs, making applications Internet aware, Nuts and Bolts Internet Programming, Security Issues

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Master an understanding of python especially the object oriented concepts. **L4**
- Ability to apply your knowledge of the weaknesses of scripting languages to select implementation. **L5**

**UNIT – V: Java Script**

Introduction to Java Script, Basic Java Script: Values, Variables and control Flow.
Functions, Data Structures: Objects and Arrays.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Comprehend the differences between typical scripting languages and typical system and application programming languages. Gain knowledge of the strengths and weakness of Perl **L5**
- Comprehend the differences between typical scripting languages and typical system and application programming languages. Gain knowledge of the strengths and weakness of Perl **L4**

**Text Books:**

1. The World of Scripting Languages, David Barron,Wiley Publications.
2. Python Web Programming , Steve Holden and David Beazley, New Riders Publications.
3. Beginning PHP and MySQL, 3rd Edition , Jason Gilmore, Apress Publications (Dream tech.).

**Reference Books:**

1. Open Source Web Development with LAMP using Linux, Apache, MySQL, Pen and PHP, J.Lee and B.Ware(Addison Wesley) Pearson Education.
2. Programming Python,M.Lutz,SPD.
3. PHP 6 Fast and Easy Web Development, Julie Meloni and Matt Telles, Cengage Learning Publications.

**Course Outcomes:**

At the end of this Course the student will be able to

- Ability to understand the differences between scripting languages. **L2**
- Master an understanding of python especially the object oriented concepts. **L3**
- Ability to apply your knowledge of the weaknesses of scripting languages to select implementation. **L4**

**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ACS64b-MOBILE COMPUTING**

**Professional Elective-II**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- This course will provide graduate students of MSc Information Systems with both broad and in-depth knowledge, and a critical understanding of mobile computing from different viewpoints: infrastructures, principles and theories, technologies, and applications in different domains.
- The course will provide a complete overview of the mobile computing subject area, including the latest research.
- Student will have the opportunity to delve into more specific technology and/or application domains by forming a small special interest group (SIG) with their fellow students.
- In addition, through presentations, Q&A, and debates, students will have the opportunity to further explore specific topics.

**UNIT – I: Introduction & GSM** **8hrs**

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, CSHSD, DECT.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the principles and theories of mobile computing technologies. **L2**
- Describe infrastructures and technologies of mobile computing technologies. **L3**

**UNIT – II: (Wireless) Medium Access Control (MAC) & Mobile Network Layer:** **8hrs**

Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA, Wireless LAN/(IEEE 802.11)

IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, DHCP.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Describe infrastructures and technologies of mobile computing technologies. **L3**
- List applications in different domains that mobile computing offers to the public, employees, and businesses. **L4**

**UNIT – III: Mobile Transport Layer & Database Issues:** **8hrs**

**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.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- List applications in different domains that mobile computing offers to the public, employees, and businesses. **L3**

- Describe the possible future of mobile computing technologies and applications. **L4**

**UNIT – IV: Data Dissemination and Synchronization:** **7 Hrs**

**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

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Describe the possible future of mobile computing technologies and applications. **L4**
- Effectively communicate course work through written and oral presentations **L5**

**UNIT – V: Mobile Adhoc Networks (MANETs), Protocols and Platforms for Mobile Computing**

**Mobile Adhoc Networks (MANETs):** Introduction, Applications & Challenges of a MANET, Routing, Classification of Routing Algorithms, Algorithms such as DSR, AODV, DSDV, Mobile Agents, Service Discovery.

**Protocols and Platforms for Mobile Computing:** WAP, Bluetooth, XML, J2ME, Java Card, Palm OS, Windows CE, Symbian OS, Linux for Mobile Devices, Android.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Describe infrastructures and technologies of mobile computing technologies. **L5**
- List applications in different domains that mobile computing offers to the public, employees, and businesses. **L6**

**Text Books:**

1. Jochen Schiller, "Mobile Communications", Addison-Wesley, Second Edition, 2009.
2. Raj Kamal, "Mobile Computing", Oxford University Press, 2007, ISBN: 0195686772.

**Reference Books:**

1. Jochen Schiller, "Mobile Communications", Addison-Wesley, Second Edition, 2004.
2. Stojmenovic and Cacute, "Handbook of Wireless Networks and Mobile Computing", Wiley, 2002, ISBN 0471419028.
3. Reza Behravanfar, "Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML", ISBN: 0521817331, Cambridge University Press, Oct 2004.

**Course Outcomes:**

At the end of this Course the student will be able to

- Explain the principles and theories of mobile computing technologies. **L2**
- Describe infrastructures and technologies of mobile computing technologies. **L3**
- List applications in different domains that mobile computing offers to the public, employees, and businesses. **L4**
- Describe the possible future of mobile computing technologies and applications. **L5**
- Effectively communicate course work through written and oral presentations **L6**

**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ACS64c-SOFTWARE ARCHITECTURE**

**Professional Elective-II**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- Understand architectural requirements
- Identify architectural structures
- Develop architectural documentation
- Generate architectural alternatives

**UNIT – I: Basic Concepts** **8hrs**

Concepts of Software Architecture, Models, Processes, Stakeholders.
Designing Architectures: The Design Process, Architectural Conception.
Refined Experience in Action: Styles and Architectural Patterns, Architectural Conception in Absence of Experience.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Argue the importance and role of software architecture in large-scale software systems. **L2**
- Design and motivate software architecture for large-scale software systems. **L3**

**UNIT – II: Modeling** **8hrs**

Modeling Concepts, Ambiguity, Accuracy, and Precision, Complex Modeling: Mixed Content and Multiple Views, Evaluating Modeling Techniques, Specific Modeling Techniques.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Design and motivate software architecture for large-scale software systems. **L3**
- Recognize major software architectural styles and frameworks. **L4**

**UNIT – III: Analysis** **8hrs**

**Analysis-** Analysis Goals, Scope of Analysis, Architectural Concern being Analyzed, Level of Formality of Architectural Models, Type of Analysis, Analysis Techniques.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Recognize major software architectural styles and frameworks. **L3**
- Describe a software architecture using various documentation approaches and architectural description languages. **L4**

**UNIT – IV: Implementation and Deployment** **7 Hrs**

Implementation and Deployment- Concepts, Existing Frameworks, Software Architecture and Deployment, Software Architecture and Mobility
Conventional Architectural styles- Pipes and Filters, Event- based, Implicit Invocation, Layered systems, Repositories, Interpreters, Process control

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Describe a software architecture using various documentation approaches and architectural description languages. **L5**
- Generate architectural alternatives for a problem and selection among them. **L3**

**UNIT – V: Applied Architectures and Styles**

Applied Architectures and Styles-Distributed and Networked Architectures, Architectures for Network-Based Applications, Decentralized Architectures, Service-Oriented Architectures and Web Services

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Use well-understood paradigms for designing new systems. **L3**
- Identify and assess the quality attributes of a system at the architectural level. **L4**

**Text Books:**

1. Software Architecture: Foundations, Theory, and Practice, by Richard N.Taylor, Nenad Medvidovic, Eric Dashofy, ISBN: 978-0-470-16774-8
2. M. Shaw: Software Architecture Perspectives on an Emerging Discipline, Prentice-Hall.
3. Len Bass, Paul Clements, Rick Kazman: Software Architecture in Practice, Pearson

**Reference Books:**

1. Pattern Oriented Software Architecture, By Frank Buchnanetal, Wiley India.
2. The Art of Software Architecture, By Stephen T. Albin

**Course Outcomes:**

At the end of this Course the student will be able to

- Argue the importance and role of software architecture in large-scale software systems. **L4**
- Design and motivate software architecture for large-scale software systems. **L3**
- Recognize major software architectural styles and frameworks. **L3**
- Describe a software architecture using various documentation approaches and architectural description languages. **L2**
- Generate architectural alternatives for a problem and selection among them. **L5**
- Use well-understood paradigms for designing new systems. **L3**
- Identify and assess the quality attributes of a system at the architectural level. **L5**

**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19AHS11-COMPETITIVE & SPOKEN ENGLISH**

**(Open Elective-II)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- To train students to use language effectively in everyday conversations and to participate in group discussions.
- To enable them to learn and practice competitive English and ready for competitive examinations.

**UNIT – 1: Grammar**

Sentences-Construction-Types-Affirmative-Interrogative-Nouns-Pronouns-Verbs-Models-Tenses-Adverb-Adjective-Speech-Voice-Articles-Prepositions-Conjunctions.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Students will improve their speaking ability in English both in terms of fluency and comprehensibility by enlarging their vocabulary. **L1**
- Students will attain and enhance competence in the four modes of literacy: listening, speaking, reading and writing **L2**

**UNIT – II: Vocabulary**

**Content of the Unit – II**

Competitive Vocabulary List-Word Building Tips- Antonyms-Synonyms-One word Substitutes-Idioms and Phrases-Phrasal Verbs-Reading Comprehension-importance- tips- Cracking unknown passage.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the factors that influence use of grammar and vocabulary in speech and writing **L1**
- Comprehend the meaning of paragraphs and unknown passages **L2**

**UNIT – III: Speaking Skills**

Dynamics of Speaking-Communication Skills -Public Speaking- Significance to Professionals- establishing credibility & Confidence- Preparation of Speech-Audience-Analysis -Topic generation Techniques.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Display competence in oral, written and visual communication **L1**
- Showan understanding of opportunities in the field of communication **L2**

**UNIT – IV: Stage Dynamics**

Organization of Speech- Platform Manners- Body language- Psychology of Persuasion- Speeches for Special Occasions-exercises-Recording and feedback sessions.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Analyze your audience and design speeches to reflect your analysis. **L1**
- Evaluate speeches based on a variety of verbal and non-verbal criteria. **L2**



11/10/21

**UNIT – V:Accent Neutralization**

Realization of past tense and plural forms- Stress Rules– Intonation- Connected speech- weak forms-assimilation-elision- Linking and Intrusion-juncture-contractions.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Able to identify which are stressed and unstressed words. **L1**
- Reproduce in speech, appropriate pattern of intonation and rhythm. **L2**

**Reference Books:**


1. Hari Mohan Prasad, ***Objective English for Competitive Examination,*** Tata McGraw Hill, New Delhi, 2014.
2. V SASIKUMAR and PV DHAMIJA ***: SPOKEN ENGLISH A Self- Learning Guide to Conversation Practice***, 2nd Edition, TATA McGRAW-HILL'S SERIES.
3. M.Sambaiah, ***Technical English***, Wiley publishers India. New Delhi. 2014.
4. JK GANGAL, A PRCACTICAL COURSE IN EFFECTIVE ENGLISHSPEAKING SKILLS, PHI LEARNING Private Ltd. New Delhi. 2012
5. KRISHNA MOHAN and N.P. SINGH,***SPEAKING ENGLISH EFFECTIVELY,*** 2nd Edition, Trinity Press, 2015.
6. Wren and Martin,***High School English Grammar and Composition,*** S. Chand Publication, New Delhi, 2014.
7. Neetu Singh, ***English for General Competitions from Plinth To Paramount*** *(Volume-I&II),*Paramount Reader Publications, 2014.
8. Dale Carnegie,***The Quick And Easy Way To Effective Speaking***, Vermilion Publications, 1990.
9. E Suresh Kumar. ***Effective Publish Speaking***, Orient Longman, 2016.


**Course Outcomes:**

At the end of this Course the student will be able to

- Becoming active participants in the learning process and acquiring proficiency in spoken English of the students. **L1**
- Speaking with clarity and confidence thereby enhancing employability skills of the students. **L2**
- Participate in critical conversations and prepare, organize and deliver in public contexts **L3**
- Improving their speaking ability in English both in terms of fluency and comprehensibility **L4**
- Equipped with competitive proficiency in English for various competitive examinations at state, national and international level. **L5**

**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ABS23-INTEGRAL TRANSFORMS AND ITS APPLICATIONS**

**(Open Elective -II)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:** This course aims at providing the student

- With the concepts and several methods of integral transforms and its applications.
- The concepts of fractional calculus and its applications.

**UNIT – 1: Basic concepts of integral transforms:: Fourier transforms:** **9 Hrs**

Introduction, basic properties, applications to solutions of Ordinary Differential Equations (ODE), Partial Differential Equations (PDE) and Integral Equations.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Solve ordinary differential equations and partial differential equations. **L3**
- Solve Integral equations. **L3**

**UNIT – II: Laplace transforms:**

Introduction, existence criteria, Convolution, differentiation, integration, inverse transform, Tauberian Theorems, Watson's Lemma, solutions to ODE, PDE including Initial Value Problems (IVP) and Boundary Value Problems (BVP).

Applications of joint Fourier-Laplace transform, definite integrals, summation of infinite series, transfer functions, impulse response function of linear systems.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Solve initial and boundary value problems using Laplace transform technique. **L3**
- Apply the techniques of joint Fourier-Laplace transform techniques. **L4**

**UNIT – III: Hankel Transforms & Hilbert Transforms**

**Hankel Transforms:** Introduction, properties and applications to PDE Mellin transforms: Introduction, properties, applications; Generalized Mellin transforms.

**Hilbert Transforms:** Introduction, definition, basic properties, Hilbert transforms in complex plane, applications; asymptotic expansions of 1-sided Hilbert transforms.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Solve PDE by using the concepts of Hankel transforms. **L4**
- Learn the concepts of Hilbert transforms. **L3**

**UNIT – IV: Stieltjes Transform, Legendre transforms and Radon transforms**

**Stieltjes Transform:**

Definition, properties, applications, inversion theorems, properties of generalized Stieltjestrans form.

**Legendre transforms:**

Introduction, definition, properties, applications.

**Radon transforms:**

Introduction, properties, derivatives, convolution theorem, applications, inverse radon transform.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Analyzes the Stieltje's and Legender's transforms. **L4**
- Analyzes random transforms and focuses on thier applications. **L3**

**UNIT – V: Fractional Calculus and its applications & Integral transforms in fractional equations**

**Fractional Calculus and its applications:** Introduction, fractional derivatives, integrals, Laplace transform of fractional integrals and derivatives.

**Integral transforms in fractional equations:** fractional ODE, integral equations, IVP for fractional Differential Equations (DE), fractional PDE, green's function for fractional DE.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Learn the basic concepts of fractional calculus. **L2**
- Applies the concepts of integral transforms in fractional calculus. **L4**

**Text Books:**

1. Advanced Topics in Applied Mathematics for Engg. & physical Science: Sudhakar Nair
2. Introduction to Applied Mathematics, Gilbert Strang

**Reference Books:**

1. Fractional Calculus Theory and Applications of Differentiation and Integration to Arbitrary Order: J. Spanier and K. B. Oldham
2. Handbook of Mathematical Functions: M. Abramowitz & I. Stegun

**Course Outcomes:**

At the end of this Course the student will be able to

- Use the basic concepts of integral transforms, Stieltjes Transform, Legendre transforms and Radon transforms etc., in real life problems. **L1**
- Use the concepts of Laplace transforms in solving the initial value and boundary value problems. **L2**
- Applies the concepts of Hankel Transforms & Hilbert Transforms while addressing the various problems related to engineering sciences. **L3**
- Analyze the problems in engineering and technology using various techniques of integral transforms and applications. **L4**
- Uses the ideas of fractional calculus and its applications in solve the real world problems. **L5**

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**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ABS24-NUMERICAL ANALYSIS**

**(Open Elective –II)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:** This course aims at providing the student

- With the concepts and several methods of Numerical methods.
- To explore the solutions of ordinary differential equations, partial differential equations and integral equations.

**UNIT – 1: Solution of Algebraic and Transcendental equations & Solution to System of Nonlinear Equations and Spline Functions** **9 Hrs**

**Solution of Algebraic and Transcendental equations:**

Ramanujan's method – Secant method – Muller's method – Graeffe's root-squaring method – Lin-Bairstow's method – Quotient-Difference method

**Solution to System of Nonlinear Equations and Spline Functions:**

Method of Iteration- Newton-Raphson method. Linear splines - Quadratic splines – Cubic splines : Minimizing property of Cubic splines – Error in the Cubic Spline ad its derivatives – Surface fitting by cubic splines. – Cubic B-Splines: Representation of B- Splines – Least squares solution – Applications of B-Splines.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Solve the algebraic and transcendental equations **L2**
- Solve the system of nonlinear equations and spline functions. **L4**

**UNIT – II: Numerical Linear Algebra:**

Triangular matrices – LU decomposition of a matrix – vector and matrix norms. – Solutions of linear systems – Direct methods: Gauss elimination – necessary for pivoting – Gauss-Jordan method – modification of the Gauss method to compute the inverse – number of arithmetic operations – LU decomposition method – computational procedure for LU decomposition method – Lu decomposition from Gauss elimination – solution of tridiagonal systems – III conditioned linear systems – Method for III- conditioned systems. – Solution of linear systems –Iterative methods. – Matrix Eigen value problems – Eigen values of a symmetric tridiagonal matrix – Householder's method – QR method.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the concepts of numerical linear algebra. **L1**
- Apply the concepts of numerical linear algebra. **L3**

**UNIT – III: Numerical solution of ordinary differential equations:**

Solution by Taylor's series, Picard's method,Euluer's method , Runge-Kutta methods, Predictor-Corrector methods: Adams-Moulton method – Milne's method. – Cubic Spline method – Simultaneous and higher order equations. – Boundary value problems: Finite difference method – Cubic Spline method – Galerkin's method.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Solve first order initial value problems. **L3**
- Solve ssimultaneous and higher order equations and boundary value problems. **L4**

**UNIT – IV: Numerical solution of Partial differential equations:**

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Solve Laplace's equation using finite difference technique. **L3**
- Solve Heat equation and wave equation. **L4**

**UNIT – V: Numerical solution of Integral equations:**

Numerical methods for Fredholm equations: Method of degenerate Kernels – method of successive approximations – Quadrature methods – use of Chebyshev series – cubic Spline method – singular Kernels – method of invariant imbedding.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Apply numerical methods for solving Fredholm equations. **L3**
- Analyzes cubic Spline method, singular Kernels – method of invariant imbedding etc. **L4**

**Text Books:**

1. S. S. Sastry, Introductory Methods of Numerical Analysis( Fifth Edition 2012), PHI Learning Private Limited, New Delhi.

**Reference Books:**

1. M.K.Jain,S.R.K.Iyengar, R.K.Jain, Numerical Methods for Scientific and Engineering Computation (sixth edition),Nee Age International(P) Limited, Publishers, New Delhi.
2. K.E. Atkinson, An Introduction to Numerical Analysis, Wiley, 1989.S.D. Conte and C. De Boor, Elementary Numerical Analysis 302226 An Algorithmic Approach, McGraw-Hill, 1981.
3. K. Eriksson, D. Estep, P. Hansbo and C. Johnson, Computational Differential Equations, Cambridge Univ. Press, Cambridge, 1996.
4. G.H. Golub and J.M. Ortega, Scientific Computing and Differential Equations: An Introduction to Numerical Methods, Academic Press, 1992.
5. J. Stoer and R. Bulirsch, Introduction to Numerical Analysis, 2nd ed., Texts in Applied Mathematics, Vol. 12, Springer Verlag, New York, 1993.

**Course Outcomes:**

At the end of this Course the student will be able to

- Understand the need of numerical methods in solving engineering problems of various fields. **L1**
- Learn various numerical techniques to solve initial and boundary value problems. **L2**
- Apply various methods in solving initial and boundary value problems **L3**
- Emphasizes the numerical solutions of Integral equations. **L4**
- Analyze the problems in engineering and technology using various techniques of Numerical methods. **L5**

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**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

## 19ABS25-OPTIMIZATION TECHNIQUES

**(Open Elective -II)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:** This course aims at providing the student

- With the basic concepts and several methods of optimization.
- With the concepts of geometric programming & constrained minimization problems.

**UNIT – 1: Linear programming I : Simplex Method** **9 Hrs**

Introduction, Applications of Linear Programming, Standard form of a Linear Programming Problem, Geometry of Linear Programming Problems, Basic Definitions in Linear Programming. Simplex Method, Simplex Algorithm and Two phase Simplex Method.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Solve the problems related to linear programming. **L3**
- Lear the simplex method and two phase simplex method. **L3**

**UNIT – II: Linear programming II : Duality in Linear Programming**

Symmetric Primal-Dual Relations, General Primal-Dual Relations, Duality Theorem, Dual Simplex Method, Transportation Problem and assignment problem.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the dual relations and duality theorem **L2**
- Solve transportation problem and assignment problem. **L4**

**UNIT – III: Non-linear programming: Unconstrained optimization techniques & Direct Search Methods**

**Non-linear programming: Unconstrained optimization techniques:** Introduction: Classification of Unconstrained minimization methods

**Direct Search Methods:** Random Search Methods: Random jumping Method, Random Walk method. Grid Search Method.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Classify Unconstrained minimization methods and direct search methods. **L2**
- Apply the unconstrained minimization methods and direct search methods **L3**

**UNIT – IV: Non-linear programming: Constrained optimization techniques**

Introduction , Characteristics of a constrained problem, Random Search Methods, complex method, Sequential linear programming, Basic approach in methods of Feasible directions, Zoutendijk's method of feasible directions: direction finding problem, determination of step length, Termination criteria.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the Constrained optimization techniques. **L2**
- Solve nonlinear programming problems. **L3**

**UNIT – V: Geometric Programming & Constrained minimization Problems**

**Geometric Programming:**

Unconstrained Minimization Problems: solution of unconstrained geometric programming using differential calculus and arithmetic-geometric inequality.

**Constrained minimization Problems :**

Solution of a constrained geometric programming problem, primal-dual programming in case of less-than inequalities, geometric programming with mixed inequality constraints.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Solve unconstrained geometric programming using differential calculus and arithmetic-geometric inequality. **L3**
- Solve Solution of a constrained geometric programming problem, primal-dual programming. **L4**

**Text Books:**

1. Singiresu S Rao., Engineering Optimization: Theory and Practices, New Age Int. (P) Ltd. Publishers, New Delhi.

**Reference Books:**

1. Chong, E.K.P.and Zak, S. H.. An Introduction to Optimization, John Wiley & Sons, N.Y.
2. Peressimi A.L., Sullivan F.E., Vhl, J.J..Mathematics of Non-linear Programming, Springer – Verlag.

**Course Outcomes:**

At the end of this Course the student will be able to

- Remembers the concepts of linear programming problems. **L1**
- Understand various techniques of linear programming problems. **L2**
- Solve constrained and unconstrained linear programming problems. **L3**
- Analyzes geometric programming using differential calculus and arithmetic-geometric inequality. **L4**
- Analyze optimization problems that occur in real world in engineering and technology using various elegant optimization techniques. **L5**

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**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA**

**19ABS33-FUNCTIONAL NANOMATERIALS FOR ENGINEERS**

**(Open Elective-II)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- To learn and understand the fundamental concepts of functional/smart nanomaterials.
- To understand the classification and important applications of functional materials
- To learn and understand the materials utilized for energy applications
- To learn and understand the principle and applications of nanosensors
- To understand the concept of self-assembling molecular layers and its applications

**UNIT – I: INTRODUCTION TO FUNCTIONAL /SMART NANOMATERIALS** **9 Hrs**

Introduction: Nanomaterials and their importance (in brief), Functional/ Smart Nanomaterials, – (Hydrogels, polymer brushes, Carbon nanotubes, Cellulose),Functionalization techniques, Properties of Smart materials (Sensing materials, Actuation materials, Control devices, Self-detection, self-diagnostics, Self-corrective, self-controlled, self-healing, Shock Absorbers, Damage arrest)-components of smart systems (Sensor :- Data Acquisition, Data Transmission; Command and control unit, Actuator:- Data Instructions, Action Devices)

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the basic properties and fictionalization of smart nanomaterials **L1**
- Explain the need of functional/smart nanomaterials for advanced technology **L2**
- Identify engineering applications of sensors **L3**
- Analyze the sensing, control and detection mechanism in smart nanomaterials **L4**
- Illustrate the components of smart systems **L2**

**UNIT – II: CLASSIFICATION AND APPLICATIONS** **9 Hrs**

Classification of smart materials (piezoelectric, electrostrictive, Magnetostrictive, Thermoresponsive, Electrochromic and Smart gels), Shape Memory Alloys and their working principle, Quantum Tunneling Composites and their working principle, Applications of smart materials in Aircrafts, Medicine, Robotics, Smart fabrics, Sporting goods and smart glass, Merits and demerits of smart materials.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Classify smart materials based on electrical, magnetic and thermal characteristics **L1**
- Understand the basic concepts and working principle of memory alloys **L2**
- Identifies the Engineering applications of smart materials **L2**
- Apply the concepts to Aircrafts, Medicine and Robotic fields **L3**
- Explain the working principle of Quantum Tunneling Composites **L2**
- Identify the Merits and demerits of smart materials in engineering field **L2**

**UNIT – III: NANOSENSORS**

Introduction, Sensor definition, Working principle of nanosensors, Types of nanosensors (Physical nanosensors – Pressure, Force, Mass, Displacement, Optical nanosensors – Proximity, Ambient light, Chemical nanosensors- Chemical composition, Molecular concentration). Applications of nanosensors (Medicine, Aerospace, Communication, Structural Engineering).

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the working principle and concept of nanosensors **L1**
- Classify the nanosensors based on their working principle and application **L2**

- Summarize various types of nanosensors **L2**
- Explain the applications of nanosensors in various fields **L2**
- Apply the concept of nanosensors in Medicine, Aerospace, Communication, Structural Engineering fields **L3**

**UNIT – IV: SELF-ASSEMBLING MOLECULAR LAYERS** **9Hrs**

Introduction, principles of self-assembly, monolayers, Characteristics of Self assembled monolayers (SAMs), Molecular SAMs, Types of SAMs, Factors influencing Monolayer order, methods of preparation (Langmuir- Boldgett film : Mechanism, Experimental arrangement, Assembly, Advantages and disadvantages of LB films) patterning of SAMs (Locally attract, Locally remove, Modify tail group). Applications (Self-cleaning and moisture repellent).

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the concept of self-assembling **L1**
- Understand the significance of molecular layers **L2**
- Explain the concept of Langmuir- Boldgett film preparation **L2**
- Explain the important factors influencing Monolayer order **L2**
- Classify the materials based on patterning of SAMs **L2**
- Apply the concept of Self-cleaning and moisture repellent **L3**

**UNIT – V: NANOMATERIALS FOR ENERGY APPLICATIONS**

Introduction, **Solar Cells** (Silicon Solar Cells, Thin film Solar Cells, Organic Solar Cells - Dye Sensitized Solar Cells, Polymer solar cells) Working Principle, Efficiency estimation and advantages, **Hydrogen Fuel Cells** – Working Principle, Structure, Assembly of fuel cell, **Water splitting** – $H_2$ Production, Photocatalytic process.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the concept of solar cell **L1**
- Classify the solar cells based on manufacturing material **L2**
- Explain the construction and working principle of solar cell **L2**
- Interpret the efficiency and advantages in various solar cells **L2**
- Explain the construction and working principle of hydrogen cells **L2**
- Identify applications of water splitting for $H_2$ production **L2**
- Explain the photocatalytic process **L2**

**Text Books:**

1. YaserDahman, Nanotechnology and Functional Materials for Engineers-, Elsevier, 2012
2. E. Zschech,C. Whelan, T. Mikolajick, Materials for Information Technology: Devices, Interconnects and Packaging Springer-Verlag London Limited 2005.

**Reference Books:**

1. Gauenzi,P.,Smart Structures, Wiley, 2009.
2. MahmoodAliofkhazraei, Handbook of functional nanomaterials, Vol (1&2), Nova Publishers, 2014.

**Course Outcomes:**

At the end of this Course the student will be able to

- Identify the various functional/smart nanomaterials materials **L1**
- Classify the smart nanomaterials based their applications and properties **L2**
- Apply the various functional nanomaterials in various applications **L3**

**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA**

**19ABS34-MATERIALS CHARACTERIZATION TECHNIQUES**

**(Open Elective-II)**

| L | T | P | C |
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**Course Objectives:**

- To learn and understand an exposure to evaluation of special characteristics of materials.
- To understand the principle and important applications of characterization techniques
- To learn and understand the materials structural characteristics
- To learn and understand the materials Mechanical & Thermal characteristics

**UNIT – I: STRUCTURE ANALYSIS BY POWDER X-RAY DIFFRACTION** **9 Hrs**

Introduction, Bragg's law of diffraction, Intensity of Diffracted beams –factors affecting Diffraction Intensities - structure of polycrystalline Aggregates, Determination of crystal structure, Crystallite size by Scherrer and WH Methods, Small angle X-ray scattering (SAXS) (in brief).

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the diffraction phenomenon in crystals **L1**
- Identify the factors affecting diffraction pattern intensities **L2**
- Explain the polycrystalline nature of the material **L3**
- Analyze the crystal structure and crystallite size by various methods **L4**
- Illustrate the Small angle X-ray scattering (SAXS) **L2**

**UNIT – II: MICROSCOPY TECHNIQUE -1 –SCANNING ELECTRON MICROSCOPY(SEM) 9 Hrs**

Introduction, Principle, Construction and working principle of Scanning Electron Microscope, Specimen preparation, Different types of modes used (Secondary Electron and Backscatter Electron), Advantages, limitations and applications of SEM.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the basic concepts and working principle of Scanning Electron Microscope **L1**
- Classify the different types of Scanning Electron Microscope modes used **L2**
- Identifies the specimen preparation for Scanning Electron Microscope **L2**
- Analyze the morphology of the sample by using Scanning Electron Microscope **L4**
- Understand the advantages and limitations of Scanning Electron Microscope **L2**

**UNIT – III: MICROSCOPY TECHNIQUE -2 - TRANSMISSION ELECTRON MICROSCOPY (TEM)** **9Hrs**

Construction and Working principle, Resolving power and Magnification, Bright and dark fields, Diffraction and image formation, Specimen preparation, Selected Area Diffraction, Applications of Transmission Electron Microscopy, Difference between SEM and TEM, Advantages and Limitations of Transmission Electron Microscopy.

**Learning Outcomes:**

- Explain the basic principle and working principle of Transmission Electron Microscope
- Classify the different types of Transmission Electron Microscope modes used **L1**
- Identifies the specimen preparation for Transmission Electron Microscope **L2**
- Analyze the morphology and crystal structure of the sample by using Transmission Electron Microscope **L2**
- Understand the advantages and limitations of Transmission Electron Microscope **L2**
- Explain the basic principle and working principle of Transmission Electron Microscope **L3**

**UNIT – IV:SPECTROSCOPY TECHNIQUES** **9Hrs**

Principle, Experimental arrangement, Analysis and Advantages of the spectroscopic techniques – (i) UV-Visible spectroscopy (ii) Raman Spectroscopy, (iii) Fourier Transform infrared (FTIR) spectroscopy, (iv) X-ray photoelectron spectroscopy (XPS).

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the principle and experimental arrangement of spectrometers **L1**
- Understand the analysis and advantages of the spectroscopic techniques **L2**
- Explain the concept of UV-Visible spectroscopy **L2**
- Explain the principle and experimental arrangement of Raman Spectroscopy **L2**
- Explain the principle and experimental arrangement of Fourier Transform infrared (FTIR) spectroscopy **L2**
- Explain the principle and experimental arrangement of X-ray photoelectron spectroscopy (XPS) **L2**

**UNIT – V: ELECTRICAL & MAGNETIC CHARACTERIZATION TECHNIQUES**

Electrical Properties analysis techniques (DC conductivity, AC conductivity) Activation Energy, Effect of Magnetic field on the electrical properties (Hall Effect). Magnetization measurement by induction method, Vibrating sample Magnetometer (VSM) and SQUID (Superconducting Quantum Interference Device)

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the various types of electrical properties analysis techniques **L1**
- Classify the solar cells based on manufacturing material **L2**
- Explain the effect of magnetic field on the electrical properties **L2**
- Analyze the magnetization by using induction method **L2**
- Explain the construction and working principle of VSM **L2**
- Explain the construction and working principle of SQUID **L2**

**Text Books:**

1. Material Characterization: Introduction to Microscopic and Spectroscopic Methods – Yang Leng – John Wiley & Sons (Asia) Pvt. Ltd. 2008
2. Microstructural Characterization of Materials - David Brandon, Wayne D Kalpan, John Wiley & Sons Ltd., 2008.

**Reference Books:**

1. Fundamentals of Molecular Spectroscopy – IV Ed. – Colin Neville Banwell and Elaine M. McCash, Tata McGraw-Hill, 2008.
2. Elements of X-ray diffraction – Bernard Dennis Cullity & Stuart R Stocks, Prentice Hall ,2001 – Science.

**Course Outcomes:**

At the end of this Course the student will be able to

- Identify the various characterization techniques **L1**
- Classify the characterization techniques based on their applications and properties **L2**
- Apply the various characterization techniques for materials characterization. **L3**

**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ABS44-Green Chemistry and Catalysis for sustainable Environment**

**(Open Elective-II)**

| L | T | P | C |
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| 3 | 0 | 0 | 3 |

**Course Objectives:**

Learn an interdisciplinary approach to the scientific and societal issues arising from industrial chemical production, including the facets of chemistry and environmental health sciences that can be integrated to promote green chemistry and the redesign of chemicals, industrial processes and products

Understand the use of alternatives assessments that combine chemical, environmental health, regulatory, and business considerations to develop safer products.

**UNIT – 1: Principles and concepts of green chemistry** **9 Hrs**

Introduction, Green chemistry Principles, sustainable development and green chemistry, atom economy, atom economic reactions: Rearrangement and addition reactions and un-economic reactions: Substitution, elimination and Wittig reactions, Reducing Toxicity. Waste - problems and Prevention: Design for degradation, Polymer recycling

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Apply the Green chemistry Principles for day to day life as well as synthesis L3
- Describe the sustainable development and green chemistry L2
- Explain economic and un-economic reactions L2
- Demonstrate Polymer recycling L2

**UNIT – II: : Catalysis and green chemistry** **10Hrs**

Introduction to catalysis, Heterogeneous catalysts: Basics of Heterogeneous Catalysis, Zeolites and the Bulk Chemical Industry, Heterogeneous Catalysis in the Fine Chemical and Pharmaceutical Industries, Catalytic Converters, Homogeneous catalysis: Transition Metal ion Catalysis, Organo-catalysis, Greener Lewis Acids, Asymmetric Catalysis, Phase transfer catalysis: Hazard Reduction, Oxidation Using Hydrogen Peroxide, Bio-catalysis and photo-catalysis with examples

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain Heterogeneous catalyst and its applications in Chemical and Pharmaceutical Industries L2
- Differentiate Homogeneous and Heterogeneous catalysis L2
- Identify the importance of Bio and Photo Catalysis L3
- Discuss Transition metal and Phase transfer Catalysis L3

**UNIT – III: Organic solvents: environmentally benign solutions** **7 Hrs**

Organic solvents and volatile organic compounds, solvent free systems, supercritical fluids: Super critical carbon dioxide, super critical water and water as a reaction solvent: water based coatings, Ionic liquids as catalysts and solvents

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Demonstrate Organic solvents and importance of solvent free systems L3
- Discuss Super critical carbondioxide L2
- Explain Super critical water and water as a reaction solvent L2
- Interpret Ionic Liquids as Catalyst and Solvent L2

**UNIT – IV: Emerging greener technologies and alternative energy sources** **8 Hrs**

Biomass as renewable resource, solar power, other forms of renewable energy, introduction and applications of Fuel Cells, Chemicals from Renewable feedstocks: Chemicals from Fatty Acids, Polymers from Renewable Resources. The Syngas Economy, The Bio-refinery, Design for energy efficiency: Photochemical Reactions and Examples, advantages and Challenges.

Microwave-assisted Reactions-examples and applications, sono-chemical reactions- examples and applications.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Describe importance of Biomass and Solar Power L2
- Illustrate Sonochemistry and Green Chemistry L2
- Apply Green Chemistry for Sustainable Development L3
- Discuss the importance of Renewable resources L3

**UNIT – V: Green processes for green nanoscience** **8 Hrs**

Introduction and traditional methods in the nanomaterials synthesis, Translating green chemistry principles for practicing nanoscience. Green Synthesis of nanophase inorganic materials and metal oxide nanoparticles: microwave-assisted synthesis, green synthesis of metal and metal oxide nanoparticles, green chemistry applications of inorganic nanomaterials

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Discuss green Chemistry Principles for practicing Green nano synthesis L3
- Illustrate Microwave Assisted Synthesis L2
- Differentiate Hydrothermal and Reflux synthesis L2
- Demonstrate Green Chemistry applications of Inorganic nanomaterials L2

**Text Books:**

1. M. Lancaster, Green Chemistry an introductory text, Royal Society of Chemistry, 2002.
2. Paul T. Anastas and John C. Warner, Green Chemistry Theory and Practice, 4th Edition, Oxford University Press, USA, 1997.

**Reference Books:**

1. Sanjay K. Sharma and AckmezMudhoo, Green Chemistry for Environmental Sustainability, First Edition, , CRC Press, 2010.
2. AlvisePerosa and Maurizio Selva, Hand Book of Green chemistry Volume 8: Green Nanoscience, wiley-VCH, 2013

**Course Outcomes:**

At the end of this Course the student will be able to

- Apply the Green chemistry Principles for day to day life as well as synthesis for sustainable development. L3
- Differentiate Homogeneous and Heterogeneous catalysis L2
- Demonstrate Organic solvents and importance of solvent free systems L2
- Describe importance of Biomass and Solar Power for green environment. L2
- Discuss green Chemistry Principles for practicing Green nano synthesis using Microwave Assisted technique. L3

**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ABS45-Chemistry of Nanomaterials and applications**

**(Open Elective-II)**

| L | T | P | C |
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| 3 | 0 | 0 | 3 |

**Course Objectives:**

- To understand synthetic principles of Nanomaterials by various methods
- And also characterize the synthetic nanomaterials by various instrumental methods
- To enumerate the applications of nanomaterials in engineering

**UNIT – 1: Introduction to nanoscience** **8 Hrs**

Introduction, importance of nanomaterials, nanoscience in nature, classification of nanostructured materials, properties, scope of nanoscience and nanotechnology& applications.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Classify the nanostructure materials **L2**
- Describe scope of nanoscience and technology **L2**
- Explain different synthetic methods of nanomaterials **L2**
- Identify the synthetic methods of nanomaterial which is suitable for preparation of particular material **L3**

**UNIT – II: : Synthesis of nanomaterials** **10 Hrs**

Bottom-Up approach:- Sol-gel synthesis, micro emulsions or reverse micelles, co-precipitation method, solvothermal synthesis, hydrothermal synthesis.

Top-Down approach:- Arc discharge Plasma arc method, aerosol synthesis, ion sputtering, laser pyrolysis, laser ablation, chemical vapour deposition method, electro deposition method, and high energy ball milling.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Describe the top down approach **L2**
- Explain aerosol synthesis and plasma arc technique **L2**
- Differentiate chemical vapour deposition method and electrodeposition method **L2**
- Discuss about high energy ball milling **L3**

**UNIT – III: Characterization nanomaterials** **7 Hrs**

Techniques for characterization: Dynamic light scattering for particle size determination, Diffraction technique, electron microscopy techniques for the characterization of nanomaterials, BET method for surface area analysis

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Discuss different technique for characterization of nanomaterial **L3**
- Explain electron microscopy techniques for characterization of nanomaterial **L3**
- Describe BET method for surface area analysis **L2**
- Apply different spectroscopic techniques for characterization **L3**

**UNIT – IV: Structural studies of nanomaterials** **8 Hrs**

Properties of nanomaterials: fullerenes, carbon nanotubes, core-shell nanoparticles. Nano-crystalline materials, magnetic nanoparticles and important properties in relation to nano-magnetic materials, thermoelectric materials, non-linear optical materials, liquid crystals

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain synthesis and properties and applications of nanaomaterials **L2**
- Discuss about fullerenes and carbon nanotubes **L3**
- Differentiate nanomagnetic materials and thermoelectric materials **L2**
- Describe liquid crystals **L2**

**UNIT – V: Applications of Nanomaterials** **7 Hrs**

Engineering, medicine, aerospace applications of nanomaterials

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Illustrate applications of nanaomaterials **L2**
- Discuss the magnetic applications of nanomaterials **L3**
- List the applications of non-linear optical materials **L1**
- Describe the applications fullerenes, carbon nanotubes **L2**

**Text Books:**

1. NANO: The Essentials: T Pradeep, MaGraw-Hill, 2007
2. Textbook of Nanoscience and nanotechnology: B S Murty, P Shankar, BaldevRai, BB Rath and James Murday, Univ. Press, 2012

**Reference Books:**

1. Ludovico Cademrtiri and Geoffrey A. Ozin& Geoffrey A. Ozin, Concepts of Nanochemistry; Wiley-VCH, 2011.
2. Guozhong Cao, Nanostructures & Nanomaterials; Synthesis, Properties & Applications: Imperial College Press, 2007
3. C. N. R. Rao, Achim Muller, K.Cheetham, Nanomaterials Chemistry, , Wiley-VCH, 2007

**Course Outcomes:**

At the end of this Course the student will be able to

- Understand the state of art synthesis of nano materials **L1**
- Characterize nano materials using ion beam, scanning probe methodologies, position sensitive atom probe and spectroscopic ellipsometry. **L2**
- Analyze nanoscale structure in metals, polymers and ceramics **L3**
- Analyze structure-property relationship in coarser scale structures **L3**
- Understand structures of carbon nano tubes **L1**

**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ABS46-Environmental Management and Audit**

**(Open Elective-II)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- To make the student understand evolution of LCA, stages in product LCA, procedure and applications for LCA.
- To understand the EMS core elements, benefits, certification, ISO 14000 series, evolution, principles, structure.
- To impart knowledge on environmental monitoring, modelling, technology assessment, risk assessment.
- Understand necessity of environmental design, principles, benefits, strategies.
- To understand types of audit, general audit methodology, audit process and apply the various domestic, industrial activities.

**UNIT – 1: Life Cycle Assessment (LCA):** **8 Hrs**

Evolution, stages, a code of good conduct for LCA, procedure for LCA-goal and scope, analyzing the inventory, assessing the environmental impact, evaluating environmental profiles, applications in government & private Sector

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Illustrate code of good conduct for LCA **L2**
- Discuss scope, analyzing the inventory and assessing the environmental impact **L3**
- List evolution and stages of LCA **L1**
- Describe the applications in government & private Sector **L2**

**UNIT – II: Environmental Management System Standards:** **8 Hrs**

Environmental Management Systems – Core Elements, benefits, certification and documentation, EMS Standards – ISO 14000 series – evolution, principles, structure, supporting systems, specification standards, implementation and benefits of Implementing

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain Environmental Management Systems **L3**
- Describe EMS Standards – ISO 14000 series **L2**
- Apply Environmental Management Systems for certification and documentation **L3**

**UNIT – III: Environmental Monitoring, Modeling& Risk Assessment** **8 Hrs**

Forecasting & Growth modeling, sensitivity Analysis, Applications of remote sensing and GIS, Environmental technology Assessment. Environmental risk assessment in industry, ecosystem approach to risk assessment, Eco-Mapping, Environmental Education

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Illustrate Applications of remote sensing and GIS in Environmental assessment **L2**
- Discuss environmental risk assessment in industry **L3**
- List ecosystem approach to risk assessment, Eco-Mapping, Environmental Education **L1**

**UNIT – IV: Environmental Design & Economics** **10 Hrs**

Principles, Benefits, Motivation, ED for manufactured products- Considerations in product life stages, Tools for products, Eco-labelling, ED for Building – Principles and Strategies for green building construction, ED for development and planning.

Economics and Environment -environmental cost, benefits, taxes, accounting, environmental Valuation – categorization and valuation techniques.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Describe principles, benefits and motivation of environmental Design for manufactured products **L2**
- Explain principles and Strategies for green building construction **L2**
- Differentiate ED for Building cost, benefits and taxes **L2**
- Discuss about categorization and valuation techniques w.r.t economics and environment **L3**

**UNIT – V: Environmental Auditing** **8 Hrs**

Objectives, Scope, types, Basic structure and steps of EA, Elements of Audit process – What, Who, Why, How, Waste audits, EA in industrial projects, Liability audit and site assessment.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Illustrate Basic structure and steps of environmental auditing **L2**
- Discuss environmental auditing in industrial projects in terms of liability audit and site assessment **L3**
- List Scope and types environmental auditing **L1**

**Text Books:**

1. Environmental Management, Vijay Kulkarni & T. V. Ramachandra, Capital Publishing Company, New Delhi, 2006.
2. Concepts of Environmental Management for Sustainable Development, M.C. Dash, Wiley Publications, 2019.

**Reference Books:**

1. Ajith Sankar, Environmental Management, OXFORD publications, 2015
2. Ni Bin Chang, Systems Analysis for Sustainable Engineering: Theory and Applications, Tata McGraw-Hill Publications, 2006.
3. Gary Skinner, Ken Crafer, Environmental Management, , Cambridge, IGCSE, 2017

**Course Outcomes:**

At the end of this Course the student will be able to

- Classify the stages in LCA with goal and procedures **L2**
- Describe the structure of EMS, Explain benefits of EMS, Differentiate core elements of EMS, Discuss about certification of ISO 14000 series. **L2**
- Discuss Forecasting & Growth modeling and Ecosystem Approach to Risk Assessment and Environmental Education. **L3**
- Explain Principles and Strategies for green building construction. **L2**
- Illustrate Objectives, Scope of Environmental auditing, elements of Audit process, liability audit and site assessment. **L2**

**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ACE65a-REMOTE SENSING AND GIS**

**(Open Elective-II)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:** The objectives of the course are to make the students learn about

- Introduce the basic principles of Remote Sensing and GIS techniques.
- Teach various types of satellite sensors and platforms
- Impart concepts of visual and digital image analyses
- Teach concepts of principles of spatial analysis
- Teach about the application of RS and GIS in Civil engineering

**UNIT – I:**

**Introduction to photogrammetry**: Principles & types of aerial photograph, geometry of vertical aerial photograph, Scale & Height measurement on single vertical aerial photograph, Height measurement based on relief displacement, Fundamentals of stereoscopy, fiducially points, parallax measurement using fiducially line.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand concepts of photogrammetry
- Estimate heights and distances.

**UNIT – II:**

**Remote sensing**: Basic concepts and foundation of remote sensing – elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology and units. Energy resources, energy interactions with earth surface features and atmosphere, resolution, sensors and satellite visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of water bodies, introduction to digital data analysis.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand advantages of remote sensing
- Demonstrate concepts of remote sensing.

**UNIT – III:**

**Geographic information system**: Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS. Data collection and input overview, data input and output. Keyboard entry and coordinate geometry procedure, manual digitizing and scanning, Raster GIS, Vector GIS – File management, Spatial data – Layer based GIS, Feature based GIS mapping.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand concepts of GIS.
- Explain data collection and data interpretation
- Develop terrain characteristics using Mapping

**UNIT – IV:**

GIS spatial analysis: Computational Analysis Methods (CAM), Visual Analysis Methods (VAM), Data storage-vector data storage, attribute data storage, overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Know applications of GIS and data interpretation.

**UNIT – V:**

Water resources applications: Land use/Land cover in water resources, Surface water mapping and inventory -Watershed management for sustainable development and Watershed characteristics - Reservoir sedimentation, Fluvial Geomorphology - Ground Water Targeting, Identification of sites for artificial Recharge structures - Inland water quality survey and management, water depth estimation and bathymetry.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Know applications of RS & GIS in water resources applications.
- Study technological problems like reservoir sedimentation ground water identification

**Text Books:**

1. Remote Sensing and GIS by B.Bhatta, Oxford University Press,NewDelhi
2. Advanced surveying : Total station GIS and remote sensing – Satheesh Gopi – Pearson publication.

**Reference Books:**

1. Fundamentals of remote sensing by gorge Joseph , Universities press, Hyderabad.
2. Concepts & Techniques of GIS by C.P.Lo Albert, K.W. Yonng, Prentice Hall(India) Publications
3. Basics of Remote sensing & GIS by S.Kumar, Laxmi Publications
4. Remote sensing and GIS by M.Anjireddy , B.S.Pubiliications, NewDelhi
5. Remote Sensing and its applications by LRA Narayana University Press1999
6. GIS by Kang – tsungchang, TMH Publications &Co
7. Principals of Geo physical Information Systems – Peter A Burragh and Rachael Mc Donnell Oxford Publishers2004

**Course Outcomes:**

At the end of this Course the student will be able to

- Comparing with ground, air and satellite based sensor platforms.
- Interpret the aerial photographs and satellite imageries.
- Create and input spatial data for GIS application.
- Apply RS and GIS concepts in water resources engineering.
- Applications of various satellite data.

**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ACE65b-ENVIRONMENTAL IMPACT ASSESTMENT & MANAGEMENT**

**(Open Elective-II)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:** The objectives of the course are to make the students learn about

- To impart knowledge on different concepts of Environmental Impact Assessment
- To teach procedures of risk assessment
- To teach the EIA methodologies and the criterion for selection of EIA methods
- To teach the procedures for environmental clearances and audit

**UNIT – I:**

**INTRODUCTION:** Basic concept of EIA : Initial environmental Examination, Elements Of EIA, - factors affecting E-I-A Impact evaluation and analysis, preparation of Environmental Base map, Classification of environmental parameters.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the elements of EIA

**UNIT – II:**

**EIA METHODOLOGIES:-**

E I A Methodologies: introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods and cost/benefit Analysis.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the criteria for selection of EIA methodology

**UNIT – III:**

**IMPACT OF DEVELOPMENTAL ACTIVITIES AND LAND USE:-**

Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives. Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures. E I A in surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, Air pollution sources, Generalized approach for assessment of Air pollution Impact.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Study the factors causing impact of development activities
- Decide mitigation measures of pollution on environment

**UNIT – IV:**

**ASSEMENT OF IMPACT ON VEGETATION AND WILDLIFE :**

Introduction - Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation – Causes and effects of deforestation.

**ENVIRONEMNTAL AUDIT :**

Introduction - Environmental Audit & Environmental legislation objectives of Environmental Audit, Types of environmental Audit, Audit protocel, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand effect of development activities on environment.
- Know the design procedures for assessment of environmental risk

- Learn about the process of environmental auditing.
- Understand procedures for preparation of environmental audit report

**UNIT – V:**

**ENVIRONEMENTAL ACTS (PROTECTION AND PREVENTION)**

Post Audit activities, The Environmental protection Act, The water preventation Act, The Air (Prevention & Control of pollution Act.), and Wild life Act. Case studies and preparation of Environmental Impact assessment statement for various Industries.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the importance of environmental protection acts
- Explain acts and notifications in Environmental legislation

**Text Books:**

1. Environmental Impact Assessment Methodologies, by Y. Anjaneyulu, B.S. Publication, Sultan Bazar, Hyderabad.
2. Environmental Science and Engineering, by J. Glynn and Gary W. Hein Ke – Prentice Hall Publishers

**Reference Books:**

1. Environmental Science and Engineering, by Suresh K. Dhaneja – S.K.,Katari& Sons Publication., NewDelhi
2. Environmental Pollution and Control, by Dr H.S. Bhatia – Galgotia Publication (P) Ltd, Delhi

**Course Outcomes:**

At the end of this Course the student will be able to

- Understand the concept of Environmental impact
- Understand the methodologies related to EIA
- Appreciate various laws related to environmental protection
- Prepare the environmental impact assessment statement and to evaluate it.

**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ACE65c-DISASTER MANAGEMENT AND MITIGATION**

**(Open Elective-II)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:** The objectives of the course are to make the students learn about

- Develop an understanding of why and how the modern disaster manager is involved with pre-disaster and post-disaster activities
- Develop an awareness of the chronological phases of natural disaster response and refugee relief operations. Understand how the phases of each are parallel and how they differ
- Understand the 'relief system' and the 'disaster victim.'
- Describe the three planning strategies useful in mitigation.
- Identify the regulatory controls used in hazard management.
- Describe public awareness and economic incentive possibilities.
- Understand the tools of post-disaster management

**UNIT – I:**

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

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To know about the natural hazards and its management
- To understand about the global warming, cyclones and tsunamis

**UNIT – II:**

Classification of hazards & Disasters: Natural hazards and Disasters - Man Made hazards & Disasters - Planetary Hazards/ Disasters - Extra Planetary Hazards/ disasters - Planetary Hazards-Endogenous Hazards - Exogenous Hazards

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Differentiate different types of hazards
- Understand different consequences of hazards

**UNIT – III:**

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

**Learning Outcomes:**

At the end of this unit, the student will be able to

- understand about earthquakes and volacanicerruptions
- Understand effects of earthquakes and mitigation measures

**UNIT – IV:**

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

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Obtain knowledge on exogenous hazards and causes
- Obtain knowledge on mitigation measures of cyclones, droughts etc.,

**UNIT – V:**

Soil Erosion:-- Mechanics & forms of Soil Erosion- Factors & causes of Soil Erosion- Conservation measures of Soil Erosion.Chemical hazards/ disasters:-- Release of toxic chemicals, nuclear explosion- Sedimentation processes.Sedimentation processes:- Global Sedimentation problems- Regional Sedimentation problems- Sedimentation & Environmental problems- Corrective measures of Erosion & Sedimentation-Biological hazards/ disasters:- Population Explosion.

Emerging approaches in Disaster Management- Three Stages

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

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Knowledge on soil erosion and its effects
- education related to risk reduction in communities in post and pre stage

**Text Books:**

1. Disaster Management by Rajib Shah, Universities Press, India,2003
2. Disaster Mitigation: Experiences And Reflections by PardeepSahni
3. Natural Hazards & Disasters by Donald Hyndman & David Hyndman – Cengage Learning
4. National Disaster Management Authority-Guidelines

**Reference Books:**

1. Kates,B.I& White, G.F The Environment as Hazards, oxford, New York, 1978
2. R.B. Singh (Ed) Disaster Management, Rawat Publication, New Delhi, 2000
3. H.K. Gupta (Ed) Disaster Management, Universiters Press, India, 2003
4. R.B. Singh, Space Technology for Disaster Mitigation in India (INCED), University of Tokyo,1994
5. Dr. Satender, Disaster Management in Hills, Concept Publishing Co., New Delhi

**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19AEE65a- ENERGY CONSERVATION & MANAGEMENT**

**(Open Elective-II)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:** The objectives of the course are to make the students learn about

- 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:** **09 Hrs**

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.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To know about various types of Energy Audit **L1**
- To know about various types of Energy conservation schemes and Energy Manager functions **L2**

**UNIT – II:** **09 Hrs**

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

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To know about various Lighting systems and types of lamps. **L1**
- To evaluate illumination level Illumination of inclined surface to beam and Design of Energy efficient lighting systems. **L2**

**UNIT – III:** **09 Hrs**

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.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To know about various Methods of Power Factor improvement **L1**
- To know about various Energy Instruments **L3**

**UNIT – IV:** **09 Hrs**

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

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To know about analysis of Heating and HVAC **L1**
- To know about Energy conservation methods **L2**

**UNIT – V:** **09 Hrs**

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).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:**

At the end of this unit, the student will be able to

- To know about basic concept of Analysis of Economics and different methods **L1**
- To know about Computation of Economic Aspects Calculation **L2**

**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–1stedition, 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_IndiaP art IISecI-37_25-08-2010.pdf

**Course Outcomes:**

At the end of this Course the student will be able to

- Explain energy efficiency, conservation and various technologies. **L1**
- Design energy efficient lighting systems. **L2**
- Calculate power factor of systems and propose suitable compensation techniques. **L3**
- Explain energy conservation in HVAC systems. **L4**
- **L5**

**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19AEE65b- PLC AND ITS APPLICATIONS**

**(Open Elective-II)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:** The student will be able to:

- Understand the basic functions and types of PLCs
- Get exposure of Easy Veep software, its applications
- Classification of PLCs and applications
- Programming using PLCs
- Troubleshooting aspects using PLCs

**UNIT – I: Introduction**

Basic functions of PLCs, Mechanical relays versus PLC, Different types of PLC's – Allen- Bradley – Micrologix: ML1000, ML1100, SLC500, Compact Logix, Mitsubishi FX series, HMI's, Processor and I/O cards

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To understand about basic functions of PLCs & classification of PLCs **L1**
- To distinguish between PLCs and Mechanical relays **L2**
- To know about Processor and I/O cards

**UNIT – II:** **10 Hrs**

Introduction to Easy Veep software, Link between mechanical, electrical and programming documentation, Logic diagrams, Flip-Flop Logic, M8000, M8001 internal bits interpretation, Binary code, data table, manipulation and search engine in Mitsubishi environment Communication between PC and PLC, Communication between PC and HMI, PLC and HMI Serial Local network, Introduction to SLC500

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To know about Easy Veep software & about Logic diagrams **L1**
- To understand about Search engine & interfacing of PC and PLCs **L2**

**UNIT – III: PLC software and applications** **10 Hrs**

Boolean algebra – understanding binary code, ADD and SUB functions, UP and Down Counters, Introduction to k1Y0, MOV function, CPR and ZCP functions, SHWT and SHRD instructions, Introduction to Absolutely Drum Instruction.

Allen Bradley PLC: Introduction to Rockwell Software, Hardware focus, Hardware considerations (Field wiring, Master Control Relay, VFD), Basic programming and applications, Cascade control – subroutine, Different programs.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To know about basic features of PLCs & various instructions of PLC **L1**
- To know about various PLC versions & understand about Cascade control and subroutines **L2**

**UNIT – IV: Programming instructions** **10 Hrs**

Instructions and binary interpretation, Bit Instruction, Timers and counters, Comparison instructions, Programming Instructions – Math instructions, Move and Logical Instructions, Discussions of programming, communications for PLC-Robotic arm, Exercise of setup and monitoring

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To know about various Programming instructions & understand Math instructions in PLCs **L1**
- To know about Logical instructions & understand about Communications with PLC using set up and monitoring **L2**

**UNIT – V: Analog and Digital parameters** **10 Hrs**

Analog and Digital parameters by using SLC5/03-VFD-Panel Mate series 1700, Practical Troubleshooting, troubleshooting technique, Control system stability and tuning basics. Applications: Process to rewind, test, and integrate with extrusion process for wiring and fibre optic industries, Food industry – yeast, flour distribution and control. Process Medical equipment Industry – Gas analyzer, Leak tester (using CO2), plastic wrapping machines etc.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To know about analog and digital parameters in certain PLCs & apply PLCs for control system stability aspects **L1**
- To know about troubleshooting techniques & identify few applications of PLCs in Science and Technology fields **L2**

**Text Books:**

1. Automating manufacturing systems with PLCs by Hugh Jack, 2010.
2. PLC Hand Book (Automation direct Siemens)

**Reference Books:**

1. Programmable Logic Controllers by R. Bliesener, F Ebel, Festo. Didactic publishers,2002.
2. Programmable Logic Controllers by W. Bolton, 4th Edition, Newnes, 2006.
3. Introduction to PLCs by Jay F. Hooper, 2nd Edition, Carolina Academic Press, 2006.

**Course Outcomes:**

At the end of this Course the student will be able to

- Understand different types of PLCs **L1**
- Understand the usage of Easy Veep software **L2**
- Understand the hardware details of Allen Bradley PLC **L3**
- Programming of PLCs **L4**
- Know about few applications of PLCs in different fields of Science and Technology **L5**

**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19AEE65c- SYSTEM RELIABILITY CONCEPTS**

**(Open Elective-II)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:** The objectives of the course are to make the students learn about

- The Basic concepts, rules for combining probabilities of events, failure density and distribution functions.
- Evaluation of network Reliability / Unreliability and types of redundancies.
- Evaluation of network Reliability / Unreliability using conditional probability method.
- Expected value and standard deviation of Exponential distribution and Measures of reliability.
- Evaluation of Limiting State Probabilities of one, two component repairable models.

**UNIT – I: Basic Probability Theory** **09 Hrs**

Basic concepts – Rules for combining Probabilities of events – Failure Density and Distribution functions – Bernoulli's trials – Binomial distribution – Expected value and standard deviation for binomial distribution – Examples.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To know about basic rules for probabilities of events **L1**
- Get detailed information about Probability of failure density and distribution Functions and obtain the expected value and standard deviation for binomial distribution. **L2**

**UNIT – II: Network Modeling and Reliability Evaluation** **09 Hrs**

Basic concepts – Evaluation of network Reliability / Unreliability – Series systems, Parallel systems, Series - Parallel systems, partially redundant systems – Types of redundancies - Evaluation of network Reliability / Unreliability using conditional probability method – Paths based and Cutset based approach – complete event tree and reduced event tree methods - Examples.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- How to find the Probability of success and failures of network using different approaches for series-parallel configurations. **L1**
- To find reliability / unreliability of complex systems using different methods **L2**

**UNIT – III: Time Dependent Probability** **09 Hrs**

Basic concepts – Reliability functions f(t), Q(t), R(t), h(t) – Relationship between these functions – Bath tub curve – Exponential failure density and distribution functions - Expected value and standard deviation of Exponential distribution – Measures of reliability – MTTF, MTTR, MTBF – Evaluation of network reliability / Unreliability of simple Series, Parallel, Series-Parallel systems - Partially redundant systems - Evaluation of reliability measure – MTTF for series and parallel systems – Examples.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the concepts of time domain functions and relationship between them. and obtain the expected value and standard deviation for exponential distribution. **L1**
- To obtain probabilistic measures for fully redundant and partially redundant configurations **L2**

**UNIT – IV: Discrete Markov Chains & Continuous Markov Processes** **09 Hrs**

Markov Chains: Basic concepts – Stochastic transitional Probability matrix – time dependent probability evaluation – Limiting State Probability evaluation – Absorbing states.

Markov Processes: Modeling concepts – State space diagrams – time dependent reliability evaluation of single component repairable model – Evaluation of Limiting State Probabilities of one, two component repairable models – Frequency and duration concepts – Frequency balance approach - Examples.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the concepts of Stochastic Transitional Probability Matrix, Limiting State Probability **L1**
- Understand the concept of Frequency balance approach. And To distinguish between Markov chains and Markov processes **L2**

**UNIT – V: Multi Component & Approximate System Reliability Evaluation** **09 Hrs**

Recursive relation for evaluation of equivalent transitional rates– cumulative probability and cumulative frequency and 'n' component repairable model – Series systems, Parallel systems, Basic probability indices – Series, Parallel systems – Complex Systems– Cutset approach – Examples.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the concepts of recursive relation for evaluation of equivalent transitional rates. **L1**
- To know about computation of basic probability indices for series, parallel configurations **L2**

**Text Books:**

1. Reliability Evaluation of Engineering Systems by Roy Billinton and Ronald N. Allan, Reprinted in India B. S. Publications, 2007.
2. Reliability Engineering by E. Balagurusamy, Tata McGraw Hill, 2003.

**Reference Books:**

1. Introduction to Reliability Engineering by E. E. Lewis by Wiley Publications.
2. Reliability and Maintainability Engineering by Charles E. Ebeling, Tata McGraw Hill, 2000.
3. Reliability and Safety Engineering by Ajit Kumar Verma, SrividyaAjit and Durga Rao Karanki, Springer, Second Edition, 2016. System Reliability Theory Marvin Rausand and ArnljotHoyland, Wiley Publictions.

**Course Outcomes:**

At the end of this Course the student will be able to

- Understand the concepts for combining Probabilities of events, Bernoulli's trial, and Binomial distribution. **L1**
- Network Reliability/Unreliability using conditional probability, path and cutest based approach, complete event tree and reduced event tree methods. **L2**
- Understanding Reliability functions and to develop relationship between these functions, expected value and standard deviation of Exponential distribution and measures of reliabilities. **L3**
- Analyze the time dependent reliability evaluation of single component repairable model, frequency and duration concepts, Frequency balance approach. **L4**
- `Recursive relation for evaluation of equivalent transitional rates, cumulative probability and cumulative frequency and 'n' component repairable model. **L5**

**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19AME65a- AUTOMOBILE ELECTRONICS, SENSORS AND DRIVES**

*(Open Elective-II)*

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:** The objectives of the course are to make the students learn about

- Explain the use of electronics in the automobile.
- Explain the importance of various types of sensors and actuators in automotive electronics.
- Demonstrate the various control elements in Engine Management system.
- Familiarize with Vehicle management systems.
- Identify various electronic and the instrumentation systems used in automobile.

**UNIT – 1: Introduction to microcomputer:** **10 Hrs**

Microcomputer: Buses, memory, timing, CPU registers; Microprocessor architecture: Initialization, operation codes, program counter, branch and jump instructions, subroutine. Analog to digital converters and Digital to analog converters, sampling, polling and interrupts, digital filters, lookup table.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Draw the architecture of microprocessor. **L3**
- Explain the importance of subroutines, branch and jump instructions in Microprocessor. **L3**
- Compare Analog to Digital Converters and Digital to Analog Converters. **L4**
- Identify the various components of Microcomputer. **L1**

**UNIT – II: Sensors and actuators** **10 Hrs**

Speed sensors, Pressure sensors: Manifold Absolute Pressure sensor, knock sensor, Temperature sensors: Coolant and Exhaust gas temperature, Exhaust Oxygen level sensor, Position sensors: Throttle position sensor, accelerator pedal position sensor and crankshaft position sensor, Air mass flow sensor. Solenoids, stepper motors and relays.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Recall the working principles of various types of sensors used in automotive electronics. **L1**
- Identify the practical applications of sensors and actuators. **L2**
- Apply the concept of sensors and actuators in real world applications **L3**

**UNIT – III: Electronic engine management system** **10Hrs**

Electronic engine control: Input, output and control strategies, electronic fuel control system, fuel control modes: open loop and closed loop control at various modes, EGR control, Electronic ignition systems – Spark advance correction schemes, fuel injection timing control.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Compare open loop and closed loop control systems. **L4**
- Identify the various elements in Engine Management System. **L2**
- Recall the concepts of electronic ignition system. **L1**

**UNIT – IV: Electronic vehicle management system** **8 Hrs**

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Cruise control system, Antilock braking system, electronic suspension system, electronic steering control, traction control system, Transmission control, Safety: Airbags, collision avoiding system, low tire pressure warning system.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the importance of cruise control system. **L2**
- Outline working of the safety systems. **L1**
- Demonstrate the control of electronic steering and traction. **L2**

**UNIT – V: Automotive instrumentation system:** **8 Hrs**

Input and output signal conversion, multiplexing, fuel quantity measurement, coolant temperature and oil pressure measurement, display devices- LED, LCD, VFD and CRT, Onboard diagnostics(OBD), OBD-II, off board diagnostics.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the method of measurement of fuel quality. **L2**
- Compare onboard diagnostics and off board diagnostics. **L4**
- Discuss various types of display devices. **L2**

**Text Books:**

1. Understanding Automotive Electronics, William B Ribbens, Newne Butterworth-Heinermann, 6th edition 2003.
2. Crouse W H, Automobile Elctrical Equipment, McGraw Hill Book Co.Inc, Newyork 2005.

**Reference Books:**

1. Bechhold "Understanding Automotive Electronics", SAE, 1998.
2. Robert Bosch "Automotive Hand Book", SAE (5th Edition), 2000.
3. Tom Denton,"Automobile Electrical and Electronic Systems" 3rd edition- Edward Arnold, London - 2004.
4. Eric Chowanietz - 'Automotive Electronics' - SAE International USA – 1995.

**Course Outcomes:**

At the end of this Course the student will be able to

- Obtain an overview of automotive components, like sensors, actuators, communication protocols and safety systems employed in today's automotive industry. **L1**
- Interface automotive sensors and actuators with microcontrollers. **L3**
- Know, the various display devices that are used in automobiles. **L2**
- Identify the elements in the engine management and vehicle management system. **L2**

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**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

## 19AME65b- PROGRAMMING OF ROBOT AND ITS CONTROL

*(Open Elective - II)*

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:** The objectives of the course are to make the students learn about

- Learn the fundamental concepts of industrial robotic technology.
- Apply the basic mathematics to calculate kinematic and dynamic forces in robot manipulator.
- Understand the robot controlling and programming methods.
- Describe concept of robot vision system.

### UNIT – 1: Fundamentals of Robots: 10 Hrs

Introduction, definition, classification and history of robotics, robot characteristics and precision of motion, advantages, disadvantages and applications of robots.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Outline the advantages, disadvantages and applications of robot. **L2**
- Compare the types of robot manipulators based on applications. **L2**

### UNIT – II: Robot Actuators And Feedback Components: 10 Hrs

Actuators, Pneumatic, Hydraulic actuators, Electric & Stepper motors, comparison. Position sensors - potentiometers, resolvers, encoders - velocity sensors, Tactile sensors, Proximity sensors.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Compare the types of actuators used in robot manipulator. **L2**
- List out the various types of robots and feedback components. **L2**

### UNIT – III: Robot Programming 10Hrs

Methods of programming - requirements and features of programming languages, software packages, problems with programming languages. VAL, RAIL, AML, C, C++.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- List out the various methods of robot programming **L2**
- Explain the requirements and features of programming **L2**

### UNIT – IV: Control of Manipulators: 8 Hrs

Open- and close-loop control, the manipulator control problem, linear control schemes, characteristics of second-order linear systems, linear second-order SISO model of a manipulator joint, joint actuators, partitioned PD control scheme, PID control Scheme, computer Torque control, force control of robotic manipulators, description of force-control tasks, force control strategies, hybrid position/force control, impedance force/torque control.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the basic concepts of robot controlling systems. **L2**
- Outline PD and PID control schemes. **L2**
- Use the force control strategies to determine the forces in robot. **L3**
- Explain the force control and torque control techniques. **L2**

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**UNIT – V: Robot Vision:** **8 Hrs**

Introduction, architecture of robotic vision system, image processing, image acquisition camera, image enhancement, image segmentation, imaging transformation, Camera transformation and calibrations, industrial applications of robot vision.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Identify the components of robot vision system. **L3**
- Explain the concept of image enhancement, segmentation and transformation. **L2**
- List the various components of robot vision system. **L1**
- Illustrate the industrial applications of robot vision system. **L2**

**Text Books:**

1. Mikell P. Groover and Mitchell Weiss, Roger N. Nagel,Nicholas G.Odrey , Industrial Robotics — Mc Graw Hill, 1986.
2. R K Mittal and I J Nagrath, Robotics and control, Illustrated Edition, Tata McGraw Hill India 2003..

**Reference Books:**

1. Saeed B. Niku, Introduction to Robotics – Analysis, System, Applications, 2nd Edition, John Wiley & Sons, 2010.
2. H. Asada and J.J.E. Slotine, Robot Analysis and Control, 1st Edition Wiley- Interscience, 1986.
3. Robert J. Schillin, Fundamentals of Robotics: Analysis and control, Prentice-Hall Of India Pvt. Limited, 1996.
4. Mohsen shahinpoor, A robot Engineering text book, Harper & Row Publishers,1987.
5. John.J.Craig Addison, Introduction to Robotics: Mechanics and Control, Wesley, 1999.
6. K.S. FU, R.C. Gonzalez and C.S.G Lee, Robotics: Control, sensing, vision, and intelligence . Mc Graw Hill, 1987.
7. Richard D. Klafter, Thomas Robotic Engineering an integrated approach, PHI publications 1988.

**Course Outcomes:**

At the end of this Course the student will be able to

- Explain fundamentals of Robots. **L2**
- Apply kinematics and differential motions and velocities. **L3**
- Demonstrate control of manipulators. **L2**
- Understand robot vision. **L2**
- Develop robot cell design and programming. **L3**

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**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

## 19AME65c- SENSORS FOR INTELLIGENT MANUFACTURING

*(Open Elective - II)*

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:** The objectives of the course are to make the students learn about

- Familiarize the sensors used in intelligent manufacturing.
- Illustrate sensors used in precision manufacturing and CNC machine tools.
- Explain sensors for monitoring of manufacturing systems.
- Outline advanced sensors used in intelligent manufacturing.

### UNIT – 1: Introduction 12 Hrs

Principles, classifications and characteristics of sensors – Electrical, magnetic, optical, acoustic, pneumatic, magnetic, electro-optical and vision sensors, role of sensors in intelligent manufacturing.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- List out various types of sensors used in manufacturing. **L1**
- Explain the characteristics of different sensors. **L3**
- Explain optical, magnetic, pneumatic and acoustic sensors. **L3**
- Describe the role of sensors in intelligent manufacturing. **L4**

### UNIT – II: Sensors and control in CIM and FMS: 10 Hrs

Design of CIM, decision support system for CIM, analysis of CIM, development of CIM strategy with sensors and control. FMS-Robot control with machine vision sensors-Architecture of robotic vision system, image processing, image acquisition, enhancement, segmentation, transformation, industrial application of robot vision, multi Sensor controlled robots, measurement of robot density, robot programming.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Identify various types of inbellisort manufacturing systems. **L2**
- List the various types of sensors in CIM. **L2**
- Explain machine sensors. **L3**
- Describe architecture of robotic design systems. **L4**

### UNIT – III: Sensors in Precision Manufacturing: 8Hrs

Testing of manufacturing components, principles and applications of digital Encoders, opto-electronic colour sensors, control applications in robotics. Sensors for CNC machine tools– linear, position and velocity sensors. Automatic identification techniques for shop floor control.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- List out different types of sensors in precision manufacturing. **L1**
- Describe the principle behind opto-electronic color sensors **L2**
- Select sensors for CNC machine tools. **L3**
- Explain automatic identification techniques for shop floor control. **L3**

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**UNIT – IV: Control of Manipulators:** **8 Hrs**

**Sensors for Monitoring of Manufacturing Systems**: Principles – sensors for monitoring temperature, force, vibration and noise. Sensors to detect machinery faults. Selection of sensors and monitoring techniques.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Identify various types of machine failures in manufacturing systems. **L2**
- Select sensors for monitoring of force, vibration and noise. **L3**
- Explain monitoring techniques for machinery faults. **L3**
- Name sensors used for temperature. **L3**

**UNIT – V: Smart / Intelligent sensors:** **8 Hrs**

Integrated sensors, micro sensors, nano sensors. Manufacturing of semi conductor sensors. Fibre optic sensors – Fibre optic parameters, configurations, photoelectric sensor for long distance, sensor alignment techniques.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- List out advance sensors in intelligent manufacturing. **L1**
- Explain about semiconductor and integrated sensors. **L3**
- Describe micro and nano sensors. **L3**
- Discuss principles of fibre optic sensors. **L3**

**Text Books:**

1. Sabrie Soloman, Sensors and Control systems in Manufacturing, McGraw-Hill, 2/e, 2010.
2. H.K Tonshoff and I.Inasaki, Sensor Applications Vol 1: Sensors in Manufacturing, Wiley-VCH Publications, 2001.

**Reference Books:**

1. Sabrie soloman, Sensors Handbook, McGraw Hill, 2/e, 20210
2. Mikell P.Groover, Mitchell Weiss, Roger N.Nagel, Nicholas G.Odrey, Industrial Robotics, Tata McGraw-Hill, 2008.

**Course Outcomes:**

At the end of this Course the student will be able to

- Classify various sensors used in intelligent manufacturing. **L2**
- Describe sensors used in computer integrated manufacturing and machine sensors. **L3**
- Discuss sensors used in precision manufacturing. **L3**
- Identify reasons behind machinery faults. **L3**
- Discuss advanced sensors in intelligent manufacturing. **L3**

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**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19AME65d- NON-CONVENTIONAL SOURCES OF ENERGY**

*(Open Elective-II)*

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:** The objectives of the course are to make the students learn about

- Familiarize with concept of various forms of renewable energy.
- Understand division aspects and utilization of renewable energy sources for both domestics and industrial applications.
- Expose the students in an environmental and cost economics of using renewable energy sources compared to fossil fuels.

**UNIT – 1: Principles Of Solar Radiation:** **10 Hrs**

Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- explain the basic concepts of solar radiation and solar collectors **L2**
- develop sun path diagrams **L3**
- Explain environmental impact of solar power. **L2**
- Discuss the instruments for measuring solar radiation and sun shine. **L6**

**UNIT – II: Solar Energy Collection:** **10 Hrs**

**Solar Energy Collection**: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

**Solar Energy Storage and Applications** :

Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications solar heating technique, solar distillation and drying, photovoltaic energy conversion.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Classify solar energy collectors. **L1**
- Describe orientation and thermal analysis of solar energy collectors. **L2**
- Explain photovoltaic energy conversion. **L2**
- Illustrate the various solar energy applications. **L2**

**UNIT – III: Wind Energy & Bio-Mass** **10Hrs**

**Wind Energy** : Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria

**BIO-MASS**: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engine operation and economic aspects.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Compare vertical axis and horizontal axis windmills. **L3**
- Illustrate the performance characteristics of vertical axis and horizontal axis windmills. **L2**
- Discuss the principles of Bio-conversion. **L6**
- Explain combustion characterizes of bio-gas. **L2**



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**UNIT – IV: Geothermal Energy & Ocean Energy** **8 Hrs**

**Geothermal Energy**: Resources, types of wells, methods of harnessing the energy, potential in India.

**Ocean Energy**: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the concept of geothermal and ocean energy. **L2**
- Discuss OTEC and principles utilization. **L6**
- Explain mini-hydel power plants and their economics. **L2**

**UNIT – V: Direct Energy Conversion** **10 Hrs**

Need for DEC, Carnot cycle, limitations, principles of DEC. Thermo-electric generators, Seebeck, Peltier and Joule Thomson effects, Figure of merit, materials, applications, MHD generators, principles, dissociation and ionization, hall effect, magnetic flux, MHD accelerator, MHD Engine, power generation systems, electron gas dynamic conversion, economic aspects. Fuel cells, principles, faraday's law's, thermodynamic aspects, selection of fuels and operating conditions.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Describe the working principle of MHD engine. **L2**
- Explain constructional details of various thermo-electric generators. **L2**
- Identify the various economic, thermodynamic aspects of electron gas dynamic conversion system. **L3**

**Text Books:**

1. Renewable energy resources, Tiwari and Ghosal, Narosa.
2. Non-Conventional Energy Sources, G.D. Rai.

**Reference Books:**

1. Renewable Energy Sources, Twidell& Weir.
2. Solar Energy, Sukhatme
3. Solar Power Engineering, B.S.Magal Frank Kreith & J.F.Kreith.
4. Non-Conventional Energy, Ashok V Desai, Wiley Eastern
5. Principles of Solar Energy, Frank Krieth & John F Kreider.
6. Non-Conventional Energy Systems, K Mittal , Wheeler.

**Course Outcomes:**

At the end of this Course the student will be able to

- Outline the various economic, thermodynamic aspects of electron gas dynamic conversion system. **L3**
- Explain the basic concepts of solar radiation and solar collectors. **L2**
- Discus OTEC and principles utilization. **L6**
- Describe orientation and thermal analysis of solar energy collectors. **L2**



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**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

## 19AME65e- NEMS & MEMS

*(Open Elective-II)*

| L | T | P | C |
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**Course Objectives:** The objectives of the course are to make the students learn about

- Familiarize the basics of MEMS and NEMS
- Focus on the available tools and procedures to analyze and design micro/nano-scale engineering systems
- Demonstrate main issues stemming from operating in micro and nano length scale.
- Train MEMS and NEMS devices and their applications
- Impart fabrication and modeling aspects of MEMS and NEMS devices
- Enable a systematic design approach to engineering projects

**UNIT – I: INTRODUCTION:** **10 Hrs**

New trends in Engineering and Science: Micro and Nano scale systems, Overview of Nano and Micro Electromechanical Systems, Micro electromechanical systems devices and structures, Nanotechnology and (N+1) Problem, Physical and Technological limitation of miniaturization;Nanoscale Structures / Nanoparticles: Adhesion, Nanotubes, Nanowires, Quantum Dots, Multilayered structures, Nanocluster Composites Crystals: Lattices, Nanocrystals and nanoparticles.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the concepts, nanostructures and nanotechnology. **L2**
- Identify the principles of processing, manufacturing and characterization of nanomaterials and nanoscale systems. **L3**
- Apply electronic microscopy, and nano indentation techniques to characterize nano materials and nanostructures. **L3**

**UNIT – II: MODELING OF MEMS AND NEMS:** **10 Hrs**

Introduction to modeling, analysis and simulation, Scaling laws for length and time and its effect on modeling, Grain size effect on materials properties (mechanical, electrical, magnetic, etc.), basic electro-magnetic with application to MEMS and NEMS, Modeling developments of micro-and nano actuators using electromagnetic fields, Lumped-parameter mathematical models of MEMS, Energy conversion in NEMS and MEMS.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the operation of micro devices, micro systems and their applications. **L1**
- Model MEMS devices and structures. **L3**
- Develop micro devices, micro systems using the MEMS fabrication process. **L3**

**UNIT – III: MANUFACTURING TECHNIQUES AND PROCESSES:** **10Hrs**

Cleanroom and Fab Procedures, Vacuum: Vacuum Systems, Pumps and Gauges; Materials for MEMS: Silicon, silicon compounds, polymers, metals; Microfabrication Technologies: Beam Machining – Ion-Beam, E-Beam and LASER processing techniques; Lithographic Patterning – Bulk μMachining, Surface μMachining, SU-8 Lithography & Surface forming, LIGA Process: X-Ray Lithography &UV LIGA; Precision Machining – Precision Milling and turning, μEDM, Micromolding & Embossing, Precision Bonding, Thin Films: Processes, Evaporation, Dry and Wet Etching, Sputtering Deposition; Characterization: Optical Techniques/Microscope, SEM, Optical and Electrical, Properties, Auger and Thin Film Analysis, AFM.

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**Learning Outcomes:**

At the end of this unit, the student will be able to

- Outline computer-aided design, fabrication, analysis and characterization of nano-structured materials, micro- and nano-scale devices. **L2**
- Develop micro/nanosystems for photonics and optical applications. **L2**
- Explain manufacturing processes based on diffusion, deposition and patterning of surfaces. **L4**

**UNIT – IV: MICRO SENSORS AND MICRO ACTUATORS: 8 Hrs**

MEMS Sensors: Piezoresistive pressure sensor, Acoustic wave sensors, Resonant Microsensor, Peizoelectric Rate gyroscope, Capacitive Accelerometer; etc. Nanosensors & Nano biosensors; Design of Actuators: Actuation using thermal forces, Actuation using shape memory Alloys, Actuation using piezoelectric crystals, Actuation using Electrostatic forces (Parallel plate, Torsion bar, Comb drive actuators), Micromechanical Motors and pumps; Nanomotor, Molecular Motor, etc.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Outline basic approaches for various actuator design. **L2**
- Distinguish between various MEMS sensors. **L4**
- Explain the operation principles of advanced micro- and nanosystems. **L4**

**UNIT – V: CONTROL OF MICROELECTROMECHANICAL SYSTEMS 10 Hrs**

Introduction to Microelectromechanical Systems Control, Control of Microelectromechanical Systems, Intelligent Control of MEMS; Synthesis, Analysis, Fabrication, and Computer-Aided Design of MEMS, Case studies: Design and Fabrication Analysis of Translational Microtransducers, Single-Phase and three phase Reluctance Micromotors, Modeling, Analysis, and Control of Micromirror Actuators; Application of Nanomotor in Bio-medical applications, Nano robots, Electronics based on CNT - Molecular Electronics.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Identify micro electro mechanical system control for a given application. **L3**
- Synthesis intelligent control of MEMS/NEMS. **L4**
- Evaluate MEMS/NEMS for various applications. **L4**

**Text Books:**

1. Marc Madou, Fundamentals of Micro fabrication, CRC press 1997.
2. Stephen D. Senturia, Micro system Design, Kluwer Academic Publishers,2001
3. J. A. Pelesko and D. H. Bernstein, Modeling of MEMS and NEMS, Chapman & Hall/CRC, 2003.
4. Sergey Edward Lyshevski, Lyshevski Edward Lyshevski, MEMS and NEMS: Systems, Devices and Structures, CRC Press, 2005.

**Reference Books:**

1. Tai Ran Hsu, MEMS and Microsystems Design and Manufacture, Tata Mcraw Hill, 2002.
2. Chang Liu, Foundations of MEMS, Pearson education India limited, 2006
3. Mahalik N P, MEMS, Tata McGraw-Hill Education, 2008.
4. Gianfranco Cerofolini, Nanoscience and Technology: Nanoscale Devices, Springer, 2009.

**Course Outcomes:**

At the end of this Course the student will be able to

- Identify processing and characterization of nanomaterials. **L3**
- Plan operation of micro devices, micro systems and their applications. **L3**
- Describe the implementation of MEMS into products. **L4**
- Explain the operation principles of advanced micro- and nanosystems. **L4**
- Apprise the technology implemented in advanced micro- and nanosystem. **L5**
- Design the micro devices, micro systems using the MEMS fabrication process. **L5**



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**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

## 19AME65f – OPTIMIZATION TECHNIQUES THROUGH MATLAB

*(Open Elective - II)*

| L | T | P | C |
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**Course Objectives:** The objectives of the course are to make the students learn about

- Introduce basics of MATLAB
- Familiarize the fundamentals of optimization
- Explain single variable optimization using various methods
- Implement multi variable optimization using various methods
- Train various evolutionary algorithms.

**UNIT – 1: Introduction to MAT LAB:** **10 Hrs**

Overview, MATLAB Preliminaries, Basics of MATLAB, Beyond the Basics of MATLAB, Popular Functions and Commands, Plotting using MATLAB, Optimization with MATLAB.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Write simple codes in MATLAB. **L3**
- Plot the data using MATLAB. **L3**
- Implement optimization models in MATLAB. **L3**

**UNIT – II: Introduction to Optimization:** **10 Hrs**

Statement of an optimization problem, Classifications of optimization Problems: Single variable optimization, Multi variable optimization with no constraints, Multi variable optimization with equality constraints, Multi variable optimization with inequality constraints, Convex and Concave programming.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Build optimization problem. **L1**
- Solve various optimization problems **L3**
- Compare convex and concave programming **L4**

**UNIT – III: Single Variable Optimization:** **10Hrs**

Finite difference method, Central difference method, Runge-Kutta method, interval halving method, golden section method with MATLAB code.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand various methods involving single variable optimization. **L2**
- Develop codes in MATLAB for different methods. **L3**
- Identify methods for solving a single variable optimization problem. **L3**

**UNIT – IV: Multi Variable Optimization:** **8 Hrs**

Conjugate gradient method, Newton's method, Powell's method, Flectcher- Reeves method, Hooke and Jeeves method, interior penalty function with MATLAB code.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Apply various methods involving multi variable optimization. **L2**
- Develop codes in MATLAB for solving various multi variable optimization problems. **L3**
- Choose methods for solving a multi variable optimization problem. **L3**



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**UNIT – V: Evolutionary Algorithms:** **8 Hrs**

Overview, Genetic Algorithms: Basics of Genetic Algorithms, Options in MATLAB, Multi Objective Optimization using Genetic Algorithms, Ant Colony Optimization, Simulated Annealing, Particle Swarm Optimization.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Apply different types of genetic algorithms. **L3**
- Model optimization problems using genetic algorithms in MATLAB. **L3**
- Compare different genetic algorithms for performance. **L5**

**Text Books:**

1. Rao V.Dukkipati, MATLAB: An Introduction with Applications, Anshan, 2010.
2. Achille Messac, Optimization in practice with MATLAB, Cambridge University Press, 2015.
3. Jasbir S Arora, Introduction to optimum design, 2/e. Elsevier, 2004.

**Reference Books:**

1. Cesar Perez Lopez, MATLAB Optimization Techniques, Academic press, Springer publications, 2014.
2. Steven C.Chapra, Applied Numerical Methods with MATLAB for Engineers and scientists, 4/e, McGraw-Hill Education, 2018.

**Course Outcomes:**

At the end of this Course the student will be able to

- Use optimization terminology and concepts, and understand how to classify an optimization problem. **L4**
- Apply optimization methods to engineering problems. **L3**
- Implement optimization algorithms. **L3**
- Compare different genetic algorithms. **L5**
- Solve multivariable optimization problems. **L4**



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**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19AEC65a-INTRODUCTION TO MICROCONTROLLER AND APPLICATIONS**

***(Open Elective-II)***

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:** The objectives of the course are to make the students learn about

- To understand the basic concepts and architecture of 8051.
- To learn various instructions and addressing modes used in 8051
- To be able to write programs in assembly language for 8051
- To be able to program 8051 Timers and implement serial communication for a given application.
- To learn interfacing of memory, I/O devices and the usage of Interrupts.

**UNIT – I:**

**Architecture of 8051:** Introduction, Block diagram of 8051 Microcontroller, Functions of each block, Pin details of 8051, ALU,ROM, RAM, Memory Organization of 8051, Special function registers, Program Counter, PSW register, Stack, I/O Ports, Timer, Interrupt, Serial Port, Oscillator and Clock, Clock Cycle, Machine Cycle, Instruction cycle, Reset, Power on Reset.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the architecture of 8051 microcontroller. **L2**
- Learn the functions of each block of 8051 microcontroller. **L1**

**UNIT – II:**

**Instruction Set of 8051:** Instruction set of 8051, Classification of 8051 Instructions, Data transfer instructions, Arithmetic Instructions, Logical instructions, Branching instructions, Bit Manipulation Instructions

**Assembler and Addressing Modes:** Assembling and running an 8051 program, Structure of Assembly Language, Assembler directives, Different addressing modes of 8051.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Know different instructions available in the Instruction set of 8051. **L1**
- Learn and use different types of addressing modes of 8051 microcontroller. **L1**

**UNIT – III:**

**Programs:** Arithmetic operations, Biggest Number / Smallest Number, Ascending order / Descending order, BCD to HEX Conversion, HEX to BCD Conversion, Odd Parity Generator Even Parity Generator, Time delay routines

**I/O:** Bit addresses for I/O and RAM, I/O programming, I/O bit manipulation programming.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Write assembly language program in 8051 for simple operations. **L6**
- Gain knowledge about different mappings used in 8051 microcontroller. **L1**

**UNIT – IV:**

**Timer:** Programming 8051 Timers, Timer registers, Different modes of Timer, Programming timer in different modes, Counter programming, Different modes of Counter, Sample programs.

**Serial Communication:** Basics of Serial communication, UART, RS 232 Protocol, 8051 interface to RS 232, 8051 UART Programming, SPI and $I^2C$ implementation on 8051.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Write programs to use the 8051 Timers for a given application. **L6**
- Use different types of serial communication devices based on the application. **L3**

**UNIT – V:**

**Interrupt**: 8051 Interrupts, Programming Timer Interrupts, Programming external hardware interrupts, Programming the serial communication interrupt, Interrupt priority in 8051.**IC 8255:** IC 8255, Block Diagram, Modes of 8255, Interfacing with 8051.

**Interfacing Techniques**: Interfacing external memory to 8051, Sensor interfacing, ADC interfacing, DAC interfacing, Keyboard interfacing, Seven segment LED Display Interfacing, Stepper Motor interfacing.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Interface memory and I/O devices for specific applications. **L4**
- Learn and apply Interrupts based on the application and usage. **L3**

**Text Books:**

1. Muhammed Ali Mazidi, Janice Gillispie Mazidi and Rolin D McKinlay, "The 8051 Microcontroller and Embedded Systems Using Assembly and C", 2nd Edition, Pearson Education, 2008.
2. Ajit pal, "Microcontrollers, Principles and Applications", – PHI Ltd., - 2011.

**Reference Books:**

1. Ajay V Deshmukh, "Microcontrollers: Theory and Applications", TATA McGraw Hill publications, 2007.
2. Krishna Kanth, "Microprocessors and Microcontrollers", PHI Publications, 2010

**Course Outcomes:**

At the end of this Course the student will be able to

- Understand the basic concepts and architecture of 8051. **L2**
- Know the usage of various instructions and addressing modes in 8051 **L1**
- Write programs in assembly language for 8051 **L6**
- Program 8051 Timers and implement serial communication for a given application. **L6**
- Interface memory, I/O devices and use Interrupts. **L4**

**B.Tech IV Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19AEC65b-PRINCIPLES OF DIGITAL SIGNAL PROCESSING**

| L | T | P | C |
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**Course Objectives:** The objectives of the course are to make the students learn about

- To understand the frequency domain analysis of discrete time signals.
- To learn the properties of discrete fourier series and fourier transforms.
- To design & analyze IIR digital filters from analog filters.
- To know various structures used in implementation of FIR digital filters.
- To grasp the importance and applications of Multirate Digital signal processing.

**UNIT – I:**

**Introduction to Digital Signal Processing:** Discrete time signals & sequences, Classification of Discrete time systems, stability of LTI systems, LTI system Properties. Solution of Linear constant coefficient difference equations , frequency domain representation of discrete time signals and systems. Review of Z-transforms.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Analyze and process signals in the discrete domain. **L4**
- Determine time domain representations and frequency domain analysis of discrete-time signals and systems. **L3**

**UNIT – II:**

**Discrete Fourier Series and Fourier Transforms:** Properties of discrete Fourier series, DFS representation of periodic sequences, Discrete Fourier transforms: Properties of DFT, linear filtering methods based on DFT, Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency FFT Algorithms, Inverse FFT.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the pproperties of discrete fourier series. **L2**
- Describe DFT using FFT algorithms. **L1**

**UNIT – III:**

**Design of IIR Digital Filters and Realizations:** Analog filter approximations – Butter worth and Chebyshev, Design of IIR Digital filters from analog filters, Design Examples, Analog and Digital frequency transformations. Basic structures of IIR systems, Transposed forms.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Design IIR digital filters from analog filters. **L6**
- Construct IIR digital filters with different realization techniques. **L6**

**UNIT – IV:**

**Design of FIR Digital Filters and Realizations:** Characteristics of FIR Digital Filters, frequency response. Design of FIR digital filters using window techniques and frequency sampling technique, comparison of IIR & FIR filters, basic structures of FIR systems.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Design FIR digital filters using window techniques. **L6**
- Construct the basic structures of FIR systems. **L6**

**UNIT – V:**

**DSP Applications:** Introduction to programmable DSPs, Multirate signal processing: Decimation, Interpolation, Sampling rate conversion by a rational factor; Adaptive filters: Introduction, Basic principles of Forward Linear Predictive filter and applications such as system identification, echo cancellation, equalization of channels, and beam forming using block diagram representation study only.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Apply Interpolation and Decimation with help of sampling and filtering. **L3**
- Understand the principle and applications of Forward Linear Predictive filter. **L2**

**Text Books:**

1. John G. Proakis and Dimitris G. Manolakis, "Digital Signal Processing, Principles, Algorithmsand Applications", Pearson Education, 2007.
2. A.V.Oppenheim and R.W. Schaffer, "Discrete Time Signal Processing",PHI.
3. B.Venkataramani and M. Bhaskar, "Digital Signal Processors – Architecture, Programming and Applications", TATA McGraw Hill, 2002.

**Reference Books:**

1. Andreas Antoniou, "Digital Signal Processing", TATA McGraw Hill, 2006
2. MH Hayes, "Digital Signal Processing", Schaum's Outline series, TATA Mc-Graw Hill, 2007.
3. Robert J. Schilling and Sandra L. Harris, "Fundamentals of Digital Signal Processing using Matlab", Thomson, 2007.

**Course Outcomes:**

At the end of this Course the student will be able to

- Articulate the frequency domain analysis of discrete time signals. **L3**
- Understand the properties of discrete fourier series and fourier transforms. **L2**
- Design & analyze IIR digital filters from analog filters. **L6**
- Design various structures used in implementation of FIR digital filters. **L6**
- Summarize the importance and applications of Multirate Digital signal processing. **L2**

**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19AEC65c-INTRODUCTION TO IMAGE PROCESSING**

***(Open Elective-II)***

| L | T | P | C |
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**Course Objectives:** The objectives of the course are to make the students learn about

- To learn the fundamentals of Image Processing and learn the different types of image transforms.
- To study different types of filtering techniques for image enhancement.
- To understand various types of image segmentation and thresholding techniques.
- To gain knowledge on wavelets and multi resolution image processing techniques.
- To comprehend various types of image compression and colour image processing methods.

**UNIT – I:**

**Digital Image Fundamentals:** Fundamental steps of digital image processing, Components of Digital Image processing, image sampling and quantization, basic relationships between pixels – neighborhood, adjacency, connectivity, distance measures. Applications of Digital Image Processing.

**Image Transforms:** Fourier Transform and its properties in one dimensional and Two dimensional, Discrete Fourier Transform, Discrete Cosine Transform, Discrete Sine transform, Walsh transform, Hadamard transform, Slant transform, KL Transforms and its properties.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the fundamentals of digital image processing. **L2**
- Analyze the image transforms in one and two dimensions. **L4**

**UNIT – II:**

**Image Enhancements and Filtering:** Gray level transformations, Histogram processing, histogram equalization, Enhancement of Frequency domain, Homomorphic filtering, Filtering in the frequency domain. Image Restoration: A Model of the Image Degradation \ Restoration Process, Noise Models, Inverse filtering, Minimum Mean Square Error (Weiner) Filtering, Constrained least squares filtering.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Analyze the filters in spatial and frequency domains. **L4**
- Understand the image restoration model and various types of noises in image restoration. **L2**

**UNIT – III:**

**Image Segmentation:** Detection of Discontinuities: Point detection, Line detection, Edge detection, Edge linking and boundary detection, Thresholding, Region based segmentation.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Learn the concept of image segmentation. **L1**
- Analyze various types of thresholding techniques. **L4**

**UNIT – IV:**

**Wavelets and Multi-resolution image processing:** Back ground, Image Pyramids, Sub band coding, The Haar Transform.Multi resolution Expansions: Series Expansions, Scaling Functions, Wavelet Functions, Wavelet Transform in One dimension: The wavelet series expansions, The Discrete wavelet transform, The Continuous Wavelet Transform, The Fast wavelet Transform, Wavelet transform in two dimensions, Wavelet Packets.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the wavelets in one dimension and two dimensions. **L2**
- Explain the multi-resolution expansions and fast wavelet transform. **L1**

**UNIT – V:**

**Image Compression:** Redundancy, coding, inter-pixel and psycho-visual; Loss less compression – Huffmann coding, predictive coding; Lossy Image compression- predictive and transform coding; Image compression standards.

**Color Image Processing:** Color Fundamentals, Color models–RGB, CMY, HSI; Pseudo color Image Processing, Basics of Full color Image Processing.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the need for image compression and its types. **L2**
- Learn the color image processing and various types of color models. **L1**

**Text Books:**

1. R.C. Gonzalez and R.E. Woods, "Digital Image Processing", Second Edition, Pearson Education, 2008.
2. Anil Kumar Jain, "Fundamentals of Digital Image Processing", Prentice Hall of India, 2nd edition 2004.

**Reference Books:**

1. Rafael C. Gonzalez, Richard E woods and Steven L. Eddins, "Digital Image processing using MATLAB", Tata McGraw Hill, 2010.
2. S Jayaraman, S Esakkirajan and T Veerakumar, "Digital Image processing", Tata McGraw Hill.
3. William K. Pratt, "Digital Image Processing", John Wiley, 3rd Edition, 2004.

**Course Outcomes:**

At the end of this Course the student will be able to

- Understand the fundamentals of Image Processing and apply different types of image transforms. **L2**
- Correlate different types of filtering techniques for image enhancement. **L4**
- Understand various types of image segmentation and thresholding techniques. **L2**
- Gain knowledge on wavelets and multi resolution image processing techniques. **L1**
- Summarize different types of image compression and colour image processing methods. **L2**

**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19AHS14a-MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**

**(Humanities Elective-I)(Common to EEE, ECE & CSE)**

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**Course Objectives:**

- To inculcate the basic knowledge of micro economics and financial accounting.
- To make the students learn how demand is estimated for different products, input- output relationship for optimizing production and cost.

**UNIT – 1**

**Introduction to Managerial Economics:**

Definition of Managerial Economics, Nature and Scope – Managerial Economics and its relation with other subjects- Basic economic tools in Managerial Economics.

**Demand Analysis & Elasticity of Demand:** Meaning- Demand distinctions- Demand determinants- Law of Demand and its exceptions, Types of Elasticity of demand - Measurement of price elasticity of demand, Significance of Elasticity of Demand.

**Demand Forecasting:** Meaning - Factors governing demand forecasting - Methods of demand forecasting - Forecasting demand for new products.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Know the nature and scope of Managerial Economics and its importance. **L1**
- Understand the concept of demand and its determinants. **L2**

**UNIT – II**

**Theory of Production**: Production Function- Isoquants and Isocosts, MRTS, Cobb-Douglas Production function.

**Cost Analysis:** Cost concepts, Opportunity cost, Fixed Vs Variable costs, Explicit costs Vs. Implicit costs, Out of pocket costs vs. Imputed costs. Break even analysis -Determination of Break-Even Point (simple problems) - Managerial Significance and limitations of BEP.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Know the production function, Input-Output relationship and different cost concepts. **L1**
- Apply the least-cost combination of inputs. **L2**

**UNIT – III**

**Introduction to Markets:** Market structures: Types of competition, Features of Perfect Competition, Monopoly and Monopolistic Competition. Price-Output Determination under Perfect Competition, Monopoly, Monopolistic Competition.

**Pricing Policies:** Methods of Pricing-Marginal Cost Pricing, Limit Pricing, Market Skimming Pricing, Penetration Pricing, Bundling Pricing, and Peak Load Pricing. Internet Pricing Models: Flat rate pricing, Usage sensitive pricing, Transaction based pricing, Priority pricing, charging on the basis of social cost, Precedence model, Smart market mechanism model.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Apply the price output relationship in different markets. **L1**
- Evaluate price-output relationship to optimize cost, revenue and profit. **L2**

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**UNIT – IV**

**Types of Industrial Organization**: Characteristic features of Industrial organization, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, State/Public Enterprises and their types.

**Capital Budgeting**: Introduction to capital, Meaning of capital budgeting, Need for capital budgeting – Capital budgeting decisions (Examples of capital budgeting) - Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR), IRR and Net Present Value Method (simple problems).

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Know the concept of capital budgeting and its importance in business. **L1**
- Contrast and compare different investment appraisal methods. **L2**

**UNIT – V**

**Introduction to Financial Accounting:** Introduction to Double-entry system, Journal, Ledger, Trial Balance- Final Accounts (with simple adjustments) - Limitations of Financial Statements.

**Interpretation and analysis of Financial Statement:** Ratio Analysis – Liquidity ratios, Profitability ratios and solvency ratios – Preparation of changes in working capital statement and fund flow statement.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Know the concept, convention and significance of accounting. **L1**
- Apply the fundamental knowledge of accounting while posting the journal entries. **L2**

**Text Books:**

1. **J.V. Prabhakar Rao**: Managerial Economics and Financial Analysis, Maruthi Publications, 2011.
2. **Prof. C.Viswanatha Reddy:** 'Financial Accounting-1' Himalaya Publishing House, Newdelhi.

**Reference Books:**

1. **A R Aryasri** - Managerial Economics and Financial Analysis, TMH 2011.
2. **Suma damodaran**- Managerial Economics, **Oxford** 2011.
3. **S.A. Siddiqui & A.S. Siddiqui**, Managerial Economics and Financial Analysis, New Age International Publishers, 2011.
4. **N. Appa Rao. & P. Vijaya Kumar**: 'Managerial Economics and Financial Analysis', Cengage Publications, New Delhi, 2011.

**Course Outcomes:**

At the end of this Course the student will be able to

- Be able to perform and evaluate present worth, future worth and annual worth analyses on one of more economic alternatives. **L1**
- Be able to perform and evaluate payback period and capitalized cost on one or more economic alternatives. **L2**
- Be able to carry out and evaluate benefit/cost, life cycle and breakeven analyses on one or more economic alternatives. **L3**
- Evaluate the capital budgeting techniques. **L4**
- Students can analyze how to invest their capital and maximize returns. **L5**

**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19AHS14b-ENTERPRENUARSHIP AND INNOVATION MANAGEMENT**

**(Humanities Elective-I)(Common to EEE, ECE & CSE)**

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**Course Objectives:**

- To enable students understand the opportunities available to start a business.
- To impart knowledge about various sources of support (Financial and Non-financial) available to start an enterprise.

**UNIT – 1: FUNDAMENTALS OF ENTREPRENEURSHIP**

Fundamentals of Entrepreneurship – Evolution and Theories of Entrepreneurship – Characteristics of Entrepreneurs Myths of Entrepreneurship – Kakinada Experiment -Elements of leadership –Role of Entrepreneurs in Indian economy – Social and Ethical Perspectives of Entrepreneurship - Corporate entrepreneurship – Social Entrepreneur, women Entrepreneurship
- Opportunities & challenges.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Define entrepreneurship and the characteristics of an entrepreneur. **L1**
- Explain the significance of entrepreneurship in the economic development of a nation. **L2**

**UNIT – II: IDEATION AND EVALUATION OF BUSINESS IDEAS**

Opportunity identification – Ideations process - Sources of business ideas – Role of creativity – Sources of Innovation - Business Idea Evaluation - Product/ Service design – Design Thinking - Customer Value Proposition (CVP) – Business models.

**Case study**: Business cases of OYO, Paytm and Flipkart/ Smartmart.

**Activity:** Idea generation in groups and CVP.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Select the right business ideas. **L1**
- Explain the business idea evaluation process **L2**

**UNIT – III: Business Organizations and Venture Establishment**

Forms of business organisations/ownership – Techno-economic feasibility assessment – Financial feasibility – Market feasibility – Preparation of Business plan – Business canvas & Lean canvas – Challenges & Pitfalls in selecting new venture.

**Activity:** Preparation of business plan (draft).

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Recall different forms of business organizations. **L1**
- Develop business canvas. **L2**

**UNIT – IV: Introduction to Innovation**

Creativity, Invention and innovation, Types of Innovation, Relevance of Technology for Innovation, The Indian innovations and opportunities.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Able to develop new ideas to discover new ways of looking problems and opportunities. **L1**
- Apply technology to innovation. **L2**



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**UNIT – V: Promoting and managing innovation**

Innovators and Imitators, Patents, Trademarks, Intellectual Property, Exploring, Executing, Leveraging and renewing innovation, Enhancing Innovation Potential & Formulating strategies for Innovation.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Intellectual Property Licensing. **L1**
- Summarize the importance of IPR. **L2**

**Text Books:**

1. Robin Lowe and Sue Marriott, Enterprise: Entrepreneurship and Innovation Concepts, Contexts and Commercialization.
2. John Bessant and Joe Tidd, Innovation and Entrepreneurship.

**Reference Books:**

1. Rabindra N. Kanungo "Entrepreneurship and innovation", Sage Publications, New Delhi, 1998.
2. Peter F. Drucker, Innovation and Entrepreneurship.
3. EDII "Faculty and External Experts – A Hand Book for New Entrepreneurs Publishers: Entrepreneurship Development" Institute of India, Ahmadabad, 1986.
4. Philips, Bonefiel and Sharma (2011), Social Entrepreneurship, Global vision publishing house, New Delhi.

**Course Outcomes:**

At the end of this Course the student will be able to

- Choose entrepreneurship as an alternative career. **L1**
- Distinguish between corporate and social entrepreneurs. **L2**
- Examine and build customer value proposition. **L3**
- Analyze feasibility of business ideas. **L4**
- Compare various supports schemes provided by GOI. **L5**

**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ACS66- CYBER SECURITY LAB**

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**List of Experiments:**

- TCP scanning using NMAP
- Port scanning using NMAP
- TCP / UDP connectivity using Netcat
- Perform an experiment to demonstrate sniffing of router traffic by using the tool wireshark.
- Perform an experiment how to use dumpsec.
- Perform an experiment to sniff traffic using ARP Poisoning
- Implementing the Secure Sockets Layer (SSL v2/v3) and Transport Layer Security (TLS v1) network protocols.
- Setup a honey pot and monitor the honey pot on network.

**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ACS67- MACHINE LEARNING LAB**

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**LIST OF EXPERIMNENTS:**

- Make use of Data sets in implementing the machine learning algorithms
- Implement the machine learning concepts and algorithms in any suitable language of choice.

**Description (If any):**

- The programs can be implemented in either JAVA or Python.
- For Problems 1 to 6 and 10, programs are to be developed without using the builtin classes or APIs ofJava/Python
- Data sets can be taken from standard repositories (https://archive.ics.uci.edu/ml/datasets.html) or constructedby the students.

**Lab Experiments:**

- Implement and demonstratethe FIND-Salgorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.
- For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithmto output a description of the set of all hypotheses consistent with the training examples.
- . Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge toclassify a new sample.
- Build an Artificial Neural Network by implementing the Backpropagationalgorithm and test the same using appropriate data sets.
- Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
- Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.
- Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.
- Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.
- Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.
- Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.

**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19AHS16-ORGANIZATIONAL BEHAVIOR**

**(Common to EEE, ECE & CSE)**

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**Course Objectives:**

- To make the student understand about the organizational behavior
- To enable them to develop self motivation, leadership and management.

**UNIT – 1:**

Organizational Behavior - Introduction to OB - Meaning and definition, scope - Organizing Process – Making organizing effective - Understanding Individual, Behavior – Attitude - Perception - Learning - Personality Types.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the concept of Organizational Behavior. **L1**
- Evaluate personality types. **L2**

**UNIT – II:**

**Individual Behavior** – Diversity – Biographical Characteristics Ability – Implementing Diversity Management – Strategies – Attitudes & Job Satisfaction - Personality – Theories of Personality – Perception – Process of Perception – Perception & Individual Decision Making – Motivation from concepts to Applications.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the concept of Organizational Behavior. **L1**
- Contrast and compare Individual Behavior and attitude. **L2**

**UNIT – III:**

**Group Behavior** – Foundations of Group Behaviour – Defining and Classifying Groups – Stages of Group Development – Group Properties – Roles – Norms – Status, Size and Cohesiveness – Group Decision Making – Understanding Work Teams – Types of Teams – Creating Effective Teams.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Know the concept of Group Dynamics. **L1**
- Contrast and compare Group behavior and group development. **L2**

**UNIT – IV:**

**Leadership and Motivational Theories**: Leadership Theories – Characteristic of effective leader – Finding and Creating Effective Leaders – Power & Polities. Introduction to motivation, Maslow's Hierarchy of Needs, Two- factor theory of Motivation, Mcdregers theory of motivational Model.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Contrast and compare Traits theory and Managerial Grid. **L1**
- Know the difference between Transactional and Transformational Leadership. **L2**

**UNIT – V:**

**Foundation of Organizational Structure**: Conflicts & Negotiations – Organization Structure – Organization Change & Stress Management – Self Management – Managing Careers.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Know the importance of organizational change and development. **L1**
- Apply change management in the organization. **L2**

**Text Books:**

1. Stephen P. Robbins, Timothy: Organizational Behaviour, Pearson 14th Edition, 2012.
2. Dr. Anjali Ghanekar, Organizational Behaviour Concepts & Cases, Everest, 19th Edition, 2013.

**Reference Books:**

1. Mirza S Saiyadain, Cases in Organizational Behavior , TMH,2011.
2. Gerard H.Seijts, Cases in Organizational Behavior, Sage,2008.
3. Nelson, Quick and Khandelwala, ORGB, 2/e, Cengage, 2012.
4. P.G. Aquinas: Organizational Behaviour Concepts, Realities, Application & Challenges, 2nd Edition, Excel Books 2012.

**Course Outcomes:**

At the end of this Course the student will be able to

- To bring about the through understanding of entrepreneurship and constraints for the growth of entrepreneurial culture. **L1**
- To demondtrate knowledge in entrepreneurship development. **L2**
- To understand the concept of entrepreneushiptaining and various entrepreneurship training institutes in India. **L3**
- To be able to demontrate progressive learning in the project report and ownership structures. **L4**
- To be able to demontrate progressive learning in the project report and ownership structures. **L5**

**IVB.Tech-ISEMESTER**
**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**
**19ACS71-CLOUD COMPUTING**

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**Course Objectives:**
Identify the technical foundations of cloud systems architectures.

- Apply principles of best practice in cloud application design and management.
- Identify and define technical challenges for cloud applications and assess their importance
- Analyze the problems and solutions to cloud application problems

**UNIT – 1: Introduction to Cloud Computing** **8 Hrs**
Evolution of Cloud Computing –Principles of Parallel and Distributed Computing – Cloud Characteristics, Recent trends in Computing- Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Web services.
**Learning Outcomes:**
At the end of this unit, the student will be able to

- Understand the fundamental principles of distributed computing. **L2**
- Understand how the distributed computing environments known as Grids can be built from lower level services. **L2**

**UNIT – II: CLOUD ARCHITECTURE, SERVICES AND STORAGE8 Hrs**
Layered Cloud Architecture Design – NIST Cloud Computing Reference Architecture. Characteristics – Cloud Services –(IaaS, PaaS, SaaS) –Deployment Models- Public, Private, Hybrid and community Cloud.Advantages of Cloud Storage – Cloud Storage Providers – S3.
**Learning Outcomes:**
At the end of this unit, the student will be able to

- Understand the importance of virtualization in distributed computing and how this has enabled the development of Cloud Computing. **L3**
- Analyze the performance of Cloud Computing **L3**

**UNIT – III: CLOUD ENABLING TECHNOLOGIES** **8 Hrs**
Basics of Virtualization – Types of Virtualization - Implementation Levels of Virtualization - Virtualization Structures - Tools and Mechanisms - Virtualization of CPU, Memory, I/O Devices - Virtual Clusters and Resource management – Virtualization for Data-center Automation.
**Learning Outcomes:**
At the end of this unit, the student will be able to

- Understand the concept of Cloud Security. **L4**
- Learn the Concept of Cloud Infrastructure Model. **L4**

**UNIT – IV: RESOURCE MANAGEMENT AND SECURITY IN CLOUD** **7 Hrs**
Inter Cloud Resource Management – Resource Provisioning and Resource Provisioning Methods Global Exchange of Cloud Resources – Security Overview – Cloud Security Challenges – Software-as-a-Service Security – Security Governance – IAM –Security Standards.
**Learning Outcomes:**
At the end of this unit, the student will be able to

- Understand the importance of virtualization in distributed computing and how this has enabled the development of Cloud Computing. **L5**
- Understand the concept of Cloud Security. **L5**

**UNIT – V: CLOUD TECHNOLOGIES AND ADVANCEMENTS** **8Hrs**

Hadoop – MapReduce – Virtual Box — Google App Engine – Programming Environment for Google App Engine — Open Stack – Federation in the Cloud – Four Levels of Federation – Federated Services and Applications – Future of Federation.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Analyze the performance of Cloud Computing. **L5**
- Learn the Concept of Cloud Infrastructure Model. **L5**

**Text Books:**

1. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, Distributed and Cloud Computing, From Parallel Processing to the Internet of Things, Morgan Kaufmann Publishers, 2012.
2. Essentials of Cloud Computing By K. Chandrasekaran-India © 2015 by Taylor & Francis Group, LLC.

**Reference Books:**

1. Tim Mather, Subra Kumaraswamy, and Shahed Latif, Cloud Security and Privacy, Oreilly, 2009.
2. Barrie Sosinsky, Cloud Computing Bible, Wiley-India, 2011
3. RajkumarBuyya, James Broberg, Andrzej M. Goscinski, Cloud Computing: Principles and Paradigms, Wiley, 2011.

**Course Outcomes:**

At the end of this Course the student will be able to

- Understand the fundamental principles of distributed computing. **L2**
- Analyze the performance of Cloud Computing. **L3**
- Understand the importance of virtualization in distributed computing and how this has enabled the development of Cloud Computing **L4**
- Understand how the distributed computing environments known as Grids can be built from lower level services. **L5**

**IV B.Tech I SEMESTER**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ACS72-DevOps**

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**Course Objectives:**

This course is designed to:

- Adapt the software Engineering practices that combine Software Development and IT operations for Quality Software.
- Enumerate the principles of continuous development and deployment, automation of configuration management, inter-team collaboration, and IT service agility.

**UNIT – 1:** **8 Hrs**

Phases of Software Development life cycle. Values and principles of agile software development.

**Learning Outcomes:**

After completing this Unit, students will be able to:

- Illustrate the Phases of Software Development life cycle **L2**
- Appraise theValues and principles of agile software development **L5**

**UNIT – II:** **8 Hrs**

Fundamentals of DevOps: Architecture, Deployments, Orchestration, Need, Instance of applications, DevOps delivery pipeline, DevOps eco system.

**Learning Outcomes:**

After completing this Unit, students will be able to:

- Explain the Fundamentals of Software development and operations **L2**
- Create the Instance of applications **L6**

**UNIT – III:** **8 Hrs**

DevOps adoption in projects: Technology aspects, Agiling capabilities, Tool stack implementation, People aspect, processes

**Learning Outcomes:**

After completing this Unit, students will be able to:

- Understand the Technology aspects and Agile capabilities **L2**
- Interpret the aspects in user's context **L5**

**UNIT – IV:** **7 Hrs**

CI/CD: Introduction to Continuous Integration, Continuous Delivery and Deployment , Benefits of CI/CD, Metrics to track CICD practices

**Learning Outcomes:**

After completing this Unit, students will be able to:

- Explain CI/CD and its benefits **L2**
- Demonstrate the Continuous Integration, Delivery and Deployment **L2**

**UNIT – V:** **8Hrs**

Devops Maturity Model: Key factors of DevOps maturity model, stages of Devops maturity model, DevOps maturity Assessment

**Learning Outcomes:**

After completing this Unit, students will be able to:

- dentify the Key factors of maturity model **L3**
- Estimate the DevOps maturity Assessment **L6**

**Text Books:**

1. The DevOps Handbook: How to Create World-Class Agility, Reliability, and Security in Technology Organizations, Gene Kim , John Willis , Patrick Debois , Jez Humb,1st Edition, O'Reilly publications, 2016.
2. What is Devops? Infrastructure as code, 1st Edition, Mike Loukides ,O'Reilly publications, 2012.

**Reference Books:**

1. Building a DevOps Culture, 1st Edition, Mandi Walls, O'Reilly publications, 2013.
2. The DevOps 2.0 Toolkit: Automating the Continuous Deployment Pipeline With Containerized Microservices, 1st Edition, Viktor Farcic, CreateSpace Independent Publishing Platform publications, 2016
3. Continuous Delivery: Reliable Software Releases Through Build, Test, and Deployment Automation, 1st Edition, Jez Humble and David Farley, 2010
4. Achieving DevOps: A Novel About Delivering the Best of Agile, DevOps, and microservices, 1st Edition, Dave Harrison, Knox Lively, Apress publications, 2019

**Course Outcomes:**

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

- Explain how DevOps will balance the needs throughout the SDLC **L2**
- Demonstrate how DevOps improves the collaboration and productivity by automation. **L6**
- Adapt DevOps in real time projects. **L2**
- Illustrate the continuous integration tools and monitoring tools **L2**

**IV B.Tech I SEMESTER**
**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**
**19ACS74a-HUMAN COMPUTER INTERACTION**
**Professional Elective-III**

| L | T | P | C |
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**Course Objectives:**

- To learn the foundations of Human Computer Interaction.
- To become familiar with the design technologies for individuals and persons with disabilities.
- To be aware of mobile HCI.
- To learn the guidelines for user interface.

**UNIT – 1: Introduction** **8 Hrs**

Importance of user Interface – definition, importance of good design. Benefits of good design. A brief history of Screen design. The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Design effective dialog for HCI **L2**
- Design effective HCI for individuals and persons with disabilities. **L3**

**UNIT – II: Design process &Screen Designing** **8 Hrs**

**Design process** –Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business junctions.

**Screen Designing**: Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Design effective HCI for individuals and persons with disabilities. **L4**
- Assess the importance of user feedback. **L3**

**UNIT – III: Windows** **8 Hrs**

**Windows** –New and Navigation schemes selection of window, selection of devices based and screen based controls. Components – text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Assess the importance of user feedback. **L3**
- Explain the HCI implications for designing multimedia/ ecommerce/ e-learning Web sites. **L3**

**UNIT – IV:** **7 Hrs**

Software tools –Specification methods, interface – Building Tools.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the HCI implications for designing multimedia/ ecommerce/ e-learning Web sites. **L4**
- Develop meaningful user interface. **L5**

**UNIT – V:** **20 Hrs**

Interaction Devices –Keyboard and function keys – pointing devices – speech recognition digitization and generation – image and video displays – drivers.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Design effective HCI for individuals and persons with disabilities. **L5**
- Assess the importance of user feedback. **L5**
- Explain the HCI implications for designing multimedia/ ecommerce/ e-learning Web sites. **L5**

**Text Books:**

1. Effective DevOps by Jennifer Davis and Katherine Daniels, Published by O'Reilly Media, Inc.,
2. Learning Agilc, Understanding Scrum, XP, Lean and Kanban, by Andrew Stellman and Jennifer Greene, Published by O'Reilly Media, Inc.,

**Reference Books:**

1. Human – Computer Interaction. Alan Dix, Janet Fincay, GreGoryd, Abowd, Russell Bealg, Pearson Education.
2. Interaction Design Prece, Rogers, Sharps. Wiley Dreamtech.
3. User Interface Design, Soren Lauesen, Pearson Education.
4. Human –Computer Interaction, D.R.Olsen, Cengage Learning.
5. Human –Computer Interaction, Smith – Atakan, Cengage Learning

**Course Outcomes:**

At the end of this Course the student will be able to

- Design effective dialog for HCI **L2**
- Design effective HCI for individuals and persons with disabilities. **L3**
- Assess the importance of user feedback. **L4**
- Explain the HCI implications for designing multimedia/ ecommerce/ e-learning Web sites. **L4**
- Develop meaningful user interface. **L3**

**IV B.Tech I SEMESTER**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ACS74b-DATA SCIENCE**

**Professional Elective-III**

| L | T | P | C |
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**Course Objectives:**

1. To study fundamental concepts in software testing
2. To discuss various software testing issues and solutions in software unit test, integration and system testing.
3. To expose the advanced software testing topics, such as object--oriented software testing methods.

**UNIT – 1: Introduction: Objective, scope and outcome of the course** **8 Hrs**

Toolboxes: Python, fundamental libraries for data Scientists. Integrated development environment (IDE). Data operations: Reading, selecting, filtering, manipulating, sorting, grouping, rearranging, ranking, and ploting..

**Learning Outcomes:**

At the end of this unit, the student will be able to

- List a range of different software testing techniques and statergies and be able to apply specific(automated) unit testing method to the projects. **L1**
- Distinguish characteristics of structural testing methods **L2**

**UNIT – II: Data preparation** **8 Hrs**

Descriptive statistics, data preparation. Exploratory Data Analysis data summarization, data distribution, measuring asymmetry. Sample and estimated mean, variance and standard score. Statistical Inference frequency approach, variability of estimates, hypothesis testing using confidence intervals, using p-values.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible. **L3**
- Discuss about the functional and system testing methods **L3**

**UNIT – III: Supervised Learning** **8 Hrs**

Supervised Learning: First step, learning curves, training-validation and test. Learning models generalities, support vector machines, random forest. Examples.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Discuss about the functional and system testing methods. **L4**
- Demonstrate various issues for object oriented testing. **L4**

**UNIT – IV: Regression** **7 Hrs**

Regression analysis, Regression: linear regression simple linear regression, multiple & Polynomial regression, Sparse model. Unsupervied learning, clustering, similarity and distances, quality measures of clustering, case study.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Distinguish characteristics of structural testing methods. **L5**
- Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible. **L4**

**UNIT – V:Network Analysis** **10 Hrs**

Network Analysis, Graphs, Social Networks, centrality, drawing centrality of Graphs, PageRank, Ego-Networks, community Detection.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Discuss about the functional and system testing methods. **L5**
- Demonstrate various issues for object oriented testing. **L5**

**Text Books:**

1. Desikan and G. Ramesh, "Introduction to Data Science", CRC Press[2].

**Course Outcomes:**

At the end of this Course the student will be able to

- List a range of different software testing techniques and statergies and be able to apply specific(automated) unit testing method to the projects. **L3**
- Distinguish characterstics of structural testing methods. **L4**
- Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible. **L5**
- Discuss about the functional and system testing methods. **L5**

**IVB.Tech I SEMESTER**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ACS74c - MULTIMEDIA AND APPLICATION DEVELOPMENT**

**Professional elective–III**

| L | T | P | C |
|---|---|---|---|
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**Course Objectives:**

- Understand the relevance and underlying infrastructure of the multimedia systems.
- Understand core multimedia technologies and standards (Digital Audio, Graphics, Video, Text, Animation)
- Be aware of factors involved in multimedia systems performance, integration and evaluation

**UNIT-I:** **8Hrs**

**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.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the fundamental concepts. L1
- To build an application by using the basic concepts. L2

**UNIT – II:** **8 Hrs**

**Action Script**: ActionScript Features, Object-Oriented ActionScript, Datatypes and Type Checking, Classes, Authoring an ActionScript Class.

Action Script-II: Inheritance, Authoring an ActionScript 2.0 Subclass, Interfaces,Packages, Exceptions

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the importance of scripts, various types of scripts and how to utilize them. L2
- To implement an application through the inheritance. L3

**UNIT – III:** **8 Hrs**

Introduction to Adobe photoshop, Getting started with photoshop, creating and saving a document in photoshop, page layout and back ground, photoshop program window-title bar,

menu bar, option bar, image window, image title bar,status bar, ruler, palettes, tool box, screen modes, saving files, reverting files, closing files.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the concept of Photoshop. L2
- Build any design or model with the photoshop. L3

**UNIT – IV:** **7 Hrs**

**Images:** working with images, image size and resolution ,imageediting,colour modes and adjustments , Zooming & Panning an Image, Rulers, Guides & Grids- Cropping & Straightening an Image,image backgrounds ,making selections. Working with tool box: working with pen tool, save and load selection-working with erasers-working with text and brushes-Colour manipulations: colour modes- Levels – Curves - Seeing Colour accurately - Patch tool – Cropping-Reading your palettes - Dust and scratches- Advanced Retouching- smoothing skin.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the concepts how to work with images in photoshop. L1
- To work with advance tools, editing in photoshop. L3

**UNIT – V:** **8 Hrs**

**Layers:** Working with layers- layer styles- opacity-adjustment layers Filters: The filter menu, Working with filters- Editing your photo shoot, presentation –how to create adds, artstic filter, blur filter, brush store filter, distort filters, noice filters, pixelate filters, light effects, difference clouds, sharpen filters, printing.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Learn the Concept of layers and layer styles. L2
- To build a design or model with all the options in photoshop. L3

**Text Books:**

1. Fudamentals of Multimedia by Ze-Nian Li and Mark S. Drew PHI/Pearson Education.
2. Essentials ActionScript 2.0, Colin Moock, SPD O,REILLY.
3. Adobe Photoshop Class Room in a Book by Adobe Creative Team.
4. Photoshop: Beginner's Guide for Photoshop - Digital Photography, Photo Editing, Color Grading & Graphic...19 February 2016 by David Maxwell

**Reference Books:**

1. Digital Multimedia, Nigel chapman and jenny chapman, Wiley-Dreamtech
2. Macromedia Flash MX Professional 2004 Unleashed, Pearson.

**Course Outcomes:**

At the end of this Course the student will be able to

- Students are able to understand Multimedia projects & Applications.
- Students are able to utilize the multimedia technologies to develop multimedia project.
- Can deal with all multimedia facts for fulfillment of all day to day multimedia requirements.

**IV B.Tech I SEMESTER**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ACS76a-NATURAL LANGUAGE PROCESSING**

**Professional Elective-IV**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- Explain the advantages and disadvantages of different NLP technologies and their applicability in different business situations.
- Use NLP technologies to explore and gain a broad understanding of text data.
- Use NLP methods to analyse sentiment of a text document.
- Use NLP methods to perform topic modelling.

**UNIT – 1: Language Processing and Python** **8 Hrs**

Computing with Language: Texts and Words, A Closer Look at Python: Texts as Lists of Words 10, Computing with Language: Simple Statistics, Back to Python: Making Decisions and Taking Control, Automatic Natural Language Understanding.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Socially Responsible: FEIT graduates identify, engage, interpret and analyse stakeholder needs and cultural perspectives, establish priorities and goals, and identify constraints, uncertainties and risks (social, ethical, cultural, legislative, environmental, economics etc.) to define the system requirements. **L2**

**UNIT – II: Accessing Text Corpora and Lexical Resources** **8 Hrs**

Accessing Text Corpora, Conditional Frequency Distributions, More Python: Reusing Code, Lexical Resources, WordNet.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Design Oriented: FEIT graduates apply problem solving, design and decision-making methodologies to develop components, systems and processes to meet specified requirements. **L3**

**UNIT – III: Processing Raw Text** **8 Hrs**

Accessing Text from the Web and from Disk, Strings: Text Processing at the Lowest Level, Text Processing with Unicode, Regular Expressions for Detecting Word Patterns, Useful Applications of Regular Expressions, Normalizing Text, Regular Expressions for Tokenizing Text, Segmentation.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Technically Proficient: FEIT graduates apply abstraction, mathematics and discipline fundamentals, software, tools and techniques to evaluate, implement and operate systems. **L4**

**UNIT – IV: Writing Structured Programs** **7 Hrs**

Back to the Basics, Sequences, Questions of Style, Functions: The Foundation of Structured Programming, Doing More with Functions, Program Development, Algorithm Design, A Sample of Python Libraries.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Collaborative and Communicative: FEIT graduates work as an effective member or leader of diverse teams, communicating effectively and operating within cross-disciplinary and cross-cultural contexts in the workplace. **L5**

**UNIT – V:Categorizing and Tagging Words** **20 Hrs**

Using a Tagger, Tagged Corpora, Mapping Words to Properties Using Python Dictionaries, Automatic Tagging, N-Gram Tagging, Transformation-Based Tagging, How to Determine the Category of a Word.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Technically Proficient: FEIT graduates apply abstraction, mathematics and discipline fundamentals, software, tools and techniques to evaluate, implement and operate systems. **L5**

**Text Books:**

1. **Natural language processing with python**, OReiSteven Bird, Evan Klein & Edward Loper.
2. Natural Language Processing with Python by Steven Bird, Ewan Klein, Edward Lopper(ISBN13:978-0596516499)

**Reference Books:**

1. Handbook of Natural Language Processing, Second Edition—NitinIndurkhya, Fred J. Damerau, Fred J. Damerau (ISBN13: 978-1420085921)

**Course Outcomes:**

At the end of this Course the student will be able to

- Socially Responsible: FEIT graduates identify, engage, interpret and analyse stakeholder needs and cultural perspectives, establish priorities and goals, and identify constraints, uncertainties and risks (social, ethical, cultural, legislative, environmental, economics etc.) to define the system requirements. **L2**
- Design Oriented: FEIT graduates apply problem solving, design and decision-making methodologies to develop components, systems and processes to meet specified requirements. **L3**
- Technically Proficient: FEIT graduates apply abstraction, mathematics and discipline fundamentals, software, tools and techniques to evaluate, implement and operate systems. **L4**

**IV B.Tech I SEMESTER**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ACS76b-SOFTWARE TESTING METHODOLOGIES**

**Professsional Elective-IV**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

1. To study fundamental concepts in software testing
2. To discuss various software testing issues and solutions in software unit test, integration and system testing.
3. To expose the advanced software testing topics, such as object--oriented software testing methods.

**UNIT – 1: Introduction** **8 Hrs**

Faults, Errors, and Failures, Basics of software testing, Testing objectives, Principles of testing, Requirements, behavior and cor-rectness, Testing and debugging, Test metrics and measurements, Verification, Validation and Testing, Types of testing, Software Quality and Reliability, Software defect tracking.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- List a range of different software testing techniques and statergies and be able to apply specific(automated) unit testing method to the projects. **L1**
- Distinguish characterstics of structural testing methods **L2**

**UNIT – II: White Box and Black Box Testing** **8 Hrs**

White box testing, static testing, static analysis tools, Structural testing: Module/Code functional testing, Code coverage testing, Code complexity testing, Black Box testing, Requirements based testing, Boundary value analysis, Equivalence partitioning, state/ graph based testing, Model based testing and model checking, Differences between white box and Black box testing.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible. **L3**
- Discuss about the functional and system testing methods **L3**

**UNIT – III: Integration, System, and Acceptance Testing** **8 Hrs**

Top down and Bottom up integration, Bi-directional integration, System integration, Scenario Testing, Defect Bash, Functional versus Non-functional testing, Design/Architecture verification, Deployment testing, Beta testing, Scalability testing, Reliability testing, Stress testing, Acceptance testing: Acceptance criteria, test cases selection and execution.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Discuss about the functional and system testing methods. **L4**
- Demonstrate various issues for object oriented testing. **L4**

**UNIT – IV: Test Selection & Minimization for Regression Testing** **7 Hrs**

Regression testing, Regression test process, Initial Smoke or Sanity test, Selection of regression tests, Execution Trace, Dynamic Slicing, Test Minimization, Tools for regression testing, Ad hoc Testing: Pair testing, Exploratory testing, Iterative testing, Defect seeding.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Distinguish characterstics of structural testing methods. **L5**
- Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible. **L4**

**UNIT – V:Test Management and Automation** **10 Hrs**

Test Planning, Management, Execution and Reporting, Software Test Automation: Scope of automation, Design & Architecture for automation, Generic requirements for test tool framework, Test tool selection, Testing in Object Oriented Systems.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Discuss about the functional and system testing methods. **L5**
- Demonstrate various issues for object oriented testing. **L5**

**Text Books:**

1. Desikan and G. Ramesh, "Software Testing: Principles and Practices", Pearson Education.

**Reference Books:**

1. Aditya P. Mathur, "Fundamentals of Software Testing", Pearson Education.
2. Naik and Tripathy, "Software Testing and Quality Assurance", Wiley K. K. Aggarwal and Yogesh Singh, "Software Engineering", New Age International Publication.

**Course Outcomes:**

At the end of this Course the student will be able to

- List a range of different software testing techniques and statergies and be able to apply specific(automated) unit testing method to the projects. **L3**
- Distinguish characterstics of structural testing methods. **L4**
- Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible. **L5**
- Discuss about the functional and system testing methods. **L5**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ACS76c-ADHOC & SENSOR NETWORKS**

**Professional Elective-IV**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- Identify and Distinguish between the notion of Wired and Wireless Networks.
- Analyze the basic concepts for designing a routing Protocol for MANETs.
- Learn the concepts of Security issues for designing a routing protocol for MANETs.
- Learn the Basic concepts of Sensor Networks for Communication in Mobile computing.
- Apply Fundamental principles Characteristics for designing Sensor Networks for Communications

**UNIT – I: Introduction** **8hrs**

Fundamentals of Wireless Communication Technology -The Electromagnetic Spectrum - Radio propagation Mechanisms - Characteristics of the Wireless channel mobile ad hoc networks (MANETs) - Wireless Sensor Networks (WSNs): concepts and architectures - Applications of Ad Hoc and Sensor Networks - Design Challenges in Ad hoc and Sensor Networks.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the Fundamental Concepts and applications of ad hoc and wireless sensor networks **L2**
- Describe the MAC protocol issues of ad hoc networks **L3**

**UNIT – II: MAC PROTOCOLS FOR AD HOC WIRELESS NETWORKS** **8hrs**

Issues in designing a MAC Protocol - Issues in Designing a MAC Protocol for Ad Hoc Wireless Networks - Design Goals of a MAC Protocol for Ad Hoc Wireless Networks - Classification of MAC Protocols -Contention based protocols - Contention based protocols with Reservation Mechanisms - Contention based protocols with Scheduling Mechanisms - Multi channel MAC - IEEE 802.11.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Describe routing protocols for ad hoc wireless networks with respect to TCP design issues **L3**
- Explain the concepts of network architecture and MAC layer protocol for WSN **L3**

**UNIT – III: ROUTING PROTOCOLS AND TRANSPORT LAYER IN AD HOC WIRELESS 8hrs**

Routing Protocol: Issues in designing a routing protocol for Ad hoc networks - Classification-proactive routing - reactive routing (on-demand) - hybrid routing - Transport Layer protocol for Ad hoc networks - Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks - Classification of Transport Layer solutions-TCP over Ad hoc wireless - Network Security - Security in Ad Hoc Wireless Networks - Network Security Requirements.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Discuss the WSN routing issues by considering QoS measurements **L4**
- Explain the concepts of network architecture and MAC layer protocol for WSN **L5**

**UNIT – IV: WIRELESS SENSOR NETWORKS (WSNS) AND MAC PROTOCOLS** **7 Hrs**

Single node architecture: hardware and software components of a sensor node -WSN Network architecture: typical network architectures -data relaying and aggregation strategies -MAC layer protocols: self-organizing - Hybrid TDMA/FDMA and CSMA based MAC -IEEE 802.15.4.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Describe the MAC protocol issues of ad hoc networks **L5**
- Describe routing protocols for ad hoc wireless networks with respect to TCP design issues **L5**

**UNIT – V: WSN ROUTING, LOCALIZATION & QOS**

Issues in WSN routing –OLSR - Localization –Indoor and Sensor Network Localization - absolute and relative localization - triangulation - QOS in WSN - Energy Efficient Design – Synchronization.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the concepts of network architecture and MAC layer protocol for WSN **L5**
- Discuss the WSN routing issues by considering QoS measurements **L5**

**Text Books:**

1. C. Siva Ram Murthy, and B. S. Manoj, "Ad Hoc Wireless Networks: Architectures and Protocols ", Pearson Education, 2008.
2. Labiod. H, "Wireless Adhoc and Sensor Networks", Wiley, 2008

**Reference Books:**

1. Carlos De Morais Cordeiro, Dharma Prakash Agrawal "Ad Hoc & Sensor Networks: Theory and Applications", World Scientific Publishing Company, 2nd edition, 2011.
2. Feng Zhao and Leonides Guibas, "Wireless Sensor Networks", Elsevier Publication

**Course Outcomes:**

At the end of this Course the student will be able to

- Explain the Fundamental Concepts and applications of ad hoc and wireless sensor networks **L2**
- Describe the MAC protocol issues of ad hoc networks **L3**
- Describe routing protocols for ad hoc wireless networks with respect to TCP design issues **L4**
- Explain the concepts of network architecture and MAC layer protocol for WSN **L5**
- Discuss the WSN routing issues by considering QoS measurements **L5**

**B.Tech IV Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ACE75a-ARCHITECTURE AND TOWN PLANNING**

**(Open Elective-III)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:** The objectives of the course are to make the students learn about

- To know the western architecture and Indian architecture and also to gain knowledge on the principles of architectural design and historical background of town planning.

## A) ARCHITECTURE:

**UNIT – I:**

At the end of this unit, the student will be able to

**History of Architecture:**

**a) Western Architecture:** Egyptian, Greek, Roman Architectures; influences- Comparative Analysis Orders

**b) Indian Architecture:** Vedic age - Indus Valley civilization - Buddhist period; stambas, Slenstas. Roranas, Chaityans, Viharas with one example for each Hindu temples - Evaluation of Dravidian and Indo Aryan Styles - Principle factors. Temple of Aibole, Mahabalipuram, Madurai, Deograph, Bhuvaneshwar, Mount Abu.

**c)** Indo - Sarsanic Architecture; Mosque - Place- FortTomb

**Learning Outcomes:**

Understand the different architectures of Indian and western countries

Understand the various principle factors of architecture

**UNIT – II:**

**Architectural Design:**

**a) Principle of designing** : Composition of plan Relationship between plan and elevation elements, form, surface Mass, Texture, Color,Tone.

**b) Principle of Compositions:** Unity, contrast, proportion, scale, Bab Rhuthm, character. Principles of Planning a Residence; Site Orientation prospect, Grouping, circulation, privacy, services and otherfactors

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the design pricnciples and compositions of architecture

**UNIT – III:**

Introduction of Post-classic Architecture and contribution of eminent architects to modern period.Brief summary of post - classic architecture - Indian and Western Architectural contribution of Edward Lutyens, Le Corbusier), Frank Lloyd Wrigt, Walter Groping, Vender Rohe, Caarihan, Nervi, Oscar Niemyer, Edward Durell stone

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Obtain the knowledge of contribution of different architects in architecture

## B) TOWNPLANNING:

**UNIT – IV:**

**Historical Back Ground:** Town planning in India - town plans of Magad - town plans of ancient Indian towns; Mourya, Pataliputravijayanagara, Delhi.Town planning in the West-town plans of Acropolis, Rome, Paris, London

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the need of town planning
- Knowledge on planning of different towns in India and other countries

**UNIT – V:**

**Components of Planning;**

a) Zoning
b) Roads and road Traffic.
c) Housing-Slums, Parks, Playgrounds.
d) Public Utility Services.
e) Surveys and maps for planning.
f) Neighbourhood Planning

Planning New town, planning standards, National and regional Planning, town planning and legislation.Garden cities and satellite town

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the different components of town planning
- Knowledge on national standards in country and town planning

**Text Books:**

**Reference Books:**

**A) ARCHITECTURE**

1. Indian Architecture – Vol:- I and II by Percy Brown, Taraporevala Publications, Bombay.
2. Planning and 'Design of Building -Section of Architecture byY.S.Sane.
3. Modern Architecture and Design by Nikolans,Pevshar.
4. Modern Ideal Hol11nes for India byR.S.Deshpande.

**B) TOWNPLANNING**

1. Town and Country .Planning - A.J.Brown andH.M.Sherrard.
2. Town Design .-FederikGibbard, Architectural press,London.
3. National Building Code ofIndia.
4. Town Planning in India - Town and Country Planning Organisation, New Delhi1962.
5. Regional Planning - Misra R.P., Mysore University.
6. Urban and Regional Planning; Principles and case studies by K.S.Rama Gouda, Mysore University Publications.
7. Town and Country Planning - P. Abercrombe, Oxford University press.

**Course Outcomes:**

At the end of this Course the student will be able to

- Learn the importance of architecture and its principles in designing
- The different architectures till date and the contribution of different architects
- The necessity of town planning and different components of planning

**B.Tech IV Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ACE75b-EXPERIMENTAL STRESS ANALYSIS**

**(Open Elective-III)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:** The objectives of the course are to make the students learn about

- To bring awareness on experimental method of finding the response of the structure to different types of load
- Demonstrates principles of experimental approach
- Teaches regarding the working principles of various strain gauges
- Throws knowledge on strain rosettes and principles of non destructive testing of concrete
- Gives an insight into the principles of photo elasticity

**UNIT – I:**

**PRINCIPLES OF EXPERIMENTAL APPROACH**: - Merits of Experimental Analysis Introduction, uses of experimental stress analysis advantages of experimental stress analysis, Different methods –Simplification of problems

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Demonstrate the merits and principles of experimental approach
- Give an insight into the uses and advantages of experimental stress analysis

**UNIT – II:**

**STRAIN MEASUREMENT USING STRAIN GAUGES:-**

Definition of strain and its relation of experimental Determinations Properties of Strain Gauge Systems-Types of Strain Gauges – Mechanical, Acoustic and Optical Strain Gauges. Introduction to Electrical strain gauges - Inductance strain gauges – LVDT – Resistance strain gauges – various types –Gauge factor – Materials of adhesion base.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Introduce various strain gauge systems and their properties
- Give information regarding the gauge factor and materials of adhesion bases

**UNIT – III:**

**STRAIN ROSSETTES AND NON – DESTRUCTIVE TESTING OF CONCRETE:-** Introduction – the three elements Rectangular Rosette – The Delta Rosette Corrections for Transverse Strain Gauge. Ultrasonic Pulse Velocity method –Application to Concrete. Hammer Test – Application to Concrete.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Introduces various strain rosettes and corrections for strain gauges
- Gives an insight into the destructive and non destructive testing of concrete

**UNIT – IV:**

**THEORY OF PHOTOELASTICITY**: - Introduction –Temporary Double refraction – The stress Optic Law –Effects of stressed model in a polariscope for various arrangements – Fringe Sharpening. Brewster"s Stress Optic law.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Introduces stress optic laws.
- Gives the arrangements and working principles of polariscope

**UNIT – V:**

**TWO DIMENSIONAL PHOTOELASTICITY:** - Introduction – Iso-chromatic Fringe patternsIsoclinic Fringe patterns passage of light through plane Polariscope and Circular polariscope Isoclinic Fringe patterns – Compensation techniques – Calibration methods – Separation methods – Scaling Model to prototype Stresses – Materials for photo – Elasticity Properties of Photoelastic Materials

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Introduces the understanding of different fringe patterns.
- Introduces model analysis and properties of photo elastic materials

**Text Books:**

1. J.W.Dally and W.F.Riley, "Experimental stress analysis College House Enterprises"
2. Dr.Sadhu Singh, "Experimental stress analysis", khanna Publishers

**Reference Books:**

1. U.C.Jindal, "Experimental Stress analysis", Pearson Publications.
2. L.S.Srinath, "Experimental Stress Analysis", MC.Graw Hill Company Publishers.

**Course Outcomes:**

At the end of this Course the student will be able to

- The student will be able to understand different methods of experimental stress analysis
- The student will be able to understand the use of strain gauges for measurement of strain
- The student will be exposed to different Non destructive methods of concrete
- The student will be able to understand the theory of photo elasticity and its applications in analysis of structures

**B.Tech IV Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ACE75c-FINITE ELEMENT ANALYSIS**

**(Open Elective-III)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:** The objectives of the course are to make the students learn about

- Familiarize basic principles of finite element analysis procedure.
- Explain theory and characteristics of finite elements that represent engineering structures.
- Apply finite element solutions to structural, thermal, dynamic problem
- Learn to model complex geometry problems and solution techniques

**UNIT – I:**

**INTRODUCTION:** Concepts of FEM – Steps involved – merits & demerits – energy principles – Discretization – Rayleigh –Ritz method of functional approximation.

**PRINCIPLES OF ELASTICITY:** Equilibrium equations – strain displacement relationships in matrix form – Constitutive relationships for plane stress, plane strain and Axi-symmetric bodies of revolution with axi-symmetric loading.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the concept of nodes and elements.(L2)
- Understand the general steps of finite element methods.(l2)
- Understand the role and significance of shape functions in finite element formulations (l2)

**UNIT – II:**

**ONE DIMENSIONAL & TWO DIMENSIONAL ELEMENTS:** Stiffness matrix for bar element – shape functions for one dimensional elements – one dimensional problems .Two Dimensional Elements - Different types of elements for plane stress and plane strain analysis – Displacement models – generalized coordinates – shape functions – convergent and compatibility requirements – Geometric invariance – Natural coordinate system – area and volume coordinates

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the formulation of one dimensional and two – dimensional elements (L2)
- Apply the formulation techniques to solveone dimensional two – dimensional problems (L2)
- Formulate and solve axisymmetric problems.(L6)

**UNIT – III:**

**GENERATION OF ELEMENT :**Generation of element stiffness and nodal load matrices for 3-node triangular element and four noded rectangular elements.

**Learning Outcomes:**

At the end of this unit, the student will be able to

Apply the formulation techniques to solve problems using triangle and quadrilateral elements. (L3)

**UNIT – IV:**

**ISOPARAMETRIC FORMULATION :**Concepts of, isoparametric elements for 2D analysis – formulation of CST element, 4 –Noded and 8-noded iso-parametric quadrilateral elements – Lagrangian and Serendipity elements. **AXI-SYMMETRIC ANALYSIS:** Basic principles-Formulation of 4-noded iso-parametric axi-symmetric element

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand concepts of isoparametric elements(L1)
- Formulate and solve axisymmetric problems.(L6)

**UNIT – V:**

**SOLUTION TECHNIQUES:** Numerical Integration, Static condensation, assembly of elements and solution techniques for static loads

**Learning Outcomes:**

At the end of this unit, the student will be able to

**Text Books:**

1. Finite Element Analysis for Engineering and Technology, Tirupathi R Chandraputla, Universities Press Pvt Ltd, Hyderabad.2003.
2. Finite Element analysis – Theory & Programming by C.S.Krishna Murthy- Tata Mc.Graw Hill Publishers

**Reference Books:**

1. Finite element analysis and procedures in engineering by H.V.Lakshminaryana, 3rd edition, universities press,Hyderabad
2. Finite element analysis in Engineering Design by S.Rajasekharan, S.Chand Publications, NewDelhi
3. Finite element analysis by S.S. Bhavakatti-New age internationalpublishers

**Course Outcomes:**

At the end of this Course the student will be able to

- Demonstrate the differential equilibrium equations and theirrelationship
- Apply numerical methods tofem
- Demonstrate the displacement models and loadvectors
- Compute the stiffness matrix for isoperimetricelements
- Analyze plane stress and plane strainproblems

**B.Tech IV Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19AEE75a- ELECTRICAL ENGINEERING MATERIALS**

**(Open Elective-III)**

| L | T | P | C |
|---|---|---|---|
| 2 | 0 | 0 | 2 |

**Course Objectives:** The objectives of the course are to make the students learn about

- Classification of materials.
- Properties of materials and its applications.
- Domestic wiring and earthling
- Concept of polarization and dipolar polarization
- Classification of materials.

**UNIT – I: Conducting Materials** **10 Hrs**

Introduction – classification of materials – Metals and Non metals, physical, thermal, mechanical and electrical properties of materials–classification of electrical materials–concept of atom – electron configuration of atom, conductors, general properties of conductors, factors effecting resistivity of electrical materials–electrical / mechanical / thermal properties of copper, aluminum, iron, steel, lead, tin and their alloys–applications.

**Learning Outcomes:**

At the end of this unit, the student will be able to

1. Understand the classification of conducting materials. **L1**
2. Analyze the properties of different conducting materials **L2**

**UNIT – II: Dielectric and High Resistivity Materials** **10 Hrs**

Introduction–solid, liquid and gaseous di electrics, leakage current, permittivity, dielectric constant, dielectric loss –loss angle –loss constant, Breakdown voltage and di electric strength of –solid, liquid and gaseous dielectrics, effect of break down–electrical and thermal effects, Polarization – electric, ionic and dipolar polarization. Effect of temperature and Frequency on dielectric constant of polar dielectrics. High Resistivity materials – electrical / thermal /mechanical properties of Manganin, Constantan, Nichrome, Tungsten, Carbon and Graphite and their applications in electrical equipment.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the classification of di electric and high resistivity materials. **L1**
- Analyze the properties of di electric and high resistivity materials **L2**

**UNIT – III: Solid Insulating Materials** **10 Hrs**

Introduction–characteristics of a good electrical insulating materials–classification of insulating materials – electrical, thermal, chemical and mechanical properties of solid insulating materials-Asbestos, Bakelite, rubber, plastics, thermoplastics. Resins, polystyrene, PVC, porcelain, glass, cotton and paper.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand about various characteristics of solid insulating materials **L1**
- Understand the classification of solid insulating materials. **L2**

**UNIT – IV: Liquid & Gas Insulating Materials** **10 Hrs**

Liquid insulating materials – Mineral oils, synthetic liquids, fluorinated liquids– Electrical, thermal and chemical properties – transformer oil – properties – effect of moisture on insulation properties Gaseous insulators– classification based on dielectric strength – dielectric loss, chemical stability properties and their applications.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the classification of liquid insulating materials. **L1**
- Analyze the properties of liquid insulating materials **L2**

**UNIT – V: Domestic Wiring** **10 Hrs**

Wiring materials and accessories–Types of wiring–Types of Switches-Specification of Wiring–Staircase wiring- Fluorescent lamp wiring-God own wiring–Basics of earthling–single phase wiring layout for residential building.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand about wiring materials and accessories **L1**
- Understand about earthing and wiring layout of domestic buildings **L2**

**Text Books:**

1. Electrical Engineering Materials by G.K. Mithal, Khanna publishers, 2nd edition,1991.
2. Acourse in Electrical Engineering Materials by R.K. Rajput, Laxmi publications,2009.

**Reference Books:**

1. An Introduction to Electrical Engineering Materials by C.S.Indulkar and S.Thiruvengadam, SChand&Company,2008.
2. Electrical engineering Materials by Technical Teachers Training Institute, Madras, McGraw Hill Education,1st Edition,2004.
3. A course in Electrical Engineering Materials Physics Properties & Applications by S P.Seth, Dhanapat Rai & Sons Publications,2018.

**Course Outcomes:**

At the end of this Course the student will be able to

- Understand the classification of materials, domestic wiring materials and earthing. **L1**
- Analyze the properties of different electrical materials **L2**
- Apply where the materials are applicable based on properties of materials **L3**
- Design and develop Residential wiring, go down wiring and earthing. **L4**
- `Understand the characteristics of materials **L5**

**B.Tech IV Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19AEE75b- DIGITAL SIGNAL PROCESSORS AND APPLICATIONS**

**(Open Elective-III)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:** The objectives of the course are to make the students learn about

- Provide the basic knowledge of different DSP Processors.
- Interfacing Memory and I/O Peripherals to different Programmable DSP Devices
- Operation of the ADC and programming modes
- Introduction to Field Programmable Gate Arrays
- Provide the basic knowledge of different DSP Processors.

**UNIT – I:** **10 Hrs**

**Introduction to the TMSLF2407 DSP Controller:** Brief Introduction to Peripherals - Types of Physical Memory - Software Tools

**C2XX DSP CPU and instruction set:** Introduction to the C2xx DSP Core and Code Generation - The Components of the C2xx DSP Core - Mapping External Devices to the C2xx Core and the Peripheral Interface -System Configuration Registers –Memory - Memory Addressing Modes - Assembly Programming Using the C2xx DSP Instruction Set

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Able to understand the basic concepts of DSP controller **L1**
- Able to understand the Assembly language programming **L2**

**UNIT – II:** **10 Hrs**

**Parallel and Serial Data Transfer:** Pin Multiplexing (MUX) and General Purpose I/O Overview - Multiplexing and General Purpose I/O Control Registers - Using the General Purpose I/O Ports, Serial Communication

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the Pin Multiplexing and GPIO pins **L1**
- Analyze the serial Communication concepts **L2**
- Understand the concept of control Registers **L3**

**UNIT – III:** **10 Hrs**

**Interrupt system of TMS320LF2407:** Introduction to Interrupts - Interrupt Hierarchy - Interrupt Control Registers - Initializing and Servicing Interrupts in Software, real time control with interrupts

**The analog-to-digital converter (ADC):** ADC Overview - Operation of the ADC and programming modes

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the concept of Interrupts **L1**
- Analyze the concept of Analog to digital converter **L2**

**UNIT – IV:** **10 Hrs**

**Event Managers (EVA, EVB):** Overview of the Event Manager (EV) - Event Manager Interrupts - General Purpose (GP) Timers- Compare Units - Capture Units and Quadrature Encoded Pulse (QEP) Circuitry - General Event Manager Information – PWM Signal Generation with Event Managers and interrupts, Measurement of speed with Capture Units, Implementation of Space Vector Modulation with DSP TMSLF2407A

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the concept of Event Manager and Interrupts **L1**
- Apply the concept of Space Vector Modulation with processor **L2**

**UNIT – V:** **10 Hrs**

**Field Programmable Gate Arrays:** Introduction to Field Programmable Gate Arrays – CPLD Vs FPGA – Types of FPGA , Configurable logic Blocks (CLB), Input/Output Block (IOB) – Programmable Interconnect Point (PIP)- HDL programming –overview of Spartan 6 & ISE Design Suite, Implementation of PWM technique with SPARTAN-6 FPGA

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the concept of Field Programmable Gate Arrays. **L1**
- Apply the concept of HDL programming and PWM technique implementation **L2**

**Text Books:**

1. Hamid A. Tolyat, "DSP based Electromechanical Motion Control"-CRC press, 2004
2. Wayne Wolf,„FPGA based system design", Prentice hall, 2004

**Reference Books:**

1. Application Notes from the website of Texas Instruments
2. Spartan-6 FPGA Configurable Logic Block, 2010
3. Xilinx Spartan 6 Data sheets

**Course Outcomes:**

At the end of this Course the student will be able to

- Write Assembly Language Programs for the Digital Signal Processors **L1**
- Configure and use Digital Input / Output lines and ADCs **L2**
- Configure and use Interrupts and Event Managers for PWM generation **L3**
- Employ DSPs & **L4**
- FPGAs for the real time control of Power Electronic Controllers **L5**

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**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19AEE75c- IOT APPLICATIONS IN ELECTRICAL ENGINEERING**

**(Open Elective-III)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:** The objectives of the course are to make the students learn about

- To learn about a few applications of Internet of Things
- To distinguish between motion less and motion detectors as IOT applications
- To know about Micro Electro Mechanical Systems (MEMS) fundamentals in design and fabrication process
- To understand about applications of IOT in smart grid
- To introduce the new concept of Internet of Energy for various applications

**UNIT – I: SENSORS** **10 Hrs**

Definitions, Terminology, Classification, Temperature sensors, Thermoresistive, Resistance, temperature detectors, Silicon resistive thermistors, Semiconductor, Piezoelectric, Humidity and moisture sensors. Capacitive, Electrical conductivity, Thermal conductivity, time domain reflectometer, Pressure and Force sensors: Piezoresistive, Capacitive, force, strain and tactile sensors, Strain gauge, Piezoelectric

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To know about basic principles of sensors and their classification **L1**
- To learn about various motion less sensors **L2**

**UNIT – II: Occupancy and Motion detectors** **10 Hrs**

Capacitive occupancy, Inductive and magnetic, potentiometric - Position, displacement and level sensors, Potentiometric, Capacitive, Inductive, magnetic velocity and acceleration sensors, capacitive, Piezoresistive, piezoelectric cables, Flow sensors, Electromagnetic, Acoustic sensors - Resistive microphones, Piezoelectric, Photo resistors

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To know about Capacitive occupancy **L1**
- To understand about Motion detectors **L2**

**UNIT – III: MEMS** **10 Hrs**

Basic concepts of MEMS design, Beam/diaphragm mechanics, electrostatic actuation and fabrication, Process design of MEMS based sensors and actuators, Touch sensor, Pressure sensor, RF MEMS switches, Electric and Magnetic field sensors

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To understand about the basic concept of MEMS **L1**
- To know about electrostatic actuation **L2**

**UNIT – IV: IOT FOR SMART GRID** **10 Hrs**

Driving factors, Generation level, Transmission level, Distribution level, Applications, Metering and monitoring applications, Standardization and interoperability, Smart home

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To get exposure fundamental applications of IoT to Smart grid **L1**
- To learn about driving factors of IoT in Generation level **L2**

**UNIT – V: IOE - Internet of Energy** **10 Hrs**

Concept of Internet of Energy, Evaluation of IoE concept, Vision and motivation of IOE, Architecture, Energy routines, information sensing and processing issues, Energy internet as smart grid.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To get exposed the new concept of internet of energy **L1**
- To learn about architecture of IOE **L2**

**Text Books:**

1. Jon S. Wilson, Sensor Technology Hand book, Newnes Publisher, 2004
2. Tai Ran Hsu, MEMS and Microsystems: Design and manufacture, 1st Edition, Mc Grawhill Education, 2017
3. ErsanKabalci and YasinKabalci, From Smart grid to Internet of Energy, 1st Edition, Academic Press, 2019

**Reference Books:**

1. Raj Kumar Buyya and Amir VahidDastjerdi, Internet of Things: Principles and Paradigms, Kindle Edition, Morgan Kaufmann Publisher, 2016
2. Yen Kheng Tan and Mark Wong, Energy Harvesting Systems for IoT Applications: Generation, Storage and Power Management, 1st Edition, CRC Press, 2019
3. RMD SundaramShriram, K. Vasudevan and Abhishek S. Nagarajan, Internet of Things, Wiley, 2019

**Course Outcomes:**

At the end of this Course the student will be able to

- To get exposed to recent trends in few applications of IoT in Electrical Engineering **L1**
- To understand about usage of various types of motionless sensors **L2**
- To understand about usage of various types of motion detectors **L3**
- To get exposed to various applications of IoT in smart grid **L4**
- To get exposed to future working environment with Energy internet **L5**

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## 19AME75a – SPECIAL TYPE OF VEHICLES

*(Open Elective-III)*

| L | T | P | C |
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**Course Objectives:** The objectives of the course are to make the students learn about

- Introduce the various types of special vehicles.
- Familiarize with the function of graders.
- Identify the applications of haulage vehicles and lift truck
- Understand the functions of scarifiers and scrapers
- Discuss the specifications of special purpose vehicles

### UNIT – I: TRACTORS & CRANES AND EXCAVATORS 8 Hrs

**TRACTORS** : General description, specification and functions, light, medium and heavy wheeled tractors, crawler tracks mounted / wheeled - Bull dozers, tilt dozers and angle dozers, front end loaders, factors affecting efficiency of output of tractors, simple problems, merits and demerits.

**CRANES AND EXCAVATORS:** General description, specifications and functions, excavator mounted cranes, mobile cranes with strut and cantilever type jibs, tractor towed and tractor mounted cranes. General description, specification and functions, classification based on attachments, face shovel, drag shovel, hoe, drag-line and grab or clam shell, advantages and limitations.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Classify various types of tractors **L1**
- Calculate the efficiency of output of tractors **L4**
- Discuss the functions of cranes and excavators **L2**
- Recall the advantages and limitations of cranes and excavators **L2**

### UNIT – II: GRADERS 6Hrs

Description, specification of tractor towed graders and motor graders, classification and functions of graders, functional details of spreading, mixing, ditching, bank sloping, snow removal, stripping, scarifying, and finishing, elementary details of transmission system (coupling, clutches, gear box, driving axles, propeller shafts), running gear and operating equipment air braking system; hydraulic system and its components, steering system of lights, medium and heavy graders, merits and limitations of graders.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the terms spreading, mixing, ditching, back sloping, scarifying. **L2**
- Discuss elementary details of transmission system **L2**
- Demonstrate the hydraulic system and its components. **L3**
- List the merits and limitations of graders. **L2**

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**UNIT – III: HAULAGE VEHICLES AND LIFT TRUCKS** **6Hrs**

General description, specification and functions, self-propelled and tractor towed haulage vehicles and pneumatic – tires, dumpers – front tipping; trucks – rear tipping, tractor towed semi-trailers and trailers (rear and side tipping, bottom dumping). General description, specification and functions, fork lift trucks, alternative front end equipment (attachments) – Jib arm, shovel bucket, squeeze clamp, boom, fork extensions, barrel forks. Scissors lift trucks - Applications in industry, advantages and disadvantages.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the importance of haulage vehicles and trucks in industries. **L2**
- Select haulage vehicles for a given application **L6**
- Illustrate the function of fork lift trucks. **L3**

**UNIT – IV: Rooters, Scarifiers And Scrapers** **6 Hrs**

General description, specification and functions, tractor towed rooters and scarifiers - Heavy duty, light duty. General description, specification and functions, tractor towed and motorized scrapers, scraper work in cutting, cambering, side hill cutting, spreading on embankments, compaction of fill merits and demerits.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Describe the specifications of rooters **L2**
- Categorize Heavy duty and light duty scarifiers **L4**
- Recall the merits and demerits of scrapers. **L1**

**UNIT – V: Compaction Vehicles And Other Special Purpose Vehicles** **6Hrs**

General description, specification and functions, smooth wheeled rollers, pneumatic tired rollers, agricultural Rollers, sheep's foot rollers, vibrating compactors. General description, specification and functions, Ambulance, oil tankers, surveillance vehicle, television recording mobile UNIT, reefer vehicle, double decker bus, vestibule bus, fire fighting vehicle.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- List various types of special purpose vehicles. **L1**
- Choose the rollers for a given application. **L1**
- Discuss the function of compactors. **L2**
- Explain the importance of special purpose vehicles in the society. **L2**

**Text Books:**

1. Peurifoy R L "Construction Planning, Equipment and Methods", Tata McGraw-Hill, NewDelhi, 2002.
2. Ian Graham, "Off-Road vehicles", Heinemann Library, 2008.

**Reference Books:**

1. Wong J "Terramechanics and Off-Road Vehicle Engineering", Butterworth-Heinemann, 2009.
2. Roninson E G, "Motor Graders", MIR Publications, Moscow, 1985.
3. Rodhiev and Rodhiev, "Tractors and Automobiles", MIR Publishers, Moscow, 1984.
4. Greenwich and Soreking, "Tractors", MIR Publishers, Moscow, 1967.

**Course Outcomes:**

At the end of this Course the student will be able to

- Classify excavators based on attachments. **L2**
- Understand the importance of graders. **L2**
- Identify the various types of fork lift attachments. **L2**
- Recall the advantages and disadvantages of special purpose vehicles. **L1**



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## 19AME75b - SIX SIGMA AND LEAN MANUFACTURING

*(Open Elective-III)*

| L | T | P | C |
|---|---|---|---|
| 2 | 0 | 0 | 2 |

**Course Objectives:** The objectives of the course are to make the students learn about

- Introduce the students, the basic concepts of six sigma and lean manufacturing.
- Expose with various quality issues in Inspection.
- Gain Knowledge on quality control and its applications to real time.
- Know the extent of cellular manufacturing and 5S.
- Understand the importance of Quality standards in manufacturing.

**UNIT – 1: Introduction to Six-Sigma** **8 Hrs**

Probabilistic models-Six Sigma measures-Yield-DPMO-Quality level-Reliability function using Six-Sigma-MTTF using Six Sigma-Maintenance free operating period- Availability using Six-Sigma-Point availability-Achieved availability-Operational Availability-Examples.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the concepts of probabilistic models **L2**
- Determine the reliability function using six-sigma **L3**
- Explain about MTTF using six sigma concepts **L2**
- Illustrate the examples of availability using sigma **L2**

**UNIT – II: The Elements of Six Sigma and their Determination** **6Hrs**

The Quality Measurement Techniques: SQC, Six Sigma, Cp and Cpk- The Statistical quality control (SQC) methods-The relationship of control charts and six sigma-The process capability index (Cp)-Six sigma approach-Six sigma and the 1.5 σ shift-The Cpk Approach Versus Six Sigma-Cpk and process average shift- Negative Cpk-Choosing six sigma or Cpk-Setting the process capability index-Examples.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- List the quality measurement techniques **L1**
- Discuss the process capability index (Cp).
- Compare the Cpk Approach and Six Sigma
- Explain about different statistical quality control methods
- State the relationship of control charts and six sigma **L2**

**UNIT – III: Introduction To Lean Manufacturing** **6Hrs**

Conventional Manufacturing versus Lean Manufacturing – Principles of Lean Manufacturing – Basic elements of lean manufacturing – Introduction to LM Tools.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Illustrate the basic elements of lean manufacturing **L2**
- List the various lean manufacturing tools. **L1**
- Describe the principles of lean manufacturing **L2**
- Compare conventional manufacturing and lean manufacturing system **L2**

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**UNIT – IV: Cellular Manufacturing, JIT, TPM** **6 Hrs**

Cellular Manufacturing – Types of Layout, Principles of Cell layout, Implementation. JIT – Principles of JIT and Implementation of Kanban. TPM – Pillars of TPM, Principles and implementation of TPM.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the concept of cellular manufacturing **L2**
- Indentify the types of layouts. **L3**
- Describe the concepts of JIT and TPM **L2**
- Demonstrate the pillars of TPM **L2**
- Create the cell layout. **L6**

**UNIT – V: Set Up Time Reduction, TQM, 5S, VSM 10** **6Hrs**

Set up time reduction – Definition, philosophies and reduction approaches. TQM – Principles and implementation. 5S Principles and implementation - Value stream mapping - Procedure and principles.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Define set up time reduction. **L1**
- Illustrate the principles and implementation of 5S techniques. **L2**
- Discuss procedure and principles of value stream mapping **L6**
- List the various reduction approaches **L1**

**Text Books:**

1. U Dinesh Kumar, Crocker, Chitra and Harithe Saranga, Reliability and Six Sigma, Springer Publishers.
2. Sung H. Park, Six Sigma for Quality and Productivity Promotion, Asian Productivity Organization

**Reference Books:**

1. Sammy G. Shina, Six Sigma for Electronics Design and Manufacturing, McGraw-Hill.
2. Design and Analysis of Lean Production Systems, Ronald G. Askin & Jeffrey B. Goldberg, John Wiley & Sons, 2003.
3. Mikell P. Groover (2002) _Automation, Production Systems and CIM.
4. Rother M. and Shook J, 1999 _Learning to See: Value Stream Mapping to Add Value and Eliminate Muda' , Lean Enterprise Institute, Brookline, MA.

**Course Outcomes:**

At the end of this Course the student will be able to

- Summarize various techniques that are related to the six-sigma and lean manufacturing **L2**
- Outline the concepts of cellular manufacturing, JIT and TPM **L2**
- Illustrate the principles and implementation of 5S techniques **L2**
- Discuss procedure and principles of value stream mapping **L6**
- Determine the reliability function using six-sigma. **L3**

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## 19AME75c – REVERSE ENGINEERING

*(Open Elective-III)*

| L | T | P | C |
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**Course Objectives:** The objectives of the course are to make the students learn about

- Introduce the concepts of reverse engineering
- Familiarize with the tools and techniques for reverse engineering
- Teach the principles of various rapid prototyping methods
- Discuss the legal aspects of reverse engineering.

### UNIT – 1: Introduction 8 Hrs

Scope and tasks of RE, Process of duplicating, Definition and use of Reverse Engineering, Reverse Engineering as a Generic Process

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Recall the definition and use of reverse engineering. **L1**
- Identify reverse engineering as a generic process. **L2**
- List various tasks of reverse engineering. **L1**

### UNIT – II: Tools and Techniques for RE 6Hrs

Object scanning: contact scanners, noncontact scanners, destructive method, coordinate measuring machine, Point Data Processing: pre processing and post processing of captured data, geometric model development, construction of surface model, solid model, noise reduction, feature identification, model verification

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Summarize various techniques in reverse engineering. **L2**
- Compare preprocessing and post processing of captured data. **L4**
- Explain noise reduction, feature identification and model verification. **L2**

### UNIT – III: Rapid Prototyping 6Hrs

Introduction, current RP techniques and materials, Stereo Lithography, Selective Laser Sintering, Fused Deposition Modelling, Three-dimensional Printing, Laminated Object Manufacturing, Multi – jet Modelling, Laser-engineered Net Shaping, Rapid Prototyping, Rapid Tooling, Rapid Manufacturing

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Identify the developments in the rapid prototyping techniques **L2**
- Classify rapid prototyping techniques. **L2**
- List the advantages and disadvantages of rapid prototyping methods. **L1**

### UNIT – IV: Integration 6 Hrs

Cognitive approach to RE, Integration of formal and structured methods in reverse engineering, Integration of reverse engineering and reuse.

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**Learning Outcomes:**
At the end of this unit, the student will be able to

- Explain the cognitive approach to reverse engineering. **L2**
- Discuss the integration of formal and structured methods in reverse engineering. **L2**

**UNIT – V: Legal Aspects of Reverse Engineering** **6Hrs**

**Legal Aspects of Reverse Engineering:** Introduction, Copyright Law.

**Learning Outcomes:**
At the end of this unit, the student will be able to

- Identify the legal aspects of reverse engineering **L2**
- Understand the concepts of copyright law. **L2**

**Text Books:**

1. Biggerstaff T. J., "Design Recovery for Maintenance and Reuse", IEEE Corporation, 1991.
2. Katheryn, A. Ingle, "Reverse Engineering", McGraw-Hill, 1994.

**Reference Books:**

1. Aiken Peter, "Data Reverse Engineering", McGraw-Hill, 1996.
2. Linda Wills,"Reverse Engineering" ,Kluiver Academic Publishers, 1996.
3. Donald R. Honsa , "Co-ordinate Measurement and reverse engineering", American Gear Manufacturers Association, 1996.

**Course Outcomes:**
At the end of this Course the student will be able to

- Understand the importance of reverse engineering. **L2**
- Make use of tools and techniques of reverse engineering. **L3**
- Identify the applications of rapid prototyping techniques. **L2**

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## 19AME75d – ENERGY AUDITING

*(Open Elective-III)*

| L | T | P | C |
|---|---|---|---|
| 2 | 0 | 0 | 2 |

**Course Objectives:** The objectives of the course are to make the students learn about

- Introduce the concepts of energy scenario and need for energy policy for industries in India.
- Familiarize with the Energy Audit concepts and its approaches.
- Teach the principles and objectives of the Energy management.

**UNIT – I: General Aspects** **8 Hrs**

Review of energy scenario in India, General Philosophy and need of Energy Audit and Management, Basic elements and measurements - Mass and energy balances – Scope of energy auditing industries - Evaluation of energy conserving opportunities, Energy performance contracts, Fuel and Energy substitution, Need for Energy Policy for Industries, National & State level energy Policies.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the fundamental aspects of energy scenario in India. **L2**
- List the various national and state level energy policy. **L1**
- Identify the basic elements and measurements of energy audit. **L3**
- Summarize the evaluation of energy conserving balances **L2**

**UNIT – II: Energy Audit Concepts** **6Hrs**

Need of Energy audit - Types of energy audit – Energy management (audit) approach - understanding energy costs - Bench marking – Energy performance - Matching energy use to requirement - Maximizing system efficiencies -Optimizing the input energy requirements - Duties and responsibilities of energy auditors- Energy audit instruments - Procedures and Techniques.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Summarize various concepts of energy audit. **L2**
- Compare various energy management approaches. **L4**
- Explain Bench marking and energy performance in energy auditing. **L2**

**UNIT – III: Principles and Objectives of Energy Management** **6Hrs**

Design of Energy Management Programmes - Development of energy management systems – Importance - Indian need of Energy Management - Duties of Energy Manager - Preparation and presentation of energy audit reports - Monitoring and targeting, some case study and potential energy savings.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Identify the developments of energy management systems **L2**
- Explain the importance of energy management **L2**
- List the various duties of energy manager **L1**

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**UNIT – IV: Thermal Energy Management** **6 Hrs**

Energy conservation in boilers - steam turbines and industrial heating systems - Application of FBC - Cogeneration and waste heat recovery -Thermal insulation - Heat exchangers and heat pumps – HVC industries-Building Energy Management.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the concepts of energy conservation in boilers **L2**
- Identify the thermal energy components **L3**
- Illustrate the applications of FBC boilers **L2**

**UNIT – V: Electrical Energy Management** **6Hrs**

Supply side Methods to minimize supply-demand gap- Renovation and modernization of power plants - Reactive power management – HVDC- FACTS - Demand side - Conservation in motors - Pumps and fan systems – Energy efficient motors.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the concepts of supply side methods to minimize supply. **L2**
- Explain the reactive power management. **L2**
- Identify the energy conservation methods in motors, pumps and fan systems. **L3**
- List the energy efficient motors. **L2**

**Text Books:**

1. Murphy, W. R., Energy Management, Elsevier, 2007.
2. Smith, C. B., Energy Management Principles, Pergamum, 2007
3. Handbook of Energy Audit, Sonal Desai, Mcgraw Hill Education Private Ltd.,

**Reference Books:**

1. Turner, W. C., Doty, S. and Truner, W. C., Energy Management Hand book, 7th edition, Fairmont Press, 2009.
2. De, B. K., Energy Management audit & Conservation, 2nd Edition, Vrinda Publication, 2010.
3. Energy Management Handbook – W.C. Turner (John Wiley and Sons, A Wiley a. Interscience publication)
4. Industrial Energy Management and Utilisation –L.C. Witte, P.S. Schmidt, D.R. Brown (Hemisphere Publication, Washington, 1988)
5. Industrial Energy Conservation Manuals, MIT Press, Mass, 1982
6. Energy Conservation guide book Patrick/Patrick/Fardo (Prentice hall1993)

**Course Outcomes:**

At the end of this Course the student will be able to

- Understand the basic concepts of energy audit and energy management **L2**
- Explain different types of energy audit, maximizing and optimizing system efficiency. **L3**
- Summarize energy management systems, prepare and present energy audit report **L5**
- Identify energy saving potential of thermal and electrical systems **L3**
- Discuss Energy audit instruments, Procedures and Techniques. **L2**

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**B.Tech IV Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

## 19AME75e – INTRODUCTION TO COMPOSITE MATERIALS

*(Open Elective-III)*

| L | T | P | C |
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**Course Objectives:** The objectives of the course are to make the students learn about

- Introduce composite materials and their applications.
- Build proper background for stress analysis in the design of composite structures.
- Familiarize various properties of composite materials.
- Focus on biodegradable composites.

**UNIT – I: Introduction to composites** **8 Hrs**

Fundamentals of composites – Definition – classification– based on Matrix – based on structure – Advantages and applications of composites - Reinforcement – whiskers – glass fiber – carbon fiber - Aramid fiber – ceramic fiber – Properties and applications.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the fundamentals of composites. **L2**
- Classify the composites based on matrix and structure. **L2**
- Identify the practical applications of composites. **L3**
- Summarize the properties and advantages of reinforcement materials **L2**

**UNIT – II: Polymer matrix composites** **6Hrs**

Polymers - Polymer matrix materials – PMC processes - hand layup process – spray up process – resin transfer moulding – Pultrusion – Filament winding – Auto clave based methods - Injection moulding – sheet moulding compound – properties and applications of PMC's.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the properties of polymer matrix composites. **L2**
- Identify the polymer matrix composites. **L3**
- Explain various process used in making the polymer matrix composites **L2**
- Discuss the auto clave based methods. **L6**

**UNIT – III: Metal matrix composites** **6Hrs**

Metals - types of metal matrix composites – Metallic Matrices. Processing of MMC – Liquid state processes – solid state processes – In-situ processes. Properties and applications of MMC's.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Outline the various types of metal matrix composite **L2**
- Explain liquid state processes and solid state processes in MMCs preparation **L2**
- Demonstrate In-situ processes **L2**
- Identify the properties and applications of MMCs **L2**

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**UNIT – IV: Ceramic matrix composites** **6 Hrs**

Ceramic matrix materials – properties – processing of CMCs – Sintering - Hot pressing – Infiltration – Lanxide process – In-situ chemical reaction techniques – sol-gel polymer pyrolsis –SHS - Cold isostatic pressing (CIPing) – Hot isostatic pressing (HIPing). Properties and Applications of CCMs.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Summarize the various types of ceramic matrix materials. **L2**
- Explain the sintering, hot pressing, infiltration and lanxide process **L2**
- Contrast between cold and hot isostatic pressing. **L2**
- Examine the properties and applications of CCMs. **L3**

**UNIT – V: Advances in composites** **6Hrs**

Advantages of carbon matrix – limitations of carbon matrix carbon fibre – chemical vapour deposition of carbon on carbon fibre perform. Properties and applications of Carbon-carbon composites. Composites for aerospace applications.

Characterization of composite materials - Mechanical Properties, Thermal Properties.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the advantages and disadvantages of carbon matrix **L2**
- Identify composites for aerospace applications **L3**
- Apply chemical vapour deposition of carbon on carbon fibre perform **L3**
- Select the carbon - carbon composites. **L1**
- Classify various bio- degradable composites **L3**

**Text Books:**

1. Chawla K.K, Composite materials, 2/e, Springer – Verlag, 1998.
2. Mathews F.L. and Rawlings R.D., Chapman and Hall, Composite Materials: Engineering and Science, 1/e, England, 1994.

**Reference Books:**

1. H K Shivanand, B V Babu Kiran, Composite Materials, ASIAN BOOKS, 2011.
2. A.B. Strong, Fundamentals of Composite Manufacturing, SME, 1989.
3. S.C. Sharma, Composite materials, Narosa Publications, 2000.
4. Maureen Mitton, Hand Book of Bioplastics & Bio-composites for Engineering applications, John Wiley publications.

**Course Outcomes:**

At the end of this Course the student will be able to

- Identify the practical applications of composites. **L3**
- Identify the polymer matrix composites. **L3**
- Classify of bio- degradable composites. **L2**
- Outline the various types of ceramic matrix materials. **L2**

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**B.Tech IV Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19AME75f – CUSTOMER RELATIONSHIP MANAGEMENT**

*(Open Elective-III)*

| L | T | P | C |
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**Course Objectives:** The objectives of the course are to make the students learn about

- Introduce basic concepts and principles of customer relationship management (CRM).
- Familiarize with appreciate the role and changing face of CRM as an IT enabled function.
- Describe concept of managing and sharing customer data.
- Explain the principles of CRM links in e-Business.
- Expose the students on Enterprise resource planning (ERP),supply chain management (SCM) and Supplier relationship management (SRM).

**UNIT – 1: CRM concepts** **8 Hrs**

CRM concepts - Acquiring customers, - Customer loyalty and optimizing customer relationships - CRM defined - success factors, the three levels of Service/ Sales Profiling - Service Level Agreements (SLAs), creating and managing effective SLAs.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the concepts of customer relationship management **L2**
- Define customer relationship management (CRM) **L1**
- Illustrate the service level agreements (SLAs) **L2**

**UNIT – II: CRM in Marketing** **6Hrs**

CRM in Marketing - One-to-one Relationship Marketing - Cross Selling & Up Selling - Customer Retention, Behaviour Prediction - Customer Profitability & Value Modeling, - Channel Optimization - Event-based marketing. - CRM and Customer Service - The Call Centre, Call Scripting - Customer Satisfaction Measurement.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the concept of one-to-one relationship marketing **L2**
- Develop the skills related to predict the behaviour and retention of the customer **L6**
- Discus about customer profitability and value modeling. **L6**
- Illustrate the various methods for CRM and customer service **L2**

**UNIT – III: Sales Force Automation** **6Hrs**

Sales Force Automation - Sales Process, Activity, Contact- Lead and Knowledge Management - Field Force Automation. - CRM links in e-Business - E-Commerce and Customer Relationships on the Internet - Enterprise Resource Planning (ERP), - Supply Chain Management (SCM), - Supplier Relationship Management (SRM), - Partner relationship Management (PRM).

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the concept of CRM links in e-Business. **L2**
- Discus E-commerce and customer relationship on the internet. **L6**
- Describe Enterprise resource planning (ERP), Supply chain management (SCM). **L2**
- Explain terms supplier relationship management and partner relationship management. **L2**



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**UNIT – IV: Analytical CRM** **6 Hrs**

Analytical CRM - Managing and sharing customer data - Customer information databases - Ethics and legalities of data use - Data Warehousing and Data Mining concepts - Data analysis - Market Basket Analysis (MBA), Click stream Analysis, Personalization and Collaborative Filtering.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain how to manage and sharing the customer data **L2**
- List the various ethics and legalities of customer database use **L1**
- Describe various data warehousing and data mining concepts **L3**
- Discus about market basket analysis (MBA) **L6**

**UNIT – V: CRM Implementation** **6Hrs**

CRM Implementation - Defining success factors - Preparing a business plan requirements, justification and processes. - Choosing CRM tools - Defining functionalities - Homegrown versus out-sourced approaches - Managing customer relationships - conflict, complacency, Resetting the CRM strategy. Selling CRM internally - CRM development Team - Scoping and prioritizing - Development and delivery - Measurement.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Define success factors for implementing the customer relationship management. **L1**
- Define functionalities of CRM. **L1**
- Explain the functions of CRM development team. **L2**
- Compare Home grown and out-sourced approaches. **L2**

**Text Books:**

1. Alok Kumar Rai, Customer Relationship Management Concept & Cases, Prentice Hall Of India Private Limted, New Delhi. 2011.
2. S. Shanmugasundaram, Customer Rela Tionship Management, Prentice Hall Of India Private Limted, New Delhi, 2008.

**Reference Books:**

1. Kaushik Mukherjee, Customer Relationship Management, Prentice Hall Of India Private Limted, New Delhi, 2008.
2. Jagdish Seth, Et Al, Customer Rela Tionship Management.
3. V. Kumar & Werner J., Customer Rela Tionship Management, Willey India, 2008.

**Course Outcomes:**

At the end of this Course the student will be able to

- Summarizes the how CRM works in industries. **L2**
- Discus about market basket analysis (MBA). **L6**
- Develop the skills related to predict the behaviour and retention of the customer. **L6**
- Explain the concepts of customer relationship management. **L2**

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**B.Tech IV Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19AEC75a-EMBEDDED SYSTEMS & IOT**

***(Open Elective-III)***

| L | T | P | C |
|---|---|---|---|
| 2 | 0 | 0 | 2 |

**Course Objectives:** The objectives of the course are to make the students learn about

- To understand the basics of Embedded Systems and IOT.
- To learn the architecture and programming of ARM Microcontroller.
- To be able to work with Raspberry Pi using Python Programming.
- To know about the IOT standards, communication technologies and protocols.
- To implement real time projects using the tools and techniques of IOT Platform.

**UNIT – I:**

**Introduction to Embedded Systems and Internet of Things (IOT):** Architecture of Embedded Systems, Embedded Systems Development process, Architecture of Internet of Things, Applications of Embedded Systems and IOT, Design Methodology for IOT Products

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Gain knowledge on basics of embedded systems and IOT Architectures. **L1**
- Understand the design methodology and applications of embedded systems and IOT. **L2**

**UNIT – II:**

**ARM Microcontrollers Architecture and Programming:** Architecture, Instruction set, Programming ports, Timer/Counter, Serial communication, interrupts in C, Introduction ARM mBed platform.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the architecture and programming of ARM Microcontrollers. **L2**
- Work with ARM Microcontrollers in implementing real time projects. **L6**

**UNIT – III:**

**Fundamentals of Python Programming & Raspberry Pi:** Introduction to python programming, Working with functions, classes, REST full, Web Services, Client Libraries, Introduction & programming Raspberry Pi3, Integrating Input Output devices with Raspberry Pi3.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Write programs using Python to implement the given task. **L6**
- Use Raspberry Pi3 for integrating Input & Output devices. **L3**

**UNIT – IV:**

**IOT Technologies, Standards and Tools:** Fundamental characteristics and high level requirements of IOT, IOT Reference models; Introduction to Communication Technologies & Protocols of IOT: BLE, Wi-Fi, LORA, 3G/4G Technologies and HTTP, MQTT, COAP protocols; Relevant Practicals on above technologies.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the characteristics and high level requirements to design new IoT devices. **L2**
- Summarize different Communication Technologies & Protocols of IoT. **L2**

**UNIT – V:**

**IOT Platform, Cloud Computing Platforms for IoT Development:** IOT Platform Architecture (IBM Internet of Things & Watson Platforms); API Endpoints for Platform Services; Devices Creation and Data Transmission; Introduction to NODE-RED and Application deployment.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Learn how to use API Endpoints for Platform Services, Devices Creation and Data Transmission. **L1**
- To implement real time projects using the tools and techniques of IoT Platform. **L6**

**Text Books:**

1. ArsheepBahga, Vijay Madisetti, "Internet of Things: A Hands-On Approach", 1st Edition, VPT, 2014.
2. K.V.K.K.Prasad, "Embedded Real Time Systems: Concepts, Design and Programming", 1st Edition, Dreamtech Publication, 2014.
3. Adrian McEwen, Hakim Cassimally, "Designing the Internet of Things", Wiley Publications, 2013

**Reference Books:**

1. Jonathan W Valvano, "Embedded Microcomputer Systems: Real-Time Interfacing", 3rd Edition, Thomson Engineering, 2012.
2. Olivier Hersent, David Boswarthick, Omar Elloumi, "The Internet of Things: Key applications and Protocols", 2nd Edition, Wiley Publications, 2012.

**Course Outcomes:**

At the end of this Course the student will be able to

- Understand the basics of Embedded Systems and IOT. **L2**
- Correlate the architecture and programming of ARM Microcontroller. **L4**
- Work with Raspberry Pi using Python Programming. **L6**
- Summarize IOT standards, communication technologies and protocols. **L2**
- Implement real time projects using the tools and techniques of IOT Platform. **L6**

**B.Tech IV Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19AEC75b-ELECTRONIC INSTRUMENTATION**

***(Open Elective-III)***

| L | T | P | C |
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**Course Objectives:** The objectives of the course are to make the students learn about

- To know about the performance characteristics of instruments and measurement of electrical quantities.
- To understand the construction, working and applications of different types of CRO"s.
- To analyze the working of different types of bridges.
- To study the working of signal & function generators.
- To analyze the working of transducers in measuring physical parameters

**UNIT – I:**

**Measuring Instruments:** Introduction, Errors in Measurement, Accuracy, Precision, Resolution and Significant figures. Basic PMMC Meter- construction and working, DC and AC Voltmeters-Multirange, Range extension, DC Ammeter, Multimeter for Voltage, Current and resistance measurements.

**Digital Instruments:** Digital Voltmeters – Introduction, DVM's based on V–T, V–F and Successive approximation principles, Resolution and sensitivity, General specifications, Digital Multimeters, Digital frequency meters, Digital measurement of time.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Learn about the performance characteristics of the instruments. **L1**
- Understand the working of different types of ammeters, voltmeters and multimeters. **L2**

**UNIT – II:**

**Oscilloscopes:** Introduction, Block diagram of CRO, Basic principle of CRT, CRT Construction and features, vertical amplifiers, horizontal dPeflection system- sweep, trigger pulse, delay line, sync selector circuits. Dual beam and dual trace CROs, Sampling and Digital storage oscilloscopes.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Grasp the construction and working of different types of oscilloscopes. **L1**
- Use CRO to measure the amplitude, frequency, phase and time period of given signals. **L3**

**UNIT – III:**

**Bridges**: DC Bridges for Measurement of resistance - Wheat stone bridge, Kelvin's Bridge, AC Bridges for Measurement of inductance- Maxwell's bridge, Hay's Bridge, Anderson bridge, Measurement of capacitance - Schearing Bridge, Wien Bridge, Errors and precautions in using bridges.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the construction and working of different types of bridges. **L2**
- Measure parameters like resistance, capacitance, and inductance using bridges. **L3**

**UNIT – IV:**

**Signal Generators:** Introduction, Fixed and variable AF oscillator, Standard signal generator, Laboratory type signal generator, AF sine and Square wave generator, Function generator, Square and Pulse generator, Sweep frequency generator.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the working and applications of signal generators. **L2**
- Gain knowledge on the working and applications of function generators. **L1**

**UNIT – V:**

**Transducers:** Introduction, Types of Transducers, Electrical transducers, Selecting a transducer, Resistive transducer, Strain gauges, Piezoelectric transducer, Photoelectric transducer, Photovoltaic transducer, Temperature transducers-RTD, LVDT.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the basic working principle and applications of transducers. **L2**
- Measure physical parameters using different types transducers. **L3**

**Text Books:**

1. H.S.Kalsi, "Electronic Instrumentation", Third edition, Tata McGraw Hill, 2010.
2. A.D. Helfrick and W.D. Cooper, "Modern Electronic Instrumentation and Measurement Techniques", PHI, 6th Edition, 2010.

**Reference Books:**

1. A.K. Sawhney, Dhanpat Rai & Co., "A course in Electrical and Electronic Measurements and Instrumentation", 9th Edition, 2010.
2. David A. Bell, "Electronic Instrumentation & Measurements", PHI, 2nd Edition, 2006.

**Course Outcomes:**

At the end of this Course the student will be able to

- Know about the performance characteristics of instruments and measurement of electrical quantities. **L1**
- Understand the construction, working and applications of different types of CRO"s. **L2**
- Compare the working of different types of bridges. **L2**
- Learn the working of signal & function generators. **L1**
- Analyze the working of transducers in measuring physical parameters. **L4**

**B.Tech IV Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19AEC75c-BASICS OF VLSI DESIGN**

***(Open Elective-III)***

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|---|---|---|---|
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**Course Objectives:** The objectives of the course are to make the students learn about

- To give exposure to different steps involved in the fabrication of ICs and electrical properties of MOS devices.
- To know the design rules in drawing the layout of any logic circuit.
- To design different types of logic gates using CMOS inverter and analyze their transfer characteristics.
- To learn the concepts scaling and designing building blocks of data path of any system using gates.
- Understand the design and operation of basic programmable logic devices.

**UNIT – I:**

**MOS Technology**: Introduction to IC Technology. The IC Era, MOS and related VLSI Technology, Basic MOS Transistors, Enhancement and Depletion modes of transistor action, nMOS and CMOS Fabrication processes.

**Basic Electrical Properties of MOS Circuits:** $I_{ds}$ versus $V_{ds}$ Relationships, Aspects of MOS transistor Threshold Voltage, MOS transistor Transconductance and Output Conductance, nMOS Inverter, Determination of Pull-up to Pull-down Ratio for nMOS inverter driven by another nMOS inverter, CMOS Inverter.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand different steps involved in the fabrication of ICs and electrical properties of MOS devices. **L2**
- Analyze the operation of NMOS, CMOS and BiCMOS inverters. **L4**

**UNIT – II:**

**MOS Circuit Design Processes**: MOS Layers, Stick Diagrams, Design Rules and Layout, General observations on the Design rules, 2µm Double Metal, Double Poly CMOS rules, Layout Diagrams-A Brief Introduction, Symbolic Diagrams-Translation to Mask Form.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Know the VLSI design flow and stick diagrams. **L1**
- Understand the design rules in drawing the layout of any logic circuit. **L2**

**UNIT – III:**

**Basic Circuit Concepts**: Sheet Resistance. Sheet Resistance concept applied to MOS transistors and Inverters, Area Capacitance of Layers, standard unit of capacitance, area Capacitance calculations, the Delay Unit, Inverter Delays, Driving large capacitive loads, Propagation Delays, Wiring Capacitances.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand different types of logics in gate level design. **L2**
- Learn and compare different performance parameters in gate level design. **L1**

**UNIT – IV:**

**Scaling of MOS Circuits**: Scaling models and scaling factors, Scaling factors for device parameters, Limitations of scaling.

**Sub System Design and Layout:** Switch logic, Gate logic, Examples of Structured Design, parity generator, multiplexers, and grey to binary code converter.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Appreciate the importance, models and limitations of scaling. **L1**
- Explain the building blocks of data path of any system using gates. **L1**

**UNIT – V:**

**Programmable Logic Devices:** Read only memories, Programmable Logic Arrays (PLA), Programmable Array Logic (PAL), Complex programmable logic devices, Field programmable gate arrays.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain different programmable logic devices. **L1**
- Compare the performance parameters and applications of different programmable logic devices. **L2**

**Text Books:**

1. Kamran Eshraghian. Douglas, A. Pucknell and Sholeh Eshraghian, "Essentials of LSI Circuits and Systems", Prentice Hall of India Private Limited, 2005 Edition.
2. Neil H.E.WESTE, David Harris andAyan Banerjee, "CMOS VLSI Design A Circuits and systems perspective", Pearson Education, 2006 Third Edition

**Reference Books:**

1. Richa Jain and Amrita Rai, "Principles of VLSI and CMOS Integrated Circuits", S.Chand and Company Limited. First edition.2012.
2. Wayne Wolf, "Modern VLSI Design", Pearson Education, 3rd Edition.

**Course Outcomes:**

At the end of this Course the student will be able to

- Understand different steps involved in the fabrication of ICs and electrical properties of MOS devices. **L2**
- Know the design rules in drawing the layout of any logic circuit. **L1**
- Compare different types of logic gates using CMOS inverter and their transfer characteristics. **L2**
- Learn the concepts to design building blocks of data path of any system using gates. **L1**
- Gain knowledge about basic programmable logic devices and testing of CMOS circuits. **L1**

**IV B.Tech I SEMESTER**
**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**
**19ACS75a-MOBILE APPLICATION DEVELOPMENT**
**Open Elective-III**

| L | T | P | C |
|---|---|---|---|
| 2 | 0 | 0 | 2 |

**Course Objectives:**

- Android Application Development course is designed to quickly get you up to speed with writing apps for Android devices. The student will learn the basics of Android platform and get to understand the application lifecycle

**UNIT – 1:** **8 Hrs**

**Introduction Android Programming**: What is Android, Activities, Linking Activities Using Intents, Fragments, Calling Built – in Applications using Intents, Displaying Notifications.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- demonstrate their understanding of the fundamentals of Android operating systems **L2**
- demonstrate their skills of using Android software development tools **L2**

**UNIT – II:** **8 Hrs**

**Android User Interface**: Understanding the Components of a Screen, Adapting to Display Orientation, Managing Changes to Screen Orientation, Utilizing the Action Bar, Listening for UI Notifications.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- demonstrate their ability to develop software with reasonable complexity on mobile platform. **L3**
- demonstrate their ability to deploy software to mobile devices **L3**

**UNIT – III:** **8 Hrs**

**Designing User Interface with Views**: Basic Views, Picker Views, Using List Views to Display Long Lists.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- demonstrate their ability to debug programs running on mobile devices **L4**
- demonstrate their ability to deploy software to mobile devices **L4**

**UNIT – IV:** **7 Hrs**

**Displaying pictures and menus with views and Data Persistence**: Views to Display pictures, menus with views, additional views, saving and loading user preferences, persisting data to files, creating and using databases.

**Learning Outcomes:**

At the end of this unit, the student will be able to

1. demonstrate their skills of using Android software development tools **L4**
2. demonstrate their ability to develop software with reasonable complexity on mobile platform **L5**

**UNIT – V:** **08Hrs**

**Content Providers:** Sharing data in android, using a content provider, creating your own content providers.

**Messaging and Networking**: SMS Messaging, Sending E-Mail, Networking

**Location-Based Services**: Displaying Maps, Getting Location Data.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- demonstrate their ability to deploy software to mobile devices **L5**
- demonstrate their ability to debug programs running on mobile devices **L5**

**Text Books:**

1. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India
2. Beginning Swift Programming, Wei-Meng Lee, December 2014, ISBN: 978-1-119-00931-3

**Reference Books:**

1. Enterprise J2ME: Developing Mobile Java Applications, Michael Juntao Yuan, Pearson Education, 2004.
2. Android Application Development for Java programming by James C. Sheusi, Cengage Learning
3. Android A Programmers Guide by Jerome DiMargio, TMH.

**Course Outcomes:**

At the end of this Course the student will be able to

1. demonstrate their understanding of the fundamentals of Android operating systems **L3**
2. demonstrate their skills of using Android software development tools **L4**
3. demonstrate their ability to develop software with reasonable complexity on mobile platform **L5**

**IV B.Tech I SEMESTER**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ACS75b-REAL TIME OPERATING SYSTEMS AND APPLICATIONS**

**Open Elective-III**

| L | T | P | C |
|---|---|---|---|
| 2 | 0 | 0 | 2 |

**Course Objectives:**

**COURSE OBJECTIVES:**

The objective of this course is to

- develop an understanding of various Real Time systems Application
- obtain a broad understanding of the technologies and applications for the emerging and exciting domain of real-time systems
- get in-depth hands-on experience in designing and developing a real operational system.

**UNIT – 1: Introduction** **8 Hrs**

Definition, Typical Real Time Applications: Digital Control, High Level Controls, Signal Processing etc., Release Times, Dead-lines, and Timing Constraints, Hard Real Time Systems and Soft Real Time Systems, Reference Models for Real Time Systems: Processors and Resources, Temporal Parameters of Real Time Workload, Periodic Task Model, Precedence Constraints and Data Dependency.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- List a range of different software testing techniques and statergies and be able to apply specific(automated) unit testing method to the projects. **L1**
- Distinguish characterstics of structural testing methods **L2**

**UNIT – II: Real Time Scheduling** **8 Hrs**

Common Approaches to Real Time Scheduling: Clock Driven Approach, Weighted Round Robin Approach, Priority Driven Approach, Dynamic Versus Static Systems, Optimality of Effective-Deadline-First (EDF) and Least-Slack-Time-First (LST) Algorithms, Rate Monotonic Algorithm, Offline Versus Online Scheduling, Scheduling A periodic and Sporadic jobs in Priority Driven and Clock Driven Systems..

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible. **L3**
- Discuss about the functional and system testing methods **L3**

**UNIT – III: Resources Sharing** **8 Hrs**

Effect of Resource Contention and Resource Access Control (RAC), Non-preemptive Critical Sections, Basic Priority-Inheritance and Priority-Ceiling Protocols, Stack Based Priority- Ceiling Protocol, Use of Priority-Ceiling Protocol in Dynamic Priority Systems, Preemption Ceiling Protocol, Access Control in Multiple-Module Resources, Controlling Concurrent Accesses to Data Objects.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Discuss about the functional and system testing methods. **L4**
- Demonstrate various issues for object oriented testing. **L4**
-

**UNIT – IV: Real Time Communication** **7 Hrs**

Basic Concepts in Real time Communication, Soft and Hard RT Communication systems, Model of Real Time Communication, Priority-Based Service and Weighted Round-Robin Service Disciplines for Switched Networks, Medium Access Control Protocols for Broadcast Networks, Internet and Resource Reservation Protocols..

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Distinguish characterstics of structural testing methods. **L5**
- Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible. **L4**

**UNIT – V:Real Time Operating Systems and Databases** **08Hrs**

Features of RTOS, Time Services, UNIX as RTOS, POSIX Issues, Characteristic of Temporal data, Temporal Consistency, Con-currency Control, Overview of Commercial Real Time databases..

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Discuss about the functional and system testing methods. **L5**
- Demonstrate various issues for object oriented testing. **L5**

**Text Books:**

1. Real Time Systems – Jane W. S. Liu, Pearson Education Publication.

**Reference Books:**

1. . Real Time Systems – Mall Rajib, Pearson Education.
2. Real-Time Systems: Scheduling, Analysis, and Verification – Albert M. K. Cheng, Wiley.

**Course Outcomes:**

At the end of this Course the student will be able to

- List a range of different software testing techniques and statergies and be able to apply specific(automated) unit testing method to the projects. **L3**
- Distinguish characterstics of structural testing methods. **L4**
- Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible. **L5**
- Discuss about the functional and system testing methods. **L5**

**IV B.Tech I SEMESTER**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ACS75c-FUNDAMENTALS OF BLOCKCHAIN AND APPLICATIONS**

**Open Elective-III**

| L | T | P | C |
|---|---|---|---|
| 2 | 0 | 0 | 2 |

**Course Objectives:**

1. To study fundamental concepts in software testing.
2. To discuss various software testing issues and solutions in software unit test, integration and system testing.
3. To expose the advanced software testing topics, such as object--oriented software testing methods.

**UNIT – 1: Introduction** **8 Hrs**

Grasping ,Blockchain Fundamentals, Tracing Blockchain's Origin,The shortcomings of current transaction systems, The emergence of bitcoin , 5 The birth of blockchain, Revolutionizing the Traditional Business, Network Exploring a blockchain application, Recognizing the key business benefits, Building trust with blockchain.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- List a range of different software testing techniques and statergies and be able to apply specific(automated) unit testing method to the projects. **L1**
- Distinguish characterstics of structural testing methods. **L2**

**UNIT – II: Blokchain working** **8 Hrs**

Taking a Look at How Blockchain Works,Why It's Called "Blockchain", What Makes a Blockchain Suitable for Business, Shared ledger, Permissions Consensus, Smart contracts, Identifying Participants and Their Roles, Fundamentals of Blockchain.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible **L3**
- Discuss about the functional and system testing methods **L3**

**UNIT – III: Business with Blockchain** **8 Hrs**

Propelling Business with Blockchains, Recognizing Types of Market Friction, Information frictions, Interaction frictions, Innovation frictions, Moving Closer to Friction-Free Business, Networks Reducing information friction, Easing interaction friction, Easing innovation friction, Transforming Ecosystems through Increased Visibility.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Discuss about the functional and system testing methods. **L4**
- Demonstrate various issues for object oriented testing. **L4**

**UNIT – IV: Blockchain in Action** **7 Hrs**

Blockchain in Action: Use Cases, Financial Services, Commercial financing, Trade finance, Cross-border transactions, Insurance, Government Supply Chain Management Healthcare, Electronic medical records, Healthcare payments pre-authorization, The Internet of Things (IoT).

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Distinguish characterstics of structural testing methods. **L5**

- Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible. **L4**

**UNIT – V:Hyperledger** **10 Hrs**

Hyperledger, a Linux Foundation Project, Hyperledger Vision, Hyperledger Fabric, How Can IBM Help Developers Innovate With Blockchain?, Offering an easily accessible cloud and development platform, Individualized attention and industry expertise.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Discuss about the functional and system testing methods. **L5**
- Demonstrate various issues for object oriented testing. **L5**

**Text Books:**

1. Fundamentals of Blockchain., RavindharVadapalli

**Reference Books:**

1. Block chain Technology Concepts and Applications, Kumar Saurabh, Ashutosh Saxena

**Course Outcomes:**

At the end of this Course the student will be able to

- List a range of different software testing techniques and statergies and be able to apply specific(automated) unit testing method to the projects. **L3**
- Distinguish characterstics of structural testing methods. **L4**
- Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible. **L5**
- Discuss about the functional and system testing methods. **L5**

**B.Tech IV Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19AHS15a-MANAGEMENT SCIENCE**

**(Humanities Elective-II)(Common to EEE , ECE & CSE)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- Understand the role of entrepreneurship in economic development.
- Identify the general characteristics of entrepreneurs.

**UNIT – I**

**INTRODUCTION TO MANAGEMENT**

Concepts of Management - Nature, importance and Functions of Management - Taylor's Scientific Management Theory, Fayol's Principles of Management, Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Leadership Styles, Social responsibilities of Management.

**DESIGNING ORGANIZATIONAL STRUCTURES**

Basic concepts related to Organization - Departmentation and Decentralization, Types of mechanistic and organic structures of organization (Line organization, Line and staff organization, functional organization, Committee organization, matrix organization, team structure) their merits, demerits and suitability.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the concept of management and organization. **L1**
- Apply the concepts & principles of management in real life industry. **L2**

**UNIT – II**

**OPERATIONS MANAGEMENT:**

Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production), Work Study. Statistical Quality Control: *c* chart, *p* chart, (simple Problems) Deming's contribution to quality.

**MATERIALS MANAGEMENT:** EOQ, Purchase Procedure and Stores Management. Inventory — functions. Types, inventory classification techniques.

**Marketing:** Functions of Marketing, Marketing Mix, and Marketing Strategies based on Product Life Cycle, Channels of distribution.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the core concepts of Management Science and Operations Management. **L1**
- Evaluate Materials departments & Determine EOQ. **L2**

**UNIT – III**

**HUMAN RESOURCES MANAGEMENT (HRM):**

Concepts of HRM, Personnel Management and Industrial Relations (PMIR), Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Placement, Wage and Salary Administration, Promotion, Transfer, Separation, Performance Appraisal, Grievance Handling and Welfare Administration, Job Evaluation, Merit Rating and methods.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the concepts of HRM in Recruitment, Selection, Training & Development. **L1**
- Apply Managerial and operative Functions. **L2**



1/10/21

**UNIT – IV**

**STRATEGIC MANAGEMENT:**

Vision, Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of Corporate Planning Process, Environmental Scanning, Value Chain Analysis, SWOT Analysis, Steps in Strategy Formulation and Implementation, Generic Strategy alternatives.

**PROJECT MANAGEMENT (PERT/CPM):**

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

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand Mission, Objectives, Goals & strategies for an enterprise. **L1**
- Evaluate PERT and CPM Techniques. **L2**

**UNIT – V**

**CONTEMPORARY MANAGEMENT PRACTICES:**

Basic concepts of MIS, Materials Requirement Planning (MRP), Just-In-Time (JIT) System, Total Quality Management (TQM), Six sigma concept, Supply Chain Management, Enterprise Resource Planning (ERP), Performance Management, Business Process outsourcing (BPO), Business Process Re-engineering and Bench Marking, Balanced Score Card.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Analyze CRM, MRP, TQM. **L1**
- Understand modern management techniques. **L2**

**Text Books:**

1. **Management Science**, Aryasri: TMH, 2004.
2. **Management**, Stoner, Freeman, Gilbert, 6th Ed, Pearson Education, New Delhi, 2004.

**Reference Books:**

1. **Marketing Mangement**, Kotler Philip & Keller Kevin Lane: 12/e, PHI,2005.
2. **Essentials of Management** ,Koontz & Weihrich:, 6/e, TMH, 2005.
3. **Management—Principles and Guidelines**, Thomas N.Duening & John M.Biztantra, 2003.
4. **Production and Operations Management**, Kanishka Bedi, , Oxford University Press, 2004.

**Course Outcomes:**

At the end of this Course the student will be able to

- Equipping engineers for a lifelong career addressing the critical technical and managerial needs of private and public organizations. **L1**
- Exploring and developing analytic abilities, making better decisions, developing and executing strategies while also leading people who innovate. **L2**
- Cultivating the technical skills as well as the behavioral challenges of running organizations and complex systems. **L3**
- Emphasizing quantitative analytic skills and an entrepreneurial spirit **L4**
- Have an introductory understanding of global entrepreneurship concepts. **L5**

**B.Tech IV Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19AHS15b-BUSINESS ENVIRONMENT**

**(Humanities Elective-II)(Common to EEE, ECE & CSE)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- To make the student understand about the business environment.
- To enable them in knowing the importance of fiscal and monitory policy.

**UNIT – I: BUSINESS ENVIRONMENT**

Meaning – Various environments affecting business – Social Economic; Political and Legal; Culture; Competitive Demographic; Technological and International environments.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the concept of Business environment. **L1**
- Explain various types of business environment. **L2**

**UNIT – II: FISCAL & MONETARY POLICY**

**FISCAL POLICY** - Public Revenues - Public Expenditure - Public debt - Development activities financed by public expenditure - Evaluation of recent fiscal policy of Government of India - Highlights of Budget - **MONETARY POLICY** - Demand and Supply of Money – RBI - Objectives of monetary and credit policy - Recent trends - Role of Finance Commission.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the concept of public revenue and public Expenditure **L1**
- Explain the functions of RBI and its role. **L2**

**UNIT – III: TRADE POLICY**

**INDIA'S TRADE POLICY** - Magnitude and direction of Indian International Trade - Bilateral and Multilateral Trade Agreements - EXIM policy and role of EXIM bank - **BALANCE OF PAYMENTS** – Structure & Major components - Causes for Disequilibrium in Balance of Payments - Correction measures.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the role of Indian international trade. **L1**
- Analyze causes for Disequilibrium and correction measure. **L2**

**UNIT – IV: WORLD TRADE ORGANIZATION**

**WORLD TRADE ORGANIZATION** - Nature and Scope - Organization and Structure - Role and functions of WTO in promoting world trade - Agreements in the Uruguay Round – TRIPS, TRIMS, and GATT - Disputes Settlement Mechanism - Dumping and Anti-dumping Measures.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the Dispute Settlement Mechanism. **L1**
- Compare and contrast the Dumping and Anti-dumping Measures. **L2**

**UNIT – V: MARKETS**

**MONEY MARKETS AND CAPITAL MARKETS** - Features and components of Indian financial systems - Objectives, features and structure of money markets and capital markets - Reforms and recent development – SEBI - Stock Exchanges - Investor protection and role of SEBI.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Apply the knowledge in future investments. **L1**
- Understand the role of SEBI in investor protection. **L2**

**Text Books:**

1. Francis Cherunilam (2009), "International Business": Text and Cases, Prentice Hallof India.
2. K. Aswathappa, "Essentials of Business Environment": Texts and Cases & Exercises 13th Revised Edition.HPH2016.

**Reference Books:**

1. K. V. Sivayya, V. B. M Das (2009), Indian Industrial Economy, Sultan Chand Publishers, New Delhi, India.
2. Sundaram, Black (2009), International Business Environment Text and Cases,Prentice Hall of India, New Delhi, India.
3. Chari. S. N (2009), International Business, Wiley India.
4. E. Bhattacharya (2009), International Business, Excel Publications, New Delhi.

**Course Outcomes:**

At the end of this Course the student will be able to

- Apply the knowledge of Money markets in future investment. **L1**
- Analyze India's Trade Policy. **L2**
- Evaluate fiscal and monitory policy. **L3**
- Develop a personal synthesis and approach for identifying business opportunities. **L4**
- `Understand various types of business environment. **L5**

**IV B.Tech I SEMESTER**
**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**
**19ACS77-CLOUD COMPUTING LAB**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 1 | 1 |

**LIST OF EXERCISES:**

1. Illustrate the installation and configuration of aneka cloud.
2. Write a program to print "Hello World" using Aneka Thread Programming model use Single Thread?
3. Install a C compiler in the virtual machine and execute a sample program.
4. Show the virtual machine migration based on the certain condition from one node to the other.
5. Find procedure to set up the one node Hadoop cluster.
6. Develop a simple web application for student details & operative using Salesforce.com in Cloud Platform under Software as Service (SaaS).
7. Develop a simple web application for personal Homepage, Attributes, Controllers, GUI, Visual Page, Forms, and Templates under Software as Service (SaaS).
8. Create virtual machine instance with given set of configuration on Amazon web Services (AWS) under Infrastructure as a Service (IaaS).
9. Develop a student home page web based application on MS-Azure Platform i.e. Platform as a Service (PaaS) Cloud.

**REFERENCE BOOKS:**

1. Barrie Sosinsky, Cloud Computing Bible, Wiley India Pvt Ltd, 2011
2. RajkumarBuyya, James Broberg and AndrzejGoscinski, Cloud computing principles and paradigms, John Wiley and Sons, 2011.
3. Thomas Erl and RicardoPuttini, Cloud Computing- Concepts, Technology & Architecture, Pearson, 2013.

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ACS73-DevOps Lab**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 2 | 1.5 |

**Laboratory Experiments**

1. Download and install Jenkins in your system.
2. Download and install cheff in your system.
3. How to setup Jenkins in tomcat server
4. How to create users and assign the roles and responsibilities.
5. How to configure the cheff server.
6. Create the cookbook in the cheff
7. Install the cheff node and configure it.
8. Install the workstation in cheff server.

**IVB.Tech I SEMESTER**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**19ACS74c - MULTIMEDIA AND APPLICATION DEVELOPMENT**

**Professional elective–III**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- Understand the relevance and underlying infrastructure of the multimedia systems.
- Understand core multimedia technologies and standards (Digital Audio, Graphics, Video, Text, Animation)
- Be aware of factors involved in multimedia systems performance, integration and evaluation

**UNIT-I:** **8Hrs**

**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.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the fundamental concepts. L1
- To build an application by using the basic concepts. L2

**UNIT – II:** **8 Hrs**

**Action Script**: ActionScript Features, Object-Oriented ActionScript, Datatypes and Type Checking, Classes, Authoring an ActionScript Class.

Action Script-II: Inheritance, Authoring an ActionScript 2.0 Subclass, Interfaces,Packages, Exceptions

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the importance of scripts, various types of scripts and how to utilize them. L2
- To implement an application through the inheritance. L3

**UNIT – III:** **8 Hrs**

Introduction to Adobe photoshop, Getting started with photoshop, creating and saving a document in photoshop, page layout and back ground, photoshop program window-title bar, menu bar, option bar, image window, image title bar,status bar, ruler, palettes, tool box, screen modes, saving files, reverting files, closing files.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the concept of Photoshop. L2
- Build any design or model with the photoshop. L3

**UNIT – IV:** **7 Hrs**

**Images:** working with images, image size and resolution ,imageediting,colour modes and adjustments , Zooming & Panning an Image, Rulers, Guides & Grids- Cropping & Straightening an Image,image backgrounds ,making selections. Working with tool box: working with pen tool, save and load selection-working with erasers-working with text and brushes-Colour manipulations: colour modes- Levels – Curves - Seeing Colour accurately - Patch tool – Cropping-Reading your palettes - Dust and scratches- Advanced Retouching- smoothing skin.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the concepts how to work with images in photoshop. L1
- To work with advance tools, editing in photoshop. L3

**UNIT – V:** **8 Hrs**

**Layers:** Working with layers- layer styles- opacity-adjustment layers Filters: The filter menu, Working with filters- Editing your photo shoot, presentation –how to create adds, artstic filter, blur filter, brush store filter, distort filters, noice filters, pixelate filters, light effects, difference clouds, sharpen filters, printing.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Learn the Concept of layers and layer styles. L2
- To build a design or model with all the options in photoshop. L3

**Text Books:**

1. Fudamentals of Multimedia by Ze-Nian Li and Mark S. Drew PHI/Pearson Education.
2. Essentials ActionScript 2.0, Colin Moock, SPD O,REILLY.
3. Adobe Photoshop Class Room in a Book by Adobe Creative Team.
4. Photoshop: Beginner's Guide for Photoshop - Digital Photography, Photo Editing, Color Grading & Graphic...19 February 2016 by David Maxwell

**Reference Books:**

1. Digital Multimedia, Nigel chapman and jenny chapman, Wiley-Dreamtech
2. Macromedia Flash MX Professional 2004 Unleashed, Pearson.

**Course Outcomes:**

At the end of this Course the student will be able to

- Students are able to understand Multimedia projects & Applications.
- Students are able to utilize the multimedia technologies to develop multimedia project.
- Can deal with all multimedia facts for fulfillment of all day to day multimedia requirements.

# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
# COLLEGE OF ENGINEERING (AUTONOMOUS), PULIVENDULA
# YSR(KADAPA) Dist. 516 390, (A.P) INDIA
## COURSE STRUCTURE (R20)
## COMPUTER SCIENCE AND ENGINEERING
## Effective from AY 2021-22
## Induction Programme

| S.No. | Course Code | Course Title | Category | L | T | P | Credits |
|---|---|---|---|---|---|---|---|
| 1. | | Physical Activities -- Sports, Yoga and Meditation, Plantation | MC | 0 | 0 | 6 | 0 |
| 2. | | Career Counselling | MC | 2 | 0 | 2 | 0 |
| 3. | | Orientation to all branches -- career options, tools, etc. | MC | 3 | 0 | 0 | 0 |
| 4. | | Orientation on admitted Branch -- corresponding labs, tools and platforms | EC | 2 | 0 | 0 | 0 |
| 5. | | Proficiency Modules & Productivity Tools | ES | 2 | 0 | 0 | 0 |
| 6. | | Assessment on basic aptitude and mathematical skills | MC | 2 | 0 | 3 | 0 |
| 7. | | Remedial Training in Foundation Courses | MC | 2 | 0 | 3 | 0 |
| 8. | | Human Values & Professional Ethics | MC | 3 | 0 | 3 | 0 |
| 9. | | Communication Skills -- focus on Listening, Speaking, Reading, Writing skills | BS | 2 | 0 | 2 | 0 |
| 10. | | Concepts of Programming | ES | 2 | 0 | 0 | 0 |

| SEMESTER - 1 | | | | | |
|---|---|---|---|---|---|
| **S.No** | **Course Code** | **Course Name** | **Category** | **L-T-P** | **Credits** |
| **1** | 20ABS05 | Linear Algebra And Calculus | BS | 3-0-0 | 3 |
| **2** | 20ABS03 | Chemistry | BS | 3-0-0 | 3 |
| **3** | 20ACS03 | Python Programming | ES | 3-0-0 | 3 |
| **4** | 20ABEE01 | Basic Electrical & Electronics Engineering | ES | 3-0-0 | 3 |
| **5** | 20AME04 | Engineering Workshop | ES | 0-0-3 | 1.5 |
| **6** | 20ACS05 | It Workshop | ES | 0-0-3 | 1.5 |
| **7** | 20ABS04 | Chemistry Lab | BS | 0-0-3 | 1.5 |
| **8** | 20ACS04 | Python Programming Lab | ES | 0-0-3 | 1.5 |
| **9** | 20ABEE02 | Basic Electrical & Electronics Engineering Lab | ES | 0-0-3 | 1.5 |
| **Total** | | | | | **19.5** |

| SEMESTER - 2 | | | | | |
|---|---|---|---|---|---|
| **S.No** | **Course Code** | **Course Name** | **Category** | **L-T-P** | **Credits** |
| **1** | 20ABS06 | Differential Equations And Vector Calculus | BS | 3-0-0 | 3 |
| **2** | 20ABS10 | Applied Physics | BS | 3-0-0 | 3 |
| **3** | 20AHS01 | Communicative English | HS | 3-0-0 | 3 |
| **4** | 20ACS08 | C-Programming & Data Structures | ES | 3-0-0 | 3 |
| **5** | 20AME01 | Engineering Graphics | ES | 1-0-4 | 3 |
| **6** | 20AHS02 | Communicative English Lab | ES | 0-0-3 | 1.5 |
| **7** | 20ABS11 | Applied Physics Lab | BS | 0-0-3 | 1.5 |
| **8** | 20ACS09 | C-Programming & Data Structures Lab | ES | 0-0-3 | 1.5 |
| | | | | | |
| **Total** | | | | | **19.5** |

| SEMESTER - 3 | | | | | |
|---|---|---|---|---|---|
| **S.No** | **Course Code** | **Course Name** | **Category** | **L-T-P** | **Credits** |
| **1** | 20ABS14 | Discrete Mathematics And Graph Theory | BS | 3-0-0 | 3 |
| **2** | 20ACS14 | Computer Organization | PC | 3-0-0 | 3 |
| **3** | 20ACS16 | Database Management Systems | PC | 3-0-0 | 3 |
| **4** | 20ACS18 | Object Oriented Programming Using Java | PC | 3-0-0 | 3 |
| **5** | 20AHS04<br>20AHS05 | Humanities Elective:<br>**i.** Managerial Economics and Financial Analysis<br>**ii.** Entrepreneurship And Innovation Management | HS | 3-0-0 | 3 |
| **8** | 20ACS17 | Database Management Systems Lab | PC | 0-0-3 | 1.5 |
| **9** | 20ACS19 | Object Oriented Programming Using Java Lab | PC | 1-0-2 | 1.5 |
| **7** | 20ACS15 | Computer Organization Lab | PC | 0-0-3 | 1.5 |
| **6** | 20ACS20 | (Skill Oriented Course – I)<br>Web Development | SC | 1-0-2 | 2 |
| **10** | 20ABS09 | Environmental Science | MC | 3-0-0 | 0 |
| | 20AMC01 | NSS Activities | MC | 0-0-2 | 0 |
| **Total** | | | | | **21.5** |

| SEMESTER - 4 | | | | | |
|---|---|---|---|---|---|
| **S.No** | **Course Code** | **Course Name** | **Category** | **L-T-P** | **Credits** |
| **1** | 20ABS15 | Numerical Methods, Probability And Statistics | BS | 3-0-0 | 3 |
| **2** | 20ACS22 | Formal Language And Automata Theory | ES | 3-0-0 | 3 |
| **3** | 20ACS23 | Operating Systems | PC | 3-0-0 | 3 |
| **4** | 20ACS25 | Design And Analysis Of Algorithms | PC | 3-0-0 | 3 |
| **5** | 20ACS27 | Software Engineering | PC | 3-0-0 | 3 |
| **6** | 20ACS29 | Skill Oriented Course – Ii<br>Mobile Application Development | SC | 1-0-2 | 2 |
| **7** | 20ACS24 | Operating Systems Laboratory | PC | 0-0-3 | 1.5 |
| **8** | 20ACS26 | Design And Analysis Of Algorithms Lab | PC | 0-0-3 | 1.5 |
| **9** | 20ACS28 | Software Engineering Laboratory | PC | 0-0-3 | 1.5 |
| **10** | 20AMC02 | Mandatory Non-Credit Course (Employability Skills) **APTITUDE AND REASONING SKILLS** | MC | 3-0-0 | 0 |
| **11** | 20AHS07 | Universal Human Values | MC | 3-0-0 | 3 |
| **Total** | | | | | **24.5** |
| Mandatory Community Service Project/ Internship during Summer Vacation | | | | | |

- Eligible & interested students are permitted to register for Honours or a Minor in IV semester after the results of III Semester are declared and students may be allowed to take maximum two subjects per semester pertaining to their Honours or a Minor from V Semester onwards.

**B.Tech III Year I Semester**

| **Semester - 5** | | | | | |
|---|---|---|---|---|---|
| **S.No** | **Course No** | **Course Name** | **Category** | **L-T-P** | **Credits** |
| 1 | 20ACS51 | Computer Networks | PC | 3-0-0 | 3 |
| 2 | 20ACS52 | Compiler Design | PC | 3-0-0 | 3 |
| 3 | 20ACS53 | Artificial Intelligence | PC | 3-0-0 | 3 |
| 4 | 20ACS54 | Professional Elective – I | PE | 3-0-0 | 3 |
| | 20ACS54A | Big Data and Analytics | | | |
| | 20ACS54B | Data mining | | | |
| | 20ACS54C | Data Visualization with Python | | | |
| 5 | 20ACS55 | Open Elective Course– I | OE | 3-0-0 | 3 |
| 6 | 20ACS50 | Web Technologies (Skill oriented course – III) | SC | 1-0-2 | 2 |
| 7 | 20ACS57 | Computer Networks Lab | PC | 0-0-3 | 1.5 |
| 8 | 20ACS58 | Artificial Intelligence lab | PC | 0-0-3 | 1.5 |
| 9 | 20AHS11 | Indian Constitution | MC | 3-0-0 | 0 |
| 10 | 20ACS59 | Evaluation of Community Service Project/Internship | PR | ------- | 1.5 |
| | | | | **Total** | **21.5** |

## Open Elective I (Interdisciplinary)

| Branch | Subject Code | Subject |
|---|---|---|
| Mathematics | 20ABS55A | Fuzzy Set Theory, Arithmetic and Logic |
| Physics | 20ABS55B | Functional Nanomaterials for Engineers |
| Chemistry | 20ABS55C | Chemistry of Energy Materials |
| CIVIL | 20ACE55A | Basics of Civil Engineering |
| EEE | 20AEE55A | Basics of Non-Conventional Energy Sources |
| ME | 20AME55A | 3D Printing |
| | 20AME55B | Smart Materials |
| ECE | 20AEC55A | Fundamentals of Electronics and Communication Engineering |
| | 20AEC55B | Transducers and Sensors |

**Note:** A student shall not be permitted to take courses as Open Electives/Minor/Honours with content substantially equivalent to the courses pursued in the student's primary major.

**B.Tech III Year II Semester**

| Semester - 6 | | | | | |
|---|---|---|---|---|---|
| **S.No** | **Course No** | **Course Name** | **Category** | **L-T-P** | **Credits** |
| 1 | 20ACS61 | Internet of Things | PC | 3-0-0 | 3 |
| 2 | 20ACS62 | Data Science | PC | 3-0-0 | 3 |
| 3 | 20ACS63 | Cyber Security | PC | 3-0-0 | 3 |
| 4 | 20ACS64 | Professional Elective – II (MOOC-I) | PE | 3-0-0 | 3 |
| 5 | 20ACS65 | Open Elective Course –II | OE | 3-0-0 | 3 |
| 6 | 20ACS66 | Internet of Things Lab | PC | 0-0-3 | 1.5 |
| 7 | 20ACS67 | Data Science Lab | PC | 0-0-3 | 1.5 |
| 8 | 20ACS68 | Cyber security Lab | PC | 0-0-3 | 1.5 |
| 9 | 20AHS10 | Soft Skills (Skill Oriented Course – IV) | SC | 1-0-2 | 2 |
| 10 | 20ACS60 | Design Thinking and Innovation for Product Innovation | MC | 3-0-0 | 0 |
| | | | | **Total** | **21.5** |
| Industry Internship (Mandatory) for 6 - 8 weeks duration during summer vacation | | | | | |

**Open Elective II (Interdisciplinary)**

| Branch | Subject Code | Subject Name |
|---|---|---|
| Mathematics | 20ABS65A | Numerical Techniques |
| Physics | 20ABS65B | Materials Characterization Techniques |
| Chemistry | 20ABS65C | Polymers and their applications |
| CIVIL | 20ACE65A | Environmental Impact Assessment |
| EEE | 20AEE65A | Energy Conservation and Management |
| ME | 20AME65A | Programming of Robots and Control |
| | 20AME65B | Non-Conventional sources of Energy |
| ECE | 20AEC65A | Introduction to Microcontrollers & Applications |
| | 20AEC65B | Principles of Digital Signal Processing |

Note: Student shall register for MOOC Course in NPTEL/SWAYAM in concurrence with the department before commencement of semester. The advanced courses should opt which is not repetitive regular courses and syllabus.

**B.Tech IV Year I Semester**

| **Semester - 7** | | | | | |
|---|---|---|---|---|---|
| **S.No** | **Course No** | **Course Name** | **Category** | **L-T-P** | **Credits** |
| 1 | 20ACS71 | Professional Elective – III | PE | 3-0-0 | 3 |
| | 20ACS71A | Software project Management | | | |
| | 20ACS71B | Software Testing | | | |
| | 20ACS71C | Software Architecture | | | |
| 2 | 20ACS72 | Professional Elective – IV | PE | 3-0-0 | 3 |
| | 20ACS72A | Micro services | | | |
| | 20ACS72B | Cloud Computing | | | |
| | 20ACS72C | Ad-hoc and sensor networks | | | |
| 3 | 20ACS73 | Professional Elective –V | PE | 3-0-0 | 3 |
| | 20ACS73A | Block chain technologies | | | |
| | 20ACS73B | Virtual Reality | | | |
| | 20ACS73C | Statistical Analysis using R | | | |
| 4 | 20ACS75 | Open Elective – III | OE | 3-0-0 | 3 |
| 5 | 20ACS76 | Open Elective – IV (MOOC-II) | OE | 3-0-0 | 3 |
| 6 | | Humanities Elective – II | HS | 3-0-0 | 3 |
| | 20AHS12 | Management Science | | | |
| | 20AHS13 | Business Environment | | | |
| 7 | 20ACS70 | Advanced Web Technologies (Skill oriented course − V) | SC | 1-0-2 | 2 |
| 8 | 20ACS79 | Evaluation of Internship | PR | ------- | 3 |
| | | | | **Total** | **23** |

**Open Elective III (Interdisciplinary)**

| **Branch** | **Subject Code** | **Subject Name** |
|---|---|---|
| Mathematics | 20ABS75A | Mathematical Modeling |
| Physics | 20ABS75B | Sensors and Actuators for Engineering Applications |
| Chemistry | 20ABS75C | Chemistry of Nano-materials and applications |
| CIVIL | 20ACE75A | Disaster Management and Mitigation |
| EEE | 20AEE75A | IOT Applications in Electrical Engineering |
| ME | 20AME75A | Introduction to Composite Materials |
| | 20AME75B | Customer Relationship Management |
| ECE | 20AEC75A | Fundamentals of Image Processing |
| | 20AEC75B | Basics of VLSI Design |

Open Elective-IV shall opt any of branch which shall not match with regular course and syllabus.

**B.Tech IV Year II Semester**

| **Semester - 8** | | | | | |
|---|---|---|---|---|---|
| **S.No** | **Course No** | **Course Name** | **Category** | **L-T-P** | **Credits** |
| 1 | 20ACS99 | Full Internship & Project work | PR | -------- | 12 |

| | |
|---|---|
| **Total** | **12** |

# Courses offered for Honours degree

## 1. Network Security

| S.No. | Course Code | Course Title | Offered in Semester | Prerequisite if any | Contact Hours per week | | Credits |
|---|---|---|---|---|---|---|---|
| | | | | | L | T | |
| 1 | 20ACSH01 | Network Security and Cyber Laws | V | Basics of Networks | 3 | 1 | 4 |
| 2 | 20ACSH02 | Social Mobile Analytics & Cloud | VI | Basics of cloud | 3 | 1 | 4 |
| 3 | 20ACSH03 | Storage Area Networks | VI | Basics of Data Base | 3 | 1 | 4 |
| 4 | 20ACSH04 | High Performance Computing | VII | Basics of computing techniques | 3 | 1 | 4 |
| 5 | 20ACSH05 | Natural Language Processing (MOOC Course) | V | Fundamentals of compiler design | | | 2 |
| 6 | 20ACSH06 | Multi Agent Systems (MOOC Course) | VII | Basics of sharing between two systems | | | 2 |

## Title of the Minor Degree
## (Disciplines to which the Minor is offered)

| S.No. | Branch | Name of the Minor degree | Course Code | Course Title | Offered in Semester | Contact Hours per week | | | Credits |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | L | T | P | |
| 1 | CSE | Web Design & Development | 20ACSM01 | User Interface Design | V | 3 | 1 | 0 | 4 |
| 2 | | | 20ACSM02 | Advanced Java Script | VI | 3 | 1 | 0 | 4 |
| 3 | | | 20ACSM03 | Content Management & Distributed systems | VI | 3 | 1 | 0 | 4 |
| 4 | | | 20ACSM04 | Mongo DB | VII | 3 | 1 | 0 | 4 |
| 5 | | | 20ACSM05 | MOOC Course | V | | | | 2 |
| 6 | | | 20ACSM06 | MOOC Course | VII | | | | 2 |
| 1 | CSE | Data Science | 20ACSM07 | Data Science | V | 3 | 1 | 0 | 4 |
| 2 | | | 20ACSM08 | Data Analytics using Python and Lab | V | 3 | 0 | 2 | 4 |
| 3 | | | 20ACSM09 | Data Visualization | VII | 3 | 1 | 0 | 4 |
| 4 | | | 20ACSM10 | Machine Learning | VI | 3 | 1 | 0 | 4 |
| 5 | | | 20ACSM11 | MOOC Course | VI | | | | 2 |
| 6 | | | 20ACSM12 | MOOC Course | VII | | | | 2 |
| 1 | CE | Construction Technology | 20ACEM01 | Building Materials | V | 3 | 1 | 0 | 4 |
| 2 | | | 20ACEM02 | Building Construction | V | 3 | 1 | 0 | 4 |
| 3 | | | 20ACEM03 | Building planning and Drawing | VI | 3 | 1 | 0 | 4 |
| 4 | | | 20ACEM04 | Surveying | VI | 3 | 1 | 0 | 4 |
| 5 | | | 20ACEM05 | MOOC Course | VII | | | | 2 |
| 6 | | | 20ACEM06 | MOOC Course | VII | | | | 2 |
| 1 | EEE | Electrical Systems | 20AEEM01 | Basic Electric Circuits and Analysis | V | 3 | 1 | 0 | 4 |
| 2 | | | 20AEEM02 | Principles of Electrical Measurements | V | 3 | 1 | 0 | 4 |
| 3 | | | 20AEEM03 | Basics of Power Electronics and Devices | VI | 3 | 1 | 0 | 4 |
| 4 | | | 20AEEM04 | Fundamentals of Control Systems | VI | 3 | 1 | 0 | 4 |
| 5 | | | 20AEEM05 | MOOC Course | VII | | | | 2 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 6 | | | 20AEEM06 | MOOC Course | VII | | | | 2 |
| 1 | ME | 3D Printing | 20AMEM07 | Materials science for Engineers | V | 3 | 1 | 0 | 4 |
| 2 | | | 20AMEM08 | Computer Aided Machine Drawing | V | 3 | 1 | 0 | 4 |
| 3 | | | 20AMEM09 | 3D Printing materials | VI | 3 | 1 | 0 | 4 |
| 4 | | | 20AMEM10 | Applications of 3D Printing | VII | 3 | 1 | 0 | 4 |
| 5 | | | 20AMEM11 | MOOC Course | VI | | | | 2 |
| 6 | | | 20AMEM12 | MOOC Course | VII | | | | 2 |
| 1 | ME | Robotics and Automation | 20AMEM13 | Introduction to Robotics | V | 3 | 1 | 0 | 4 |
| 2 | | | 20AMEM14 | Industrial Automation | V | 3 | 1 | 0 | 4 |
| 3 | | | 20AMEM15 | Hydraulic and Pneumatic circuits | VI | 3 | 1 | 0 | 4 |
| 4 | | | 20AMEM16 | Programming and control of Robot | VII | 3 | 1 | 0 | 4 |
| 5 | | | 20AMEM17 | MOOC Course | VI | | | | 2 |
| 6 | | | 20AMEM18 | MOOC Course | VII | | | | 2 |
| 1 | ME | Industrial Engineering | 20AMEM19 | Production Planning and Control | V | 3 | 1 | 0 | 4 |
| 2 | | | 20AMEM20 | Marketing Management | VI | 3 | 1 | 0 | 4 |
| 3 | | | 20AMEM21 | Customer Relationship Management | VI | 3 | 1 | 0 | 4 |
| 4 | | | 20AMEM22 | Six Sigma & Lean Manufacturing | VII | 3 | 1 | 0 | 4 |
| 5 | | | 20AMEM23 | MOOC Course | V | | | | 2 |
| 6 | | | 20AMEM24 | MOOC Course | VII | | | | 2 |
| 1 | ECE | Electronics & Communication Engineering | 20AECM01 | Electronic Circuits | V | 3 | 1 | 0 | 4 |
| 2 | | | 20AECM02 | Digital Electronics | V | 3 | 1 | 0 | 4 |
| 3 | | | 20AECM03 | Principles of Communications | VI | 3 | 1 | 0 | 4 |
| 4 | | | 20AECM04 | Electronic Instrumentation | VI | 3 | 1 | 0 | 4 |
| 5 | | | 20AECM05 | MOOC Course | VII | | | | 2 |
| 6 | | | 20AECM06 | MOOC Course | VII | | | | 2 |

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA**
**DEPARTMENT OF MATHEMATICS**
**I B.TECH – I SEMESTER (R20)**
**(Common to all Branches of Engineering)**
**(THEORY)**

| Subject Code | Title of the Subject | L | T | P | C |
|---|---|---|---|---|---|
| | *Linear Algebra and Calculus* | 3 | 0 | - | 3 |

| COURSE OBJECTIVES | |
|---|---|
| 1 | This course will illuminate the students in the concepts of calculus and linear algebra. |
| 2 | To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications |

| COURSE OUTCOMES | |
|---|---|
| CO1 | Develop the use of matrix algebra techniques that is needed by engineers for practical applications |
| CO2 | Utilize mean value theorems for real life problems |
| CO3 | Familiarize with functions of several variables which is useful in optimization |
| CO4 | Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2 and 3- dimensional coordinate systems. |
| CO5 | Students will learn the utilization of special functions. |

## SYLLABUS

**Unit I: Matrix Operations and Solving Systems of Linear Equations**

Rank of a matrix by echelon form, Normal form, solving system of non-homogeneous and homogeneous linear equations. Eigen values and Eigen vectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem, diagonalization of a matrix.

**Unit II: Infinite series and Mean Value Theorems**

Infinite series:

Series, Convergence and divergence, Geometric series, Integral test, P- series, comparison test, ratio test, root test.

Mean Value Theorems:

Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem (without proof). Expansions of functions: Taylor's and Maclaurin's series, indeterminate forms and L-Hospital rule (Limits).

BOS Chairman
Mathematics

**Unit III: Multivariable calculus**

Functions of several variables – Limit and Continuity, Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers for three variables.

**Unit IV: Multiple Integrals**

Double integrals, change of order of integration, areas enclosed by plane curves, Triple Integrals, Volume of solid as double integral and as triple integral, change of variables in double integral and Triple integral.

**Unit V: Special Functions- Beta and Gamma functions**

Beta and Gamma functions and their properties, relation between beta and gamma functions. Derichlet's integral and its applications (Areas and Volumes of solids).

**Textbooks:**


1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.


**References:**


1. B. V. Ramana, Higher Engineering Mathematics, Tata Mc-Grawhill publishing company Ltd., New Delhi.
2. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
3. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
4. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 201.

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS), PULIVENDULA**

**B.Tech – I Yr I sem (R20)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

# Chemistry

**(EEE, ECE and CSE)**

**Course Objectives**:

- To familiarize engineering chemistry and its applications
- To train the students on the principles and applications of electrochemistry, Spectroscopy and polymers
- To introduce instrumental methods and modern engineering materials.

## Unit 1: Structure and Bonding Models: (10 hrs)

Planck's quantum theory, dual nature of matter, Schrodinger equation, significance of $\Psi$ and $\Psi^2$, applications to hydrogen, molecular orbital theory – bonding in homo- and heteronuclear diatomic molecules – energy level diagrams of $N_2$, $O_2$, CO and NO, $\pi$-molecular orbitals of butadiene and benzene, calculation of bond order.

**Learning Outcomes:**

*At the end of this unit, the students will be able to*

- **apply** Schrodinger wave equation to hydrogen atom (L3)
- **recall** molecular orbital theory and energy level diagrams of atoms (L1)
- **illustrate** the molecular orbital energy level diagram of different molecular species (L2)
- **explain** the calculation of bond order of $O_2$ and CO molecules (L2)
- **discuss** the basic concept of molecular orbital theory (L3)

## Unit 2: Modern Engineering materials: (12 hrs)

i). Understanding of materials: Crystal field theory – salient features – splitting in octahedral, tetrahedral and square planar geometry. Properties of coordination compounds- oxidation state, coordination number, magnetic properties and colour.

ii). Semiconductor materials, superconductors- basic concept, band diagrams for conductors, semiconductors and insulators, effect of doping on band structures.

iii). Supercapacitors: Introduction, basic concept-classification – applications.

iv). Nanochemistry: Introduction, classification of nanometerials, properties and applications of fullerenes, carbon nanotubes and graphene nanoparticles.

**Learning Outcomes:**

*At the end of this unit, the students will be able to*

- **explain** splitting of in octahedral and tetrahedral geometryof complexes (L2).
- **recall** applications of semiconductors, super conductors, nanomaterials (L1)
- **discuss** the magnetic behaviour and colour of coordination compounds (L3).
- **explain** the band theory of solids for conductors, semiconductors and insulators (L2)
- **demonstrate** the application of fullerenes, carbon nano tubes and graphene nanoparticles (L2).

**Unit 3: Electrochemistry and Applications:** (12 hrs)

Introduction to electrochemistry, electrodes – concepts of reference electrodes (Calomel electrode, Ag/AgCl electrode and glass electrode); Electrochemical cell, Nernst equation, cell potential calculations and numerical problems, pH metry, potentiometry- potentiometric titrations (redox titrations), concept of conductivity- Specific, equivalent & molar conductance and.cell constant, conductivity cell, conductometric titrations (acid-base titrations).

Electrochemical sensors – potentiometric sensors (glucose potentiometric sensor), amperometric sensors(Estimation of Uric Acid (UA))

Primary cells – Zinc-air, Na-Air batteries, secondary cells – Nickel-Cadmium (NiCd),and lithium ion batteries- working of the batteries including cell reactions; fuel cells: hydrogen-oxygen, methanol fuel cells – working of the cells and applications.

**Learning Outcomes:**

*At the end of this unit, the students will be able to*

- **apply** Nernst equation for calculating electrode and cell potentials (L3)
- **recall** applications of various batteries (L1).
- **explain** the theory of construction of battery and fuel cells (L2)
- **solve** problems based on cell potential (L3)

**Unit 4: Polymer Chemistry:** (10 hrs)

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, copolymerization (stereospecific polymerization) with specific examples and mechanisms of polymer formation.

Plastics - Thermoplastics and Thermosettings, Preparation, properties and applications of – PVC, Teflon, Bakelite, Nylon-6,6, carbon fibres. Calculation of molecular Weight of polymer by weight average and number average methods, polydispersity index

Elastomers–Buna-S, Buna-N–preparation, properties and applications.

Conducting polymers – polyacetylene, polyaniline, polypyrroles – mechanism of conduction and applications.

**Learning Outcomes:**

*At the end of this unit, the students will be able to*

- **explain** the different types of polymers and their applications (L2)
- **find** number average and weight average of polymer (L1)
- **explain** the preparation, properties and applications of Bakelite, Nylon-6,6, and carbon fibres (L2)
- **describe** the mechanism of conduction in conducting polymers (L2)
- **discuss** Buna-S and Buna-N elastomers and their applications (L2)

**Unit 5: Instrumental Methods and Applications** (8 hrs)

Regions of electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. UV-Visible, IR Spectroscopies- Principle, selection rules and applications. Solid-Liquid Chromatography–TLC, retardation factor.

**Learning outcomes:**

After completion of Unit IV, students will be able to:

- **explain** the different types of spectral series in electromagnetic spectrum (L2)
- **understand** the principles of UV-Vis, IR Spectroscopy (L2)
- **find** retention time and volumes of samples (L1)
- **explain** the various applications of analytical instruments (L2)

**Text Books:**

1. Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai, 2013.

2. Arun Bahl, B.S. Bahl and G.D. Tuli, Essentials of Physical Chemistry, S.Chand Publication, New Delhi 2012.

**Reference Books:**

1.G.V.Subba Reddy, K.N.Jayaveera and C. Ramachandraiah, Engineering Chemistry, Mc Graw Hill, 2020.

2. J.D. Lee, Concise Inorganic Chemistry, 5/e, Oxford University Press, 2008.

3. K. Sesha Maheswaramma and Mridula Chugh, Engineering Chemistry, Pearson Publication Pvt. Ltd.

4. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.

**Course Outcomes:**

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

- **compare** the materials for construction of battery and electrochemical sensors (L2)
- **recall** properties and applications of polymers and engineering materials (L1)
- **explain** the preparation, properties, and applications of thermoplastics & thermosetting, elastomers & conducting polymers. (L2)
- **explain** the principles of spectrometry, TLC in separation of solid and liquid mixtures (L2)
- **apply** the principle of Band diagrams in application of conductors and semiconductors (L3)

# Python Programming

**(CSE)**

**I B. Tech – I Semester**

**L-T-P-C**
**3-0-0-3**

**OBJECTIVES:**

- To introduce object oriented programming using an easy-to-use language.
- To use iterators and generators.
- To test objects and handle changing requirements.
- To be exposed to programming over the web.

**UNIT I - INTRODUCTION, DATA TYPES AND EXPRESSIONS**

**Introduction:** Computer science, Computer algorithms, Computer software, The Python programming language, First program in Python.

**Data Types and Expressions:** Literals, Variables and Identifiers, Operators, Expressions and Data types.

**UNIT II - CONTROL STRUCTURES, LISTS, DICTIONARIES AND SETS**

**Control Structures:** Control structures, Boolean expressions, Selection control and Iterative control.

**Lists:** List structures, Lists in Python, Iterations over lists, Assigning and copying lists, List comprehensions.

**Dictionaries, Tuples and Sets:** Dictionary types in Python, Implementation of Dictionary, Tuples, Set data type - the Set data type in Python, Implementation of sets.

**UNIT III - DESIGN WITH FUNCTIONS, STRINGS AND TEXT FILES**

Program routines, Functions, Recursion-Recursive functions, Recursive problem solving, Iteration Vs Recursion, A case study of Towers of Hanoi using recursion; Using text files, String processing, Exception handling, A Case study on cigarette Use/ Lung cancer Correlation program.

**UNIT IV - OBJECTS AND THEIR USE, OBJECT ORIENTED PROGRAMMING**

**Objects and Their Use:** Software objects, Turtle graphics- Creating a turtle graphics window, The default turtle, Fundamental turtle attributes and behavior, Additional turtle Attributes, creating multiple turtles.

**Object Oriented Programming:** Encapsulation, Inheritance, and Polymorphism.

**UNIT V - GUI PROGRAMMING**

Tkinter Overview - tkinter pragmatics, Documentation, Extensions, structure; tkinter coding alternatives, adding buttons and callbacks-lambda, bound method, callable class object, Binding events; adding multiple widgets, Reusable GUI Components with classes, Dialogs, Entry, check buttons and Radio buttons, Scales, Menus.

**TEXT BOOKS:**

1. Charles Dierbach, Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2016.

2. Mark Lutz, "Programming Python," O'Reilly Publications, Fourth Edition, 2011.

**REFERENCE BOOK:**

1. Kenneth Lambert and B.L. Juneja, *Fundamentals of Python,* Cengage Learning, Third Edition, 2012.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING (AUTONOMOUS), PULIVENDULA
YSR (KADAPA) Dist 516 390, (A.P) INDIA

I B.Tech – II Sem (ME)
I B Tech - I SEM (CSE)

LTPC

3 0 0 3

# Basic Electrical & Electronics Engineering

## Part A: Basic Electrical Engineering

~~(Civil, Mechanical, CSE)~~

**Course Objectives:**

1. To introduce basics of electric circuits.
2. To teach DC and AC electrical circuit analysis.
3. To explain working principles of transformers and electrical machines.
4. To impart knowledge on low voltage electrical installations

**Unit 1 DC & AC Circuits:**

Electrical circuit elements (R - L and C) - Kirchhoff laws - Series and parallel connection of resistances with DC excitation. Superposition Theorem - Representation of sinusoidal waveforms - peak and rms values - phasor representation - real power - reactive power - apparent power - power factor - Analysis of single-phase ac circuits consisting of RL - RC - RLC series circuits.

**Unit Outcomes: Able to**

- Recall Kirchoff laws (L1)
- Analyze simple electric circuits with DC excitation (L4)
- Apply network theorems to simple circuits (L3)
- Analyze single phase AC circuits consisting of series RL - RC - RLC combinations (L4)

**Unit 2 DC & AC Machines:**

Principle and operation of DC Generator - EMF equations - OCC characteristics of DC generator – principle and operation of DC Motor – Performance Characteristics of DC Motor - Speed control of DC Motor – Principle and operation of Single Phase Transformer - OC and SC test on transformer - principle and operation of Induction Motor [ Elementary treatment only]

**Unit Outcomes: Able to**

- Explain principle and operation of DC Generator & Motor.
- Perform speed control of DC Motor (L2)
- Explain operation of transformer and induction motor. (L2)
- Explain construction & working of induction motor & DC motor

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**Unit 3 Electrical Installations:**
Components of LT Switchgear: Switch fuse unit (SFU),MCB,ELCB,MCCB,Tpes of wires and cables,Earthing. Types of batteries,important Characteristics for Batteries. Elementary Calculations for energy consumption,power factor improvement and battery backup

**Unit Outcomes: Able to**

- Explain principle and operation of protecting equipments.
- Come to know different types of batteries and their usage.

1.
2.
3.
4.
5
6.
7.
8.
9.
10.

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I B.Tech I Sem

## COURSE NO. - Basic Electrical & Electronics Engineering

**(Common to Mechanical, CSE)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

## Part B: Basic Electronics Engineering

**Course Objectives:**

- To provide comprehensive idea about working principle, operation and applications of PN junction & zener diodes, BJT, FET, MOSFET and operational amplifier
- To introduce fundamentals of digital electronics
- To educate on principles of various communication systems
- To teach efficacy of electronic principles which are pervasive in engineering applications

### UNIT I ANALOG ELECTRONICS

Overview of Semiconductors, PN junction diode, Zener diode, Applications of diode as switch and rectifier, Zener diode as regulator, special purpose diodes: photodiode, phototransistor, LCD and LED.

BJT construction, operation, configuration and characteristics, JFET and MOSFET construction, operation, characteristics (CS configuration), applications.

Operational Amplifiers: Introduction, block diagram, basic op-amp circuits: Inverting, Non Inverting, summer, subtractor, voltage follower.

**Unit Outcomes:**

- Describe operation and characteristics of diodes and transistors
- Make use of diodes and transistors in simple, typical circuit applications
- Understand operation of basic op-amp circuits

### UNIT II DIGITAL ELECTRONICS

Introduction, Switching and Logic Levels, Digital Waveform, characteristics of digital ICs, logic gates, number systems, combinational circuits - adders, multiplexers, decoders; introduction to sequential circuits, flip flops, shift register, binary counter.

**Unit Outcomes:**

- Explain different logic gates using truth table
- Distinguish combinational and sequential circuits
- Analyze various combinational circuits such as adders, multiplexers and decoders
- Understand functionality of flip-flops, shift registers and counters

## UNIT III COMMUNICATION AND DATA ACQUISITION SYSTEMS

Introduction, Elements of Communication Systems, EM spectrum, basics of electronic communication, Communication receivers, Examples of communication systems: Microwave & Satellite, Fibre optic, Television, mobile communication (block diagram approach). Data Acquisition System, D/A and A/D converters, Data loggers, Digital Transducer.

**Unit Outcomes:**

- Describe basic elements of a communication system
- Understand functioning of various communication systems
- Explain the need for Data Acquisition Systems.

**TEXT BOOKS:**

1. D.P. Kothari, I.J. Nagrath, Basic Electronics, 2nd edition, McGraw Hill Education (India) Private Limited
2. S.K. Bhattacharya, Basic Electrical and Electronics Engineering, 2nd edition, Pearson India Private Limited.

**REFERENCES:**

1. R. Muthusubramanian, S. Salivahanan, "Basic Electrical and Electronics Engineering", Tata McGraw-Hill Education, Reprint 2012.
2. David Bell, Electronic Devices and Circuits: Oxford University Press, 5th EDn., 2008.
3. H S Kalsi, Electronic Instrumentation, Tata McGraw Hill Education (India) Private Limited.

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) :: PULIVENDULA**
**DEPARTMENT OF MECHANICAL ENGINEERING**
**I YEAR I SEMESTER (CIVIL, MECH, CSE)**

| Subject Code | Title of the Subject | L | T | P | C |
|---|---|---|---|---|---|
| | Engineering Workshop | 0 | 0 | 3 | 1.5 |

| | COURSE OBJECTIVES |
|---|---|
| 1 | To bring awareness about workshop practices for Engineers. |
| 2 | To familiarize how wood working operations can be performed. |
| 3 | To teach the practices for sheet metal operations. |
| 4 | To develop the technical skills related to fitting and electrical wiring. |

| COURSE OUTCOMES | |
|---|---|
| CO1 | **Apply** wood working skills in real world applications. |
| CO2 | **Apply** fitting operations in various applications. |
| CO3 | **Build** different parts with metal sheets in real world applications. |
| CO4 | **Demonstrate** soldering and brazing. |
| CO5 | **Apply** basic electrical engineering knowledge for house wiring practice. |

**Mapping between Course Outcomes and Programme Outcomes**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 2 | 2 | | | | | | | | 1 |
| CO2 | 3 | 2 | 2 | 2 | | | | | | | | 1 |
| CO3 | 2 | 3 | 2 | 1 | | | | | | | | 1 |
| CO4 | 2 | 3 | 2 | 1 | 1 | 1 | | | | | | 1 |
| CO5 | 3 | 2 | 2 | 1 | 1 | 1 | | | | | | 1 |

**1. Wood Working:**

Familiarity with different types of woods and tools used in wood working and make following joints

a) Half – Lap joint
b) Mortise and Tenon joint
c) Corner Dovetail joint or Bridle joint
d) Wood Turning Operation

**2. Sheet Metal Working:**

Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets

a) Tapered tray b) Conical funnel c) Elbow pipe d) Brazing & Riveting

**3. Fitting:**

Familiarity with different types of tools used in fitting and do the following fitting exercises

a) V-fitting b) Dovetail fitting c) Contour Fitting
d) Bicycle tire puncture and change of two wheeler tyre.

**4. Electrical Wiring:**

Familiarities with different types of basic electrical circuits and make the following connections

a) Parallel and series b) Two way switch c) Godown lighting d) Tube light

e) Three phase motor f) Soldering of wires

**Textbooks:**

1. K.Venkata Reddy., Workshop Practice Manual, 6/e BS Publications.
2. Kannaiah P. and Narayana K.L., Workshop Manual, 2/e, Scitech publishers.
3. John K.C., Mechanical Workshop Practice. 2/e, PHI 2010.

# IT - Workshop

**(CSE, CIVIL & MECH)**

**B. Tech – I Semester** **L-T-P-C**
**0-0-3-1.5**

**Course Objectives:**

- To provide Technical training to the students on Productivity tools like Word processors, Spreadsheets, Presentations
- To make the students know about the internal parts of a computer, assembling a computer from the parts, preparing a computer for use by installing the operating system
- To learn about Networking of computers and use Internet facility for Browsing and Searching

**Course Outcomes:**

- Disassemble and Assemble a Personal Computer and prepare the computer ready to use
- Prepare the Documents using Word processors
- Prepare Slide presentations using the presentation tool
- Interconnect two or more computers for information sharing
- Access the Internet and Browse it to obtain the required information
- Install single or dual operating systems on computer

**Preparing your Computer (2 weeks)**

**Task 1: Learn about Computer:** Identify the internal parts of a computer, and its peripherals. Represent the same in the form of diagrams including Block diagram of a computer. Write specifications for each part of a computer including peripherals and specification of Desktop computer, Submit it in the form of a report.

**Task 2: Assembling a Computer:** Disassemble and assemble the PC back to working condition. Students should be able to trouble shoot the computer and identify working and non-working parts. Student should identify the problem correctly by various methods available (eg: beeps). Students should record the process of assembling and trouble shooting a computer.

**Task 3: Install Operating system:** Student should install Linux on the computer. Student may install another operating system (including proprietary software) and make the system dual boot or multi boot. Students should record the entire installation process.

**Task 4: Productivity tools (6 weeks)**

**Word Processor:** Students should be able to create documents using the word processor tool. Some of the tasks that are to be performed are inserting and deleting the characters, words and lines, Alignment of the lines, Inserting header and Footer, changing the font, changing the colour, including images and tables in the word file, making page setup, copy and paste block of text, images, tables, linking the images which are present in other directory, formatting paragraphs, spell checking, etc. Students should be able to prepare project cover pages, content sheet and chapter pages at the end of the task using the features studied. Students should submit a user manual of the word processor considered.

**Task 5: Spreadsheet:** Students should be able to create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spreadsheet application considered.

**Task 6: Presentations :** creating, opening, saving and running the presentations, Selecting the style for slides, formatting the slides with different fonts, colours, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyperlinking, running the slide show, setting the timing for slide show. Students should submit a user manual of the Presentation tool considered.

**Optional Tasks:**

**Task 7: Laboratory Equipment**: Students may submit a report on specifications of various equipment that may be used by them for the laboratories in their curriculum starting from I B.tech to IV. B.Tech. It can vary from department to department. Students can refer to their syllabus books, consult staff members of the concerned department or refer websites. The following is a sample list. Instructors may make modifications to the list to suit the department concerned.

- Desktop computer
- Server computer
- Switch (computer science related)
- Microprocessor kit
- Micro controller kit
- Lathe machine
- Generators
- Construction material
- Air conditioner
- UPS and Inverter

- RO system
- Electrical Rectifier
- CRO
- Function Generator
- Microwave benches

**References:**


1. "Introduction to Computers", Peter Norton, Mc Graw Hill
2. "LaTeX Companion" – Leslie Lamport, PHI/Pearson.
3. "MOS study guide for word, Excel, Powerpoint & Outlook Exams", Joan Lambert, Joyce Cox, PHI.
4. "Introduction to Information Technology", ITL Education Solutions limited, Pearson Education.
5. "Networking your computers and devices", Rusen, PHI
6. "Trouble shooting, Maintaining & Repairing PCs", Bigelows, TMH.

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS), PULIVENDULA**

**B.Tech – I Yr I Sem (R20)**

**L T P C**
**0 0 3 1.5**

# Chemistry Lab
## (EEE, ECE and CSE)

**Course Objectives**:

- Verify the fundamental concepts with experiments

List of Experiments:

1. Conductometric titration of strong acid vs. strong base.
2. Conductometric titration of weak acid vs. strong base.
3. Determination of cell constant and conductance of solutions.
4. Potentiometry - determination of redox potentials and emfs.
5. Acid-base totration by pH metry.
6. Determination of Strength of an acid in Pb-Acid battery.
7. Preparation of polymer- bakelite.
8. Verification Lambert-Beer's law.
9. Estimation of manganese by colorimetry.
10. Separation of organic mixtures by Thin layer chromatography.
11. Identification of simple organic compounds by IR.
12. Preparation of nanomaterials by precipitation.
13. Estimation of Ferrous Iron by Dichrometry.

**Course Outcomes:**

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

- **determine** the cell constant and conductance of solutions (L3)
- **find** conductivity of acid and base (L1)
- **prepare** polymer Bakelite materials (L2)
- **measure** the strength of an acid present in secondary batteries (L3)
- **analyse** the IR spectra of some organic compounds (L3)

# Python Programming Laboratory

**(CSE)**

**I B. Tech – I Semester** **L-T-P-C**
**0-0-3-1.5**

1. Write a Python program to find GCD of two numbers.
2. Write a Python Program to find the square root of a number.
3. Write a Python program to find the exponentiation of a number.
4. Write a Python Program to find the maximum from a list of numbers.
5. Write a Python program to find first n prime numbers.
6. Write a Python program to find all prime numbers within a given range.
7. Write a Python program to print 'n terms of Fibonacci series using iteration.
8. Write a Python program demonstrate use of slicing in string.
9. Write a Python program that accepts a sequence of whitespace separated words as input and prints the words after removing all duplicate words and sorting them alphanumerically.
10. Write a Python program to demonstrate use of list & related functions.
11. Write a Python program to demonstrate use Dictionary& related functions.
12. Write a Python program to demonstrate use tuple, set & related functions.
13. Write a Python program to implement stack using list.
14. Write a Python program to implement queue using list.
15. Write a Python program to read and write from a file.
16. Write a Python program to demonstrate working of classes and objects.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

I B.Tech – II Sem (ME) CE Pulivendula

I B.Tech – I SEM (CSE)

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| 0 | 0 | 3 | 1.5 |

# (09A02201) Basic Electrical & Electronics Engineering Lab

**(Civil, Mechanical, CSE, CSSE, IT and Food Technology)**

## Part A: Electrical Engineering Lab

**Course Objectives:**

1. To Verify Kirchoff's laws
2. To verify Superposition theorem.
3. To learn performance characteristics of DC Machines.
4. To perform open circuit & Short Circuit test on 1- Phase Transformer.
5. To Study the I – V Characteristics of Solar PV Cell

**List of experiments: -**

1. Verification of Kirchhoff laws.
2. Verification of Superposition Theorem.
3. Open circuit characteristics of a DC Shunt Generator.
4. Speed control of DC Shunt Motor.
5. OC & SC test of 1 – Phase Transformer.
6. Brake test on 3 - Phase Induction Motor.
7. I – V Characteristics of Solar PV cell
8. Brake test on DC Shunt Motor.

**Course Outcomes: Able to**

1. Verify Kirchoff's Laws & Superposition theorem.
2. Perform testing on AC and DC Machines.
3. Study I – V Characteristics of PV Cell

## Part B: Electronics Engineering Lab

**Course outcomes:**

- Describe construction, working and characteristics of diodes, transistors and operational amplifiers (L2)
- Demonstrate how electronic devices are used for applications such as rectification, switching and amplification (L2)
- Build different building blocks in digital electronics using logic gates (L3)
- Explain functionality of flip-flops, shift registers and counters for data processing applications (L2)
- Explain functioning of various communication systems (L2)

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I B.Tech I Sem

## COURSE NO. - Basic Electrical & Electronics Engineering Lab

**(Common to Civil, Mechanical, CSE)**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 3 | 1.5 |

### PART B: ELECTRONICS ENGINEERING LAB

**Course outcomes:**

- Describe construction, working and characteristics of diodes, transistors and operational amplifiers
- Demonstrate how electronic devices are used for applications such as rectification, switching and amplification
- Build different building blocks in digital electronics using logic gates
- Explain functionality of flip-flops, shift registers and counters for data processing applications
- Explain functioning of various communication systems

**Any Six experiments to be done**

**LIST OF EXPERIMENTS:**

1. Draw and study the characteristics of Semi-conductor diode and Zener Diode.
2. Draw and study the input and output characteristics of Transistor in Common Emitter configuration
3. Draw and study the static and transfer characteristics of FET in Common Source Configuration
4. Construct half wave and full wave rectifier circuits. Find ripple factor and plot their output waveforms with and without filters
5. Study the application of Op-amp as an Inverting amplifier, Non-inverting amplifier, Voltage follower, Summer and Subtractor
6. Realization of logic gates, AND, OR, NOT, NAND, NOR, XOR
7. Realization of Adders, Multiplexers and Decoders using logic gates.
8. Realization of flip-flops using logic gates.
9. D/A converter and A/D converter.

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA**
**DEPARTMENT OF MATHEMATICS**
**I B.TECH – II SEMESTER (R20)**
**(Common to all Branches of Engineering)**
**(THEORY)**

| Subject Code | Title of the Subject | L | T | P | C |
|---|---|---|---|---|---|
| | ***Differential Equations and Vector Calculus*** | 3 | 0 | - | 3 |

| COURSE OBJECTIVES | |
|---|---|
| 1 | To enlighten the learners in the concept of differential equations and vector calculus |
| 2 | To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications. |

| COURSE OUTCOMES | |
|---|---|
| CO1 | Solve the linear differential equations related to various engineering fields |
| CO2 | Solve the differential equations reducible to linear, and finds the relevant applications. |
| CO3 | Identify solution methods for partial differential equations that model physical processes |
| CO4 | Interpret the physical meaning of different operators such as gradient, curl and divergence |
| CO5 | Estimate the work done against a field, circulation and flux using vector calculus and also to establish the relations between them using vector integral theorems. |

## SYLLABUS

**UNIT I: Differential Equations**

First order and first degree differential equations – Formation, Exact, Linear and Bernoulli equations. Applications to Newton's law of cooling and law of natural growth and decay.

Non-homogeneous Linear Differential Equations of second Higher Order with constant coefficients with RHS terms of the type $e^{ax+b}, \sin(ax+b), \cos(ax+b)$, polynomials in x, $e^{ax}V(x), xV(x)$ where $V(x)$ is a function of x, Method of variation of parameters.

**UNIT II: Equations Reducible to Linear Differential Equations with constant coefficients and Applications**

Cauchy's and Legendre's linear equations, simultaneous linear equations with constant coefficients.

Applications: Mass spring system and L-C-R Circuit problems.

**UNIT III: Partial Differential Equations**

Linear partial differential equations of first order, non-linear PDEs of first order (standard forms). Solutions to homogenous linear partial differential equations with constant coefficients, Rules for finding the complementary function and the particular integral.

**UNIT IV: Vector differential Calculus**

Scalar and vector point functions, Del applied to scalar point functions: Gradient, Del applied to vector point functions: Divergent and Curl and their properties.

Del applied to twice to point functions and Del applied to products of point functions (Identities).

**UNIT V: Vector integral Calculus**

Line integral- Circulation -work done - potential function, Surface integral-flux, volume integral.

Vector integral theorems: Green's theorem in the plane, Stoke's theorem, Gauss Divergence theorem (all theorems without proof) and related problems.

**Textbooks:**


1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.


**References:**


1. B. V. Ramana, Higher Engineering Mathematics, Tata Mc-Grawhill publishing company Ltd., New Delhi.
2. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
3. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett, 2011.
4. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.

# JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::
# PULIVENDULA
## B. Tech. I Year Syllabus (R20 Regulation)
## Applied Physics
## (ECE, EEE & CSE)

L T P C
3 0 0 3

| | COURSE OBJECTIVES |
|---|---|
| 1 | To make a bridge between the physics in school and engineering courses. |
| 2 | To identify the importance of the optical phenomenon i.e. interference, diffraction and polarization related to its Engineering applications |
| 3 | To understand the mechanisms of emission of light, the use of lasers as light sources for low and high energy applications, study of propagation of light wave through optical fibres along with engineering applications. |
| 4 | To explain the significant concepts of dielectric and magnetic materials that leads to potential applications in the emerging micro devices. |
| 5 | To enlighten the concepts of Quantum Mechanics and to provide fundamentals of de'Broglie waves, quantum mechanical wave equation and its applications, the importance of free electron theory and band theory of solids. |
| 6. | Evolution of band theory to distinguish materials, basic concepts and transport phenomenon of charge carriers in semiconductors. To give an impetus on the subtle mechanism of superconductors using the concept of BCS theory and their fascinating applications. |

**Unit-I: Wave Optics** **12hrs**

**Interference-** Principle of superposition – Interference of light –Interference by wavefront and amplitude division - Interference in thin films (Reflection Geometry) – Colours in thin films – Newton's Rings – Determination of wavelength of light source and refractive index of liquid.

**Diffraction-** Introduction – Fresnel and Fraunhofer diffraction – Fraunhofer diffraction due to single slit, double slit - Diffraction grating – Grating spectrum.

**Polarization-** Introduction – Types of polarization – Polarization by reflection, refraction and double refraction (Qualitative) - Nicol's Prism - Half wave and Quarter wave plates with applications.

**Unit Outcomes:**

***The students will be able to***

- **Explain** the need of coherent sources and the conditions for sustained interference (L2)
- **Identify** engineering applications of interference (L3)
- **Analyze** the differences between interference and diffraction with applications (L4)
- **Illustrate** the concept of polarization of light and its applications (L2)
- **Classify** ordinary polarized light and extraordinary polarized light (L2)

**Unit-II: Lasers and Fiber optics** **8hrs**

**Lasers-** Introduction – Characteristics of laser – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion – Lasing action – Pumping mechanisms – $CO_2$ laser – Semi conductor Laser - Applications of lasers.

**Fiber optics-** Introduction – Principle of optical fiber – Acceptance Angle – Numerical Aperture – Classification of optical fibers based on refractive index profile and modes – Propagation of electromagnetic wave through optical fibers – Fiber optic communication system – Losses in optical fibers – Applications.

**Unit Outcomes:**

***The students will be able to***

- **Understand** the basic concepts of LASER light Sources (L2)
- **Apply** the concepts to learn the types of lasers (L3)
- **Identifies** the Engineering applications of lasers (L2)
- **Explain** the working principle of optical fibers (L2)
- **Classify** optical fibers based on refractive index profile and mode of propagation (L2)
- **Identify** the applications of optical fibers in various fields (L2)

**Unit-III: Dielectric and Magnetic Materials** **8hrs**

**Dielectric Materials-** Introduction – Dielectric polarization – Dielectric polarizability, Susceptibility and Dielectric constant – Types of polarizations: Orientation polarizations (Qualitative), Ionic and Electronic Polarizations – Lorentz internal field – Clausius-Mossotti equation – Dielectric breakdown – Dielectric Loss – Piezoelectricity and Ferro electricity.

**Magnetic Materials-** Introduction – Magnetic dipole moment – Magnetization – Magnetic susceptibility and Permeability – Origin of permanent magnetic moment – Classification of magnetic materials: Dia, Para, Ferro, Ferri & Antiferro – Domain concept of Ferromagnetism (Qualitative) – Hysteresis – Soft and Hard magnetic materials.

**Unit Outcomes:**

***The students will be able to***

- **Explain** the concept of dielectric constant and polarization in dielectric materials (L2)
- **Summarize** various types of polarization of dielectrics (L2)
- **Interpret** Lorentz field and Claussius-Mosotti relation in dielectrics (L2)
- **Apply** the concept of polarization to materials like piezoelectric and ferroelectrics (L3)
- **Classify** the magnetic materials based on susceptibility and their temperature dependence (L2)
- **Explain** the applications of dielectric and magnetic materials (L2)
- **Apply** the concept of magnetism to magnetic devices (L3)

**Unit IV: Quantum Mechanics, Free Electron Theory and Band theory of Solids** **10hrs**

**Quantum Mechanics-** Dual nature of matter (de Broglie hypothesis) – Schrodinger's time independent wave equation – Significance of wave function – Particle in a one-dimensional infinite potential well.

**Free Electron Theory-** Classical free electron theory – Quantum free electron theory – Equation for electrical conductivity – Fermi-Dirac distribution – Density of states (Qualitative) – Fermi energy.

**Band theory of Solids-** Bloch's Theorem (Qualitative) – Kronig-Penney model (Qualitative) – E vs k diagram – Classification of crystalline solids – Effective mass of electron – $m^*$ vs k diagram – Concept of hole.

**Unit Outcomes:**

***The students will be able to***

- **Explain** the concept of dual nature of matter (L2)
- **Understand** the significance of wave function (L2)
- **Interpret** the concepts of classical and quantum free electron theories (L2)
- **Explain** the importance of K-P model
- **Classify** the materials based on band theory (L2)
- **Apply** the concept of effective mass of electron (L3)

**Unit – V: Semiconductors and Superconductors** **10hrs**

**Semiconductors-** Introduction – Intrinsic semiconductors – Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic semiconductors – Density of charge carriers – Dependence of Fermi energy on carrier concentration and temperature – Drift and diffusion currents – Einstein's equation – Direct and indirect band gap semiconductors – Hall effect – Applications of semiconductors.

**Superconductors-** Introduction – Properties of superconductors – Meissner effect – Type I and Type II superconductors – BCS theory – Josephson effects (AC and DC) – High $T_c$ superconductors – Applications of superconductors.

**Unit Outcomes:**

***The students will be able to***

- **Classify** the energy bands of semiconductors (L2)
- **Interpret** the direct and indirect band gap semiconductors (L2)
- **Identify** the type of semiconductor using Hall effect (L2)
- **Identify** applications of semiconductors in electronic devices (L2)
- **Explain** how electrical resistivity of solids changes with temperature (L2)
- **Classify** superconductors based on Meissner's effect (L2)
- **Explain** Meissner's effect, BCS theory & Josephson effect in superconductors (L2)

**Text books:**

1. Engineering Physics by M. N. Avadhanulu, P.G. Kshirsagar & TVS Arun Murthy S.Chand Publications, 11th Edition (2019).
2. Engineering Physics" by D.K. Bhattacharya and Poonam Tandon, Oxford press (2018).

**Reference Books:**

1. Engineering Physics – Shatendra Sharma, Jyotsna Sharma, Pearson Education, (2018)
2. Introduction To Solid State Physics, Charles Kittel, 8th Ed.,Wiley India Edition.
3. Engineering Physics by M.R. Srinivasan, New Age international publishers (2014).
4. Engineering Physics – K. Thyagarajan, McGraw Hill Publishers (2018).
5. Engineering Physics - Sanjay D. Jain, D. Sahasrambudhe and Girish, University Press (2016).
6. Semiconductor physics and devices- Basic principle – Donald A, Neamen, Mc Graw Hill (2014).

| COURSE OUTCOMES | |
|---|---|
| CO1 | **Study** the different realms of physics and their applications in both scientific and technological systems through physical optics. (L2) |
| CO2 | **Identify** the wave properties of light and the interaction of energy with the matter (L3).<br>**Asses** the electromagnetic wave propagation and its power in different media (L5). |
| CO3 | **Understands** the response of dielectric and magnetic materials to the applied electric and magnetic fields. (L3) |
| CO4 | **Study** the quantum mechanical picture of subatomic world along with the discrepancies between the classical estimates and laboratory observations of electron transportation phenomena by free electron theory and band theory. (L2) |
| CO5 | **Elaborate** the physical properties exhibited by materials through the understanding of properties of semiconductors and superconductors. (L5) |

**JNTUA COLLEGE OF ENGINEERING :( AUTONOMOUS), PULIVENDULA**

**I B.TECH**

**COMMUNICATIVE ENGLISH (R20)**

**(Common to All Branches of Engineering)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

## 1. INTRODUCTION:

The course is designed to train students in receptive (listening and reading) as well as productive and interactive (speaking and writing) skills by incorporating a comprehensive, coherent and integrated approach that improves the learners' ability to effectively use English language in academic/ workplace contexts. The shift is from *learning about the language* to *using the language*. component of campus placement tests. Activity based teaching-learning methods would be adopted to ensure that learners would engage in actual use of language both in the classroom and laboratory sessions.

## 2. COURSE OBJECTIVES

| | |
|---|---|
| 1 | Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers |
| 2 | Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials |
| 3 | Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations |
| 4 | Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information |
| 5 | Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing |

## 3. COURSE OUTCOMES

| | |
|---|---|
| CO1 | Retrieve the knowledge of basic grammatical concepts. |
| CO2 | Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken and the improve the fluency of English.. |
| CO3 | Apply grammatical structures to formulate sentences and correct word forms |
| CO4 | Analyze discourse markers to speak clearly on a specific topic in informal discussions |
| CO5 | Evaluate reading/listening texts and to write summaries based on global comprehension of these texts. |
| CO6 | Create a coherent paragraph interpreting a figure/graph/chart/table. |

**4. SYLLABUS:**

**UNIT –I**

***Reading*: What Is My Name? —P Sathyavathi**

- ***Writing***: Paragraph writing
- ***Listening***: Listening for theme-main
- ***Functional English***: Greeting, taking leave and introducing oneself and others
- ***Grammar:*** Parts of speech- Nouns –classification-usages- Pronouns - classifications-usages-
- ***Vocabulary*:** Homonyms- Homophones- Homographs

***Non Detailed Study***: Listening Skills from **English and Soft Skills**

**UNIT-II**

***Reading* : The Kitchen — Vimala**

- ***Writing*** : Essay Writing –Descriptive Essays
- ***Listening*** : Listening for theme -1
- ***Functional English***: Making requests
- ***Grammar:*** Types of sentences- Question Tags
- ***Vocabulary*** : Synonyms - Antonyms

**Non detailed Study**: Teamwork Skills from **English and Soft Skills**

**UNIT-III**

***Reading* : Adivasis — Kancha Ilaiah**

- ***Writing*** : Statement of Purpose
- ***Listening:*** Listening for main ideas
- ***Functional English:*** Inviting -Apologizing
- ***Grammar:***– Kinds of verbs – Auxiliaries- Tenses,
- ***Vocabulary*** : Prefixes –Suffixes – One-word substitutes

**Non detailed Study**: Assertive Skills from **English and Soft Skills**

**UNIT-IV**

***Reading*: The Bet – Anton Chekhov**

- ***Writing:*** Letter Writing –Official letters-business Letters-Application Letters
- ***Listening***: Listening for details
- ***Functional English:*** Interrupting - Asking for and giving opinions
- ***Grammar:*** Adjectives- Conjunctions- Articles – Active & Passive Voice
- ***Vocabulary***: Phrasal verbs -Idioms

***Non detailed Study***: Learning Skills from **English and Soft Skills**

## UNIT-V

***Reading*** **: The Gift of the Magi - O. Henry**

- ***Writing:*** Information Transfer
- ***Listening*** : Listening for opinions
- ***Functional English*** : Asking for the time and directions
- ***Grammar:*** Prepositions- Reported Speech
- ***Vocabulary*** : Commonly confused words

**Non detailed Study** : Emotional Intelligence Skills from **English and Soft Skills**

**5. Prescribed Text books:**

[1] **Detailed text: English for Fluency**, K Purushottam, Orient Black Swan,2013.

[2] **Non detailed text: English and Soft Skills**, S P Dhanavel, Orient Black Swan 2013Edition.

**6. REFERENCES:**

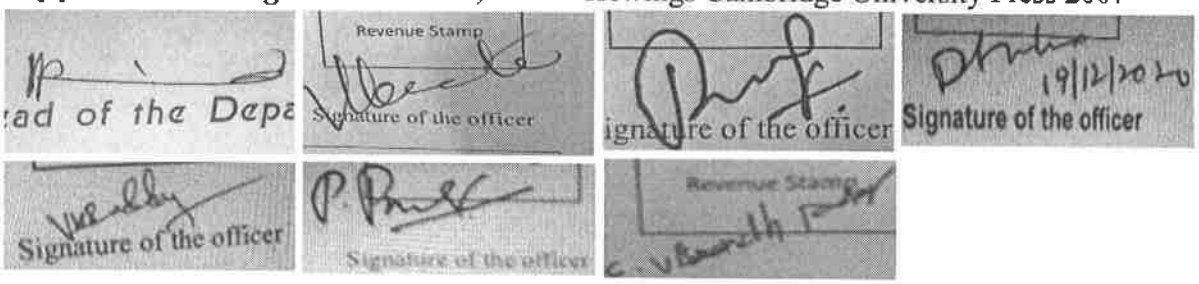

[1] **A Practical Course in Effective English Speaking Skills.** J.K.Gangal, PHI, New Delhi.2012

[2] **Fundamentals of Technical Communication,** Meenakshi Raman, Oxford University Press,2015.

[3] **Spoken English,** R.K. Bansal & JB Harrison, Orient Longman,2013, 4Th edition.

[4] **Murphy's English Grammar** with CD, Murphy, Cambridge University Press,3 Rd edition.

[5] **Advanced English Grammar** , Martin Hewings Cambridge University Press 2007

**B.Tech I Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

## 20ACS08 - C-Programming & Data Structures

**(Common to CSE & EEE)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- To impart the basic concepts of data structures and algorithms
- To understand concepts about searching and sorting techniques
- To Understand basic concepts about stacks,queues,lists,trees and graphs
- To understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures

**UNIT – I: Fundamentals of C** **8hrs**

**Fundamentals of C:** Introduction to C Programming language, The Basic Data Types, Variables, Constants, Scope and life time of variables, Qualifiers, Storage Classes.

**Operators:** Arithmetic, Logic, and Relational operators

**Statements and Expressions:** Arithmetic, Conditional, Control, and Iterative Statements, Console I/O Statements

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To understand basics of C.(L1) **L1**
- To learn about statements and expressions.(L1) **L1**

**UNIT – II: Arrays and Strings** **8hrs**

**Arrays and Strings:** Single-Dimension Arrays, Generating a Pointer to an Array, Passing Single Dimension Arrays to Functions , Strings, Two-Dimensional Arrays, Multidimensional Arrays, Array Initialization, Working with arrays.

**Functions:** The General Form of a Function, Understanding the Scope of a Function, Function Arguments, Function Prototypes, Different ways of calling functions, return Statement, Recursion.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To learn how to use Arrays and Strings.(L2) **L2**
- To learn how to use functions.(L2) **L2**

**UNIT – III: Pointers, Structures, Unions, Enumerations, and typedef** **8hrs**

**Pointers:** Pointer Variables, The Pointer Operators, Pointer Expressions, Pointer Assignments, Pointer Conversions, Pointer Arithmetic, Pointer Comparisons, Pointers and Arrays, Arrays of Pointers, Initializing Pointers, Pointers to Functions, Dynamically Allocated Arrays.

**Structures, Unions, Enumerations, and typedef:** Structures, Arrays of Structures, Passing Structures to Functions, Self Referential Structures, Arrays and Structures within Structures, Unions, typedef.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To learn how to use pointers.(L3) **L3**
- To learn how to implement structures and unions.(L3) **L3**

**UNIT – IV: Data Structures** **7hrs**

Stacks, Stacks using Dynamic Arrays, Queues, Circular Queues Using Dynamic Arrays, Evaluation of Expressions, Multiple Stacks and Queues. Linked lists: Singly Linked Lists and Chains, Linked Stacks and Queues, Additional List Operations, Doubly Linked Lists.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To learn about Data Structures.(L3) **L3**
- To learn how to use data structures in C.(L3) **L3**

**UNIT – V: Searching and Sorting Techniques**

**Searching and Sorting Techniques:** Linear and Binary search, Insertion, selection, quick, merge, and bubble sort.

**Trees:** Binary Trees, Binary Tree Traversals, Additional Binary Tree Operations, Binary Search Trees, AVL Trees. B-Trees: BTrees, B + Trees.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To learn about sorting.(L4) **L4**
- To learn about searching(L4) **L4**
- Implement trees(L5) **L5**

**Text Books:**

1. **The Complete Reference C":** Fourth Edition Herbert Schildt Osborne/McGraw-Hill.
2. "C Programming and Data Structures", by E. Balaguruswamy, McGraw-Hill.
3. "Data Structures using C", by Reema Thareja, 2nd Edition, OXFORD Press.
4. "Fundamentals of Data Structures in C", Horowitz, Sahni, Anderson-freed, 2nd Edition, 2011, Universities Press.

**Reference Books:**

1. RS Bichkar "Programming with C", 2012, Universities Press.
2. Pelin Aksoy, and Laura Denardis, "Information Technology in Theory", 2017, Cengage
3. Byron Gottfried and Jitender Kumar Chhabra, "Programming with C", 4th Edition, 2019, McGraw Hill Education.
4. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education.
5. 5. D. Samanta, "Classic Data Structures", 2nd Edition, Prentice-Hall of India, Pvt. Ltd., India, 2012.
6. 6. Peter Bras, "Advanced Data Structures", Cambridge University Press, 2016
7. 7. Richard F.Gilberg, Behrouz A.Forouzan, "Data Structures A Pseudo code Approach with C", Second Edition, Cengage Learning 2005.

**Course Outcomes:**

At the end of this Course the student will be able to

- Ability to analyze algorithms and algorithm correctness.(L2) **L2**
- Ability to summarize searching and sorting techniques(L3) **L3**
- Ability to describe stack,queue and linked list operation.(L4) **L4**
- Ability to have knowledge of tree and graphs concepts(L5) **L5**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) :: PULIVENDULA**
**DEPARTMENT OF MECHANICAL ENGINEERING**
**I YEAR I SEMESTER (CIVIL, MECH, CSE)**

| Subject Code | Title of the Subject | L | T | P | C |
|---|---|---|---|---|---|
| | Engineering Workshop | 0 | 0 | 3 | 1.5 |

| | COURSE OBJECTIVES |
|---|---|
| 1 | To bring awareness about workshop practices for Engineers. |
| 2 | To familiarize how wood working operations can be performed. |
| 3 | To teach the practices for sheet metal operations. |
| 4 | To develop the technical skills related to fitting and electrical wiring. |

| COURSE OUTCOMES | |
|---|---|
| CO1 | **Apply** wood working skills in real world applications. |
| CO2 | **Apply** fitting operations in various applications. |
| CO3 | **Build** different parts with metal sheets in real world applications. |
| CO4 | **Demonstrate** soldering and brazing. |
| CO5 | **Apply** basic electrical engineering knowledge for house wiring practice. |

**Mapping between Course Outcomes and Programme Outcomes**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 2 | 2 | | | | | | | | 1 |
| CO2 | 3 | 2 | 2 | 2 | | | | | | | | 1 |
| CO3 | 2 | 3 | 2 | 1 | | | | | | | | 1 |
| CO4 | 2 | 3 | 2 | 1 | 1 | 1 | | | | | | 1 |
| CO5 | 3 | 2 | 2 | 1 | 1 | 1 | | | | | | 1 |

**1. Wood Working:**

Familiarity with different types of woods and tools used in wood working and make following joints

a) Half – Lap joint
b) Mortise and Tenon joint
c) Corner Dovetail joint or Bridle joint
d) Wood Turning Operation

**2. Sheet Metal Working:**

Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets

a) Tapered tray b) Conical funnel c) Elbow pipe d) Brazing & Riveting

**3. Fitting:**

Familiarity with different types of tools used in fitting and do the following fitting exercises

a) V-fitting b) Dovetail fitting c) Contour Fitting
d) Bicycle tire puncture and change of two wheeler tyre.

**4. Electrical Wiring:**

Familiarities with different types of basic electrical circuits and make the following connections

a) Parallel and series b) Two way switch c) Godown lighting d) Tube light

e) Three phase motor f) Soldering of wires

**Textbooks:**

1. K.Venkata Reddy., Workshop Practice Manual, 6/e BS Publications.
2. Kannaiah P. and Narayana K.L., Workshop Manual, 2/e, Scitech publishers.
3. John K.C., Mechanical Workshop Practice. 2/e, PHI 2010.

# JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)
# PULIVENDULA
## B.Tech I Year Syllabus (R20 Regulation)
## Engineering Physics Laboratory
## (Civil & Mechanical Branches)

L T P C
0 0 3 1.5

**Course Objectives:**

- Understand the role of Optical fiber parameters in engineering applications.
- Recognize the significance of laser by studying its characteristics and its application in finding the particle size.
- Illustrates the magnetic and dielectric materials applications.
- Identifies the various sensor applications.

**Note: - In the following list of experiments, out of 15 experiments any 10 experiments must be performed in a semester.**

**List of Engineering Physics Experiments**

1. Determination of the thickness of the wire using wedge shape method
   **Experimental outcomes:**
   **Operates** optical instrument like travelling microscope. (L2)
   **Estimate** the thickness of the wire using wedge shape method (L2)
   **Identifies** the formation of interference fringes due to reflected light from non-uniform thin film. (L2)
2. Determination of the radius of curvature of the lens by Newton's ring method
   **Experimental outcomes:**
   **Operates** optical instrument like travelling microscope. (L2)
   **Estimate** the radius of curvature of the lens (L2)
   **Identifies** the formation of interference fringes due to reflected light from non-uniform thin film. (L2)
   **Plots** the square of the diameter of a ring with no. of rings (L3)
3. Determination of wavelengths of various spectral lines of mercury source using diffraction grating in normal incidence method
   **Experimental outcomes:**
   **Operates** optical instrument like spectrometer. (L2)
   **Estimate** the wavelength of the given source (L2)
   **Identifies** the formation of grating spectrum due diffraction. (L2)
4. Determination of dispersive power of prism.
   **Experimental outcomes:**
   **Operates** optical instrument like spectrometer. (L2)
   **Estimate** the refractive index and dispersive power of the given prism (L2)
   **Identifies** the formation of spectrum due to dispersion. (L2)
5. Determination of wavelength of LASER light using diffraction grating.
   **Experimental outcomes:**
   **Operates** various instrument (L2)
   **Estimate** the wavelength of laser source (L2)
   **Identifies** the formation of grating spectrum due diffraction. (L2)
6. Determination of particle size using LASER.
   **Experimental outcomes:**
   **Operates** various instrument (L2)
   **Estimate** the Particles size using laser (L2)
   **Identifies** the application of laser (L2)
7. To determine the numerical aperture and acceptance angle of an optical fiber
   **Experimental outcomes:**
   **Operates** various instruments and connect them as per the circuit. (L2)
   **Estimate** the numerical aperture and acceptance angle of a given optical fiber. (L2)
   **Identifies** the significance of numerical aperture and acceptance angle of an optical fiber in various engineering applications. (L2)
8. Determination of dielectric constant by charging and discharging method.
   **Experimental outcomes:**

**Operates** various instruments and connect them as per the circuit. (L2)
**Estimate** the dielectric constant of the given substance. (L2)
**Identifies** the significance of dielectric constant in various devices. (L2)

9. Study of variation of Magnetic field along the axis of a current carrying coil – Stewart-Gee's Method.

**Experimental outcomes:**
**Operates** various instruments and connect them as per the circuit. (L2)
**Estimate** the magnetic field along the axis of a circular coil carrying current. (L2)
**Plots** the intensity of the magnetic field of circular coil carrying current with distance (L3)

10. Measurement of magnetic susceptibility by Gouy's method

**Experimental outcomes:**
**Operates** various instruments and connect them as per the circuit. (L2)
**Estimate** the magnetic susceptibility of the given material. (L2)
**Identifies** the significance of magnetic susceptibility in various engineering applications. (L2)

11. Study of B-H curve of Ferromagnetic material

**Experimental outcomes:**
**Operates** various instruments and connect them as per the circuit. (L2)
**Estimate** the hysteresis loss, coercivity and retentivity of the ferromagnetic material. (L2)
**Classifies** the soft and hard magnetic material based on B-H curve. (L2)
**Plots** the magnetic field H and flux density B (L3)

12. Determination of ultrasonic velocity in liquid (Acoustic grating)

**Experimental outcomes:**
**Operates** various instruments. (L2)
**Estimate** the velocity of ultrasonic waves in liquids. (L2)
**Illustrates** the basic applications of ultrasonics. (L3)

13. Rigidity modulus of material of a wire-dynamic method (Torsional pendulum)

**Experimental outcomes:**
**Operates** various instruments. (L2)
**Estimate** the rigidity modules of a given wire (L2)
**Plots** length of the pendulum (l) with time period $T^2$ (L3)

14. Sonometer: Verification of the three laws of stretched strings

**Experimental outcomes:**
**Operates** various instruments. (L2)
**Estimate** the linear density of a given wire (L2)
**Identify** the frequency of tuning fork (L3)

15. Determination of losses in optical fiber.

**Experimental outcomes:**
**Operates** various instruments and connect them as per the circuit. (L2)
**Estimate** the numerical aperture and acceptance angle of a given optical fiber. (L2)
**Identifies** the significance of losses in optical fiber and its engineering applications. (L2)

**Course Outcomes:**

***The students will be able to***

- **Operate** various optical instruments (L2)
- **Estimate** wavelength of laser and particles size using laser(L2)
- **Evaluate** the acceptance angle of an optical fiber and numerical aperture (L3)
- **Estimate** the susceptibility and related magnetic parameters of magnetic materials (L2)
- **Plot** the intensity of the magnetic field of circular coil carrying current with distance (L3)
- **Determine** magnetic susceptibility of the material and its losses by B-H curve (L3)
- **Apply** the concepts of ultrasonics by acoustic grating (L2)

**References:**


1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.
2. http://vlab.amrita.edu/index.php -Virtual Labs, Amrita University

**JNTUA COLLEGE OF ENGINEERING :( AUTONOMOUS), PULIVENDULA**
**I B.TECH**
**COMMUNICATIVE ENGLISH LABORATORY (R20)**
**(Common to All Branches of Engineering)**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 3 | 1.5 |

**Course Objectives**

- students will be exposed to a variety of self-instructional, learner friendly modes of language learning
- students will learn better pronunciation through stress, intonation and rhythm
- students will be trained to use language effectively to face interviews, group discussions, public speaking
- students will be initiated into greater use of the computer in resume preparation, report writing, format making etc

**Course Outcomes**

- CO1: Listening and repeating the sounds of English Language
- CO2: Understand the different aspects of the English language proficiency with emphasis on LSRW skills
- CO3: Apply communication skills through various language learning activities
- CO3: Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
- CO5: Evaluate and exhibit acceptable etiquette essential in social and professional settings
- CO6: Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.

**Unit 1**

1. Phonetics-Importance -Introduction to Sounds of Speech
2. Vowels and Consonants Sounds
3. Phonetic Transcription

**Learning Outcomes**
At the end of the module, the learners will be able to

- understand different accents spoken by native speakers of English
- employ suitable strategies for skimming and scanning on monitor to get the general idea of a text and locate specific information
- learn different professional registers and specific vocabulary to describe different persons, places and objects

**Unit 2**

1. Word Stress & Intonation
2. Communication skills
3. Role Play & JAM

**Learning Outcomes**
At the end of the module, the learners will be able to

- produce a structured talk extemporarily
- comprehend and produce short talks on general topics
- participate in debates and speak clearly on a specific topic using suitable discourse markers

**Unit 3**

1. Describing people/objects/places
2. Speeches for Special Occasions
3. Etiquettes of Telephonic Communication

**Learning Outcomes**
At the end of the module, the learners will be able to

- Learn different ways of greeting and introducing oneself/others
- summarize the content with clarity and precision and take notes while listening to a talk/lecture and make use of them to answer questions
- replenish vocabulary with one word substitutes, homonyms, homophones, homographs to reduce errors in speech and writing

**Unit4**

1. Group Discussions
2. Debates
3. Interviews Skills

**Learning Outcomes**
At the end of the module, the learners will be able to

- Learn different ways of asking information and giving directions
- Able to transfer information effectively
- understand non-verbal features of communication

**Unit 5**

1. Resume writing & Practicing
2. Oral Presentations
3. Writing Video Speeches as it is & Book reviews – oral and written

**Learning Outcomes**

At the end of the module, the learners will be able to

- make formal oral presentations using effective strategies
- learn different techniques of précis writing and paraphrasing strategies
- comprehend while reading different texts and edit short texts by correcting common errors

Suggested Software

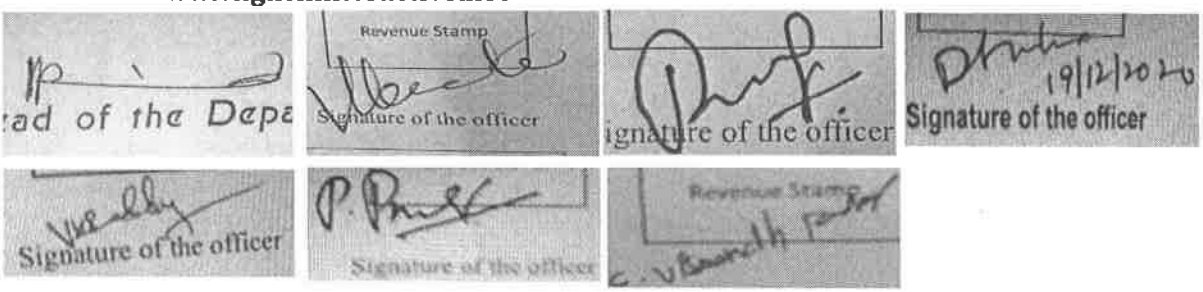
- Orell
- Walden Infotech
- Young India Films

**Reference Books**


- Bailey, Stephen. *Academic writing: A handbook for international students*. Routledge, 2014.
- Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking*. Heinley ELT; 2nd Edition, 2018.
- Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
- Hewings, Martin. *Cambridge Academic English (B2)*. CUP, 2012.
- A Textbook of English Phonetics for Indian Students by T.Balasubramanyam


**Web Links**

- www.esl-lab.com
- www.englishmedialab.com
- **www.englishinteractive.net**



# JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::
# PULIVENDULA
## B.Tech I Year Syllabus (R20 Regulation)
## Applied Physics Laboratory
## (ECE, EEE & CSE)

L T P C
0 0 3 1.5

**Course Objectives:**

- Understands the concepts of interference, diffraction and their applications.
- Understand the role of optical fiber parameters in communication.
- Recognize the importance of energy gap in the study of conductivity and Hall Effect in a semiconductor.
- Illustrates the magnetic and dielectric materials applications.
- Apply the principles of semiconductors in various electronic devices.

**Note: In the following list, out of 15 experiments, any 10 experiments must be performed in a semester**

**List of Applied Physics Experiments**

1. Determination of the thickness of thin object using wedge shape method
   **Experimental outcomes:**
   **Operates** optical instrument like travelling microscope. (L2)
   **Estimate** the thickness of the wire using wedge shape method (L2)
   **Identifies** the formation of interference fringes due to reflected light from non-uniform thin film. (L2)
2. Determination of the radius of curvature of the lens by Newton's rings
   **Experimental outcomes:**
   **Operates** optical instrument like travelling microscope. (L2)
   **Estimate** the radius of curvature of the lens (L2)
   **Identifies** the formation of interference fringes due to reflected light from non-uniform thin film. (L2)
   **Plots** the square of the diameter of a ring with no. of rings (L3)
3. Determination of wavelengths of various spectral lines of mercury source using diffraction grating in normal incidence method
   **Experimental outcomes:**
   **Operates** optical instrument like spectrometer. (L2)
   **Estimate** the wavelength of the given source (L2)
   **Identifies** the formation of grating spectrum due diffraction. (L2)
4. Determination of dispersive power of prism.
   **Experimental outcomes:**
   **Operates** optical instrument like spectrometer. (L2)
   **Estimate** the refractive index and dispersive power of the given prism (L2)
   **Identifies** the formation of spectrum due to dispersion. (L2)
5. Determination of wavelength using diffraction grating by laser source.
   **Experimental outcomes:**
   **Operates** various instrument (L2)
   **Estimate** the wavelength of laser source (L2)
   **Identifies** the formation of grating spectrum due diffraction. (L2)
6. Determination of particle size by laser source.
   **Experimental outcomes:**
   **Operates** various instrument (L2)
   **Estimate** the Particles size using laser (L2)
   **Identifies** the application of laser (L2)
7. Determination of numerical aperture and acceptance angle of an optical fiber
   **Experimental outcomes:**
   **Operates** various instruments and connect them as per the circuit. (L2)
   **Estimate** the numerical aperture and acceptance angle of a given optical fiber. (L2)
   **Identifies** the significance of numerical aperture and acceptance angle of an optical fiber in various engineering applications. (L2)
8. Determination of dielectric constant and Curie temperature of a ferroelectric material.
   **Experimental outcomes:**
   **Operates** various instruments and connect them as per the circuit. (L2)
   **Estimate** thedielectric constantof the given substance. (L2)
   **Identifies** the significance of dielectric constant in various devices. (L2)

9. Study of variation of Magnetic field along the axis of a current carrying coil – Stewart-Gee's Method.

**Experimental outcomes:**

**Operates** various instruments and connect them as per the circuit. (L2)

**Estimate** the magnetic field along the axis of a circular coil carrying current. (L2)

**Plots** the intensity of the magnetic field of circular coil carrying current with distance (L3)

10. Measurement of magnetic susceptibility by Gouy's method

**Experimental outcomes:**

**Operates** various instruments and connect them as per the circuit. (L2)

**Estimate** the magnetic susceptibility of the given material. (L2)

**Identifies** the significance of magnetic susceptibility in various engineering applications. (L2)

**11.** Study of B-H curve of Ferromagnetic material

**Experimental outcomes:**

**Operates** various instruments and connect them as per the circuit. (L2)

**Estimate** the hysteresis loss, coercivity and retentivity of the ferromagnetic material. (L2)

**Classifies** the soft and hard magnetic material based on B-H curve. (L2)

**Plots** the magnetic field H and flux density B (L3)

**12.** Determination of the resistivity of semiconductor by four probe method

**Experimental outcomes:**

**Operates** various instruments and connect them as per the circuit. (L2)

**Estimate** the resistivity of a semiconductor. (L2)

**Identifies** the importance of four probe method in finding the resistivity of semiconductor. (L3)

13. Study of Energy gap of a material using p-n junction diode

**Experimental outcomes:**

**Operates** various instruments and connect them as per the circuit. (L2)

**Estimate** the energy gap of a semiconductor. (L2)

**Illustrates** the engineering applications of energy gap. (L3)

**Plots 1/T** with log R (L3)

14. Determination of mobility of charge carriers in semiconductor by Hall Effect.

**Experimental outcomes:**

**Operates** various instruments and connect them as per the circuit. (L2)

**Estimate** the charge carrier concentration and mobility in a semiconductor. (L2)

**Illustrates** the applications of Hall Effect. (L3)

**Plots** the voltage with current and voltage with magnetic field (L3)

15. Determination of losses in optical fiber.

**Experimental outcomes:**

**Operates** various instruments and connect them as per the circuit. (L2)

**Estimate** the numerical aperture and acceptance angle of a given optical fiber. (L2)

**Identifies** the significance of losses in optical fiber and its engineering applications. (L2)

**Course Outcomes:**

***The students will be able to***

- **Operate** optical instruments like microscope and spectrometer (L2)
- **Determine** thickness of a hair/paper with the concept of interference (L2)
- **Estimate** the wavelength of different colors using diffraction grating and resolving power (L2)
- **Plot** the intensity of the magnetic field of circular coil carrying current with distance (L3)
- **Evaluate** the acceptance angle of an optical fiber and numerical aperture (L3)
- **Determine** the resistivity of the given semiconductor using four probe method (L3)
- **Identify** the type of semiconductor i.e., n-type or p-type using hall effect (L3)
- **Calculate** the band gap of a given semiconductor (L3)

**References**:


1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.
2. http://vlab.amrita.edu/index.php -Virtual Labs, Amrita University

# C-Programming & Data Structures Laboratory

**(CSE, EEE)**

**B. Tech – II Semester (R20)** **L-T-P-C**

**0-0-3-1.5**

**Week 1:**

1. Write a program to perform arithmetic operations.
2. Write a program to exchange two numbers without using temporary variable
3. Write a program to exchange two numbers with temporary variable
4. Write a program to find the maximum of three numbers

**Week 2:**

1. Write a program to compute the factorial of a given number.
2. Write a program to check whether the number is prime or not
3. Write a program to check for number palindrome.
4. Write a program to generate Fibonacci numbers in the given range.

**Week 3:**

1. Write a program to find the sum of the digits of a number.
2. Write a program to find the sum of positive and negative numbers in a given set of numbers.
3. Write a program to find the sum of first and last digit numbers in a given number.

**Week 4:**

1. Write a program to read two matrices and print their sum and product in the matrix form.
2. Write a program to find the maximum of a set of numbers.
3. Write a program to read matrix and perform the following operations.
    a. Find the sum of Diagonal Elements of a matrix.
    b. Print Transpose of a matrix.
    c. Print sum of even and odd numbers in a given matrix.

**Week 5:**

1. Write a program to insert a substring in to a given string and delete few characters from the string. Don't use library functions related to strings.
2. Write a program to read two strings and perform the following operations without using built-in string Library functions and by using your own implementations of functions.
    a. String length determination b. Compare Two Strings
    c. Concatenate them, if they are not equal d. String reversing

**Week 6:**

1. Write programs using recursion for Factorial of a number, GCD, LCM, Towers of Hanoi.
2. Write a program to exchange two numbers using pointers.
3. Write a program to calculate the length of string using pointers.
4. Write a program to using pointers to read in an array of integers and print its elements in reverse order.

**Week 7:**

1. Write a C Program to implement Stack ADT Using arrays and linked lists.
2. Write a C Program to implement Queue ADT Using arrays and linked lists.

**Week 8:**

1. Write a c Program to convert infix expression to postfix expression
2. Write a c Program to evaluate postfix expression.

**Week 9:**

1. Write a C Program to implement List ADT.
2. Write a C Program to implement priority queues using arrays.

**Week 10:**

1. Write a C program to implement Linear Search Technique.
2. Write a C program to implement Binary Search Technique.

**Week 11:**

1. Write a C program to implement insertion and Selection sort algorithm.
2. Write a C program to implement Quick and Merge sort algorithm.
3. Write a C program to implement bubble sort algorithm.

**Week 12:**

1. Write a C program to construct Binary Tree and Binary Search Tree.
2. Write a C program to implement Binary Tree Traversal technique.

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**
**II Year B.Tech. I-Sem (R20)**
**20ABS14- DISCRETE MATHEMATICS AND GRAPH THEORY**
**(CSE)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- To describe logical sentences in terms of predicates, quantifiers, and logical connectives in theory of inference for the statement calculus. (L2)
- To demonstrate the application of basic methods of discrete mathematics in Computer Science problem solving. (L3)
- To explain about the Boolean Algebra, Graph theory and Recurrence relations. (L3)
- To reveal the concepts of graph theory which is applied in addressing the problems related to computer science. (L3)
- To introduce the mathematical concepts which will be useful to study advanced courses such as Design and Analysis of Algorithms, Theory of Computation, Cryptography and Software Engineering etc. (L4)

**UNIT – 1: Mathematical logic :**

**Statements and Notation, Connectives-** Negation, Conjunction, Disjunction, Conditional and Bi-conditional, Statement formulas and Truth Tables. Well-formed formulas, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications.

**Normal Forms:** Disjunctive Normal Forms, Conjunctive Normal Forms, Principal Disjunctive Normal Forms (PDNF), Principal Conjunctive Normal Forms (PCNF), Ordering and Uniqueness of Normal Forms.

**The Theory of Inference for the Statement Calculus:** Rules of Inference, Consistency of Premises and Indirect Method of Proof.

**The predicate Calculus, and Inference theory of the Predicate Calculus:** Predicates, the statement function, variables and quantifiers, predicate formulas, free and bound variables, the universe of discourse, valid formulas and equivalences, some valid formulas over finite universe, special valid formulas involving quantifiers, theory of inference for the predicate calculus.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Describe logical sentences in terms of predicates, quantifiers, and logical connectives. **L2**
- Evaluate basic logic statements using truth tables and the properties of logic . **L3**
- Apply rules of inference to test the consistency of premises and validity of arguments and verify the equivalence of two formulas and their duals. **L3**
- Find the Principal Conjunctive and Principal Disjunctive Normal Forms of a statement formula. **L3**

**UNIT – II: Set Theory:**

**Basic concepts of Set theory**: Notation, inclusion and equality of sets, the power set, some operation on sets, Venn diagrams, some basic set identities, the principle of specification, ordered pairs and n-tuples, Cartesian products.

**Relations and Ordering**: Relations, properties of binary relations in a set, relation matrix and the graph of a relation, partition and covering of a set, equivalence relations, compatibility relations, composition of binary relations, and partial ordering.

**Functions:** Definition and introduction, composition of functions, inverse functions, binary and n-ray operations, characteristic function of a set, Hashing functions.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Describe the basic concepts of set theory. **L2**
- Describe equivalence, partial order and compatible relations. **L2**
- Describe functions and composition of functions. **L3**
- Describe binary and n-ray operations. **L3**

**UNIT – III: Algebraic Structures, Lattices and Boolean algebra:**

**Algebraic Systems**: Examples and General Properties, **Semi Groups and Monoids**: Definitions and examples, homomorphism of semi groups and monoids, subsemigroups and submonoids and **Groups**: Definition and examples, subgroups and homomorphisms, cosets and Lagrange's theorem, normal subgroups, algebraic systems with two binary operations.

**Lattices and Boolean algebra:** Lattices as Partially Ordered Sets, Boolean algebra, Boolean Functions.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Describes the properties of Semi groups, Monoids and Groups **L2**
- Identify the properties of Lattices **L2**
- Evaluate Boolean functions and simplify expression using the properties of Boolean algebra **L3**

**UNIT – IV: Recurrence Relations:**

**Recurrence Relations:** Generating Functions of Sequences, Calculating Coefficients of Generating Functions, Recurrence Relations, Solving Recurrence Relations by Substitution and Generating Functions, The method of Characteristic Roots, Solution of Inhomogeneous Recurrence Relations.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Find the generating functions for a sequence. **L3**
- Solve problems using recurrence relations and recursion to analyze complexity of algorithms. **L4**

**UNIT – V: Graph Theory :**

**Graphs:** Basic Concepts, Isomorphism and Sub graphs, Planar Graphs, Euler's Formula, Multi graphs and Euler Circuits, Hamiltonian Graphs.

**Graph coloring**: Chromatic Number, The Four-Color Problem.

Trees and their Properties, Spanning Trees, Directed Trees, Binary Trees.

**Algorithms to find a spanning tree in connected graph**: Depth first search (DFS) algorithm , Breadth first search (BFS) algorithm and Kruskal's algorithm, minimum spanning tree.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Investigate if a given graph is simple or a multigraph, directed or undirected, cyclic or a cyclic. **L2**
- Apply the concepts of functions to identify the Isomorphic Graphs and Identify Euler Graphs, Hamilton Graph. **L2**
- Describes Graph coloring and chromatic number of a graph. **L2**
- Apply depth-first and breadth-first search algorithm. **L3**
- Apply Prim's and Kruskal's algorithms to find a minimum spanning tree. **L3**

**Text Books:**

1. J P Trembly and R Manohar, "Discrete Mathematical Structures with Applications to Computer Science", 1st Edition, McGraw Hill, 2017(For Unit I&II).
2. Joe L. Mott. Abraham Kandel and Theodore P. Baker, "Discrete Mathematics for Computer Scientists & Mathematicians", 2nd Edition, Pearson, 2008. (for Units III to V).

**Reference Books:**

1. Kenneth H Rosen, "Discrete Mathematics and Its Applications (SIE)",7th Edition, MCGRAW-HILL.
2. Ralph P. Grimaldi and B.V. Ramana, "Discrete and Combinatorial Mathematics, an Applied Introduction", 5th Edition, Pearson, 2016.
3. Narsingh Deo, "Graph Theory with Applications to Engineering", Prentice Hall, 1979.

4. D.S. Malik and M.K. Sen, "Discrete Mathematics theory and Applications", I[st] Edition, Cenegage Learning, 2012.
5. C L Liu and D P Mohapatra, "Elements of Discrete Mathematics, A computer Oriented approach", 4th edition, MCGRAW-HILL, 2018.

**Course Outcomes:**

At the end of this Course the student will be able to

- Remember elementary mathematical arguments and identify fallacious reasoning. **L1**
- Understand the properties of Compatibility, Equivalence and Partial Ordering relations, Lattices and Hassee Diagrams. **L2**
- Understand the general properties of Algebraic Systems, Semi Groups, Monoids and Groups and Solve the homogeneous and non-homogeneous recurrence relations. **L3**
- Identify Euler Graphs, Hamilton Graph and Chromatic Number of a graph and apply the concepts of functions to identify the Isomorphic Graphs.. **L4**
- Design solutions for problems using breadth first and depth first search techniques. **L3**

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**B.Tech II Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**20ACS14 - COMPUTER ORGANIZATION**

**(CSE)**

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

**Course Objectives:**

- To gain methodical understanding of the basic structure and operation of a digital computer.
- To learn the fundamentals of computer organization and its relevance to classical and modern problems of computer design
- To make the students understand the structure and behavior of various functional modules of a computer.
- To explore the hardware requirements for cache memory and virtual memory for better understanding of memory management.

**UNIT – I: Binary Systems & Gate –Level Minimization**

**Binary Systems:**

Digital Systems, Binary Numbers, Number Base Conversions, Octaland Hexadecimal Numbers, Compliments, Signed Binary Numbers, Binary Codes, Binary Storage and Registers, Binary Logic.

**Gate –Level Minimization:** The Map Method, Four Variable Map, Five-Variable Map, Product of Sums Simplification, Don't-Care Conditions.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Identify the different peripherals, ports and connecting cables.
- Illustrate the working of a Computer

**UNIT – II: Combinational Logic**

**Combinational Logic:** Combinational Circuits, Analysis Procedure, Design Procedure, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Solve complex problems using language independent notations. **L3**
- Solve Computational problems. **L3**

**UNIT – III: Synchronous Sequential Logic & Functions and Program Structure**

**Synchronous Sequential Logic:** Sequential Circuits, Latches, Flip-Flops, Analysis of Clocked Sequential Circuits, State Reduction and Assignment, Design Procedure.

**Registers &Counters:**Registers, Shift Registers, Ripple Counters, Synchronous Counters, Other counters.

**Functions and Program Structure:** Basics of functions, functions returning non-integers, external variables, scope variables, header variables, register variables, block structure, initialization, recursion, the C processor.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Recognize the programming elements of C Programming language. **L1**
- Select the control structure for solving the problem. **L4**

**UNIT – IV: Introduction to Computer Organization and Architecture:**
Basic Computer Organization – CPU Organization – Memory Subsystem Organization and Interfacing – I/O Subsystem Organization and Interfacing – A Simple Computer Levels of Programming Languages, Assembly Language Instructions, Instruction Set Architecture Design, A simple Instruction Set Architecture.

**Learning Outcomes:**
At the end of this unit, the student will be able to

- Solve mathematical problems using C Programming language. **L3**
- Structure the individual data elements to simplify the solutions. **L6**

**UNIT – V: Sorting and Searching & Structures & Some other Features**
**Central Processing Unit:** Introduction, General Register Organization, Stack Organization, Instruction formats –Addressing Modes – Data Transfer and Manipulation – Program Control.
**Computer Arithmetic:** Addition and Subtraction – Multiplication Algorithms – Division Algorithms –Floating-Point Arithmetic Operations – Decimal Arithmetic unit.

**Learning Outcomes:**
At the end of this unit, the student will be able to

- Select sorting algorithm based on the type of the data. **L4**
- Organize heterogeneous data. **L6**

**Text Books:**

1. Digital Design, M.Morris Mano &Micheal D. Ciletti, Pearson, 5thEdition, 2013.
2. Digital Logic & State Machine Design, David J. Comer, Oxford University Press, 3rdReprinted Indian Edition, 2012.
3. ."Computer Systems Organization and Architecture", John D. Carpinelli, PEA, 2009.

**Reference Books:**

1. "Computer Organization", Carl Hamacher, ZvonksVranesic, SafeaZaky, 5/e, MCG, 2002.
2. "Computer Organization and Architecture", 8/e, William Stallings, PEA, 2010.
3. "Computer Systems Architecture a Networking Approach", 2/e, Rob Williams.
4. "Computer Organization and Architecture" Ghoshal, Pearson Education, 2011
5. Digital Logic Design, R.D. Sudhakar Samuel, Elsevier.

**Course Outcomes:**
At the end of this Course the student will be able to

- Recognize the importance of programming language independent constructs. **L2**
- Solve computational problems. **L3**
- Select the features of C language appropriate for solving a problem. **L4**
- Design computer programs for real world problems. **L6**
- Organize the data which is more appropriated for solving a problem. **L6**
- Construct his own computer using parts. **L6**

**B.Tech II Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**20ACS16 - DATA BASE MANAGEMENT SYSTEMS**

**(CSE)**

| L | T | P | C |
|---|---|---|---|
| 3 | 1 | 0 | 4 |

**Course Objectives:**

- The objective of the course is to present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from a DBMS.

**UNIT – I: The Worlds of Database Systems & The Entity-Relationship Model**

**The Worlds of Database Systems** –file system VS a DBMS–Advantages of DBMS–Levels of abstraction in DBMS, Data Independency, Queries in DBMS

**The Entity-Relationship Model** –Database design and ER diagrams–Elements of ER models - Additional features ER models.

**The Relational Data Model** –Basics of the Relational Model–Integrity constraints overrelations, From E/R Diagrams to Relational Designs – Introduction to views.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Identify the different peripherals, ports and connecting cables.

**UNIT – II: Relational Algebra and Calculus & The Database Language SQL**

**Relational Algebra and Calculus** –Preliminaries, Relational algebra: Selection and Projection,Set Operations, Renaming, Joins, Division - Relational Calculus – Expressive power of Algebra and Calculus.

**The Database Language SQL** –Simple Queries in SQL–UNION, INTERSECT, EXCEPT– Nested queries, Aggregate operators.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Solve complex problems using language independent notations. **L3**

**UNIT – III: Database Normalization & Index Structures:**

**Database Normalization** – Rules about Functional Dependencies- Normal Forms based on FDs– 1NF, 2NF, 3NF, BCNF, Multivalve Dependencies, 4NF, 5NF.

**Index Structures** –Indexes on Sequential Files–Secondary Indexes–B-Trees, B+ Trees–Hash Based Indexing.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Recognize the programming elements of C Programming language. **L1**

**UNIT – IV: Transaction Management & Concurrency Control and Database Recovery:**

**Transaction Management**: Transactions, ACID properties, Serializability, Other isolation levels.

**Concurrency Control and Database Recovery** – Serializability and Recoverability, Introduction to Lock management-Concurrency Control without Locking. Storage, Recovery and Atomicity, Recovery algorithm, Buffer management, Failure with loss of Non-Volatile storage.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Solve mathematical problems using C Programming language. **L3**

**UNIT – V: Query Processing and Optimization:**

**Query Processing and Optimization**: Measures of Query cost, Selection operation, Sorting, Join operation, Evaluation of expressions, Query processing in memory. Transformation of Relational, Estimating Statistics of expression, Choice of evaluation plans.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Select sorting algorithm based on the type of the data. **L4**
- Organize heterogeneous data. **L6**

**Text Books:**

1. **"Database Systems, The Complete Book",** Hector Garcia-Molina, Jeffrey D. Ullman and Jennifer Widom, 6th impression, 2011, Pearson.
2. **"Data base Management Systems",** Raghu Rama Krishnan, Johannes Gehrke, 3rd Edition,2003, McGraw Hill.

**Reference Books:**

1. "Fundamentals of Database Systems", ElmasriNavrate, 6th edition, 2013, Pearson.
2. "Data base Systems design", Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
3. "Introduction to Database Systems", C.J.Date, Pearson Education.
4. "Data base System Concepts", Silberschatz, Korth, McGraw Hill, V edition.

**Course Outcomes:**

At the end of this Course the student will be able to

- Describe the fundamental elements of relational database management systems. **L2**
- Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL. **L3**
- Design ER-models to represent simple database application scenarios. **L4**
- Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data. **L6**
- Improve the database design by normalization. **L6**
- Familiar with basic database storage structures and access techniques: file and page organizations, indexing methods including B tree, and hashing. **L6**

**B.Tech II Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**20ACS18 - OBJECT ORIENTED PROGRAMMING USING JAVA PROGRAMMING**

**(CSE)**

| L | T | P | C |
|---|---|---|---|
| 3 | 1 | 0 | 4 |

**Course Objectives:**

- To understand the basic concepts and fundamentals of platform independent object oriented language.
- To demonstrate skills in writing programs using exception handling techniques and multithreading.
- To understand streams and efficient user interface design techniques.

**UNIT – I: Object Oriented Programming Concepts & Introduction to JAVA Programming:**

**Object Oriented Programming Concepts:** Object, Class, Abstraction, Encapsulation, Inheritance, Polymorphism.

**Introduction to JAVA Programming:** How Java changed the Internet, The Java Buzzwords, The evolution of Java, Simple Java Program

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Identify the different peripherals, ports and connecting cables.

**UNIT – II: Introducing Classes:**

Data Types, Variables, Operators, Control Structures, and Arrays.

**Introducing Classes:** Constructors, The this Keyword, The finalize( ) Method, A Stack Class. Using Objects as Parameters, A Closer Look at Argument Passing, Understanding static, Introducing final, Introducing Nested and Inner Classes, Exploring the String Class, Using Command-Line Arguments, Var-args: Variable-Length Arguments, The Object Class.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Solve complex problems using language independent notations. **L3**
- Solve Computational problems. **L3**

**UNIT – III: Inheritance and Polymorphism, Packages and interfaces, Exception Handling:**

**Inheritance and Polymorphism:** Types of Inheritance, Dynamic method dispatch, Static and Dynamic Polymorphism

**Packages and interfaces:** Packages, Access Protection, Importing Packages, Interfaces, Default Interface Methods, Use static Methods in an Interface.

**Exception Handling:** Exception-Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch Clauses, Nested try Statements, throw, throws, finally, Java's Built-in Exceptions, Creating Your Own Exception Subclasses, Chained Exceptions, Three Recently Added Exception Features, Using Exceptions.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Recognize the programming elements of C Programming language. **L1**
- Select the control structure for solving the problem. **L4**

**UNIT – IV: Multithreaded Programming:**

**Multithreaded Programming:** The Java Thread Model, The Main Thread, Creating a Thread, Creating Multiple Threads, Using isAlive( ) and join( ), Thread Priorities, Synchronization, Inter thread Communication, Suspending, Resuming, and Stopping Threads. Obtaining a Thread's State, Using Multithreading.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Solve mathematical problems using C Programming language. **L3**
- Structure the individual data elements to simplify the solutions. **L6**

**UNIT – V: Advanced JAVA Concepts**

**Advanced JAVA Concepts:** JDBC Inyroduction,JDBC Driver, DB Connectivity steps, Connectivity with oracle,Hibernate,Swing Oveviw,Swing Environment, Struts, JSP.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Select sorting algorithm based on the type of the data. **L4**
- Organize heterogeneous data. **L6**

**Text Books:**

1. Java The Complete Reference 9th edition, Herbert Schildt, Mc Graw Hill Education, 2014.
2. Programming with Java, E. Balagurusamy.

**Reference Books:**

1. J2SE Core Java, A.R.Kishore Kumar.

**Course Outcomes:**

At the end of this Course the student will be able to

- Use the syntax and semantics of java programming language and basic concepts of OOP. **L2**
- Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages. **L3**
- Apply the concepts of Multithreading and Exception handling to develop efficient and error free codes. **L4**
- Design computer programs for real world problems. **L6**
- Design event driven GUI and web related applications which mimic the real word scenarios. **L6**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**20AHS04 - MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**

**(Common to all Branches)**

| L | T | P | C |
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**Course Objectives:**

- To inculcate the basic knowledge of micro economics and financial accounting.
- To make the students learn how demand is estimated for different products, input- output relationship for optimizing production and cost.

**UNIT – I**

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Know the nature and scope of Managerial Economics and its importance. **L1**
- Understand the concept of demand and its determinants. **L2**

**UNIT – II**

**Theory of Production**: Production Function- Isoquants and Isocosts, MRTS, Cobb-Douglas Production function.

**Cost Analysis:** Cost concepts, Opportunity cost, Fixed Vs Variable costs, Explicit costs Vs. Implicit costs, Out of pocket costs vs. Imputed costs. Break even analysis -Determination of Break-Even Point (simple problems) - Managerial Significance and limitations of BEP.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Know the production function, Input-Output relationship and different cost concepts. **L1**
- Apply the least-cost combination of inputs. **L2**

**UNIT – III**

**Introduction to Markets:** Market structures: Types of competition, Features of Perfect Competition, Monopoly and Monopolistic Competition. Price-Output Determination under Perfect Competition, Monopoly, Monopolistic Competition.

**Pricing Policies:** Methods of Pricing-Marginal Cost Pricing, Limit Pricing, Market Skimming Pricing, Penetration Pricing, Bundling Pricing, and Peak Load Pricing. Internet Pricing Models: Flat rate pricing, Usage sensitive pricing, Transaction based pricing, Priority pricing, charging on the basis of social cost, Precedence model, Smart market mechanism model.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Apply the price output relationship in different markets. **L1**
- Evaluate price-output relationship to optimize cost, revenue and profit. **L2**

**UNIT – IV**

**Types of Industrial Organization**: Characteristic features of Industrial organization, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, State/Public Enterprises and their types.

**Capital Budgeting**: Introduction to capital, Meaning of capital budgeting, Need for capital budgeting – Capital budgeting decisions (Examples of capital budgeting) - Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR), IRR and Net Present Value Method (simple problems).

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Know the concept of capital budgeting and its importance in business. **L1**
- Contrast and compare different investment appraisal methods. **L2**

**UNIT – V**

**Introduction to Financial Accounting:** Introduction to Double-entry system, Journal, Ledger, Trial Balance- Final Accounts (with simple adjustments) - Limitations of Financial Statements.

**Interpretation and analysis of Financial Statement:** Ratio Analysis – Liquidity ratios, Profitability ratios and solvency ratios – Preparation of changes in working capital statement and fund flow statement.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Know the concept, convention and significance of accounting. **L1**
- Apply the fundamental knowledge of accounting while posting the journal entries. **L2**

**Text Books:**

1. **J.V. Prabhakar Rao**: Managerial Economics and Financial Analysis, Maruthi Publications, 2011.
2. **Prof. C.Viswanatha Reddy:** 'Financial Accounting-1' Himalaya Publishing House, Newdelhi.

**Reference Books:**

1. **A R Aryasri** - Managerial Economics and Financial Analysis, TMH 2011.
2. **Suma damodaran**- Managerial Economics, **Oxford** 2011.
3. **S.A. Siddiqui & A.S. Siddiqui**, Managerial Economics and Financial Analysis, New Age International Publishers, 2011.
4. **N. Appa Rao. & P. Vijaya Kumar**: 'Managerial Economics and Financial Analysis', Cengage Publications, New Delhi, 2011.

**Course Outcomes:**

At the end of this Course the student will be able to

- Be able to perform and evaluate present worth, future worth and annual worth analyses on one of more economic alternatives. **L1**
- Be able to perform and evaluate payback period and capitalized cost on one or more economic alternatives. **L2**
- Be able to carry out and evaluate benefit/cost, life cycle and breakeven analyses on one or more economic alternatives. **L3**
- Evaluate the capital budgeting techniques. **L4**
- Students can analyze how to invest their capital and maximize returns. **L5**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**20AHS05 - ENTERPRENUARSHIP AND INNOVATION MANAGEMENT**

**(Common to all Branches)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- To enable students understand the opportunities available to start a business.
- To impart knowledge about various sources of support (Financial and Non-financial) available to start an enterprise.

**UNIT – 1: FUNDAMENTALS OF ENTREPRENEURSHIP**

Fundamentals of Entrepreneurship – Evolution and Theories of Entrepreneurship – Characteristics of Entrepreneurs –Myths of Entrepreneurship – Kakinada Experiment -Elements of leadership –Role of Entrepreneurs in Indian economy – Social and Ethical Perspectives of Entrepreneurship - Corporate entrepreneurship – Social Entrepreneur, women Entrepreneurship - Opportunities & challenges.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Define entrepreneurship and the characteristics of an entrepreneur. **L1**
- Explain the significance of entrepreneurship in the economic development of a nation. **L2**

**UNIT – II: IDEATION AND EVALUATION OF BUSINESS IDEAS**

Opportunity identification – Ideations process - Sources of business ideas – Role of creativity – Sources of Innovation - Business Idea Evaluation - Product/ Service design – Design Thinking - Customer Value Proposition (CVP) – Business models.

**Case study**: Business cases of OYO, Paytm and Flipkart/ Smartmart.

**Activity:** Idea generation in groups and CVP.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Select the right business ideas. **L1**
- Explain the business idea evaluation process **L2**

**UNIT – III: Business Organizations and Venture Establishment**

Forms of business organisations/ownership – Techno-economic feasibility assessment – Financial feasibility – Market feasibility – Preparation of Business plan – Business canvas & Lean canvas – Challenges & Pitfalls in selecting new venture.

**Activity:** Preparation of business plan (draft).

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Recall different forms of business organizations. **L1**
- Develop business canvas. **L2**

**UNIT – IV: Introduction to Innovation**

Creativity, Invention and innovation, Types of Innovation, Relevance of Technology for Innovation, The Indian innovations and opportunities.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Able to develop new ideas to discover new ways of looking problems and opportunities. **L1**
- Apply technology to innovation. **L2**

**UNIT – V: Promoting and managing innovation**

Innovators and Imitators, Patents, Trademarks, Intellectual Property, Exploring, Executing, Leveraging and renewing innovation, Enhancing Innovation Potential & Formulating strategies for Innovation.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Intellectual Property Licensing. **L1**
- Summarize the importance of IPR. **L2**

**Text Books:**

1. Robin Lowe and Sue Marriott, Enterprise: Entrepreneurship and Innovation Concepts, Contexts and Commercialization.
2. John Bessant and Joe Tidd, Innovation and Entrepreneurship.

**Reference Books:**

1. Rabindra N. Kanungo "Entrepreneurship and innovation", Sage Publications, New Delhi, 1998.
2. Peter F. Drucker, Innovation and Entrepreneurship.
3. EDII "Faculty and External Experts – A Hand Book for New Entrepreneurs Publishers: Entrepreneurship Development" Institute of India, Ahmadabad, 1986.
4. Philips, Bonefiel and Sharma (2011), Social Entrepreneurship, Global vision publishing house, New Delhi.

**Course Outcomes:**

At the end of this Course the student will be able to

- Choose entrepreneurship as an alternative career. **L1**
- Distinguish between corporate and social entrepreneurs. **L2**
- Examine and build customer value proposition. **L3**
- Analyze feasibility of business ideas. **L4**
- Compare various supports schemes provided by GOI. **L5**

**B.Tech II Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**20ACS17 - DATABASE MANAGEMENT SYSTEMS LAB**

**(CSE)**

| L | T | P | C |
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**Course Objectives:**

- To create a database and query it using SQL.
- Understand the significance of integrity constraints.

**List of Experiments :**

1. **Practice session:** Students should be allowed to choose appropriate DBMS software, install it, configure it and start working on it. Create sample tables, execute some queries, use SQLPLUS features, use PL/SQL features like cursors on sample database. Students should be permitted to practice appropriate User interface creation tool and Report generation tool.
2. A college consists of number of employees working in different departments. In this context,create two tables **employee** and **department**. Employee consists of columns empno, empname, basic, hra, da, deductions, gross, net, date-of-birth. The calculation of hra,da are as per the rules of the college. Initially only empno, empname, basic have valid values. Other values are to be computed and updated later. Department contains deptno, deptname, and description columns. Deptno is the primary key in department table and referential integrity constraint exists between employee and department tables. Perform the following operations on the the database:

- Create tables department and employee with required constraints.
- Initially only the few columns (essential) are to be added. Add the remaining columns separately by using appropriate SQL command.
- Basic column should not be null.
- Add constraint that basic should not be less than 5000.
- Calculate hra,da,gross and net by using PL/SQL program.
- Whenever salary is updated and its value becomes less than 5000 a trigger has to be raised preventing the operation.
- The assertions are: hra should not be less than 10% of basic and da should not be less than 50% of basic.
- The percentage of hra and da are to be stored separately.
- When the data becomes more than 100%, a message has to be generated and with user permission da has to be merged with basic.
- Empno should be unique and has to be generated automatically.
- If the employee is going to retire in a particular month, automatically a message has to be generated.
- The default value for date-of-birth is 1 jan, 1970.
- When the employees called daily-wagers are to be added the constraint that salary should be greater than or equal to 5000 should be dropped.
- Display the information of the employees and departments with description of the fields.
- Display the average salary of all the departments.
- Display the average salary department wise.
- Display the maximum salary of each department and also all departments put together.

- Commit the changes whenever required and rollback if necessary.
- Use substitution variables to insert values repeatedly.
- Assume some of the employees have given wrong information about date-of-birth. Update the corresponding tables to change the value.
- Find the employees whose salary is between 5000 and 10000 but not exactly 7500.
- Find the employees whose name contains _en'.
- Try to delete a particular deptno. What happens if there are employees in it and if there are no employees.
- Create alias for columns and use them in queries.
- List the employees according to ascending order of salary.
- List the employees according to ascending order of salary in each department.
- Use _&&' wherever necessary
- Amount 6000 has to be deducted as CM relief fund in a particular month which has to be accepted as input from the user. Whenever the salary becomes negative it has to be maintained as 1000 and the deduction amount for those employees is reduced appropriately.
- The retirement age is 60 years. Display the retirement day of all the employees.
- If salary of all the employees is increased by 10% every year, what is the salary of all the employees at retirement time.
- Find the employees who are born in leap year.
- Find the employees who are born on feb 29.
- Find the departments where the salary of atleast one employee is more than 20000.
- Find the departments where the salary of all the employees is less than 20000.
- On first January of every year a bonus of 10% has to be given to all the employees. The amount has to be deducted equally in the next 5 months. Write procedures for it.
- As a designer identify the views that may have to be supported and create views.
- As a designer identify the PL/SQL procedures necessary and create them using cursors.
- Use appropriate Visual programming tools like oracle forms and reports, visual basic etc to create user interface screens and generate reports.
- **Note**: As a designer, identify other operations that may be required and add to the above list. The
- above operations are not in order. Order them appropriately. Use SQL or PL/SQL depending on the requirement.

1. Build a Customer Journey Map (CJM) for any mock scenario or persona created during last experiment and frame 2-3 questions using HMW (How Might We) tool(CJM-Before-During-After).
2. Design service blueprint and identify touch points from previously designed CJM.
3. Story boarding design ideas: Consider a scenario and create user stories and storyboards to transform information about user needs into design concepts.
4. Take product/system to be designed from previously framed problem statement from experiment 1 and apply Combine, Rearrange and Enhance triggers in CREATE (Combine, Rearrange, Enhance, Adapt, Turnaround, Eliminate) tool. Draw product/system after applying triggers.
5. Develop a function map for persona designed from experiment 2 or any mock scenario. (Differently abled student: Enable him to move around campus on his own).

6. Identify the components to establish a banking system/new capital/company etc. through zap your logical brain and list the possible scenarios to analyze the components using what if tool.
7. Create an application prototype for product recommendation using Marvel POP Software or FIGMA.
8. Development of 3D prototype for kids' toys using tinker cad or fusion 360.

**Reference Books:**

1. S.Salivahanan, S.Suresh Kumar, D.Praveen Sam, "Introduction to Design Thinking",Tata Mc Graw Hill, First Edition,2019.
2. Kathryn McElroy,"Prototyping for Designers: Developing the best Digital and Physical Products",O'Reilly,2017.
3. Michael G. Luchs, Scott Swan , Abbie Griffin, "Design Thinking – New Product Essentials from PDMA",Wiley,2015.
4. Vijay Kumar, "101 Design Methods: A Structured Approach for Driving Innovation in Your Organization", 2012.

**Course Outcomes:**

At the end of this Course the student will be able to

- Investigate the requirements of a problem by conducting surveys. **L1**
- Create meaningful and actionable problem statements for creative problem solving. **L2**
- Construct blueprints to visualize user attitudes and behavior for gaining insights of customers. **L3**
- Design prototypes of innovative products or services for a customer base. **L4**
- Develop relevant products or services by choosing good design and applying empathy tools for experiencing user requirements. **L5**
- Work independently and communicate effectively in oral and written forms. **L6**
- Investigate the requirements of a problem by conducting surveys. **L6**

**B.Tech II Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**20ACS19 - OBJECT ORIENTED PROGRAMMING USING JAVA LABORATORY**

**(CSE)**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 3 | 1.5 |

**Software's for Lab:**

- JDK and JRE 1.8
- Eclipse IDE (Integrated Development Environment)

**Week-1 (Basics):**

- Use Eclipse or Net bean platform and acquaint with the various menus. Create a test project, add a test class, and run it. See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods, and classes. Try debug step by step with a small program of about 10 to 15 lines which contains at least one if else condition and a for loop.
- Write a Java program that prints all real solutions to the quadratic equation $ax^2 + bx+c=0$. Read in a, b, c and use the quadratic formula. If the discriminant $b^2 - 4ac$ is negative, display a message stating that there are no real solutions.
- Five Bikers Compete in a race such that they drive at a constant speed which may or may not be the same as the other. To qualify the race, the speed of a racer must be more than the average speed of all 5 racers. Take as input the speed of each racer and print back the speed of qualifying racers.
- Write a Java program to search an element using binary search.

**Course Outcome:**

- To Understand basic OOPs concepts of Java programming.

**Week-2 (Applets & Arrays):**

- Write an applet program that displays a simple message
- Write an applet to display a simple message on a colored background.
- Write java program that inputs 5 numbers, each between 10 and 100 inclusive. As each number is read display it only if it's not a duplicate of any number already read display the complete set of unique values input after the user enters each new value.
- Write a Java program for sorting a given list of names in ascending order?

**Course Outcome:**

- To develop GUI using Applets and implement arrays.

**Week-3(Strings & Command-line arguments):**

- A palindrome is a string that is spelled the same way backward and forward. For example, mom, dad, radar, 727 are all examples of palindromes. Write a program that lets the user type a word and then detern1ines whether the string 1s a palindrome.
- Write a Java program that reads a line of integers and then displays each integer and the sum of all integers. (use StringTokenizer class)?
- Write a program using command line argument to design an application to avail a ride of uber/ola cab using promo code. The user is required to provide current location address and destination address at command prompt?
- Write a program in Java which enters five numbers in an array using command line arguments and print sum and average of the numbers.

**Course Outcome:** To understand Strings and command-line arguments in Java.

**Week-4 (Class, objects and constructors):**

- Write a program in Java to create a class ' Box' which contains three data members for holding width, height and length of box and two methods 'area' and 'volume' to calculate and return the area and volume of box. Create another class named 'BoxDemo' which uses Box class.
- WAP that describes a class person. It should have instance variables to record name, age and salary. Create a person object. Set and display its instance variables.
- Write a Java program that displays Student details by using default and parameterized constructors.

**Course Outcome:**

- To create a class, objects and constructors in Java Programming.

**Week-5 (methods and Inner classes):**

- Create class point with following instance variable and methods.
  Instance variable: private int x,y Constructors : public Point(), Point(int x, int y)
  Methods : public void setX(int x), setY(int y), setXY(int x, int y)
- Write a Java program that creates Inner class.
- Create a class and access the static variables and static methods in another class.

**Course Outcome:**

- To Implement methods and Inner classes.

**Week-6 (Inheritance):**

- Write java program to create a super class called Figure that receives the dimensions of two dimensional objects. It also defines a method called area that computes the area of an object. The program derives two subclasses from Figure. The first is Rectangle and second is Triangle. Each of the sub class overridden area() so that it returns the area of a rectangle and a triangle respectively.
- Write a java program that implements educational hierarchy using inheritance.
- Write a java program to find the details of the students eligible to enroll for the examination ( Students, Department combined give the eligibility criteria for the enrollement class) using interfaces

| | | | |
|---|---|---|---|
| • Teaching | Non-Teaching | Office | Salary: |
| • Designition | Designition | empno | getvalue() |
| • setvalue() | setvalue() | empname | |

**Course Outcome:**

- To create Java program by using Inheritance.

**Week-7 (Polymorphism and Interface):**

- Write a Java program to implement method overloading and method overriding
- Write an application that creates an interface‘ and implements it.
- Define an interface using JAVA that contains a method to calculate the perimeter of an object. Define two classes circle and Rectangle with suitable fields and methods . Implement the interface "perimeter" in these classes.
- Write the appropriate main() method to create object of each class and test 'all the methods.

**Course Outcome:** To create Java program by using Polymorphism and Interface.

**Week-8 (Packages):**

- Write a JAVA program illustrate class path
- Write a case study on including in class path in your os environment of your package.
- Write an application that creates a package p1. Add some classes in it.
- Write a JAVA program that import and use the defined your package in the previous Problem.

**Course Outcome:**

- To create a package and understanding the classpath.

**Week-9 (Exception handling mechanism):**

- Write a java program that implements Array Index out of bound Exception using built-in-Exception.
- An University has applied promotion criteria for students. According to criteria a student cannot promote to next academic year if he have less than 4.5 CGP A. A developer is trying to implement this situation using exception handling in JAVA. Write a correct Java code to help him.
- Write a java program to identify the significance of finally block in handling exceptions.
- Write a java program to generate multiple threads of creating clock pulses. (using runnable interface).

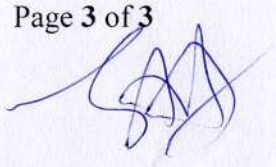
**Course Outcome:**

- To implement the Exception handling mechanism in Java.

**Week-10 (Multi-threading):**

- Write a JAVA program that creates threads by extending Thread class .First thread display "Good Morning "every 1 sec, the second thread displays "Hello "every 2 seconds and the third display "Welcome" every 3 seconds ,(Repeat the same by implementing Runnable)
- Write a program illustrating **isAlive** and **join ()**
- Write a Program illustrating Daemon Threads.
- Write a case study on thread Synchronization after solving the above producer consumer problem





**B.Tech II Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**20ACS15 - COMPUTER ORGANIZATION LABORATORY**

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|---|---|---|---|
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**List of Experiments :**

- Design the following adders
  A) Ripple Carry Adder
  B)Carry-Look-Ahead Adder
  C) Wallace Tree Adder
- Design the Synthesis of Flip Flops
- Simulate the Registers and Counters
- Simulate the Combinational Multipliers
- Design the Booth's Multiplier
- Implementation of the given Boolean function using logics in both SOP and POS forms.
- Verification of state tables of RS,JK,T and D flipflops using NAND and NOR gates.
- Implementation and verification of Decoder/De-multiplexer andEncoder using logic gates.
- Implementation of 4 X 1 multiplexer using logic gates.

**B.Tech II Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**20ACS20 - WEB DEVELOPMENT**

**(SKILL ORIENTED COURSE-I)**

**(CSE)**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 2 | 1 |

**Course Objectives:**

1. Develop static pages (using only HTML) of an online Book store. The pages should resemble: www.amazon.com.

2. The website should consist the following, pages. Home page, Registration and user Login, User profile page, Books catalog, Shopping cart, Payment By credit card, order confirmation. , Validate the registration, user login, user profile and payment by credit.

3. 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
4. Display the XML file as follows.
   The contents should be displayed in a table. The header of the table should be in color GREY. And the Author names column should be displayed in one color and should be capitalized and in bold. Use your own colors for remaining columns. Use XML schemas XSL and CSS for the above purpose.

5. Create a simple visual bean with a area filled with a color. The shape of 6 the area depends on the property shape. If it is set to true then the shape of the area is Square and it is Circle, if it is false. The color of the area should be changed dynamically for every mouse click.
   1) Install TOMCAT web server. While installation assign port number 8080. Make sure that these ports are available i.e., no other process is using this port
   2) 2) Access the above developed static web pages for books web site, using these servers by Putting the web pages developed in week-1 and week-2 in the document root. Access the pages by using the urls : http://localhost:8080/rama/books.html

6. Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 And, pwd4 respectively. Write a servelet for doing 8 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 ".

7. 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).
   Practice 'JDBC' connectivity. Write a java program/servlet/JSP 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).

8. Write a JSP which does the following job: Insert the details of the 3 or 4 users who register with the web site 10 (week9) by using registration form. Authenticate the user when he submits the login form using the user name and password from the database.

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA**
**DEPARTMENT OF CHEMISTRY**
**II B.TECH – I/II SEMESTER Mandate Course (MC)**
**(THEORY)**

| Subject Code | Title of the Subject | L | T | P | C |
|---|---|---|---|---|---|
| | **Environmental Science** | 3 | 0 | - | 0 |

| **COURSE OBJECTIVES** | |
|---|---|
| 1 | To make the student understand multi disciplinary nature of environment and its components. |
| 2 | To investigate the relationship between human life and environment from scientific prospective. |
| 3 | To impart knowledge to the students about fundamental concepts of Ecosystem and Biodiversity |
| 4 | Necessasity of analyzing regional, national and global environmental problems |
| 5 | To understand and apply the fundamentals of Environmental science to important local, regional, national and global environmental problems and potential issues |

| **COURSE OUTCOMES** | |
|---|---|
| CO1 | Solve the environmental problems based fundamental concepts of Environmental Science. |
| CO2 | Describe the structure and function of significant environmental systems |
| CO3 | Differentiate Natural and Polluted environment and asses its impact different on the environmental components. |
| CO4 | Apply the Pyramid of number, mass and Energy, Demonstrate about Renweable energy resources.<br>Illustrate the Forest ecosystem, Discuss about Grass and Net biomass productivity |
| CO5 | Differentiate between Forest and desert Ecosystems, Critically evaluate arguments regarding environmental issues. Illustrate the Food chain and food web, Identify the applications of rain water harvesting, Interpret advantages of In-situ and Ex-situ conservation of biodiversity |

**Mapping between Course Outcomes and Programme Outcomes**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | | | | | | | |
| CO2 | | | | | | | | | | | | |
| CO3 | | | | | | | | | | | | |
| CO4 | | | | | | | | | | | | |
| CO5 | | | | | | | | | | | | |

Bos Chairman
Chemistry

## SYLLABUS

**UNIT-I**:

**i) Multidisciplinary** nature of environmental studies

The **Multidisciplinary** nature of environmental studies Definition; Scope and importance, Need for public awareness.

**ii) Natural Resources:**

Renewable and non-renewable resources: Natural resources and associated problems.

a) Forest resources: Use and Over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems.

c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, Case studies.

f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

**UNIT-II:**

**i) 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 the following ecosystem: -

a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem

d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

**ii) Biodiversity and its Conservation**

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

**UNIT-III:**

**Environmental Pollution:**

**Definition** - Causes, effects and control measures of: -

a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution

e. Noise pollution f. Thermal pollution g. Nuclear hazards

Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. Disaster management: floods, earthquake, cyclone and landslides.

**UNIT-IV:**

BOS Chairman

BOS chemistry

**Social Issues and the Environment**

From Unsustainable to Sustainable development. Urban problems related to energy.
Water conservation, rain water harvesting, watershed management.
Resettlement and rehabilitation of people; its problems and concerns. Case studies. Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
Wasteland reclamation.
Environment 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-V:**

**i) Human Population and the Environment**

Population growth, variation among nations. Population explosion-Family welfare Programme. Environment and human health. Human Rights. Value Education. HIV/AIDS. - Women and Child Welfare. Role of information Technology in Environment and human health.
- Case Studies.

**ii) Field Work**

- Visit to a local area to document environmental assets-river/forest/grassland/ hill/mountain.
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural.
- Study of common plants, insects, birds.
- Study of simple ecosystems-pond, river, hill slopes, etc.

**Text Books:**

1. Shashi Chawla, A Text Book of Environmental Studies, Mc Graw Hill Education, 4th edtion, 2014
2. De A.K., Environmental Chemistry, Wiley Eastern Ltd , 2012

**Reference Books**

**1.** Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad -380013, India, Email: mapin@icenet. net (R).
2. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p.
3. Cunningham, W.P.Cooper, T.H. Gorhani, E & Hepworth, M.T.2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p.
4. Anubha Kaushik and C.P.Kaushik, Basics of Environment and Ecology, New Age International Publishers, 4th Edition, 2012.

BOS Chairman
Chemistry

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**
**II Year B.Tech. II-Sem (R20)**
**20ABS15 - NUMERICAL METHODS, PROBABILITY AND STATISTICS**
**(Common to CIVIL, ME, EEE & CSE)**

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**Course Objectives:**

- To familiarize the students with numerical methods of solving the non-linear equations, interpolation, differentiation, integration, and ordinary differential equations.
- To impart knowledge in basic concepts and few techniques in probability and statistics in various applications in engineering.

**UNIT – 1: Solution to algebraic and transcendental equations& Interpolation:**
Solution of algebraic and transcendental equations: bisection method, Newton-Raphson method and Regula-Falsi method, Finite differences, relation between operators, interpolation using Newton's forward and backward difference formulae. Interpolation with unequal intervals: Newton's divided difference and Lagrange's formulae.

**Learning Outcomes:**
At the end of this unit, the student will be able to

- find approximate roots of the an equation by using different numerical methods L2
- explain various discrete operators and find the relation among operators L2
- apply Newton forward and backward formulas for equal and unequal intervals L3

**UNIT – II: Numerical differentiation, integration & Solution of Initial Value Problems to Ordinary Differential Equations of first order:**
**Numerical Differentiation and Numerical integration**: Numerical differentiation using Newton's forward & backward interpolation formulae; Numerical Integration by trapezoidal rule, Simpson's $1/3^{rd}$ and $3/8^{th}$ rules.
**Numerical Solutions of Ordinary differential equation:** Solution by Taylor's series, Picard's method of successive approximations, Euler's method, modified Euler's method and Runge-Kutta method of fourth order.

**Learning Outcomes:**
At the end of this unit, the student will be able to

- find integration of a function by different numerical methods L3
- solve ordinary differential equations using different numerical schemes L3

**UNIT – III: Probability & Random Variables:**
Probability axioms, addition law and multiplicative law of probability, conditional probability, Baye's theorem.
Random variables (discrete and continuous), probability distribution: Binomial - Poisson approximation to the binomial distribution and normal distribution-their properties. (All concepts without proofs)

**Learning Outcomes:**
At the end of this unit, the student will be able to

- explains the basic concepts of probability theory and elementary theorems on probability. L2
- applies the knowledge of discrete random variable and continuous random variable and the respective probability distributions. L3

**UNIT – IV: Testing of hypothesis:**
Formulation of hypothesis, critical region, level of significance. Large sample tests: test for single proportion, difference of two proportions, test for single mean and difference of two means.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- explain the concept of testing of hypothesis L2
- apply the concept of hypothesis testing for large samples L3

**UNIT – V: Small Sample Tests:**

Student t-distribution (single mean, two means and paired t-test), Testing of equality of variances (F-test), $\chi 2$ - test for independence of attributes and goodness of fit.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- apply the concept of testing hypothesis for small samples L3
- apply the concept of hypothesis testing for large samples and estimate the goodness of fit L3

**Text Books:**

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2. Miller and Freunds, Probability and Statistics for Engineers,7/e, Pearson, 2008
3. S.S.Sastry, "Introductory methods of Numerical Analysis", 5th edition, PHI, 2012.
4. Advanced Engineering Mathematics, R K Jain and S R K Iyengar, Narosa Publishing House, New Delhi.

**Reference Books:**

1. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons publications, 2012.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9/e, John Wiley & Sons, 2006.
3. P. Kandasamy, K. Thilagavathy, S. Gunavathy, Numerical Methods, S. Chand & Company, 2nd Edition, Reprint 2012.

**Course Outcomes:**

At the end of this Course the student will be able to

- apply different methods to find roots of the equations and find approximate the solutions of ordinary differential equations **L3**
- apply the Laplace transform for solving differential equations **L3**
- explain the concepts of probability and their applications **L3**
- apply discrete and continuous probability distributions in practical problems **L4**
- use the statistical inferential methods based on small and large sampling tests **L3**

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**B.Tech II year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**20ACS22 - FORMAL LANUAGE AND AUTAMETA THEORY**

**(CSE)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- Understand formal definitions of machine models.
- Classify machines by their power to recognize languages.
- Understanding of formal grammars, analysis
- Understanding of hierarchical organization of problems depending on their complexity
- Understanding of the logical limits to computational capacity .
- Understanding of un-decidable problems.

**UNIT – I: Finite Automota** **8hrs**

Why Study Automata Theory? The Central Concepts of Automata Theory, Automation, Finite Automation, Transition Systems, Acceptance of a String by a Finite Automation, DFA, Design of DFAs, NFA, Design of NFA, Equivalence of DFA and NFA, Conversion of NFA into DFA, Finite Automata with Null-Transition, Minimization of Finite Automata, Mealy and Moore Machines, Applications and Limitation of Finite Automata.

**Learning Outcomes:**

- Acquire a full understanding and mentality of Automata Theory as the basis of all computer science languages design. **L1**
- Be able to design sample automata. **L1**
- Be able to design FAs, NFAs, Grammars, languages modelling, small compilers basics. **L1**

**Unit-II: Regular Expression** **8hrs**

Regular Expressions, Regular Sets, Identity Rules, Equivalence of two Regular Expressions, Manipulations of Regular Expressions, Finite Automata and Regular Expressions, Inter Conversion, Equivalence between Finite Automata and Regular Expressions, Pumping Lemma, Closers Properties, Applications of Regular Expressions, Finite Automata and Regular Grammars, Regular Expressions and Regular Grammars.

**Learning Outcomes:**

- Understand the regular expressions. **L2**
- Understanding the Pumping Lemma. **L2**
- Understand the Finite Automata and Regular Grammars. **L2**

**UNIT – III: Context Free Grammars** **8hrs**

Formal Languages, Grammars, Classification of Grammars, Chomsky Hierarchy Theorem, Context Free Grammar, Leftmost and Rightmost Derivations, Parse Trees, Ambiguous Grammars, Simplification of Context Free Grammars-Elimination of Useless Symbols, Null-Productions and Unit Productions, Normal Forms for Context Free Grammars-Chomsky Normal Form and Greibach Normal Form, Pumping Lemma, Closure Properties, Applications of Context Free Grammars.

**Learning Outcomes:**

- Understanding the Context free languages and grammers, and also Normalising CFG. **L3**
- Understanding the minimization of deterministic and nondeterministic finite automata. **L4**
- Understand basic properties of Turing machines and computing with Turing machines. **L4**

**UNIT – IV :Pushdown Automata**

Pushdown Automata, Definition, Model, Graphical Notation, Instantaneous Description Language Acceptance of pushdown Automata, Design of Pushdown Automata, Deterministic and Non – Deterministic Pushdown Automata, Equivalence of Pushdown Automata and Context Free Grammars Conversion, Two Stack Pushdown Automata, Application of Pushdown Automata

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the concept of Pushdown automata and its application. **L4**
- Understand the concept of Two Stack Pushdown Automata. **L4**

**UNIT – V: Turing Machine**

Turing Machine, Definition, Model, Representation of Turing Machines-Instantaneous Descriptions, Transition Tables and Transition Diagrams, Language of a Turing Machine, Design of Turing Machines, Techniques for Turing Machine Construction, Types of Turing Machines, Church's Thesis, Universal Turing Machine, Restricted Turing Machine.

**Decidable and Un-decidable Problems**: NP, NP-Hard and NP-Complete Problems.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Know the concepts of tractability and decidability, the concepts of NP-completeness and NP-hard problem. **L5**
- Understand the challenges for Theoretical Computer Science and its contribution to other sciences. **L5**

**Text Books:**

1. Introduction to Automata Theory, Languages and Computation, J.E.Hopcroft, R.Motwaniand J.D.Ullman, 3rd Edition, Pearson, 2008.
2. Theory of Computer Science-Automata, Languages and Computation, K.L.P.Mishra and N.Chandrasekaran, 3rd Edition, PHI, 2007.

**Reference Books:**

1. Formal Language and Automata Theory, K.V.N.Sunitha and N.Kalyani, Pearson, 2015.
2. Introduction to Automata Theory, Formal Languages and Computation, ShyamalenduKandar, Pearson, 2013.
3. Theory of Computation, V.Kulkarni, Oxford University Press, 2013.
4. Theory of Automata, Languages and Computation, Rajendra Kumar, McGraw Hill, 2014.

**Course Outcomes:**

At the end of this Course the student will be able to

- Argue the correctness of algorithms using inductive proofs and invariants. **L2**
- Analyze worst-case running times of algorithms using asymptotic analysis. **L2**
- Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize divide-and-conquer algorithms. Derive and solve recurrences describing the performance of divide-and-conquer algorithms. **L3**
- Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize dynamic-programming algorithms, and analyze them. **L3**
- Describe the greedy paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize greedy algorithms, and analyze them. **L4**
- 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. **L5**
- 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. **L5**

**B.Tech II-II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**20ACS23 - OPERATING SYSTEMS**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- To understand the basic concepts and functions of operating systems.
- To understand Processes and Threads
- To understand Processes and Threads
- To understand the concept of Deadlocks
- To analyze various memory management schemes.
- To understand I/O management and File systems.
- To be familiar with the basics of Linux system and Mobile OS like iOS and Android.

**UNIT – I: OPERATING SYSTEM OVERVIEW** **8hrs**

Computer System Overview-Basic Elements, Instruction Execution, Interrupts, Memory Hierarchy, Cache Memory, Direct Memory Access, Multiprocessor and Multicore Organization. Operating system overview-objectives and functions, Evolution of Operating System.- Computer System Organization Operating System Structure and Operations- System Calls, System Programs, OS Generation and System Boot.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the Basics of Operating System **L1**
- To learn about the evaluation of operating system **L1**
- To learn about the Operating structure **L1**

**UNIT – II: PROCESS MANAGEMENT** **8hrs**

Processes - Process Concept, Process Scheduling, Operations on Processes, Inter-process Communication; CPU Scheduling - Scheduling criteria, Scheduling algorithms, Multiple-processor scheduling, Real time scheduling; Threads- Overview, Multithreading models, Threading issues; Process Synchronization - The critical-section problem, Synchronization hardware, Mutex locks, Semaphores, Classic problems of synchronization, Critical regions, Monitors; Deadlock - System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the process management **L2**
- To learn about the CPU Scheduling **L2**
- To learn how to overcome the dead locks **L3**

**UNIT – III: STORAGE MANAGEMENT** **8hrs**

Main Memory – Background, Swapping, Contiguous Memory Allocation, Paging, Segmentation, Segmentation with paging, 32 and 64 bit architecture Examples; Virtual Memory – Background, Demand Paging, Page Replacement, Allocation, Thrashing; Allocating Kernel Memory, OS Examples.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand The Memory Management **L3**
- To learn about the Page Replacement **L3**
- Understand the Demand paging **L3**

**UNIT – IV: FILE SYSTEMS AND I/O SYSTEMS** **7hrs**

Mass Storage system – Overview of Mass Storage Structure, Disk Structure, Disk Scheduling and Management, swap space management; File-System Interface - File concept, Access methods, Directory Structure, Directory organization, File system mounting, File Sharing and Protection; File System Implementation- File System Structure, Directory implementation, Allocation Methods, Free Space Management, Efficiency and Performance, Recovery; I/O Systems – I/O Hardware, Application I/O interface, Kernel I/O subsystem, Streams, Performance.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the File Systems and I/O Systems **L2**
- To implement the file concepts **L4**
- To learn how to Recovery the data **L3**

**UNIT – V: CASE STUDY**

Linux System - Design Principles, Kernel Modules, Process Management, Scheduling, Memory Management, Input-Output Management, File System, Inter-process Communication; Mobile OS - iOS and Android - Architecture and SDK Framework, Media Layer, Services Layer, Core OS Layer, File System.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To implement te Kernal models **L5**
- To implement the Mobile OS **L5**

**Text Books:**

1.Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, —Operating System Concepts‖, 9th Edition, John Wiley and Sons Inc., 2012.

**Reference Books:**

1. Ramaz Elmasri, A. Gil Carrick, David Levine, —Operating Systems – A Spiral Approach‖, Tata McGraw Hill Edition, 2010.
2. Achyut S.Godbole, Atul Kahate, —Operating Systems‖, McGraw Hill Education, 2016
3. Andrew S. Tanenbaum, —Modern Operating Systems‖, Second Edition, Pearson
4. Gary Nutt, —Operating Systems‖, Third Edition, Pearson Education, 2004.
5. Harvey M. Deitel, —Operating Systems‖, Third Edition, Pearson Education, 2004.
6. Daniel P Bovet and Marco Cesati, —Understanding the Linux kernel‖, 3rd edition, O'Reilly, 2005.
7. Neil Smyth, —iPhone iOS 4 Development Essentials – Xcode‖, Fourth Edition, Payload media, 2011.

**Course Outcomes:**

At the end of this Course the student will be able to

- Analyze various scheduling algorithms. **L2**
- Understand deadlock, prevention and avoidance algorithms. **L3**
- Compare and contrast various memory management schemes. **L4**
- Understand the functionality of file systems. **L2**
- Perform administrative tasks on Linux Servers. **L3**

**B.Tech II Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**20ACS25 - DESIGN AND ANALYSIS OF ALGORITHMS**

**(CSE)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- 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.

**UNIT – I:** **8hrs**

Introduction to Algorithm, Algorithm specification, performance analysis, Asymptotic Notations. **Divide and Conquer**: General Method, Binary search, finding the maximum and minimum, merge sort, Quick sort, Selection sort, Stressen's matrix multiplication , Analysis of Divide and Conquer run time, Recurrence Relations-Master's Method

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize divide-and-conquer algorithms. Derive and solve recurrences describing the performance of divide-and-conquer algorithms. **L2**

**UNIT – II:** **8hrs**

**Greedy Method:** General Method ,Knapsack problem , job scheduling with deadlines, minimum cost spanning trees-Prim's and Krushkal's Algorithm, single source shortest paths- Dijkastra's ,Bell Man ford And Wars hall's Algorithm.

**Dynamic Programming:** General Method, Multi stage graphs , All-pairs shortest paths, 0/1 knapsack, the travelling sales person problem.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Describe the greedy paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize greedy algorithms, and analyze them. **L3**
- 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. **L3**

**UNIT – III:** **8hrs**

**Basic Traversal and search techniques**: Techniques for binary trees and Techniques for graphs, AND/OR graphs, connected components and spanning trees, Bi-Connected components and Dfs.

**Back tracking:** General Method,8-queens problem ,sum of subsets problem, graph coloring and Hamiltonian cycles, knapsack problem.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- 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. **L3**
- 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. **L4**

**UNIT – IV:** **7 Hrs**

**Branch and bound**: LIFO and FIFO methods, Travelling salesperson, 0/1 knapsack problem, efficiency considerations.

**Lower Bound Theory**: Comparison trees of sorting and Searching, Lower bound through reductions-multiplying triangular matrices, inverting a lower triangular matrix, computing the transitive closure.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain what amortized running time is and what it is good for. Describe the different methods of amortized analysis (aggregate analysis, accounting, potential method). Perform amortized analysis. **L4**
- Explain what competitive analysis is and to which situations it applies. Perform competitive analysis. **L4**

**UNIT – V:**

**Basic concepts**: Non deterministic algorithm ,The classes NP-Hard and NP-Complete

**NP-Hard and NP-Complete problems**: Np Hardness, Scheduling Problems, NP-Completeness, Cook's theorem (without proof), Reductions for clique Decision problem, Chromatic number decision problem.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Compare between different data structures. Pick an appropriate data structure for a design situation. **L4**
- Explain what an approximation algorithm is, and the benefit of using approximation algorithms. Be familiar with some approximation algorithms, including algorithms that are PTAS or FPTAS. Analyze the approximation factor of an algorithm. **L4**

**Text Books:**

1. "Fundamentals of computer Algorithms: EllisHorowitz,s.satrajsahani and raja sekharan,2nd edition,university press.
2. Algorithm design –Jon Kleinberg and Eva Tardos ,pearson.
3. "Introduction to the Design and Analysis of Algorithms", AnanyLevitin ,Third Edition, Pearson Education, 2012.

**Reference Books:**

1. Design and Analysis of algorithms",Aho,Ullman and Hopcroft,pearson education.
2. "Algorithms"-Richard Johnson baugh and Marcus Schaefer,pearson Education.
3. Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction toAlgorithms", Third Edition, PHI Learning Private Limited, 2012.
4. Donald E. Knuth, "The Art of Computer Programming", Volumes 1& 3 Pearson Education, 2009. Steven S. Skiena, "The Algorithm Design Manual", Second Edition, Springer, 2008.

**Course Outcomes:**

At the end of this Course the student will be able to

- Argue the correctness of algorithms using inductive proofs and invariants. **L2**
- Analyze worst-case running times of algorithms using asymptotic analysis. **L2**
- Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize divide-and-conquer algorithms. Derive and solve recurrences describing the performance of divide-and-conquer algorithms. **L3**
- Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize dynamic-programming algorithms, and analyze them. **L3**
- Describe the greedy paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize greedy algorithms, and analyze them. **L4**
- 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. **L5**
- 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. **L5**

**B.Tech II Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**20ACS27 - SOFTWARE ENGINEERING**

**(CSE)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- To provide the idea of decomposing the given problem into Analysis, Desing, Implementation, Testing nd Maintenance phases.
- To provide an idea of using various process models in the software industry according to given circumstances.
- To gain the knowledge of how Analysis, Design, Implementation, Testing and Maintenance processes are conducted in a software project.

**UNIT – I:** **8hrs**

**Software and Software Engineering:** The Nature of Software, The Unique Nature of Web Apps, Software Engineering, Software Process, Software Engineering Practice, Software Myths.

**Process Models:** A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, The Unified Process, Personal and Team Process Models.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the Nature of Software. **L1**
- Understand the process model. **L1**

**UNIT – II:** **8hrs**

**Software Project Planning and Management:** Responsibilities of a Software Project Manager, Project Planning, Metrics for Project Size Estimation, Project Estimation Techniques, Empirical Estimation Techniques, COCOMO-A Heuristic Estimation Technique, Halstead's Software Science-An Analytical Technique, Staffing Level Estimation, Scheduling, Organization and Team Structures, Staffing, Risk Management.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To learn about the COCOMO. **L2**
- To learn about the Organization and Team Structures. **L2**

**UNIT – III:** **8hrs**

**Understanding Requirements**: Requirements Engineering, Establishing the Groundwork, Eliciting Requirements, Requirements Analysis, Structured Analysis, Developing Use Cases, Building the Requirements Model, Negotiating Requirements, and Validating Requirements.

**Requirements Modeling**: Requirements Analysis, Scenario-Based Modeling, UML Models That Supplement the Use Case.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To learn about the Requirements. **L3**
- Understand the requirements. **L3**

**UNIT – IV:** **7 Hrs**

**Design Concepts**: Design within the Context of Software Engineering, Design Process, Design Concepts, The Design Model.

**Architectural Design:** Software Architecture, Architectural Genres, Architectural Styles, Architectural Design.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To learn about the Design Concepts. **L3**
- To learn about the Architectural Design. **L3**

**UNIT – V:**

**User Interface Design:** The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps.

**Coding and Testing:** Coding, Code Review, Software Documentation, Testing, Testing in the Large versus Testing in the Small, Unit Testing, Black-Box Testing, White-Box Testing, Debugging, Integration Testing.

**Software Maintenance:** Characteristics of Software Maintenance, Software Reverse Engineering, Software Maintenance Process Models, and Estimation of Maintenance cost.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To learn about the User interface Design. **L3**
- To learn about the Coding and Testing. **L3**
- To learn about the Software Maintenance.

**Text Books:**

1. Software Engineering A practitioner's Approach, Roger S. Pressman, Seventh Edition, 2009, McGraw Hill International Edition.
2. Fundamentals of Software Engineering, Rajib Mall, Third Edition, 2009,PHI

**Reference Books:**


1. Software Engineering, Ian Sommerville, Ninth edition, Pearson education.
2. Software Engineering : A Primer, Waman S Jawadekar, Tata McGraw-Hill,2008
3. Software Engineering, A Precise Approach, PankajJalote, Wiley India, 2010.
4. Software Engineering, Principles and Practices, Deepak Jain, Oxford UniversityPress.
5. Software
6. Software Engineering2: Specification of systems and languages, Diner Bjorner, Springer International edition ,2006.
7. Software Engineering Foundations, Yingxu Wang, Auerbach Publications,2008.
8. Software Engineering Principles and Practice, Hans Van Vliet, 3rd edition, John Wiley &SonsLtd.
9. Software Engineering 3: Domains, Requirements,and Software Design, D.Bjorner, Springer InternationalEdition.
10. Introduction to Software Engineering, R.J.Leach, CRCPress.


**Course Outcomes:**

At the end of this Course the student will be able to

- Students will be able to decompose the given project in various phases of a lifecycle. Knowledge, Understand (Leve1, Level2) **L1 L2**
- Students will be able to choose appropriate process model depending on the user requirements. Apply, Create (Level 2) **L2**
- Students will be able perform various life cycle activities like Analysis, Design, Implementation, Testing and Maintenance. Evaluate(Level 3) **L3**
- Students will be able to know various processes used in all the phases of the product. Analyze(Level 3) **L3**
- Students can apply the knowledge, techniques, and skills in the development of a software product. **L3**

**B.Tech II Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**20ACS29 - MOBILE APPLICATION DEVELOPMENT (MAD)**

**Skill Oriented Course – II**

| L | T | P | C |
|---|---|---|---|
| 1 | 0 | 2 | 2 |

**Course Objectives:**

Android Application Development course is designed to quickly get you up to speed with writing apps for Android devices. The student will learn the basics of Android platform and get to understand the application lifecycle

**List of Experiments:**

**Build your first app:** Introduction to Android, Create Your First Android App, Layouts, Views and Resources, Text and Scrolling Views

**Activities:** Understanding Activities and Intents, The Activity Lifecycle and Managing State, Activities and Implicit Intents

**Testing, debugging, and using support libraries:** The Android Studio Debugger, Testing your App, The Android Support Library

**User interaction:** User Input Controls, Menus, Screen Navigation, RecyclerView

**Delightful user experience:** Drawables, Styles, and Themes, Material Design, Providing Resources for Adaptive Layouts

**Testing your UI:** Testing the User Interface

**Background Tasks:** AsyncTask and AsyncTaskLoader, Connect to the Internet, Broadcast Receivers, Services

**Triggering, scheduling and optimizing background tasks:** Notifications, Scheduling Alarms, Transferring Data Efficiently

**Preferences and Settings:** Storing Data, Shared Preferences, App Settings

**Storing data using SQLite:** SQLite Primer, SQLite Database

**Sharing data with content providers:** Share Data Through Content Providers

**Loading data using loaders:** Loaders

Permissions, Performance and Security, Firebase and AdMob, Publish!

**Course Outcomes:**

At the end of this Course the student will be able to

- By the end of the course, student will be able to write simple GUI applications, use built-in widgets and components, work with the database to store data locally, and much more.

**B.Tech II Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**20ACS24 - OPERATING SYSTEMS LABORATORY**

**(CSE)**

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

**Course Objectives:**

- To learn Unix commands and shell programming
- To implement various CPU Scheduling Algorithms
- To implement Process Creation and Inter Process Communication.
- To implement Deadlock Avoidance and Deadlock Detection Algorithms
- To implement Page Replacement Algorithms
- To implement File Organization and File Allocation Strategies

**List of Experiments**

1. Basics of UNIX commands
2. Write programs using the following system calls of UNIX operating system fork, exec, getpid, exit, wait, close, stat, opendir, readdir
3. Write C programs to simulate UNIX commands like cp, ls, grep, etc.
4. Shell Programming
5. Write C programs to implement the various CPU Scheduling Algorithms
6. Implementation of Semaphores
7. Implementation of Shared memory and IPC
8. Bankers Algorithm for Deadlock Avoidance
9. Implementation of Deadlock Detection Algorithm
10. Write C program to implement Threading & Synchronization Applications
11. Implementation of the following Memory Allocation Methods for fixed partition
12. First Fit b) Worst Fit c) Best Fit
13. Implementation of Paging Technique of Memory Management
14. Implementation of the following Page Replacement Algorithms **a)** FIFO **b)** LRU **c)** LFU

**Course Outcomes:**

At the end of this Course the student will be able to

- Analyze various scheduling algorithms. **L2**
- Understand deadlock, prevention and avoidance algorithms. **L3**
- Compare and contrast various memory management schemes. **L4**
- Understand the functionality of file systems. **L2**
- Perform administrative tasks on Linux Servers. **L3**
- Compare iOS and Android Operating Systems. **L4**

**B.Tech II Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**20ACS26 - DESIGN AND ANALYSIS OF ALGORITHMS LABORATORY**

**(CSE)**

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

**Course Objectives:**

1. Analyze the asymptotic performance of algorithms.
2. Write rigorous correctness proofs for algorithms.
3. Demonstrate a familiarity with major algorithms and data structures.
4. Apply important algorithmic design paradigms and methods of analysis.

**List of Experiments:**

1.Implement merge sort algorithm to sort a given set of elements and determine the time required to sort the elements

2.Sort a given set of elements using the quick sort method and determine the time required to sort the elements.

3.Sort a given set of elements using the Selection sort method and determine the time required to sort the elements

4.Implement Binary search method by Divide and Conquer.

5.Implement Knapsack problem using Greedy method.

6.Implement sum of subsets problem using Back Tracking.

7. Implement 0/1 Knapsack problem using Dynamic Programming.

8.Perform tree traversal algorithms for a given tree.

Preorder b) post order c) In order

9.Implement a) BFS and b) DFS methods of Graph.

10.Find Minimum Cost Spanning Tree of a given undirected graph using

a) Prim's algorithm

b) Krushkal's algorithm.

11. Implement All-Pairs Shortest Paths Problem

12. Implement N Queen's problem using Back Tracking.

**Course Outcomes:**

At the end of this Course the student will be able to

- Argue the correctness of algorithms using inductive proofs and invariants.(L2) **L2**
- Analyze worst-case running times of algorithms using asymptotic analysis.(L2) **L2**
- Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize divide-and-conquer algorithms. Derive and solve recurrences describing the performance of divide-and-conquer algorithms.(L3) **L3**

- Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize dynamic-programming algorithms, and analyze them.(L3) **L3**
- Describe the greedy paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize greedy algorithms, and analyze them.(L4) **L4**
- 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.(L5) **L5**
- 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.(L5) **L5**

**B.Tech II Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**20ACS28 - SOFTWARE ENGINEERING LABORATORY**

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

**Course Objectives:**

- To provide the idea of decomposing the given problem into Analysis, Desing, Implementation, Testing and Maintenance phases.
- To provide an idea of using various process models in the software industry according to given circumstances.
- To gain the knowledge of how Analysis, Design, Implementation, Testing and Maintenance processes are conducted in a software project.

**List of Experiments:**

1. Identifying the Requirements from Problem Statements.
2. Estimation of Project Metrics.
3. Modeling UML Use Case Diagrams and Capturing Use Case Scenarios.
4. E-R Modeling from the Problem Statements.
5. Identifying Domain Classes from the Problem Statements.
6. State chart and Activity Modeling.
7. Modeling UML Class Diagrams and Sequence diagrams.
8. Modeling Data Flow Diagrams.
9. Estimation of Test Coverage Metrics and Structural Complexity.
10. Designing Test Suites

**Course Outcomes:**

At the end of this Course the student will be able to

- 1. Students will be able to decompose the given project in various phases of a lifecycle. Knowledge, Understand (Leve1, Level2) **L1 L2**
- 2 .Students will be able to choose appropriate process model depending on the user requirements. Apply, Create (Level 2) **L2**
- 3 .Students will be able perform various life cycle activities like Analysis, Design, Implementation, Testing and Maintenance. Evaluate(Level 3) **L3**
- 4 .Students will be able to know various processes used in all the phases of the product. Analyze(Level 3) **L3**
- 5 .Students can apply the knowledge, techniques, and skills in the development of a software product. Apply (Level 3) **L3**

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**
**COLLEGE OF ENGINEERING (AUTONOMOUS), PULIVENDULA**

**B.Tech – IV / V Sem (R20)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 0 |

## APTITUDE AND REASONING SKILLS

(Common to CIVIL ,ME, EEE, ECE & CSE)

**Course Objectives**

- To equip students with aptitude and reasoning skills in order to help them succeed in competitive exams.
- To help students improve their knowledge of quantitative and reasoning skills, which in turn helps them comprehend and solve various mathematical problems in professional life.

### UNIT 1: Quantitative Aptitude 1:

Number Systems - HCF and LCM - Square Roots and Cube Roots – Averages - Problems on ages – Allegations – Percentages - Profit and loss - Logarithms – Progressions - Decimal Fractions - Simplification.

### UNIT 2: Reasoning 1:

Directions - Blood Relations - Series and Sequences - Odd man out.

### UNIT 3: Quantitative Aptitude 2:

Permutation and Combination - Ratio and Proportion and variation –Inequalities - Time and Work - Time and Distance - Pipes and Cisterns - Simple interest and Compound interest – Calendar - Clocks.

### UNIT 4: Quantitative Aptitude 3:

**Mensuration :** Area, Volume and Surface Areas
**Data Interpretation :** Tabulation, Line Graphs, Bar Graphs, Pie charts.

### UNIT 5: Reasoning 2:

Coding and Decoding - Data sufficiency-Logical deductions.

**Text Books:**


1. Quantitative Aptitude, R.S. Agarwal, S. Chand Publishers, New Delhi, 2012.
2. Verbal and Non-Verbal Reasoning, R.S.Agarwal, S.Chand Publishers, New Delhi, 2012.

**Reference Books:**


1. How to Prepare for Quantitative Aptitude, Arun Sharma, TMH Publishers, New Delhi, 2003.
2. IrnK.Wolf, Barron's GRE, Sharon Weiner-Green, Galgotia Publications, New Delhi, 2006.
3. More Puzzles, Shakuntala Devi, OPB, New Delhi, 2006.
4. Brain Teasers, Ravi Narula,Jaico Publishing House, New Delhi, 2005.
5. Puzzles and Teasers, George J Summers, Jaico Publishing House, Mumbai, 2005
6. Puzzles to Puzzle you, Shakuntala Devi , Orient Paper Backs Publishers(OPB), New Delhi, 2005.


**Course Outcomes:**

The student will be able to

- apply the knowledge of general mathematical models discussed to solve a variety of problems.
- read between the lines and understand various mathematical and reasoning concepts.
- demonstrate various principles involved in solving mathematical problems pertain to Quantitative functions.
- crack puzzles, decode information from charts and interpret their logical thinking in the aspects.

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

## 20AHS03 - UNIVERSAL HUMAN VALUES

**(Common to all branches)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 0 |

**Course Objectives:**

- Exposure to the value of life, society and harmony.
- Leading towards holistic perspective based on self-exploration about themselves (human being), family, and society and nature/existence.
- Bringing transition from the present state to Universal Human Order.
- Instill commitment and courage to act.
- Know about appropriate technologies and management patterns.

**UNIT –I : HUMAN VALUES** **12 Hrs**

Importance of UHV- Morals-Values –Ethics- definitions and differences-Integrity-Work Ethic-Service learning –Respect for others –Caring and Sharing – Honesty – self confidence-Courage-Co Operation –Commitment – Empathy –Character-Spirituality- Moral dilemmas.

**Learning Outcomes:**

At the end of this unit, the student will be able to

Understand the concept of morals, Ethics. **L1**

Able to analyse Moral dilemmas. **L2**

**UNIT – II: PERSONALITY DEVELOPMENT** **12 Hrs**

Concept Of Personality- Types-Determinants-Intrapersonal Skills-meaning-types- Techniques -Interpersonal Skills- meaning-types- Techniques-SWOT Analysis -Building Right Attitude.-Communication skills-Non Verbal Communication skills.

**Learning Outcomes:**

At the end of this unit, the student will be able to

Analysing SWOT. **L1**

Knowing about self personality. **L2**

**UNIT – III : ENGINEERING AS EXPERIMENTATION** **12 Hrs**

Engineering as an Experimentation-Engineers as Responsible Experimenters -Codes Of Ethics and Industrial Standards-Case Study: The Challenger-Confidentiality-Conflicts of Interests-Risk and Analysis methods-Safety and Safety Measures.

**Learning Outcomes:**

At the end of this unit, the student will be able to

Understand the concept of Ethics in industry. **L1**

Able to assesment safety standards. **L2**

**UNIT – IV : FAMILY AND SCOCIETY** **12 Hrs**

Family -Importance –Types-Functions-Influences and generation gap- Premarital counseling-Good family-Characteristics-Building a healthy family- Parents and Children -Honouring Parents-Society Definition—Types-Roles-Responsibilities-Social Evils-reasons-remedies.

**Learning Outcomes:**

At the end of this unit, the student will be able to

Development of a holistic perspective based on self-exploration about themselves. **L1**

Strengthening of self-reflection. **L2**

**UNIT – V : GLOBAL ISSUES** **12 Hrs**

Globalization: Globalization-MNCs-Technology-Cross culture issues- Environmental Ethics-Disasters- global pandemics-Computer Ethics and Net Etiquettes -Human and Employee Rights-Weapons Development -Ethics and Research-Intellectual Property Rights( IPR).

**Learning Outcomes:**

At the end of this unit, the student will be able to

Understand various cross culture issues. **L1**

Identifying Employee Rights. **L2**

**Text Books:**

**1. "Engineering Ethics" by Harris, Pritchard and Rabins, CENGAGE Learning, India Edition, 2009.**

**2. Engineering Ethics includes Human Values" by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd-2009.**

**3. "Ethics in Engineering" by Mike W. Martin and Roland Schinzinger – Tata McGrawHill– 2003.**

**4. "Professional Ethics and Morals" by Prof.A.R.Aryasri, Dharanikota Suyodhana Maruthi Publications.**

**5. "Professional Ethics and Human Values" by A.Alavudeen, R.Kalil Rahman and M.Jayakumaran- Laxmi Publications.**

**Reference Books:**

**1. "Indian Culture, Values and Professional Ethics" by PSR Murthy-BS Publication.**

**2. "Professional Ethics and Human Values" by Prof.D.R.Kiran.**

**Course Outcomes:**

At the end of this Course the student will be able to

- Define terms like Natural Acceptance, Happiness and Prosperity. **L1**
- Know about appropriate technologies and management patterns Understand awareness of oneself, and ones surroundings (family, society, nature). **L2**
- Apply what they have learnt to their own self in different day-to-day settings in real life. **L3**
- Relate human values with human relationship and human society. **L4**
- Justify the need for universal human values and harmonious existence. **L5**

**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**20ACS51-Computer Networks**

**(CSE)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:** The objectives of the course are to make the students learn about
Understand the basic concepts of Computer Networks.

Introduce the layered approach for design of computer networks.

Familiarize with the applications of Internet

Explore the network protocols used in Internet environment

Explain the format of headers of IP

**UNIT – I:** Computer Networks and the Internet
What is the Internet?, The Network Edge, The Network Core, Delay, Loss, and Throughput in Packet-Switched Networks, Protocol Layers and their Service Models, Networks under attack, History of Computer Networking and the Internet.

**Learning Outcomes:**
At the end of this unit, the student will be able to
Enumerate the hardware components of a computer network

List the layers of a Computer Network **L1**

Identify the performance metrics of a computer network **L1**

**UNIT – II:** Application Layer **L3**

Principles of Network Applications, The web and HTTP, File transfer: FTP, Electronic mail in the internet, DNS-The Internet's Directory Service, Peer-to-Peer Applications.

**Learning Outcomes:**
At the end of this unit, the student will be able to
Design new applications of a computer network

Analyze the application protocols **L6**

Extend the existing applications **L4**

**L2**

**UNIT – III:**Transport Layer
Introduction and Transport-Layer Services, Multiplexing and De-multiplexing, Connectionless Transport: UDP, Principles of Reliable Data transfer, Connection-Oriented Transport: TCP, Principles of Congestion Control, TCP Congestion Control.

**Learning Outcomes:**
At the end of this unit, the student will be able to
Design Congestion control algorithms

Select the appropriate transport protocol for an application **L6**

**L3**

Identify the transport layer services L3

**UNIT – IV:**The Network Layer
Introduction, Virtual Circuit and Datagram Networks, The Internet Protocol(IP): Forwarding and Addressing in the Internet, Routing Algorithms, Routing in the Internet, Broadcast and Multicast Routing.

**Learning Outcomes:**
At the end of this unit, the student will be able to
Compare routing algorithms L4

Design routing algorithms L6

Extend the existing routing protocols L2

**UNIT – V:** The Layer: Links, Access Networks, and LANs
Introduction to the Link Layer, Error-Detection and Correction Techniques, Multiple Access Links and Protocols, Switched Local Area Networks, Link Virtualization: A Network as a Link Layer, Data Center Networking, Retrospective: A Day in the Life of a Web Page Request.

**Learning Outcomes:**
At the end of this unit, the student will be able to
Compare medium access protocols L4

Classify the computer networks L2

Design a Data Centre for an organization L6

**Text Books:**

1. James F. Kurose, Keith W. Ross, "Computer Networking: A Top-Down Approach", 6th edition, Pearson, 2019.

**Reference Books:**

1. . Forouzan, "Datacommunications and Networking", 5th Edition, McGraw Hill Publication.
2. Andrew S.Tanenbaum, David j.wetherall, "Computer Networks", 5th Edition, PEARSON.
3. Youlu Zheng, Shakil Akthar, "Networks for Computer Scientists and Engineers", Oxford Publishers, 2016.

**Course Outcomes:**
At the end of this Course the student will be able to

- Identify the software and hardware components of a Computer network L3
- Develop new routing, and congestion control algorithms L3
- Assess critically the existing routing protocols L5
- Explain the functionality of each layer of a computer network L2
- Choose the appropriate transport protocol based on the application requirements L3

**B.Tech III Year I Semester**
**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**
**20ACS52--COMPILER DESIGN**
**(Common to CSE)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:** The objectives of the course are to make the students learn about
Teach the concept tsrelatedtoassemblers,loaders,linkersandeditors
Introducethebasicprinciplesofthecompilerconstruction
ExplaintheConceptofContextFree Grammars,ParsingandvariousParsingTechniques.
Exposetheprocessofintermediatecodegeneration.
InstructtheprocessofCodeGenerationandvariousCodeoptimizationtechniques.
ExplainneedofProgramverification

**UNIT – I: Overview of Compilation and Language:**
processing:Preprocessor-Compiler-assembler-interpreters-pre-processors-linkers and loaders-structure of a compiler- Phases of Compilation-Lexical Analysis, Regular Grammar and regular expression for common programming languagefeatures,passandPhases oftranslation,interpretation, bootstrapping.

**Learning Outcomes:**
At the end of this unit, the student will be able to
To realize basics of compiler design and apply for real time applications. **L1**
To introduce different translation languages. **L2**

**UNIT – II: Top down Parsing & Bottom up Parsing :**
**Top down Parsing:** Context-free grammars, Top down parsing-Backtracking,LL(1) ,recursivedescentparsing,Predictiveparsing,Preprocessingstepsrequiredforpredictiveparsing.
**Bottomup Parsing:**Shift Reduce parsing, LR and LALR parsing, Error recovery in parsing,handlingambiguousgrammar.

**Learning Outcomes:**
At the end of this unit, the student will be able to
To understand the importance of code optimization. **L2**
To know about compiler generation tools and techniques. **L3**

**UNIT – III:Semantic analysis:**
Intermediateforms of source Programs-abstract syntax tree, polishnotationand three address codes. Attributed grammars, Syntax directed translation, Conversion of popularProgramminglanguages,languageConstructsintoIntermediate codeforms,Typechecker.

**Learning Outcomes:**
At the end of this unit, the student will be able to
To learn working of compiler and non compiler applications. **L3**
Design a compiler for a simple programming language. **L4**

**UNIT – IV: Symbol Tables & Intermediate code Generation & Code optimization**

**SymbolTables:**Symboltableformat,organizationforblockstructureslanguages,hashing,treestructuresrepresentationofscopeinformation.
**IntermediatecodeGeneration:**Intermediatelanguages,Declarations,Assignmentstatements,Booleanexpressions,Backpatching.
**Codeoptimization:**Considerationfor Optimization,Scope of Optimization,localoptimization,loopoptimization,frequencyreduction,constantfolding,DAGrepresentation.
**Learning Outcomes:**
At the end of this unit, the student will be able to
Able to understand the symbol tables
Able to understand the intermediate code generation **L5**

**UNIT – V: Data flow analysis & Object code generation** **L5**
**Dataflowanalysis:**Flowgraph,dataflowequation,globaloptimization,redundantsubexpressionelimination,Inductionvariableelements,Live variableanalysis,Copypropagation.
**Objectcodegeneration:**Objectcodeforms,machinedependentcodeoptimization,registerallocationandassignment,DAGforregisterallocation.
**Learning Outcomes:**
At the end of this unit, the student will be able to
Ability to understand and data flow analysis.
Ability to understand the object code generation. **L5**

**Text Books:** **L6**

1. Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman (2007), Compilers Principles, Techniques and Tools, 2nd edition, Pearson Education, New Delhi, India.

**Reference Books:**

1. Alfred V. Aho, Jeffrey D. Ullman (2001), Principles of compiler design, Indian student edition, Pearson Education, New Delhi, India.
2. "Kenneth C. Louden (1997), Compiler Construction– Principles and Practice, 1st edition, PWS Publishing.

**Course Outcomes:**
At the end of this Course the student will be able to
To realize basics of compiler design and apply for real time applications. **L1**
To introduce different translation languages. **L2**
To understand the importance of code optimization. **L3**
To know about compiler generation tools and techniques.. **L4**
To learn working of compiler and non compiler applications. **L5**
Design a compiler for a simple programming language. **L6**

**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**20ACS53-Artificial Intelligence**

**(CSE)**

| L | T | P | C |
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| 3 | 0 | 0 | 3 |

**Course Objectives:**

- This course is designed to:
- Define Artificial Intelligence and establish the cultural background for study
- Understand various learning algorithms
- Explore the searching and optimization techniques for problem solving
- Provide basic knowledge on Natural Language Processing and Robotics

**UNIT – I:**

What is AI, Foundations of AI, History of AI, The State of Art.

**Intelligent Agents:** Agents and Environments, Good Behaviour: The Concept of Rationality, The Nature of Environments, The Structure of Agents.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Recognize the importance of Artificial Intelligence **L1**
- Identify how intelligent agent is related to its environment **L2**
- Build an Intelligent agent **L3**

**UNIT – II**

**Solving Problems by searching:** Problem Solving Agents, Example problems, Searching for Solutions, Uninformed Search Strategies, Informed search strategies, Heuristic Functions, Beyond Classical Search: Local Search Algorithms and Optimization Problems, Local Search in Continues Spaces, Searching with Nondeterministic Actions, Searching with partial observations, online search agents and unknown environments.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain how an agent can formulate an appropriate view of the problem it faces. **L2**
- Solve the problems by systematically generating new states **L3**
- Derive new representations about the world using process of inference **L5**

**UNIT – III: 8hrs**

**Reinforcement Learning:** Introduction, Passive Reinforcement Learning, Active Reinforcement Learning, Generalization in Reinforcement Learning, Policy Search, applications of RL 10 Page Natural Language Processing: Language Models, Text Classification, Information Retrieval, Information Extraction.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Examine how an agent can learn from success and failure, reward and punishment. **L5**
- Develop programs that make queries to a database, extract information from texts, and retrieve relevant documents from a collection using Natural Language Processing. **L6**

**UNIT–IV:**

**Natural Language for Communication:** Phrase structure grammars, Syntactic Analysis, Augmented Grammars and semantic Interpretation, Machine Translation, Speech Recognition Perception: Image Formation, Early Image Processing Operations, Object Recognition by appearance, Reconstructing the 3D World, Object Recognition from Structural information, Using Vision.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Develop programs that translate from one language to another, or recognize spoken words. **L6**
- Explain the techniques that provide robust object recognition in restricted context. **L2**
-

**UNIT – V:**

**Robotics:** Introduction, Robot Hardware, Robotic Perception, Planning to move, planning uncertain movements, Moving, Robotic software architectures, application domains Philosophical foundations: Weak AI, Strong AI, Ethics and Risks of AI, Agent Components, Agent Architectures, Are we going in the right direction, What if AI does succeed.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the role of Robot in various applications. . **L2**
- List the main philosophical issues in AI. **L1**

**Text Books:**

1. Stuart J.Russell, Peter Norvig, "Artificial Intelligence A Modern Approach", 3rd Edition, Pearson Education, 2019.

**Reference Books:**

1. Nilsson, Nils J., and Nils Johan Nilsson. Artificial intelligence: a new synthesis. Morgan Kaufmann, 1998.
2. Johnson, Benny G., Fred Phillips, and Linda G. Chase. "An intelligent tutoring system for the accounting cycle: Enhancing textbook homework with artificial intelligence." Journal of Accounting Education 27.1 (2009): 30-39.

**Course Outcomes:**

At the end of this Course the student will be able to

- Apply searching techniques for solving a problem (L3) **L3**
- Design Intelligent Agents (L6) **L6**
- Develop Natural Language Interface for Machines (L6) **L6**
- Design mini robots (L6) **L6**
- Summarize past, present and future of Artificial Intelligence (L5) **L5**

**III B.Tech I SEMESTER**
**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**
**20ACS54A-BIG DATA ANALYTICS**
**(Professional Elective-I)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**
1. Master the concepts of HDFS and Map Reduce framework.
2. Understand Hadoop Architecture.
3. Setup Hadoop Cluster and write Complex Map Reduce programs.
4. Perform Data Analytics using Hive.
5. Implement HBase and Map Reduce Integration.
6. Implement best Practices for Hadoop Development.
7. They will understood about R analytics Based on big data.

**UNIT – 1:** Introduction to Big Data
**Hrs**
What is Big Data. Why Big Data is Important. Meet Hadoop. Data. Data Storage and Analysis. Comparison with other systems. Grid Computing. A brief history of Hadoop. Apache hadoop and the Hadoop EcoSystem. Linux refresher; VMWare Installation of Hadoop.
**Learning Outcomes:**
At the end of this unit, the student will be able to
- Student will be able to know where the Big data is used and its importance. **L2**
- Students will be able to know how the Big data will be handled and its problems. **L2**

**UNIT – II:** The design of HDFS
**Hrs**
HDFS concepts. Command line interface to HDFS.Hadoop File systems. Interfaces. Java Interface to Hadoop. Anatomy of a file read. Anatomy of a file writes. Replica placement and Coherency Model. Parallel copying with distcp, Keeping an HDFS cluster balanced.
**Learning Outcomes:**
At the end of this unit, the student will be able to
- Students will be able to learn the importance of Hadoop. **L2**
- Students will be able to know about Doug Cutting and how the Hadoop came into existence. **L3**

**UNIT – III:**
**Hrs**
Introduction. Analyzing data with unix tools. Analyzing data with hadoop. Java MapReduce classes (new API). Data flow, combiner functions, Running a distributed MapReduce Job. Configuration API. Setting up the development environment. Managing configuration. Writing a unit test with MRUnit. Running a job in local job runner. Running on a cluster.Launching a job. The MapReduce WebUI.
**Learning Outcomes:**
At the end of this unit, the student will be able to
- Students will be able to know about Doug Cutting and how the Hadoop came into existence. **L3**

- Student will be able to know about HDFS, MapReduce and Hadoop releases. **L4**

**UNIT – IV:**

Classic Mapreduce. Job submission. Job Initialization. Task Assignment. Task execution .Progress and status updates. Job Completion. Shuffle and sort on Map and reducer side. Configuration tuning. Map Reduce Types. Input formats. Output formats, Sorting. Map side and Reduce side joins.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Student will be able to know about HDFS, MapReduce and Hadoop releases. **L3**
- Students will be able to know how to write a program in Hadoop **L4**

**UNIT – V:** The Hive Shell

Hive services. Hive clients. The meta store. Comparison with traditional databases. Hive Ql. Hbasics. Concepts. Implementation. Java and Map reduce clients. Loading data, web queries.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Students will be able to know how to write a program in Hadoop **L4**
- Students will be able to know how Map and Reduce done in Hadoop **L5**
- Students will be able to know how to view information about jobs in web browser **L5**

**Text Books:**

1. Tom White, Hadoop,"The Definitive Guide", 3rd Edition, O'Reilly Publications, 2012.
2. Dirk deRoos, Chris Eaton, George Lapis, Paul Zikopoulos, Tom Deutsch ,"Understanding Big Data Analytics for Enterprise Class Hadoop and Streaming Data", 1st Edition, TMH,2012.

**Reference Books:**

1. Hadoop for Dummies by Dirk deRoos ,Paul C.Zikopoulos,Roman B.MelnyK,Bruce Brown,Rafael Coss

**Course Outcomes:**

At the end of this Course the student will be able to

- Student will be able to know where the Big data is used and its importance. **L2**
- Students will be able to know how the Big data will be handled and its problems. **L3**
- Students will be able to learn the importance of Hadoop. **L3**
- Students will be able to know about Doug Cutting and how the Hadoop came into existence. **L4**
- Student will be able to know about HDFS, MapReduce and Hadoop releases. **L3**
- Students will be able to know how to write a program in Hadoop **L5**
- Students will be able to know how Map and Reduce done in Hadoop **L5**
- Students will be able to know how to view information about jobs in web browser **L6**

**III B.Tech I SEMESTER**
**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**
**20ACS54B-DATA MINING**
**(Professional Elective-I)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- Discuss classification algorithms learn how data is grouped using clustering techniques. To develop the abilities of critical analysis to data mining systems and applications.
- To implement practical and theoretical understanding of the technologies for data mining

To understand the strengths and limitations of various data mining models;.

**UNIT – 1: Introduction to Data Mining**

Introduction, What is Data Mining, Definition, KDD, Challenges, Data Mining Tasks, Data Preprocessing, Data Cleaning, Missing data, Dimensionality Reduction, Feature Subset Selection, Discretization and Binaryzation, Data Transformation; Measures of Similarity and Dissimilarity- Basics.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand what Is Data Mining, what kinds of data can be mined, what kinds of patterns can be mined, and what kinds of applications are targeted. **L2**
- Explain major Issues in data mining. **L2**

**UNIT – II: Association Rules**

Problem Definition, Frequent Item Set Generation, The APRIORI Principle, Support and Confidence Measures, Association Rule Generation; APRIOIRI Algorithm, The Partition Algorithms, FP-Growth Algorithms, Compact Representation of Frequent Item Set- Maximal Frequent Item Set, Closed Frequent Item Set.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Apply Association rules in data mining applications. **L3**
- Ability to identify the association rules, classification and clusters in large data sets. **L2**

**UNIT – III: Classification**

Problem Definition, General Approaches to solving a classification problem , Evaluation of Classifiers , Classification techniques, Decision Trees-Decision tree Construction , Methods for Expressing attribute test conditions, Measures for Selecting the Best Split, Algorithm for Decision tree Induction ; Naive-Bayes Classifier, Bayesian Belief Networks; K- Nearest neighbor classification-Algorithm and Characteristics.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Ability to classify web pages, extracting knowledge from the web **L1**
- Ability to classify the algorithms and Characteristics **L2**

**UNIT – IV: Clustering**

Problem Definition, Clustering Overview, Evaluation of Clustering Algorithms, Partitioning Clustering-K-Means Algorithm,. Hierarchical Clustering-Agglomerative Methods and divisive methods, Density based Clustering.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Ability to identify the problem definition L2
- Ability to use the clustering algorithms L3

**UNIT – V: Web and Text Mining**

Introduction, web mining, web content mining, web structure mining, we usage mining, Text mining –unstructured text, episode rule discovery for texts, hierarchy of categories, text clustering.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Ability to classify web pages, extracting knowledge from the web L3
- Ability to solve real world problems in business and scientific information using data mining L3

**Text Books:**

1. Data Mining- Concepts and Techniques- Jiawei Han, Micheline Kamber, Morgan Kaufmann Publishers,Elsevier, 2 Edition, 2006.
2. Introduction to Data Mining, Pang-Ning Tan, Vipin Kumar, Michael Steinbanch, Pearson Education.
3. Data mining Techniques and Applications

**Reference Books:**

1. Data Mining Techniques, Arun K Pujari, 3rd Edition, Universities Press.
2. Data Mining Principles & Applications – T.V Sveresh Kumar, B.Esware Reddy, Jagadish S Kalimani, Elsevier.
3. Data Mining, Vikaram Pudi, P Radha Krishna, Oxford University Press

**Course Outcomes:**

At the end of this Course the student will be able to

- Ability to identify the association rules, classification and clusters in large data sets. L2
- Ability to solve real world problems in business and scientific information using data mining L3
- Ability to classify web pages, extracting knowledge from the web L4

**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**20ACS54C-Data Visualization with Python**

**(Professional Elective-I)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:** The objectives of the course are to make the students learn about

- Learn the fundamentals of Python's Matplotlib library and its main features.
- Customize objects in Matplotlib.
- Understand the different plot types available.
- Create multiple plots in Matplotlib

**UNIT – I: Python Introduction:**

Python: Introduction to Python,Numbers, Strings, Lists, Tuples, Dictionary, Type Conversions- Control Flow,Functions,Modules, Packages,File Handling.

**Learning Outcomes:**

At the end of this unit, the student will be able to

To realize basics of python. **L1**

To introduce different packages. **L2**

**UNIT – II: Jupyter Notebook**

How to Install, Introduction to Jupyter Notebook, Python scripting basics, Numpy and Pandas.

**Learning Outcomes:**

At the end of this unit, the student will be able to

To understand the installation process. **L2**

To know about Python scripting basics. **L3**

**UNIT – III:Data Visualization Tools in Python**

Introduction to Matplotlib, Basic plots using matplotlib, Specialized Visualization Tools using Matplotlib, Advanced Visualization Tools using MatplotlibWaffle Charts, Word Clouds.

**Learning Outcomes:**

At the end of this unit, the student will be able to

To know about the Matplotlib. **L6**

Gain knowledge on Word Clouds **L3**

**UNIT – IV:Seabron**

Introduction to Seaborn: Seaborn functionalities and usage, Spatial Visualizations and Analysis in Python with Folium, Case Study.

**Learning Outcomes:**

At the end of this unit, the student will be able to

To know about Spatial Visualizations and Analysis in Python **L4**

Design a seabron **L6**

**UNIT – V: Dashboard**

Dashboard creation using the Plotly library. Create a dashboard with a theme US Domestic Airline Flights Performance, US airline reporting carrier on-time performance dataset, Plotly, and Dash concepts.

**Learning Outcomes:**

At the end of this unit, the student will be able to

Design a Dash board **L4**

Classify the Data sets **L2**

**Text Books:**

1. Core Python Programming - Second Edition, R. Nageswara Rao, Dreamtech Press.

2. R Graphics Essentials for Great Data Visualization by Alboukadel Kassambara.

**Reference Books:**

. 1.https://www.coursera.org/learn/python-for-data-visualization#syllabus

**Course Outcomes:**

At the end of this Course the student will be able to

- Apply statistical methods for Data visualization **L3**
- Gain knowledge on Python **L3**
- Understand usage of various packages in Python. **L5**
- Demonstrate knowledge of Matplotlib, Seaborns and Dash board creation. **L2**
- Apply data visualization tools on various data sets. **L3**

**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**20ACS50-Web Technologies**

**(Skill Oriented Course)**

| L | T | P | C |
|---|---|---|---|
| 1 | 0 | 2 | 2 |

**Experiments:**

1. Introduction
2. Installation & Architecture
3. Creating a react application
4. JSX
5. Components
6. Styling
7. Properties(Prop)
8. Event Management
9. State Management
10. Http client programming
11. Routing
12. Redux
13. Animation
14. Testing

References

https://www.tutorialspoint.com/reactjs/index.htm

**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**20ACS57-Computer Networks Lab**

**(CSE)**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 3 | 1.5 |

**Experiments:**

1. StudyofdifferenttypesofNetworkcablesandPracticallyimplementthecross-wiredcableandstraightthroughcableusingclampingtool.
2. Study of Network Devices in Detail.
3. Study of network IP.
4. Connect the computers in Local Area Network.
5. Study of basic network command and Network configuration commands.
6. Configure a Network topology using packet tracer software.
7. Configure a Network topology using packet tracer software.
8. Configure a Network using Distance Vector Routing protocol.
9. Configure Network using Link State Vector Routing protocol.
10. Configuring Static and Default Routes
11. Configuring RIP
12. Planning Network-based Firewalls
13. Configuring a Cisco Router as a DHCP Server

**Course Outcomes:**

At the end of this Course the student will be able to

- Identify various components of computer and their interconnection. L3
- Identify basic Networking IP. L3
- To know the networking topology commands . L5
- To know about the Configuring a Cisco Router as a DHCP Server. L2
- To know the Configuring RIP. L3

**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**20ACS58-ARTIFICIAL INTELLIGENCE LABORATORY**

**(CSE)**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 3 | 1.5 |

**Objectives:**

Explore the methods of implementing algorithms using artificial intelligence techniques

Illustrate search algorithms

Demonstrate building of intelligent agents

**Experiments:**

1.Write a program to implement DFS and BFS
2.Write a Program to find the solution for travelling salesman Problem
3.Write a program to implement Simulated Annealing Algorithm
4.Write a program to find the solution for wampus world problem
5.Write a program to implement 8 puzzle problem
6.Write a program to implement Towers of Hanoi problem
7.Write a program to implement A* Algorithm
8.Write a program to implement Hill Climbing Algorithm
9.Build a Chatbot using AWS Lex, Pandora bots.
10.Build a bot which provides all the information related to your college.
11.Build a virtual assistant for Wikipedia using Wolfram Alpha and Python
12.The following is a function that counts the number of times a string occurs in another string:

```
# Count the number of times string s1 is found in string s2
def countsubstring(s1,s2):
count = 0
for i in range(0,len(s2)-len(s1)+1):
 if s1 == s2[i:i+len(s1)]:
count += 1
return count
```

For instance, countsubstring('ab','cabalaba') returns 2.
Write a recursive version of the above function. To get the rest of a string (i.e. everything but the first character).
13.Higher order functions. Write a higher-order function count that counts the number of elements in a list that satisfy a given test. For instance: count(lambda x: x>2, [1,2,3,4,5]) should return 3, as there are three elements in the list larger than 2. Solve this task without using any existing higher-order function.

14.Brute force solution to the Knapsack problem. Write a function that allows you to generate random problem instances for the knapsack program. This function should generate a list of items containing N items that each have a unique name, a random size in the range 1 ..... 5 and a random value in the range 1 ..... 10.

Next, you should perform performance measurements to see how long the given knapsack solver take to solve different problem sizes. You should peform atleast 10 runs with different randomly generated problem instances for the problem sizes 10,12,14,16,18,20 and 22. Use a backpack size of 2:5 x N for each value problem size N. Please note that the method used to generate random numbers can also affect performance, since different distributions of values can make the initial conditions of the problem slightly more or less demanding. How much longer time does it take to run this program when we increase the number of items? Does the backpack size affect the answer? Try running the above tests again with a backpack size of 1 x N and with 4:0 x N.

15.Assume that you are organising a party for N people and have been given a list L of people who, for social reasons, should not sit at the same table. Furthermore, assume that you have C tables (that are infinitly large).

Write a function layout(N,C,L) that can give a table placement (ie. a number from 0 : : :C -1) for each guest such that there will be no social mishaps.

For simplicity we assume that you have a unique number 0 .....N-1 for each guest and that the list of restrictions is of the form [(X,Y), ...] denoting guests X, Y that are not allowed to sit together. Answer with a dictionary mapping each guest into a table assignment, if there are no possible layouts of the guests you should answer False.

**Reference Books:**


1. 1.Tensorflow: https://www.tensorflow.org/
2. Pytorch: https://pytorch.org/ https://github.com/pytorch
3. Keras: https://keras.io/ https://github.com/keras-team
4. Theano: http://deeplearning.net/software/theano/ https://github.com/Theano/Theano
5. Cafee2: https://caffe2.ai/ https://github.com/caffe2
6. Deeplearning4j: https://deeplearning4j.org/
7. Scikit-learn:https://scikit-learn.org/stable/ https://github.com/scikit-learn/scikit-learn
8. Deep Learning.Ai: https://www.deeplearning.ai/
9. OpenCv: https://opencv.org/ https://github.com/qqwweee/keras-yolo3
10. YOLO: https://www.pyimagesearch.com/2018/11/12/yolo-object-detection-with-opencv/ nVIDIA:CUDA https://developer.nvidia.com/cuda-math-library
11. David Poole, Alan Mackworth, Randy Goebel, "Computational Intelligence : a logical approach", Oxford University Press, 2004.
12. G. Luger, "Artificial Intelligence: Structures and Strategies for complex problem solving", Fourth Edition, Pearson Education, 2002.
13. J. Nilsson, "Artificial Intelligence: A new Synthesis", Elsevier Publishers, 1998.
14. Artificial Neural Networks, B. Yagna Narayana, PHI
15. Artificial Intelligence , 2nd Edition, E.Rich and K.Knight, TMH.
16. Artificial Intelligence and Expert Systems, Patterson, PHI.

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| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 0 |

# Constitution of India

## Course Objectives:

1. To enable the student to understand the importance of constitution.
2. To understand philosophy of fundamental rights and duties.
3. To understand the structure of executive, legislature and judiciary.
4. To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and election commission of India.
5. To understand the central and state relation financial and administrative.

## UNIT-I

Introduction to Indian Constitution: Constitution' meaning of the term, Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

**Learning Outcomes:**

At the end of this unit students will be able to:

1. Understand the concept of Indian constitution.
2. Apply the knowledge on directive principle of state policy.
3. Analyze the History, features of Indian constitution.
4. Evaluate Preamble Fundamental Rights and Duties.

## UNIT-II

Democratic forms of Constitution, Union Government and its Administration Structure of the Indian Union: Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions;

**Learning Outcomes:**

At the end of this unit students will be able to:

1. Understand the structure of Indian government.
2. Differentiate between the state and central government.
3. Explain the role of President and Prime Minister.
4. Know the Structure of supreme court and High court.

## UNIT-III

Federalism, Political relations, Financial relations of State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organisation, Structure and Functions.

**Learning Outcomes:**

At the end of this unit students will be able to:

1. Understand the structure of state government.
2. Analyze the role Governor and Chief Minister.
3. Explain the role of state Secretariat.
4. Differentiate between structure and functions of state secrateriate.

## UNIT-IV

A. Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation PachayatiRaj: Functions PRI: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy.

**Learning Outcomes:**

At the end of this unit students will be able to:

1. Understand the local Administration.
2. Compare and contrast district administration role and importance.
3. Analyze the role of Myer and elected representatives of Municipalities.
4. Evaluate Zilla panchayat block level Organisation.

## UNIT-V

Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate , State Election Commission, Supreme Court, High Court.

**Learning Outcomes:**

At the end of this unit students will be able to:

1. Know the role of Election Commission apply knowledge.
2. Contrast and compare the role of Chief Election commissioner and Commissiononerate.
3. Analyze role of state election commission.
4. Evaluate various commissions of viz SC/ST/OBC and women.

## REFERENCES:


1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd.. New Delhi.
2. Subash Kashyap, Indian Constitution, National Book Trust.
3. J.A. Siwach, Dynamics of Indian Government & Politics.
4. D.C. Gupta, Indian Government and Politics.
5. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication.
6. J.C. Johari, Indian Government and Politics Hans.


## Course Outcomes:

1. Understand historical background of the constitution making and its importance for building a democratic India.
2. Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
3. Understand the value of the fundamental rights and duties for becoming good citizen of India.
4. Analyze the decentralization of power between central, state and local self-government.
5. Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.
6. Know the sources, features and principles of Indian Constitution.
7. Learn about Union Government, State government and its administration.
8. Get acquainted with Local administration and Pachayati Raj.
9. Be aware of basic concepts and developments of Human Rights.
10. Gain knowledge on roles and functioning of Election Commission.

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech. V-Sem (R20)

FUZZY SET THEORY, ARITHMETIC AND LOGIC

(Open Elective -I)

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:** This course aims at providing

- the basic knowledge to understand Fuzzy set theory and Arithmetic. and
- Logic, related to a real word problems of engineering, Science etc.

**UNIT – 1: Classical (Crisp) Sets To Fuzzy Sets & Fuzzy Sets Versus Crisp Sets:** **9 Hrs**

**Classical (Crisp) Sets To Fuzzy Sets:**

Introduction: Crisp Sets: An Overview, Fuzzy Sets: Basic Types, Fuzzy Sets: Basic Concepts.

**Fuzzy Sets Versus Crisp Sets:**

Alpha -Cuts :Additional Properties of alpha -Cuts, Representations of Fuzzy Sets, Extension Principle for Fuzzy Sets.

**Learning Outcomes:**

At the end of this unit, the student will be able to

| | |
|---|---|
| • The basic concepts of Sets and Fuzzy sets | L2 |
| • Analyze the Fuzzy Sets Versus Crisp Sets | L3 |

**UNIT – II: Operations On Fuzzy Sets:**

Types of Operations, Fuzzy Complements, Fuzzy Intersections: t-Norms.

Fuzzy Unions: t-Conorms ,Combinations of Operations, Aggregation Operations.

**Learning Outcomes:**

At the end of this unit, the student will be able to

| | |
|---|---|
| • Do some operations on Fuzzy sets | L2 |
| • Assess t-Norms Fuzzy Unions | L3 |

**UNIT – III: Fuzzy Arithmetic & Fuzzy Relations :**

**Fuzzy Arithmetic :**

Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals, Arithmetic Operations on Fuzzy Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations.

**Fuzzy Relations:**

Crisp versus Fuzzy Relations, Projections and Cylindric Extensions, Binary Fuzzy Relations,

Binary Relations on a Single Set, Fuzzy Equivalence Relations, Fuzzy Compatibility Relations, Fuzzy Ordering Relations.

**Learning Outcomes:**

At the end of this unit, the student will be able to

| | |
|---|---|
| • Perform arithmetic operations on Fuzzy numbers and equations. | L2 |
| • Analyze Fuzzy Relations, Projections and Cylindric Extensions etc. | L3 |

| | |
|---|---|
| **UNIT – IV: Fuzzy Relation Equations & Possibility Theory:** | |
| **Fuzzy Relation Equations:**<br>General Discussion ,Problem Partitioning ,Solution Method.<br>**Possibility Theory:**<br>Fuzzy Measures, Evidence Theory, Possibility Theory, Fuzzy Sets and Possibilty Theory, Possibility Theory versus Probability Theory. | |
| **Learning Outcomes:** | |
| At the end of this unit, the student will be able to | |
| • Solve Fuzzy relation equations. | L3 |
| • Analyze Possibility Theory. | L4 |
| | |
| **UNIT – V: Fuzzy logic:** | |
| Classical Logic: An Overview, Multi-valued Logics, Fuzzy Propositions, Fuzzy Quantifiers, Linguistic Hedges, Inference from Conditional Fuzzy Propositions, Inference from Conditional and Qualified Propositions, Inference from Quantified Propositions. | |
| **Learning Outcomes:** | |
| At the end of this unit, the student will be able to | |
| • Understand the Fuzzy logic. | L1 |
| • Analyze the Inferences from Conditional, Qualified, and Quantified Propositions. | L4 |
| | |
| **Text Books:** | |
| 1. Fuzzy Sets and Fuzzy Logic, Geoge J. Klir and Bo Yuan | |
| | |
| | |
| **Reference Books:** | |
| 1. Fuzzy Mathematical Models in Engineering and Management Science, A. Kaufmann and M.M. Gupta | |
| 2. Fuzzy Logic, Timothy J. Ross | |
| 3. Fuzzy Set Theory, H.J. Zimmermann | |
| 4. Introduction to Fuzzy Logic and Fuzzy Sets, J.J. Buckley and E. Eslami | |
| | |
| **Course Outcomes:** | |
| At the end of this Course the student will be able to | |
| • Understand the basic concepts of Fuzzy sets and logic. | **L1** |
| • Do some operations of Fuzzy sets. | **L2** |
| • Solve Fuzzy relation equations. | **L3** |
| • Analyze the Inferences from Conditional, Qualified, and Quantified Propositions. | **L4** |
| • analyze the real word problem through the technique of Fuzzy set theory and logic to have better insight of the real word problems. | **L5** |

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA
DEPARTMENT OF PHYSICS
III B.TECH – I SEMESTER-R20 (Open elective-Interdisciplinary) –OE-ID.1(THEORY)

## FUNCTIONAL NANOMATERIALS FOR ENGINEERS
(Common to all branches)

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- Be able to describe the terminology and basics of smart materials and smart systems
- Be able to understand the classification and applications of smart materials.
- Be able to understand the use of appropriate materials for energy applications.
- Be able to identify appropriate techniques for understanding the mechanisms of nanosensors
- Be able to explain the concepts of self-assembling monolayers and their applications

### UNIT-I: INTRODUCTION TO FUNCTIONAL /SMART NANOMATERIALS — 9 Hrs

Introduction:-Nanomaterials and their importance (in brief), Functional/ Smart Nanomaterials, – (Hydrogels, Carbon nanotubes) and their Functionalization techniques, Properties of Smart materials (Sensing materials, Actuation materials, Self-detection, Self-corrective, self-healing, Shock Absorbers)- Components of smart systems (Sensor :- Data Acquisition, Data Transmission; Command and control unit, Actuator:- Data Instructions, Action Devices)

**Learning Outcomes:**

At the end of this unit, the student will be able to

| | |
|---|---|
| • **Understand** the basic properties and functionalization of smart nanomaterials | **L1** |
| • **Explain** the need of functional/smart nanomaterials for advanced tecghnology | **L2** |
| • **Identify** engineering applications of sensors | **L3** |
| • **Analyze** the sensing, control and detection mechanism in smart nanomaterials | **L4** |
| • **Illustrate** the components of smart systems | **L2** |

### UNIT-II: CLASSIFICATION AND APPLICATIONS — 9 Hrs

Introduction, Classification of smart materials (piezoelectric, electrostrictive, Magnetostrictive, Thermoresponsive and Electrochromic), Shape Memory Alloys and their working principle, Applications of smart materials in Aircrafts, Medicine, Robotics,Smart fabrics, Sporting goods and smart glass, Merits and de-merits of smart materials.

**Learning Outcomes:**

At the end of this unit, the student will be able to

| | |
|---|---|
| • **Classify** smart materials based on electrical, magnetic and thermal characteristics | **L1** |
| • **Understand** the basic concepts and working principle of memory alloys | **L2** |
| • **Identifies** the Engineering applications of smart materials | **L2** |
| • **Apply** the concepts to Aircrafts, Medicine and Robotic fields | **L3** |
| • **Identify** the Merits and demerits of smart materials in engineering field | **L2** |

### Unit-III NANOSENSORS — 9 Hrs

Introduction, Principle of nanosensors, Types of nanosensors (Physicalnanosensors – *Pressure, Force, Mass, Displacement*, Optical nanosensors – *Proximity, Ambient light*, Chemical nanosensors- *Chemical composition, Molecular concentration*).Applications of nanosensors (Medicine, Aerospace, Communication, Structural Engineering).

**Learning Outcomes:**

At the end of this unit, the student will be able to

| | |
|---|---|
| • **Explain** the working principle and concept of nanosensors | L1 |
| • **Classify** the nanosensors based on their working principle and application | L2 |
| • **Summarize** various types of nanosensors | L2 |
| • **Explain** the applications of nanosensors in various fields | L2 |
| • **Apply** the concept of nanosensors in Medicine, Aerospace, Communication, Structural Engineering fields | L3 |

**UNIT-IV: SELF-ASSEMBLING MONO LAYERS** **9Hrs**

Introduction, principles of self-assembly, monolayers, Characteristics of Self assembled monolayers (SAMs), Types of SAMs, Factors influencing Monolayer order, Methods of preparation of SAMs(Langmuir- Boldgett film :Mechanism, Experimental arrangement, Assembly, Advantages and disadvantages of LB films) patterning of SAMs (Locally attract, Locally remove, Modify tail group).Applications (Self-cleaning and moisture repellent).

**Learning Outcomes:**

At the end of this unit, the student will be able to

| | |
|---|---|
| • **Explain** the concept of self-assembling | L1 |
| • **Understand** the significance of molecular layers | L2 |
| • **Explain** the concept of Langmuir- Boldgett film preparation | L2 |
| • **Explain** the important factors influencing Monolayer order | L2 |
| • **Classify** the materials based on patterning of SAMs | L2 |
| • **Apply** the concept of Self-cleaning and moisture repellent | L3 |

**UNIT-V: NANOMATERIALS FOR ENERGY APPLICATIONS** **9Hrs**

Introduction, **Solar Cells** (Silicon Solar Cells, Thin film Solar Cells, Organic Solar Cells, Polymer solar cells) Working Principle, Efficiency estimation and advantages. **HydrogenFuel Cells** – Working Principle, Configuration, Assembly of fuel cell, Water **splitting** – $H_2$ Production, Photocatalytic process.

**Learning Outcomes:**

At the end of this unit, the student will be able to

| | |
|---|---|
| • **Explain** the concept of solar cell | L1 |
| • **Classify** the solar cells based on manufacturing material | L2 |
| • **Explain** the construction and working principle of solar cell | L2 |
| • **Interpret** the efficiency and advantages in various solar cells | L2 |
| • **Explain** the construction and working principle of hydrogen cells | L2 |
| • **Identify** applications of water splitting for $H_2$ production | L2 |
| • **Explain** the photocatalytic process | L2 |

**Text Books:**


1. YaserDahman, Nanotechnology and Functional Materials for Engineers-, Elsevier, 2012
2. E. Zschech,C. Whelan, T. Mikolajick, Materials for Information Technology: Devices, Interconnects and Packaging Springer-Verlag London Limited 2005.


**Reference Books:**


1. Gauenzi,P.,Smart Structures, Wiley, 2009.
2. MahmoodAliofkhazraei, Handbook of functional nanomaterials,-Vol (1&2), Nova Publishers, 2014.

| Course Outcomes: | |
|---|---|
| At the end of this Course the student will be able to | |
| • **Identify** the various functional/smart nanomaterials materials | **L1** |
| • **Classify** the smart nanomaterials based their applications and properties | **L2** |
| • **Apply** the various functional nanomaterials in various applications | **L3** |
| • **Classify** the solar cells based on manufacturing material | **L4** |
| • `**Interpret** the efficiency and advantages in various solar cells | **L5** |

| JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA | | | | |
|---|---|---|---|---|
| B.Tech – III-I-Sem | L | T | P | C |
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| **Chemistry of Energy Materials** (OE.1)<br>(common to all branches) | | | | |

**Course Objectives:**

- To make the student understand basic electrochemical principles such as standard electrode potentials, emf and applications of electrochemical principles in the design of batteries.
- To understand the basic concepts of processing and limitations of fossil fuels and Fuel cells & their applications.
- To impart knowledge to the students about fundamental concepts of hydrogen storage in different materials and liquefaction method.
- Necessity of harnessing alternate energy resources such as solar energy and its basic concepts.
- To understand and apply the basics of calculations related to material and energy flow in the processes.

| UNIT-I: **Electrochemical Systems** | 9 Hrs |
|---|---|

**a) Introduction to Energy-** Materials, Chemistry, Engineering and Technology.
**b) Electrochemical Systems:** Galvanic cell, standard electrode potential, application of EMF, Electrode mechanism, Batteries-Lead-acid and Lithium ion batteries.

**Learning Outcomes:**
At the end of this unit, the student will be able to:

- Solve the problems based on electrode potential (L3)
- Describe the Galvanic Cell (L2)
- Differentiate between Lead acid and Lithium ion batteries(L2)
- Illustrate the electrical double layer(L2)

| UNIT-II:**Fuel Cells** | 7 Hrs |
|---|---|

Basic design of fuel cell, Fuel cell working principle, Fuel cell efficiency Classification of fuel cells, Polymer electrolyte membrane (PEM) fuel cells, Solid-oxide fuel cells (SOFC), and their applications

**Learning Outcomes:**
At the end of this unit, the student will be able to:

- Classify the fuel cell(L2)
- Describe the working Principle of Fuel cell(L2)
- Explain the efficiency of the fuel cell (L2)
- Discuss about the Basic design of fuel cells(L3)

| UNIT-III: **Hydrogen Storage** | 9 Hrs |
|---|---|

Hydrogen Storage, Chemical and Physical methods of hydrogen storage, Hydrogen Storage in metal hydrides, metal organic frame works (MOF) zinc-(3-aminotriazolato)-oxalate; MOF-74 ($Zn_2$ -(2,5-dihydroxy-1,4-benzenedicarboxylate), Carbon structures (Carbon nano tubes, fullerenes), metal oxide porous structures, hydrogen storage by high pressure methods-liquefaction method

**Learning Outcomes:**

After completing the course, the student will be able to:

- Differentiate Chemical and Physical methods of hydrogen storage (L2)
- Discuss the metal organic frame work(L3)
- Illustrate the carbon and metal oxide porous structures (L2)
- Describe the liquification methods(L2)

| UNIT-IV: **Solar Energy** | 8 Hrs |
|---|---|

Solar energy introduction and prospects, photovoltaic (PV) technology, concentrated solar power (CSP), Solar Fuels – Hydrogen: Ammonia& Hydrazine, Solar cells (Si-Te& Cd-Te), advantages and disadvantages

**Learning Outcomes:**

After completing the course, the student will be able to:

- Apply the photo voltaic technology (L3)
- Demonstrate about solar energy and prospects(L2)
- Illustrate the Solar cells (L2).
- Discuss about concentrated solar power(L3)

| UNIT-V: **Photochemical and Photo electrochemical Conversions** | 7 Hrs |
|---|---|

Photochemical cells and applications of photochemical reactions, photo electrochemical cell, advantages of photoelectro catalytic conversions.

**Learning Outcomes:**

- After completing the course, the student will be able to:
- Differentiate between Photo and Photo electrochemical Conversions(L2)
- Illustrate the photochemical cells(L2)
- Identify the applications of photochemical reactions(L3)
- Interpret advantages of photoelectron catalytic conversion(2)

**Text Books:**


1. Bahl and Bahl and Tuli, Essentials of Physical Chemistry, S. Chand Publications, New Delhi, 28th Edition, 2020.
2. US Department of Energy (EG&G technical services and corporation), Fuel Cell Hand Book 7th Edition, 2004.


**Reference Books:**


1. Ira N. Levine, Physical chemistry 6th Edition, McGraw Hills Education, New Delhi, 2009.
2. Silver and Atkins, Inorganic Chemistry, , 7th Edition, Oxford University Press, 2018
3. Michael Hirscher, Hand book of Hydrogen Storage: New materials for future energy, storage, Wiley-VCH Verlag GmbH & Co. KGaA, 2010

4. Klaus Jagar et.al.. Solar energy fundamental, technology and systems, UIT-Cambridge publishers, 2016

**Course Outcomes:**

At the end of this Course the student will be able to

- Understand to perform simultaneous material and energy balances(L1)
- Lists about various electrochemical and energy systems(L1)
- Classify solid, liquid and gaseous fuels(L3)
- Analyze the energy demand of world, nation and available resources to fulfill the demand(L3)
- Evaluate the conventional energy resources and their effective utilization(L3)
- To be able to understand and perform the various characterization techniques of fuels(L1)
- Explain knowledge of modern energy conversion technologies(L2)
- To be able to identify available nonconventional (renewable) energy resources and techniques to utilize them effectively(L1)

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACE55A- BASICS OF CIVIL ENGINEERING

(Open Elective-I)

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**Course Objectives:**

- To study the basic concept of Civil Engineering and instruction buildings.
- To understand the concept of planning of buildings and drawing of single stored building.
- To study the Basic principles of surveying and instruments used.
- To study about the various materials used for the construction of Buildings.
- To understand the construction of Structural Elements in buildings.

**UNIT-I:**

**Introduction to Civil Engineering Building planning** : Introduction to types of buildings as per NBC; Selection of site for buildings. Components of a residential building and their functions. Introduction to industrial buildings – office / factory / software development office / power house /electronic equipment service centre

**UNIT-II:**

Site plan, Orientation of a building, Open space requirements, Position of doorsand windows, Size of rooms; Preparation of a scaled sketch of the plan of asingle storeyed residential building in a given site plan. Introduction to the various building area terms - Computation of plinth area/ built up area, Floor area / carpet area - for a simple single storeyed building; Setting out of a building.

**UNIT-III**

**Surveying** - Principles and objectives of surveying; Horizontal measurements – instruments used – tape, types of tapes; Ranging(direct ranging only) Theodolite and Total station-Principles

**UNIT-IV:**

**Building materials**

Bricks, cement blocks - Properties and specifications.

Cement – OPC, properties, grades; other types of cement and its uses (inbrief).

Cement mortar – constituents, preparation.

Concrete – PCC and RCC – grades.

Steel - Use of steel in building construction, types and market forms.

**UNIT-V:**

Building construction – Foundations; Bearing capacity of soil (definitiononly); Functions of foundations, Types - shallow and deep (sketches only).

Brick masonry – header and stretcher bond, English bonds – Elevation and plan (one brick thick walls only).

Roofs – functions, types, roofing materials (brief discussion only).

Floors – functions, types; flooring materials (brief discussion only).

Decorative finishes – Plastering – Purpose, procedure.

Paints and Painting – Purpose, types, preparation of surfaces for painting (brief discussion only).

**Text Books:**


- Rangwala, S. C., Essentials of Civil Engineering, Charotar Publishing House
- Rangwala, S. C. and Dalal, K. B., Engineering Materials, Charotar Publishing house
- Rangwala, S. C. and Dalal, K. B., Building Construction, Charotar Publishing house
- Dr. K. R. Arora, "Surveying Volume-1", Standard book house, New Delhi, 13th Edition, 2012. 2. S. K.
- Duggal, "SurveyingVolume-2", Tata McGraw-Hill Education Private Limited, India,New Delhi, 3rd Edition, 2009.

**Course Outcomes:**

At the end of this Course the student will be able to

- To learn the types of buildings and components of building.
- To get the knowledge of planning of single stored buildings.
- To understand Basic concepts of surveying and Basic uses of instruments in surveying.
- To know the materials used for the construction of Buildings.
- To get the knowledge about the construction methods of Buildings.

*Annexure-I* *R20*

**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**BASICS OF NON-CONVENTIONAL ENERGY SOURCES**

**(Open Elective-I)**

| L | T | P | C |
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**Course Objectives:** The objectives of the course are to make the students learn about

- Identify various sources of Energy and the need of Renewable Energy Systems
- Understand the concepts of Solar Radiation, Wind energy and its applications
- Distinguish between solar thermal and solar PV systems
- Interpret the concept of geo thermal energy and its applications
- Understand the use of biomass energy and the concept of Ocean energy and fuel cells.

**UNIT – I: Solar Energy** **10 Hrs**

Solar radiation - beam and diffuse radiation, solar constant, earth sun angles, attenuation and measurement of solar radiation, local solar time, derived solar angles, sunrise, sunset and day length. flat plate collectors, concentrating collectors, storage of solar energy thermal storage.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To understand about solar thermal parameters
- To distinguish between flat plate and concentrated solar collectors
- To know about thermal storage requirements
- To know about measurement of solar radiation

**UNIT – II: PV Energy Systems** **10 Hrs**

Introduction, The PV effect in crystalline silicon basic principles, the film PV, Other PV technologies, Electrical characteristics of silicon PV cells and modules, PV systems for remote power, Grid connected PV systems..

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the concept of PV effect in crystalline silicon and their characteristics
- Understand other PV technologies
- To know about electrical characteristics of PV cells & modules
- To know about grid connected PV systems

**UNIT – III: Wind Energy** **10 Hrs**

Principle of wind energy conversion; Basic components of wind energy conversion systems; wind mill components, various types and their constructional features; design considerations of horizontal and vertical axis wind machines: analysis of aerodynamic forces acting on wind mill blades and estimation of power output; wind data and site selection considerations

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To understand basics of wind energy conversion and system
- To distinguish between VAWT and HAWT systems
- To understand about design considerations
- To know about site selection considerations of WECS

**UNIT – IV: Geothermal Energy** **10 Hrs**

Estimation and nature of geothermal energy, geothermal sources and resources like hydrothermal, geo-pressured hot dry rock, magma. Advantages, disadvantages and application of geothermal energy, prospects of geothermal energy in India..

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the Geothermal energy and its mechanism of production and its Applications
- Analyze the concept of producing Geothermal energies
- To learn about disadvantages and advantages of Geo Thermal Energy Systems
- To know about various applications of GTES

**UNIT – V: Miscellaneous Energy Technologies** **10 Hrs**

**Ocean Energy**: Tidal Energy-Principle of working, performance and limitations. Wave Energy-Principle of working, performance and limitations.

**Bio mass Energy**: Biomass conversion technologies, Biogas generation plants, Classification, advantages and disadvantages, constructional details, site selection, digester design consideration

**Fuel cell**: Principle of working of various types of fuel cells and their working, performance and limitations.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Analyze the operation of tidal energy
- Analyze the operation of wave energy
- Analyze the operation of bio mass energy
- Understand the principle, working and performance of fuel cell technology
- Apply these technologies to generate power for usage at remote centres

**Text Books:**

1. Stephen Peake, "Renewable Energy Power for a Sustainable Future", Oxford International Edition, 2018.
2. G. D. Rai, "Non-Conventional Energy Sources", 4th Edition, Khanna Publishers, 2000.

**Reference Books:**

1. S. P. Sukhatme, "Solar Energy",3rd Edition, Tata Mc Graw Hill Education Pvt. Ltd,2008.
2. B H Khan , " Non-Conventional Energy Resources", 2nd Edition, Tata Mc Graw Hill Education Pvt Ltd, 2011.
3. S. Hasan Saeed and D.K.Sharma,"Non-Conventional Energy Resources",3rd Edition, S.K.Kataria& Sons, 2012.
4. G. N. Tiwari and M.K.Ghosal, "Renewable Energy Resource: Basic Principles and Applications", Narosa Publishing House, 2004.

**Course Outcomes:**

At the end of this Course the student will be able to

- To distinguish between various alternate sources of energy for different suitable application requirements
- To differentiate between solar thermal and PV system energy generation strategies
- To understand about wind energy system
- To get exposed to the basics of Geo Thermal Energy Systems
- To know about various diversified energy scenarios of ocean, biomass and fuel cells

**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**20AME55a-3D PRINTING**

**(Open Elective-I)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:** The objectives of the course are to make the students learn about

- Familiarize of additive manufacturing / rapid prototyping and its applications in various fields.
- Impart reverse engineering techniques.
- Explain different processes available in additive manufacturing.
- Bring awareness on mechanical properties of materials and geometric issues related to additive manufacturing applications.

**UNIT – I: Introduction to 3D PRINTING Systems:** **10 Hrs**

History and Development of 3D printing, Need of 3D Printing, Difference between 3D Printing and CNC, Classification of 3D Printing Processes: Based on Layering Techniques, Raw Materials and Energy Sources, 3D Printing Process Chain, Benefits and Applications of 3D Printing, Representation of 3D model in STL format, RP data formats: SLC, CLI, RPI, LEAF, IGES, CT, STEP, HP/GL.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Identify the applications for additive manufacturing processes. **L3**
- Explain the process of additive manufacturing. **L2**
- Represent a 3D model in STL format and other RP data formats to store and retrieve the geometric data of the object. **L3**

**UNIT – II: CAD & Reverse Engineering:** **8 Hrs**

Basic Concept, Digitization techniques, Model Reconstruction, Data Processing for Additive Manufacturing Technology: CAD model preparation, Part Orientation and support generation, Model Slicing, Tool path Generation, Software's for Additive Manufacturing Technology: MIMICS, MAGICS. Reverse Engineering (RE) –Meaning, Use, RE – The Generic Process, Phase of RE Scanning, Contact Scanners, Noncontact Scanners, Point Processing, Application Geometric Model, Development.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Apply various digitalization techniques. **L3**
- Explain the concept of reverse engineering and scanning tools. **L2**

**UNIT – III: Solid and Liquid Based AM Systems:** **8 Hrs**

**Laminated Object Manufacturing (LOM):** Principle, Process, Materials, Advantages, Limitations, Applications.

**Solid Ground Curing (SGC):** Principle, Process, Materials, Advantages, Limitations, Applications.

**Fusion Deposition Modeling (FDM):** Principle, Process, Materials, Advantages, Limitations, Applications.

**Stereo lithography Apparatus (SLA):** Principle, Process, Materials, Advantages, Limitations and Applications.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the principles, advantages, limitations and applications of solid and liquid based AM systems. **L2**
- Identify the materials for solid and liquid based AM systems. **L3**

**UNIT – IV: Powder Based AM Systems:** **8 Hrs**

Principle and Process of Selective Laser Sintering (SLS), Advantages, Limitations and Applications of SLS, Principle and Process of Laser Engineered Net Shaping (LENS), Advantages, Limitations and Applications of LENS, Principle and Process of Electron Beam Melting (EBM), Advantages, Limitations and Applications of EBM.

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**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the principles, advantages, limitations and applications of powder based AM systems. **L2**
- Apply SLS, LENS and EBM 3D printing methods. **L3**

**UNIT – V: Other Additive Manufacturing Systems:** **8 Hrs**

Three Dimensional Printing (3DP): Principle, Process, Advantages, Limitations and Applications. Ballistic Particle Manufacturing (BPM): Principle, Process, Advantages, Limitations, Applications. Shape Deposition Manufacturing (SDM): Principle, Process, Advantages, Limitations, Applications.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain principles and limitation of 3D printing using BPM and SDM. **L2**
- Use BPM and SDM 3D printing methods. **L3**

**Text Books:**

1. Ian Gibson, David W. Rosen, Brent Stucker, Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing, 1/e Springer, 2010.
2. Chua C.K., Leong K.F. and Lim C.S., Rapid Prototyping: Principles and Applications, 2/e World Scientific Publishers, 2003.
3. Liou W. Liou, Frank W., Liou, Rapid Prototyping and Engineering Applications: A Tool Box for Prototype Development, CRC Press, 2007.

**Reference Books:**

1. Pham D.T. and Dimov S.S., Rapid Manufacturing; The Technologies and Application of RPT and Rapid Tooling, Springer, London 2001.
2. Gebhardt A., Rapid prototyping, Hanser Gardener Publications, 2003.
3. Hilton P.D. and Jacobs P.F., Rapid Tooling: Technologies and Industrial Applications, CRC Press, 2005.
4. Rafiq Noorani, Rapid Prototyping: Principles and Applications in Manufacturing, John Wiley & Sons, 2006.

**Course Outcomes:**

At the end of this Course the student will be able to

- Demonstrate various additive manufacturing and rapid prototyping techniques applications. **L4**
- Describe different additive manufacturing processes. **L3**
- Apply methods in rapid prototyping. **L2**
- Use powder based AM system. **L3**
- Model 3D printing using SDM and BPM methods. **L6**

**Online Learning Resources:**

- https://www.hubs.com/knowledge-base/introduction-fdm-3d-printing/
- https://slideplayer.com/slide/6927137/
- https://www.mdpi.com/2073-4360/12/6/1334
- https://www.centropiaggio.unipi.it/sites/default/files/course/material/2013-11-29%20-%20FDM.pdf
- https://lecturenotes.in/subject/197
- https://www.cet.edu.in/noticefiles/258_Lecture%20Notes%20on%20RP-ilovepdf-compressed.pdf
- https://www.vssut.ac.in/lecture_notes/lecture1517967201.pdf
- https://www.youtube.com/watch?v=NkC8TNts4B4

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**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**20AME55b-SMART MATERIALS**

**(Open Elective-I)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:** The objectives of the course are to make the students learn about

- Familiarize the smart materials and its role in developing intelligent systems.
- Introduce the students with HBLS and LBHS smart materials.
- Expose the students in smart systems development and uses.
- Understand the working principle of smart actuators and smart sensors.

**UNIT – I: Introduction to Smart Materials:** **10 Hrs**

**Introduction to Smart Materials**: What is Intelligence? Artificial intelligence Vs. embedded Intelligence, Definition of smart material, need for smart materials, classifications of smart systems, components of a smart systems, smart system applications, the role of Smart Materials in developing Intelligent Systems and Adaptive Structures.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Recall what intelligence is. **L1**
- Define smart materials. **L1**
- Describe the role of smart materials in development of intelligent systems and adaptive structures. **L2**
- Illustrate the applications of smart systems. **L2**

**UNIT – II: High bandwidth - Low strain generating (HBLS) Smart Materials:** **8 Hrs**

**High bandwidth - Low strain generating (HBLS) Smart Materials:**

**Piezoelectric Materials** – constitutive relationship, electromechanical coupling coefficients, piezoelectric constants, piezoceramic materials, variation of coupling coefficients in hard and soft piezoceramics, polycrystalline vs single crystal piezoelectric materials, polyvinyldene fluoride, piezoelectric composites.

**Magnetostrictive Materials** – constitutive relationship, magneto-mechanical coupling coefficients, Joule Effect, Villari Effect, Matteuci Effect, Wiedemann effect, Giant magnetostriction in Terfenol-D, Terfenol-D particulate composites, Galfenol and Metglas materials.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Describe the constitutive relationship of piezoelectric materials. **L2**
- Compare polycrystalline and single crystal piezeoelectric materials. **L2**
- Explain concepts of Joule effect, Villari effect, Matteuci effect, Wiedemann effect. **L2**
- Discus Galfenol and Metglas materials. **L6**

**UNIT – III: Low bandwidth - High strain generating (LBHS) materials:** **8 Hrs**

**Low bandwidth - High strain generating (LBHS) materials**: Shape Memory Alloys (SMA) – Introduction, Phenomenology, Influence of stress on characteristic temperatures, Modelling of shape memory effect. Vibration control through shape memory alloys. Design considerations, multiplexing embedded NiTiNOL actuators. Electro-active Polymers (EAP)- Introduction, Phenomenology, Influence of stress on characteristic temperatures.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- List various types of LBHS smart materials. **L2**
- Identify the influence of stress on characteristic temperatures in SMA and EAP. **L3**
- Explain the concept of vibration control through shape memory alloys. **L2**
- Discus design considerations of shape memory alloy. **L6**

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**UNIT – IV: Smart actuator:** **8 Hrs**

**Smart actuators:**

**Based on HBLS smart materials:** Piezoelectric Actuators – Induced Strain actuation model, Unimorph and Bimorph Actuators, Actuators embedded in composite laminate, Impedance matching in actuator design, Feedback Control, Pulse Drive, Resonance Drive. Magnetostrictive Actuators – Magnetostrictive Mini Actuators, Thermal instabilities, Discretely distributed actuation, Manetostrictive Composites.

**Based on LBHS Smart Materials -** Shape Memory Alloy based actuators for Shape Control, Electro-active Polymers for Work-Volume Generation.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Recall working principle of actuators. **L1**
- Explain impedance matching in actuator design, feedback control, pulse drive and resonance. **L2**
- Describe the working principle of Piezoelectric Actuators & Magnetostrictive Actuators. **L2**
- Discus the concepts of actuators based on HBLS and LBHS. **L6**

**UNIT – V: Smart sensors:** **8 Hrs**

**Smart sensors:**

**Sensors based on HBLS Smart Materials -** Piezoelectric Sensors, Magnetostrictive Sensors, Techniques of Self Sensing MEMS Sensors.

**Sensors based on LBHS Smart Materials** - EAP based sensors, SMA based encoders, Optical Fibre based Sensing.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Select the type of sensor required for smart systems. **L1**
- Explain techniques of self sensing MEMS sensors. **L2**
- discus EPA based and SMA based sensors. **L6**
- Explain optical based sensing system. **L2**

**Text Books:**

1. M.V. Gandhi, B.D. Thompson" Smart Materials and Structures" Springer Science & Business Media, 31.
2. A.V. Srinivasan, Smart Structures; Analysis and Design, Cambridge University Press, Cambridge; New York, 2001
3. K.Uchino, Kluwer, Piezoelectric Actuators and ultrasonic Motors Academic Publishers, Boston, 1997.

**Reference Books:**

1. Brian Culshaw, Smart Structures and Materials, Artech House, Boston,2000.
2. Gauenzi, P., Smart Structures, Wiley, 2009.
3. Cady, W. G., Piezoelectricity, Dover Publication.
4. A.J. Moulson and J.M-Herbert, Electro ceramics: Materials, Properties/ / Wiley/ 2/e.

**Course Outcomes:**

At the end of this Course the student will be able to

- Describe the role of smart materials in development of intelligent systems and adaptive structures. **L2**
- Compare polycrystalline and single crystal piezoelectric materials. **L2**
- Identify the influence of stress on characteristic temperatures in SMA and EAP. **L3**
- Explain techniques of self sensing MEMS sensors. **L2**

**Online Learning Resources:**

- https://nptel.ac.in/courses/112104251
- http://wwwcourses.sens.buffalo.edu/mae538/LecNotes.html
- http://ssdl.iitd.ac.in/vssdl/smart.pdf
- https://www.stem.org.uk/resources/elibrary/resource/33044/smart-materials-1

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

## 20AEC55a- FUNDAMENTALS OF ELECTRONICS AND COMMUNICATION ENGINEERING

(Open Elective-I)

L–T – P - C
3 – 0 – 0 – 3

**Course Objectives:**

- To study the basic principle, construction and operation of semiconductor devices.
- To learn the real time applications of semiconductor devices.
- To introduce binary number systems, logic gates and digital logic circuits.
- To get an idea about the basic principles of communication systems and their applications.
- To learn the measurement of physical parameters using Sensors and Transducers.

**UNIT I**

**Introduction to Electronics Engineering:** Overview, scope and objective of studying Electronics Engineering. Introduction to semiconductor devices: Bond structure of semiconductors, intrinsic and extrinsic semiconductors; Basic principle and operation of semiconductor devices – diode, bipolar junction transistor, field effect transistors; Introduction to VLSI.

**Learning Outcomes:**

*At the end of the unit, the student will be able to*:

- Understand the basic principle, construction and operation of semiconductor devices.(L2)
- Learn about the diode, bipolar junction transistor and field effect transistors.(L1)

**UNIT II**

**Applications of semiconductor devices:** Basic concepts of rectifiers, voltage regulators, amplifiers and oscillators; Basic concepts of operational amplifier and their applications.

**Learning Outcomes:**

*At the end of the unit, the student will be able to*:

- To learn the real time applications of semiconductor devices.(L1)
- To understand the basic concepts of operational amplifier and their applications.(L2)

**UNIT III**

**Introduction to digital systems:** Binary number system, Boolean algebra, Logic gates, adders, one-bit memory, flip-flops (SR, JK), shift registers, Asynchronous counter.

**Learning Outcomes:**

*At the end of the unit, the student will be able to*:

- Understand the binary number systems, Boolean algebra and working of logic gates.(L2)
- Know the working and applications of digital logic circuits.(L1)

**UNIT IV**

**Introduction to Communication Systems:** Elements of a communication system – transmitter and receiver; Signal types in communication; FDM and TDM; Processing of signals for transmission – basic concepts of amplitude and frequency modulation; Examples of telecommunication systems – telephone, radio, television, mobile communication and satellite communication.

**Learning Outcomes:**

*At the end of the unit, the student will be able to*:

- Identify the basic elements of a communication system.(L2)
- Understand various examples of telecommunication systems.(L2)

**UNIT V**

**Sensors and Transducers** - Active and passive transducers: Measurement of displacement (Resistance, capacitance, inductance; LVDT) Force (strain gauges) Pressure (piezoelectric transducers) Temperature (resistance thermometers, thermocouples and thermistors), Velocity, Acceleration, Vibration, pH measurement Signal Conditioning Circuits.

Learning Outcomes:

*At the end of the unit, the student will be able to:*

- Understand the basic working principle and applications of different sensors and transducers.(L2)
- Measure physical parameters using different types of sensors and transducers.(L3)

**TEXT BOOKS**

1. Millman J, Halkias C.C andJit S, "Electronic Devices and Circuits", Tata McGraw-Hill, 2nd 2007 Edition.
2. Mano M.M., "Digital Design", Prentice-Hall, 3rd Edition. 2002
3. A.K. Sawhney, "A course in Electrical and Electronics Measurements and Instrumentation",DhanpatRai& Co. 3rd edition Delhi, 2010.
4. Kennedy G. and Davis B., "Electronic Communication Systems", Tata McGraw-Hill, 4th 2008 Edition.

**REFERENCE BOOKS**

1. Tomasi W., "Advanced Electronic Communication Systems", Pearson/Prentice-Hall, 6th 2004 Edition.
2. Boylstead R.L. andNashelsky L., "Electronic Devices and Circuit Theory", Pearson, 10th 2009 Edition.

**Course outcomes:**

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

- Understand the basic principle, construction and operation of semiconductor devices.(L2)
- Learn the real time applications of semiconductor devices.(L1)
- Comprehend the binary number systems, logic gates and digital logic circuits.(L1)
- Understand the basic principles of communication systems and their applications.(L2)
- Measure the physical parameters using Sensors and Transducers.(L3)

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## 20AEC55b- TRANSDUCERS AND SENSORS

**(Open Elective-I)**

L – T – P - C
3 – 0 – 0 – 3

**Course Objectives:**

- To study about the characteristics of instrumentation system and transducers.
- To know the operation of different types of Temperature Transducers.
- To learn the operation of different types of Flow Transducers.
- To understand the working and operation of different types of Pressure Transducers.
- To gain the knowledge on working of Force and Sound Transducers.

**UNIT I**

**Introduction:** General Configuration and Functional Description of measuring instruments, Static and Dynamic Characteristics of Instrumentation System, Errors in Instrumentation System, Active and Passive Transducers and their Classification.

**Motion Transducers:** Resistive strain gauge, LVDT, RVDT, Capacitive transducers, Piezo-electric transducers, seismic displacement pick-ups, vibrometers and accelerometers.

**Learning Outcomes:**

*At the end of the unit, the student will be able to:*

- Learn the characteristics of instrumentation system and transducers.(L1)
- Measure motion using different motion transducers.(L3)

**UNIT II**

**Temperature Transducers:** Standards and calibration, fluid expansion and metal expansion type transducers - bimetallic strip, Thermometer, Thermistor, RTD, Thermocouple and their characteristics.

Hall effect transducers, Digital transducers, Proximity devices, Bio-sensors, Smart sensors, Piezo-electric sensors.

**Learning Outcomes:**

*At the end of the unit, the student will be able to:*

- Understand the working principle of temperature transducers.(L2)
- Study about different types of bio sensors and smart sensors.(L1)

**UNIT III**

**Flow Transducers:** Bernoulli's principle and continuity, Orifice plate, Nozzle plate, Venture tube, Rotameter, Anemometers, Electromagnetic flow meter, Impeller meter and Turbid flow meter.

**Learning Outcomes:**

*At the end of the unit, the student will be able to:*

- Understand the Bernoulli's principle and continuity.(L2)
- Learn how to measure flow using different types of flow meters.(L1)

**UNIT IV**

**Pressure Transducers:** Standards and calibration, different types of manometers, elastic transducers, diaphragm bellows, bourdon tube, capacitive and resistive pressure transducers, high and low pressure measurement.

**Learning Outcomes:**

*At the end of the unit, the student will be able to:*

- Work with different types of manometers.(L3)
- Use different types of pressure transducersto measure pressure.(L3)

**UNIT V**

**Force and Sound Transducers:** Proving ring, hydraulic and pneumatic load cell, dynamometer and gyroscopes. Sound level meter, sound characteristics, Microphone.

**Learning Outcomes:**

*At the end of the unit, the student will be able to:*

- Learn how to measure force using force transducers.(L1)
- Understand the working and operation of sound transducers.(L2)

**TEXT BOOKS**

1. A.K. Sawhney, "A course in Electrical and Electronics Measurements and Instrumentation", DhanpatRai& Co. 3rd edition Delhi, 2010.
2. Rangan C.S, Sarma G.R and Mani V S V, "Instrumentation Devices and Systems", TATA McGraw Hill publications, 2007.

**REFERENCE BOOKS**

1. Doebelin. E.O, "Measurement Systems Application and Design", McGraw Hill International, New York, 2004.
2. Nakra B.CandChaudharyK.K , "Instrumentation Measurement and Analysis", Second Edition, Tata McGraw-Hill Publication Ltd.2006.

**Course outcomes:**

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

- Understand the characteristics of instrumentation system and transducers.(L2)
- Know the operation of different types of Temperature Transducers.(L1)
- Compare the operation of different types of Flow Transducers.(L2).
- Correlate the working and operation of different types of Pressure Transducers.(L4)
- Gain the knowledge on working of Force and Sound Transducers.(L1)

**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**20ACS55A- Fundamentals of Internet of Things**

**(Open Elective-I)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

## Course objectives:

- To understand the fundamentals of Internet of Things.
- To build a small low cost embedded system using Arduino / Raspberry Pi or equivalent boards.
- To apply the concept of Internet of Things in the real world scenario.

**UNIT I : Fundamentals of IoT**

Introduction – Characteristics-Physical Design – IoT Protocols – Logical Design – Enabling technologies – IoT Levels – Six Levels of IoT - Domain Specific IoTs.

**Learning Outcome:**

At the end of this unit, students will able to

- Describe the IoT devices physical design and able to design IoT devices in various levels of IoT L1
- Explain the technologies enabling related to industry. L2

**UNIT II: IOT and M2M**

Software defined networks, network function virtualization, difference between SDN and NFV for IoT Basics of IoT System Management with NETCONF, YANG- NETCONF, YANG, SNMP, NETOPEER.

**Learning Outcome:**

At the end of this unit, students will able to

- Describe the Software defined networks and Network function virtualization with respect to the IoT systems. L2
- Explain the NETCONF protocol with YANG modeling language. L2

**UNIT III: IoT Design Methodology**

IoT Systems Management – IoT Design Methodology – Specifications Integration and Application Development.

**Learning Outcome:**

At the end of this unit, students will able to

- Describe the IoT devices complete design methodology with all spectifications. L2
- Explain the system Integration and application development and deployment.L3 L3

**UNIT IV: Sensors and Connectivity**

Sensors- Types of sensor nodes, Internet communications, IP addresses, MAC Address, TCP and UDP Ports, Application layer protocols

**Learning Outcome:**

At the end of this unit, students will able to

- Describe various sensors usage with respect to the IoT systems and differentiation between IP address and MAC address L3
- Explain the benefits of application layer protocols. L4

**UNIT V: IOT Industry Applications**

Cisco IoT system - IBM Watson IoT platform – Manufacturing - Converged Plant wide Ethernet Model (CPwE) – Power Utility Industry – Grid Blocks Reference Model - Smart and Connected Cities: Layered architecture, Smart Lighting, Smart Parking Architecture and Smart Traffic Control

**Learning Outcome:**

At the end of this unit, students will able to

- Describe the industry oriented IoT devices and its applications. L4

**TEXT BOOKS:**

2. Arshdeep Bahga, Vijay Madisetti, "Internet of Things – A Hands-on Approach", Universities Press, 2015.
3. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, —IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, Cisco Press, 2017

**REFERENCES:**

4. Manoel Carlos Ramon, "Intel® Galileo and Intel® Galileo Gen 2: API Features and Arduino Projects for Linux Programmers", Apress, 2014.
5. Marco Schwartz, "Internet of Things with the Arduino Yun", Pack Publishing, 2014.
6. *Simon Monk, "Programming the Raspberry Pi: Getting Started with Python"*, McGraw-Hill, *2013.*
7. CharalamposDoukas,"Building Internet of Things With the Arduino", Second Edition, 2012.
8. Dr.John Bates, "Thingalytics: Smart Big Data Analytics for the Internet of Things", Software AG Publisher, 2015.

**Course Outcomes:**

- Interpret the impact and challenges posed by IoT networks leading to new architectural models. L2
- Appraise the role of IoT protocols for efficient network communication. L3
- Illustrate different sensor technologies for sensing real world entities and identify the

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

**20ACS55B-E-Marketing**
**(Open Elective-I)**

| L | T | P | C |
|---|---|---|---|
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**Course Objectives:** The objectives of the course are to make the students learn about
I. Understand the legal and ethical issues in e-marketing.

II. Analyze online marketing and supply chain management.

III. Provides extensive theoretical and practical knowledge of online marketing.

IV. Develop marketing skills required for a continuously growing international business environment.

**UNIT – I: E-BUSINESS OVERVIEW :**

Traditional commerce vs. e-commerce, e-commerce and e-business categories of e-commerce development and growth of e-commerce advantages and disadvantages of e-commerce international nature of e-commerce..

**Learning Outcomes:**
At the end of this unit, the student will be able to
To realize basics of E-Marketing. **L1**

To introduce different E-Business Models . **L2**

**UNIT – II: E-BUSINESS INFRASTRUCTURE :**

E Commerce architectural framework, the internet and www-internet protocols, internet, intranet and extranets, internet connection options, security issues in e commerce environment, encryption techniques payment systems types of payments legal, ethical and tax issues in e-commerce.

**Learning Outcomes:**
At the end of this unit, the student will be able to
To understand the E-Marketing Plan. **L2**

To know about Online Expression . **L3**

**UNIT – III: ONLINE MARKETING AND SUPPLY CHAIN MANAGEMENT**

Online marketing, business models of e marketing, online advertisement, advertisement methods and strategies online retailing e-auctions.Supply chain management-procurement process and the supply chain types of procurement, multi-tier supply chains and trends in supply chain management.

**Learning Outcomes:**
At the end of this unit, the student will be able to
To know about the Data Drive Strategy . **L6**

Gain knowledge on Consumer Behavior Online **L3**

**UNIT – IV: ONLINE SERVICES :**

Online financial services, online banking and brokerage, online insurance services, online real estate services, travel services online, hospitality services online, recruitment services online, publishing services online entertainment, e-learning.

**Learning Outcomes:**

At the end of this unit, the student will be able to

To know about Pricing Strategies L4

To know about Channel Management and Power. L6

**UNIT – V: MOBILE COMMERCE :**

Definition of mobile commerce, mobile commerce framework, growth of mobile commerce benefits and limitations of mobile commerce mobile network infrastructure, information distribution for mobile networks multimedia content, publishing, mobile payment models, mobile commerce applications.

**Learning Outcomes:**

At the end of this unit, the student will be able to

To know how Browsing Behavior Model L4

To know about Ten rules for CRM Success. L2

**Text Books:**

1. Gary P. Schneider, "Ecommerce-Strategy, Technology and Implementation", Cengage Learning, India Edition

2. Kenneth C. Laudon, Carol GuercioTraver, "E-commerce–Business", Technology, Pearson, Low Price Edition.

3. Bharat Bhasker, "Electronic Commerce Framework, Technologies and Applications", 3rdn Edition.Tata McGraw, Hill.

**Reference Books:**

1. Efraim Turban, Tae Lee, David King and H. Micheal Chung, "Electronic Commerce, Managerial Perspective", Pearson Education Asia.

2. CSV Murthy, "E-commerce-Concepts, Models and Strategies", HPH.

3. . J. Christopher Westland and Theodore H K Clark, "Global Electronic Commerce ,Theory and Case Studies", Oxford Universities Press.

**Course Outcomes:**

At the end of this Course the student will be able to

- Analyse the confluence of marketing, operations, and human resources in real-time delivery. L3
- Explain emerging trends in digital marketing and critically assess the use of digital marketing tools by applying relevant marketing theories and frameworks. L3
- Investigate and evaluate issues in adapting to globalised markets that are constantly changing and increasingly networked. L5
- Investigate and evaluate issues in adapting to globalised markets that are constantly changing and increasingly networked. L2
- Demonstrate cognitive knowledge of the skills required in conducting online research and research on online markets, as well as in identifying, assessing and selecting digital market opportunities. L3

**B.Tech III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**20ACS55C-Computer Architecture and Organization**

**(Open Elective-I)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:** The objectives of the course are to make the students learn about

- To impart basic concepts of computer architecture and organization.
- To explain key skills of constructing cost-effective computer systems.
- To familiarize the basic CPU organization.
- To help students in understanding various memory devices.

## UNIT – I: STRUCTURE OF COMPUTERS:

Computer types, Functional units, Basic operational concepts, VonNeumann Architecture, Bus Structures, Software, Performance, Multiprocessors and Multicomputer, Data representation, Fixed and Floating point, Error detection and correction codes.

COMPUTER ARITHMETIC: Addition and Subtraction, Multiplication and Division algorithms, Floating-point Arithmetic Operations, Decimal arithmetic operations.

**Learning Outcomes:**

At the end of this unit, the student will be able to

To realize basics of computer structure. **L1**

To know about the arithmetic operations. **L2**

## UNIT – II: BASIC COMPUTER ORGANIZATION AND DESIGN:

Instruction codes, Computer Registers, Computer Instructions and Instruction cycle. Timing and Control, Memory-Reference Instructions, Input-Output and interrupt. Central processing unit: Stack organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Complex Instruction Set Computer (CISC) Reduced Instruction Set Computer (RISC), CISC vs RISC.

**Learning Outcomes:**

At the end of this unit, the student will be able to

To understand the organization of computer. **L2**

To know about design of the computer. **L3**

## UNIT – III:REGISTER TRANSFER AND MICRO-OPERATIONS

REGISTER TRANSFER AND MICRO-OPERATIONS: Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro-Operations, Logic Micro-Operations, Shift Micro-Operations, Arithmetic logic shift unit.

MICRO-PROGRAMMED CONTROL: Control Memory, Address Sequencing, Micro-Program example, Design of Control Unit.

**Learning Outcomes:**
At the end of this unit, the student will be able to
To know about the registers and its operations. L6

Gain knowledge on Micro operations. L3

## UNIT – IV:MEMORY SYSTEM

MEMORY SYSTEM: Memory Hierarchy, Semiconductor Memories, RAM(Random Access Memory), Read Only Memory (ROM), Types of ROM, Cache Memory, Performance considerations, Virtual memory, Paging, Secondary Storage, RAID.

**Learning Outcomes:**
At the end of this unit, the student will be able to
To know about Semiconductor Memories L4

To know about the Cache Memory L6

## UNIT – V: INPUT OUTPUT

INPUT OUTPUT: I/O interface, Programmed IO, Memory Mapped IO, Interrupt Driven IO, DMA.
MULTIPROCESSORS: Characteristics of multiprocessors, Interconnection structures, Inter Processor Arbitration, Inter processor Communication and Synchronization, Cache Coherence.

**Learning Outcomes:**
At the end of this unit, the student will be able to
To know about the Input/Output operations L4

To know about the multiprocessors. L2

**Text Books:**

1. M. Moris Mano (2006), Computer System Architecture, 3rd edition, Pearson/PHI, India.

**Reference Books:**

1. Carl Hamacher, Zvonks Vranesic, SafeaZaky (2002), Computer Organization, 5th edition, McGraw Hill, New Delhi, India.

2.William Stallings (2010), Computer Organization and Architecture- designing for performance, 8th edition, Prentice Hall, New Jersy

3.Anrew S. Tanenbaum (2006), Structured Computer Organization, 5th edition, Pearson Education Inc,

4.John P. Hayes (1998), Computer Architecture and Organization, 3rd edition, Tata McGrawHill

**Course Outcomes:**

At the end of this Course the student will be able to

- Identify various components of computer and their interconnection. **L3**
- Identify basic components and design of the CPU: the ALU and control unit. **L3**
- Compare and select various Memory devices as per requirement. **L5**
- Compare various types of IO mapping techniques. **L2**
- Critique the performance issues of cache memory and virtual memory. **L3**

**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA**

**20ACS61- INTERNET OF THINGS**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design & develop IOT Devices.

**UNIT – I: Fundamentals of IoT**

Introduction – Characteristics-Physical Design - Protocols – Logical Design – Enabling technologies – IoT Levels – Six Levels of IoT - Domain Specific IoTs.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Able to understand the application areas of IOT **L2**
- Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks **L2**
- Able to understand building blocks of Internet of Things and characteristics. **L3**

**UNIT – II: IOT and M2M**

M2M, IoT vs M2M, SDN and NFV for IoT, IOT system Management with NETCONF-YANG.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Discuss the IOT and M2M **L3**
- Able to understand the IOT system Management with NETCONF-YANG **L3**

**UNIT – III: IoT Design Methodology**

IoT Systems Management – IoT Design Methodology – Specifications Integration and Application Development.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Able to understand the Specifications Integration and Application Development. **L4**
- Able to understand the IoT Design Methodology **L4**

**UNIT-IV: Sensors and Connectivity**

Sensors- Types of sensor nodes, Internet communications, IP addresses, MAC Address, TCP and UDP Ports, Application layer protocols..

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Able to identify the sensors and its applications **L3**
- Able to use the sensors in different applications **L3**

**UNIT – V: IOT Applications**

IOT application for industry-Future factory concepts, Brownfield IoT, Smart objects, Smart applications, Study of existing IoT platforms/middleware, IoT- A, Hydra etc.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Able to identify the IOT applications **L5**
- Able to identify the IOT platforms **L5**

**Text Books:**

1. ArshdeepBahga, Vijay Madisetti, "Internet of Things – A Hands-on Approach", Universities Press, 2015.

**Reference Books:**

1. Manoel Carlos Ramon, "Intel® Galileo and Intel® Galileo Gen 2: API Features and Arduino Projects for Linux Programmers", Apress, 2014.

2. Marco Schwartz, "Internet of Things with the Arduino Yun", Pack Publishing, 2014.
3. *Simon Monk, "Programming the Raspberry Pi: Getting Started with Python"*, McGraw-Hill, *2013.*
4. CharalamposDoukas, "Building Internet of Things With the Arduino", Second Edition, 2012.
5. Dr. John Bates, "Thingalytics: Smart Big Data Analytics for the Internet of Things", Software AG Publisher, 2015.

**Course Outcomes:**

At the end of this Course the student will be able to

- Able to understand the application areas of IOT · Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks · **L3**
- Able to understand building blocks of Internet of Things and characteristics. **L4**

**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA**

**20ACS62- DATA SCIENCE**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- To study fundamental concepts in software testing
- To discuss various software testing issues and solutions in software unit test, integration and system testing.
- To expose the advanced software testing topics, such as object--oriented software testing methods.

**UNIT-I: Introduction: Objective, scope and outcome of the course**

Toolboxes: Python, fundamental libraries for data Scientists. Integrated development environment (IDE). Data operations: Reading, selecting, filtering, manipulating, sorting, grouping, rearranging, ranking, and ploting.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- List a range of different software testing techniques and statergies and be able to apply specific(automated) unit testing method to the projects. **L1**
- Distinguish characteristics of structural testing methods **L2**

**UNIT-II: Data preparation**

Descriptive statistics, data preparation. Exploratory Data Analysis data summarization, data distribution, measuring asymmetry. Sample and estimated mean, variance and standard score. Statistical Inference frequency approach, variability of estimates, hypothesis testing using confidence intervals, using p-values.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible. **L3**
- Discuss about the functional and system testing methods **L3**

**UNIT-III Supervised Learning**

Supervised Learning: First step, learning curves, training-validation and test. Classification of Learning models generalities, support vector machines, random forest. Examples.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Discuss about the functional and system testing methods. **L4**
- Demonstrate various issues for object oriented testing. **L4**

**UNIT-IV: Regression**

Regression analysis, Regression: linear regression simple linear regression, multiple & Polynomial regression, Sparse model. Unsupervied learning, clustering, similarity and distances, quality measures of clustering, case study.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Distinguish characteristics of structural testing methods. **L5**
- Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible. **L4**

**UNIT-V: Network Analysis**

What is Network Analysis, Graphs, Social Networks, centrality, drawing centrality of Graphs, PageRank, Ego-Networks, community Detection.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Discuss about the functional and system testing methods. **L5**
- Demonstrate various issues for object oriented testing. **L5**

**Text Books:**

1. Desikan and G. Ramesh, "Introduction to Data Science", CRC Press[2].

**Course Outcomes:**

At the end of this Course the student will be able to

- List a range of different software testing techniques and statergies and be able to apply specific(automated) unit testing method to the projects. **L3**
- Distinguish characterstics of structural testing methods. **L4**
- Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible. **L5**
- Discuss about the functional and system testing methods. **L5**

**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA**

**20ACS63- CYBER SECURITY**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- To familiarize various types of cyber-attacks and cyber-crimes
- To give an overview of the cyber laws
- To study the defensive techniques against these attacks

**UNIT-I: Introduction to Cyber Security**

Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, Comprehensive Cyber Security Policy.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Protect and defend computer systems and networks from cybersecurity attacks. **L2**
- Characterize privacy, legal and ethical issues of information security. **L3**
- Identify vulnerabilities critical to the information assets of an organization. **L2**

**UNIT-II: Cyber Forensics**

Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Define the security controls sufficient to provide a required level of confidentiality, integrity, and availability in an organization's computer systems and networks **L2**
- Diagnose and investigate cyber security events or crimes related to computer systems and digital evidence. **L3**

**UNIT-III Cybercrime: Mobile and Wireless Devices**

Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Attacks on Mobile/Cell Phones.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Diagnose attacks on an organization's computer systems and networks. **L2**
- Propose solutions including development, modification and execution of incident response plans. **L3**

**UNIT-IV: Cyber Security: Organizational Implications**

Introduction, cost of cybercrimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Apply critical thinking and problem-solving skills to detect current and future attacks on an organization's computer systems and networks. **L4**

**UNIT-V: Privacy Issues: Basic Data Privacy Concepts**

Fundamental Concepts, Data Privacy Attacks, Data linking and profiling, privacy policies and their specifications

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Communication orally and in writing, proposed information security solutions to technical and non Apply business principles to analyze and interpret data for planning, decision **L4**

**Text Books:**

1. Nina Godbole and SunitBelpure, Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley
2. B. B. Gupta, D. P. Agrawal, Haoxiang Wang, Computer and Cyber Security: Principles, Algorithm, Applications, and Perspectives, CRC Press, ISBN 9780815371335, 2018.

**Reference Books:**

1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press.
2. Introduction to Cyber Security, Chwan-Hwa(john) Wu,J. David Irwin, CRC Press T&F Group.

**Course Outcomes:**

At the end of this Course the student will be able to

- To understand cyber-attacks, types of cybercrimes, cyber laws and also how to protect them self and ultimately the entire Internet community from such attacks. **L4**

**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA**

**20ACS66- INTERNET OF THINGS LAB**

| L | T | P | C |
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| 0 | 0 | 3 | 1.5 |

**Course Objectives:**

- Understand the IoT using Arduino programming.
- Explain the interfacing of data, I/O devices with Arduino UNO.
- Describe the digital protection schemes in power system relays.

**List of Experiments**

1. Start Raspberry Pi and try various Linux commands in command terminal window: ls, cd, touch, mv, rm, man, mkdir, rmdir, tar, gzip, cat, more, less, ps, sudo, cron, chown, chgrp, ping etc.
2. Run some python programs on Pi like: Read your name and print Hello message with name.
   Read two numbers and print their sum, difference, product and division.
   Word and character count of a given string.
   Area of a given shape (rectangle, triangle and circle) reading shape and appropriate values from Standard input.
   Print a name 'n' times, where name and n are read from standard input, using for and while loops. Handle Divided by Zero Exception.
   Print current time for 10 times with an interval of 10 seconds.
   Read a file line by line and print the word count of each line.
3. Write a program to blink LED by using Switch.
4. Write a program to read the LDR values and based on the value control the intensity of LED
5. Get input from two switches and switch on corresponding LEDs
6. Write a program to toggle 2 LED's alternatively with a delay of 1 second.
7. Flash an LED at a given on time and off time cycle, where the two times are taken from a file.
8. Write a program to control the servo motor.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- List out the different IOT applications and importance of IOT in present scenario. **L2**
- List the application of Arduino and Node MCU **L2**

**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA**

**20ACS67- DATA SCIENCE LAB**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 3 | 1.5 |

**Course Objectives:**

- The main objective of the course is to inculcate the basic understanding of Data Science and it's practical implementation using Python.

**List of Experiments**

1. Creating a NumPy Array
   a. Basic ndarray
   b. Array of zeros
   c. Array of ones
   d. Random numbers in ndarray
   e. An array of your choice
   f. Imatrix in NumPy
   g. Evenly spaced ndarray
2. The Shape and Reshaping of NumPy Array a. Dimensions of NumPy array b. Shape of NumPy array c. Size of NumPy array d. Reshaping a NumPy array e. Flattening a NumPy array f. Transpose of a NumPy array
3. Expanding and Squeezing a NumPy Array a. Expanding a NumPy array b. Squeezing a NumPy array c. Sorting in NumPy Arrays
4. Indexing and Slicing of NumPy Array a. Slicing 1-D NumPy arrays b. Slicing 2-D NumPy arrays c. Slicing 3-D NumPy arrays d. Negative slicing of NumPy arrays
5. Stacking and Concatenating Numpy Arrays a. Stacking ndarrays b. Concatenating ndarrays c. Broadcasting in Numpy Arrays
6. Perform following operations using pandas a. Creating dataframe b. concat() c. Setting conditions d. Adding a new column
7. Perform following operations using pandas a. Filling NaN with string b. Sorting based on column values c. groupby()
8. Read the following file formats using pandas a. Text files b. CSV files c. Excel files d. JSON files
9. Read the following file formats a. Pickle files b. Image files using PIL c. Multiple files using Glob d. Importing data from database
10. Demonstrate web scraping using python
11. Perform following preprocessing techniques on loan prediction dataset a. Feature Scaling b. Feature Standardization c. Label Encoding d. One Hot Encoding
12. Perform following visualizations using matplotlib a. Bar Graph b. Pie Chart c. Box Plot d. Histogram e. Line Chart and Subplots f. Scatter Plot

Web References:

1. https://www.analyticsvidhya.com/blog/2020/04/the-ultimate-numpy-tutorial-for-data-science-beginners/
2. https://www.analyticsvidhya.com/blog/2021/07/data-science-with-pandas-2-minutes-guide-to-key-concepts/
3. https://www.analyticsvidhya.com/blog/2020/04/how-to-read-common-file-formats-python/
4. https://www.analyticsvidhya.com/blog/2016/07/practical-guide-data-preprocessing-python-scikit-learn/

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Perform various operations on numpy arrays **L2**
- Importing data from different file formats using pandas **L2**
- Draw different types of charts using matplotlib **L3**

**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA**

**20ACS68- CYBER SECURITY LAB**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 3 | 1.5 |

**List of Experiments**

1. TCP scanning using NMAP
2. Port scanning using NMAP
3. TCP / UDP connectivity using Netcat
4. Perform an experiment to demonstrate sniffing of router traffic by using the tool wireshark.
5. Perform an experiment how to use dumpsec.
6. Perform an experiment to sniff traffic using ARP Poisoning
7. Implementing the Secure Sockets Layer (SSL v2/v3) and Transport Layer Security (TLS v1) network protocols
8. Setup a honey pot and monitor the honey pot on network.

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

## SOFT SKILLS

**(Common to all branches)**

| L | T | P | C |
|---|---|---|---|
| 1 | 0 | 2 | 2 |

**Course Objectives:**

- To prepare to face global competition for employment and excellence in profession.
- To help the students understand and build interpersonal and interpersonal skills that will enable them to lead meaningful professional life.

### UNIT – 1: SOFT SKILLS: INTRODUCTIUON

*Soft Skills*: Definition-Meaning--Importance- Why skill gap -Analysis--Personality Development vs. Soft Skills- Learning Methods.

**Learning Outcomes:**

At the end of this unit, the student will be able to

| | |
|---|---|
| • Developing self-motivation, raised aspirations and belief in one's own abilities, defining and committing to achieving one's goals. | **L1** |
| • Learning to keep going when things don't go according to plan, coping with the unfamiliar, managing disappointment and dealing with conflict | **L2** |

### UNIT – II: PERSONAL SKILLS

*Intra-Personal:* Definition-Meaning-Importance-SWOT analysis- Goal Setting- Emotional Intelligence- Right thinking- Problem Solving-Time management.

*Inter-Personal:* Definition-Meaning-Importance-Communications skills- Team Work-Negotiation Skills-Leadership skills.

**Learning Outcomes:**

At the end of this unit, the student will be able to

| | |
|---|---|
| • A commitment to ethics and integrity in academic and professional relationships, within the community and the environment. | **L1** |
| • Describe how good communication with other can influence our working relationships | **L2** |

### UNIT – III: VERBAL AND NON VERBAL SKILLS

*Verbal Skills*: Definition and Meaning-Importance-Improving Tips for Listening, Speaking, Reading- Writing Skills.

*Non Verbal Skills:* Definition and Meaning-Importance- Dress Code- Facial Expressions- Eye Contact- Proxemics- Haptics -Posture -Kinetics- Para Language.

**Learning Outcomes:**

At the end of this unit, the student will be able to

| | |
|---|---|
| • Compares verbal and nonverbal communication | **L1** |
| • Understand the functions of nonverbal communication | **L2** |

### UNIT – IV: FINISHING SCHOOL

*Before Interview:* Bridging between Campus and Corporate- Preparation of Resume-Cover Letter- Statement of Purpose-E-mail writing-Corporate Etiquettes.

| Learning Outcomes: | |
|---|---|
| At the end of this unit, the student will be able to | |
| • Learner will be able to prepare his/ her own Resume and Cover letter. | L1 |
| • Learner will understand the importance of etiquettes and learn the nuances of expected behaviour within a group, a social class and society at general | L2 |

**UNIT – V: DURING INTERVIEW**

*Interview Skills*: Importance-Purpose- Types of interviews –Preparation for interviews - Top Questions- Body Language in Interview Room-Do's and Don'ts s of interview.

| Learning Outcomes: | |
|---|---|
| At the end of this unit, the student will be able to | |
| • Learner will be able to face interview questions and effectively present his /her. skills | L1 |
| • Learner will manage how to plan and organize personal and professional life. | L2 |

**Reference Books:**


1. Sherfield, M. Robert at al ***Cornerstone Developing Soft Skills***, 4th ed. Pearson Publication, New Delhi, 2014.
2. Alka Wadkar, ***Life Skills for Success***, Sage Publications India Private Limited; First edition (1 May 2016)
3. Sambaiah.M. ***Technical English***, Wiley publishers India. New Delhi. 2014.
4. Gangadhar Joshi, ***From Campus to Corporate***, *Sage Text.*
5. Alex.K, ***Soft Skills***, 3rd ed. S. Chand Publication, New Delhi, 2014.
6. Meenakshi Raman and Sangita Sharma, ***Technical Communication: Principle and Practice***, Oxford University Press. 2009.
7. Shalini Varma, ***Body Language for Your Success Mantra***, 4th ed, S. Chand Publication, New Delhi, 2014.
8. Stephen Covey, ***Seven Habits of Highly Effective People***, JMD Book, 2013.


| Course Outcomes: | |
|---|---|
| At the end of this Course the student will be able to | |
| • The students will be able to assimilate and understood the meaning and importance of soft skills and learn how to develop them. | L1 |
| • The students will understand the significance of soft skills in the working environment for professional excellence. | L2 |
| • The students will be prepared to undergo the placement process with confidence and clarity. | L3 |
| • The students will be ready to face any situation in life and equip themselves to handle them effectively. | L4 |
| • The students will understand and learn the importance of etiquettes in both professional and personal life | L5 |

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**B.Tech. VI /VII-Sem (R20)**

**NUMERICAL TECHNIQUES**

**(Open Elective -II)**

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**Course Objectives:** This course aims at providing the student

- With the concepts and several methods of Numerical methods.
- To explore the solutions of ordinary differential equations, partial differential equations and integral equations.

**UNIT – 1: Solution to System of Nonlinear Equations and Spline Functions:** **9 Hrs**

Method of Iteration- Newton-Raphson method. Linear splines - Quadratic splines – Cubic splines: Minimizing property of Cubic splines – Error in the Cubic Spline ad its derivatives – Surface fitting by cubic splines. – Cubic B-Splines: Representation of B- Splines – Least squares solution – Applications of B-Splines.

**Learning Outcomes:**

At the end of this unit, the student will be able to

| | |
|---|---|
| • Solve the algebraic and transcendental equations. | L2 |
| • Solve the system of nonlinear equations and spline functions. | L4 |

**UNIT – II: Numerical Linear Algebra:**

Triangular matrices – LU decomposition of a matrix – vector and matrix norms. – Solutions of linear systems –Direct methods: Gauss elimination – necessary for pivoting – Gauss-Jordan method – modification of the Gauss method to compute the inverse – number of arithmetic operations – LU decomposition method – computational procedure for LU decomposition method – LU decomposition from Gauss elimination – solution of tridiagonal systems – III conditioned linear systems – Method for III- conditioned systems. – Solution of linear systems –Iterative methods.

**Learning Outcomes:**

At the end of this unit, the student will be able to

| | |
|---|---|
| • Understand the concepts of numerical linear algebra. | **L1** |
| • Apply the concepts of numerical linear algebra. | **L3** |

**UNIT – III: Initial and Boundary value problems:**

Predictor-Corrector methods: Adams-Moulton method – Milne's method. – Cubic Spline method – Simultaneous and higher order equations. – Boundary value problems: Finite difference method – Cubic Spline method – Galerkin's method.

**Learning Outcomes:**

At the end of this unit, the student will be able to

| | |
|---|---|
| • Solve first order initial value problems. | L3 |
| • Solve ssimultaneous and higher order equations and boundary value problems. | L4 |

**UNIT – IV: Numerical solution of Laplace's equation and Poisson's equation:**

Laplace's equation and Poisson's equation – Finite difference approximations to derivatives – solution of Laplace's equation and Poisson's equation: Jacobi's method – Gauss-Seidel method – Successive over

| | |
|---|---|
| relaxation method – ADI method. | |
| **Learning Outcomes:** | |
| At the end of this unit, the student will be able to | |
| • Solve Laplace's equation using finite difference technique. | L3 |
| • Solve Poisson's equation through iterative methods. | L4 |
| | |
| **UNIT – V: One dimensional Heat equation & Wave equation:** | |
| Heat equation in one dimension: Finite difference approximations-Bender-Schmidt recurrence formula-Crank-Nicolson formula ; Iterative methods for the solution of equations - Gauss-Seidel iteration formula and One dimensional Wave equation. | |
| **Learning Outcomes:** | |
| At the end of this unit, the student will be able to | |
| • Apply numerical methods for solving one dimensional heat equation. | L3 |
| • Apply numerical methods for solving one dimensional wave equation. | L4 |
| | |
| **Text Books:** | |
| 1. S. S. Sastry, Introductory Methods of Numerical Analysis( Fifth Edition 2012), PHI Learning Private Limited, New Delhi. | |
| | |
| **Reference Books:** | |
| 1. M.K.Jain,S.R.K.Iyengar, R.K.Jain, Numerical Methods for Scientific and Engineering Computation (sixth edition),Nee Age International(P) Limited, Publishers, New Delhi. | |
| 2. K.E. Atkinson, An Introduction to Numerical Analysis, Wiley, 1989.S.D. Conte and C. De Boor, Elementary Numerical Analysis 302226 An Algorithmic Approach, McGraw-Hill, 1981. | |
| 3. K. Eriksson, D. Estep, P. Hansbo and C. Johnson, Computational Differential Equations, Cambridge Univ. Press, Cambridge, 1996. | |
| 4. G.H. Golub and J.M. Ortega, Scientific Computing and Differential Equations: An Introduction to Numerical Methods, Academic Press, 1992. | |
| 5. J. Stoer and R. Bulirsch, Introduction to Numerical Analysis, 2nd ed., Texts in Applied Mathematics, Vol. 12, Springer Verlag, New York, 1993. | |
| | |
| **Course Outcomes:** | |
| At the end of this Course the student will be able to | |
| • Understand the need of numerical methods in solving engineering problems of various fields. | **L1** |
| • Learn various numerical techniques to solve initial and boundary value problems. | **L2** |
| • Apply various methods in solving Laplace's equation. | **L3** |
| • Emphasizes the numerical solutions of one dimensional heat and wave equations . | **L4** |
| • Analyze the problems in engineering and technology using various techniques of Numerical methods.` | **L5** |

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**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA**
**DEPARTMENT OF PHYSICS**
**III B.TECH – II SEMESTER-R20 (Open elective-Interdisciplinary) –OE-ID.1(THEORY**

## MATERIALS CHARACTERIZATION TECHNIQUES
**(Common to all branches)**

| L | T | P | C |
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**Course Objectives:**

- The latest analysis techniques and material structure and property correlation
- The most advanced imaging instruments for investigating the modern materials at the highest topographic resolution
- The commonly used analytical tools for characterizing modern materials at highest sensitivity
- The latest advancement in spectroscopy for getting structural and elemental analysis of Materials

**UNIT – 1: Structure analysis by Powder X-Ray Diffraction** **9 Hrs**

Introduction, Bragg's law of diffraction, Intensity of Diffracted beams –factors affecting Diffraction Intensities - structure of polycrystalline Aggregates, Determination of crystal structure, Crystallite size by Scherrer equation, Small angle X-ray scattering (SAXS) (in brief).

**Learning Outcomes:**

At the end of this unit, the student will be able to

| | |
|---|---|
| • **Understand** the diffraction phenomenon in crystals | **L1** |
| • **Identify** the factors affecting diffraction pattern intensities | **L2** |
| • **Explain** the polycrystalline nature of the material | **L3** |
| • **Analyze** the crystal structure and crystallite size by various methods | **L4** |
| • **Illustrate** the Small angle X-ray scattering (SAXS) | **L2** |

**UNIT – II: Microscopy technique -1 –Scanning Electron Microscopy (SEM)** **9 Hrs**

Introduction, Principle, Construction and working principle of Scanning Electron Microscope, Specimen preparation, Different types of modes used (Secondary Electron and Back scattered Electron), Energy Dispersive X-ray Analyzer (to provide elemental identification and quantitative compositional information), Advantages and limitations of SEM.

**Learning Outcomes:**

At the end of this unit, the student will be able to

| | |
|---|---|
| • **Explain** the basic concepts and working principle of Scanning Electron Microscope | **L1** |
| • **Classify** the different types of Scanning Electron Microscope modes used | **L2** |
| • **Identifies** the specimen preparation for Scanning Electron Microscope | **L2** |
| • **Analyze** the morphology of the sample by using Scanning Electron Microscope | **L4** |
| • **Understand** the advantages and limitations of Scanning Electron Microscope | **L2** |

**UNIT – III: Microscopy Technique -2 - Transmission Electron Microscopy (TEM)** **9Hrs**

Principle, Construction and Working principle, Resolving power and Magnification, Bright and dark fields, Diffraction and image formation, Specimen preparation, Selected Area Diffraction, Applications of Transmission Electron Microscopy,Difference between SEM and TEM, Advantages and Limitations of Transmission Electron Microscopy.

| | |
|---|---|
| **Learning Outcomes:** | |
| At the end of this unit, the student will be able to | |
| • **Explain** the basic principle and working principle of Transmission Electron Microscope | **L1** |
| • **Classify** the different types of Transmission Electron Microscope modes used | **L2** |
| • **Identifies** the specimen preparation for Transmission Electron Microscope | **L2** |
| • **Analyze** the morphology and crystal structure of the sample by using Transmission Electron Microscope | **L2** |
| • **Understand** the advantages and limitations of Transmission Electron Microscope | **L3** |
| | |
| **UNIT – IV: Spectroscopy techniques** | **9 Hrs** |
| Principle, Experimental arrangement, Analysis and Advantages of the spectroscopic techniques – (i) UV-Visible spectroscopy – quantitative analysis of elements and organic compounds, energy band gap determination – wood and Tauc and KubelkaMunk functions (ii) Raman Spectroscopy – Molecular analysis using vibrational modes (iv) X-ray photoelectron spectroscopy (XPS) for surface materials characterization and chemical analysis. | |
| **Learning Outcomes:** | |
| At the end of this unit, the student will be able to | |
| • **Explain** the principle and experimental arrangement of spectrometers | **L1** |
| • **Understand** the analysis and advantages of the spectroscopic techniques | **L2** |
| • **Explain** the concept of UV-Visible spectroscopy | **L2** |
| • **Explain** the principle and experimental arrangement of Raman Spectroscopy | **L2** |
| • **Explain** the principle and experimental arrangement of X-ray photoelectron spectroscopy (XPS) | **L2** |
| | |
| **UNIT – V: Electrical & Magnetic Characterization techniques** | |
| Electrical Properties analysis techniques (DC conductivity, AC conductivity) Activation Energy, Effect of Magnetic field on the electrical properties (Hall Effect). Magnetization measurement by induction method,Vibrating sample Magnetometer (VSM) and SQUID (Superconducting Quantum Interference Device) | |
| **Learning Outcomes:** | |
| At the end of this unit, the student will be able to | |
| • **Explain** the various types of electrical properties analysis techniques | **L1** |
| • **Explain** the effect of magnetic field on the electrical properties | **L2** |
| • **Analyze** the magnetization by using induction method | **L2** |
| • **Explain** the construction and working principle of VSM | **L2** |
| • **Explain** the construction and working principle of SQUID | **L2** |
| | |
| **Text Books:** | |
| 1. Material Characterization: Introduction to Microscopic and Spectroscopic Methods – Yang Leng – John Wiley & Sons (Asia) Pvt. Ltd. 2008 | |
| 2. Microstructural Characterization of Materials - David Brandon, Wayne D Kalpan, John Wiley & Sons Ltd., 2008. | |
| | |
| **Reference Books:** | |
| **1.** Fundamentals of Molecular Spectroscopy – IV Ed. – Colin Neville BanwellandElaine M. McCash, Tata McGraw-Hill, 2008. | |
| **2.** Elements of X-ray diffraction – Bernard Dennis Cullity & Stuart R Stocks, Prentice Hall , 2001 – Science. | |

| Course Outcomes: | |
|---|---|
| At the end of this Course the student will be able to | |
| • **Identify** the various characterization techniques | **L1** |
| • **Classify** the characterization techniques based on their applications and properties | **L2** |
| • Ilustates the various characterization techniques for materials characterization. | **L3** |
| • **Apply** suitability in Engineering Applications | **L4** |

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

| B.Tech – IV-I-Sem | L | T | P | C |
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**Polymers and their applications** (OE.2)
(common to all branches)

**Course Objectives:**

- To understand the basic principles of polymers
- To synthesize the different polymeric materials and their characterization by various instrumental methods.
- To impart knowledge to the students about fundamental concepts of Hydro gels of polymer networks, surface phenomenon by micelles
- To enumerate the applications of polymers in engineering

| UNIT-I: **Polymers-Basics and Characterization** | 9 Hrs |
|---|---|

Basic concepts: monomers, repeat units, degree of polymerization, linear, branched and network polymers, classification of polymers, Polymerization mechanisms: condensation, addition.Molecularweight concepts: determination bynumber, weight and viscosity average molecular weights, polydispersity and molecular weight distribution. Measurement of molecular weight: end group, viscosity, light scattering, osmotic and ultracentrifugation methods, analysis and testing of polymers, Characterization of polymers by XRD, DSC.

**Learning Outcomes:**
At the end of this unit, the student will be able to:

- Classify the polymers (L3)
- Explain polymerization mechanism (L2)
- Differentiate addition, condensation polymerizations(L2)
- Describe measurement of molecular weight of polymer(L2)

| UNIT-II: **Synthetic Polymers** | 8 Hrs |
|---|---|

**Polymerization** processes – Bulk, Solution, Suspension and Emulsion polymerization.Preparation and significance, classification of polymers based on physical properties, Thermoplastics, Thermosetting plastics, Fibers and elastomers, General Applications. Preparation of Polymers based on different types of monomers, Olefin polymers, Diene polymers, nylons, Urea - formaldehyde, phenol - formaldehyde and melamine Epoxy and Ion exchange resins.

**Learning Outcomes:**
At the end of this unit, the student will be able to:

- Differentiate Bulk, solution, Suspension and emulsion polymerization(L2)
- Describe fibers and elastomers (L2)
- Identify the thermosetting and thermo polymers(L3)

| **UNIT-III: Natural Polymers & Modified cellulosics** | 8 Hrs |
|---|---|

Natural Polymers: Chemical & Physical structure, properties, source, important chemical

modifications, applications of polymers such as cellulose, lignin, starch, rosin, shellac, latexes, vegetable oils and gums, proteins.Modified cellulosics: Cellulose esters and ethers such as Ethyl cellulose, CMC, HPMC, cellulose acetals, Liquid crystalline polymers; specialty plastics- PES, PAES, PEEK, PEA.

**Learning Outcomes:**

After completing the course, the student will be able to:

- Describe the properties and applications of polymers(L2)
- Interpret the properties of cellulose, lignin, starch, rosin, latex (L2)
- Discuss the special plastics of PES, PAES, PEEK (L3)
- Explain modified cellulosics(L2)

| **UNIT-IV: Hydrogels of Polymer networks and Drug delivery** | 8 Hrs |
|---|---|

Definitions of Hydrogel, polymer networks, Types of polymer networks, Methods involved in hydrogel preparation, Classification, Properties of hydrogels, **Applications** of hydrogels in drug delivery.Introduction to drug systems including regulation, absorption and disposition, routes of administration and dosage forms. Advanced drug delivery systems and controlled release.

**Learning Outcomes:**

After completing the course, the student will be able to:

- Identify types of polymer networks(L3)
- Describe methods involve in hydrogel preparation(L2)
- Explain applications of hydrogels in drug delivery(L2)
- Demonstrate the advanced drug delivery systems and controlled release(L2)

| UNIT-V: **Advanced Polymers for engineering applications** | 7Hrs |
|---|---|

**Importance of advance polymers examples**-polymers in sensors,conducting and synthetic metals, photonics, thermoplastics. Applications of Biodegradable polymers, Bio-PET, BIO-PEP, Polylactides

**Learning Outcomes:**

After completing the course, the student will be able to:

- Demonstrate conducting polymers (L3)
- Explain Biodegradable polymers (L2)
- Discuss applications of Biodegradable polymers, Bio-PET, BIO-PEP, Polylactides (L3)

**Text Books:**


1. Fred W.Billmayer, A Text book of Polymer science, 3rd Edition, Wiley India, 2007
2. K.J.Saunders, Organic polymer Chemistry, Chapman and Hall, 1973.


**Reference Books:**


1. B.Miller, Advanced Organic Chemistry, Prentice Hall, 2nd Edn, 2003
2. Ambikanandan Misra, Aliasgar Shahiwala, Applications of polymers in Drug delivery system, Elsevier Pub., 2020.
3. Gowarikar, Polymer Chemistry –New Age International Publications, 2019
4. Physical Chemistry , Samel Galsstone, Lan Caster Press, 1970.


**Course Outcomes:**

At the end of this Course the student will be able to

- Understand the state of art synthesis of Polymeric materials(L1)
- Understand the hydro gels preparation, properties and applications in drug delivery system (L2).
- Explain biodegradable polymers(L2)
- Discuss applications of Biodegradable polymers (L3)

**B.Tech III Year II Sem & IV Year I Sem**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA**

**20ACE65A- ENVIRONMENTAL IMPACT ASSESSMENT**

**(Open Elective-II)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- This course is aimed at exposing the student to the concept of environmental impact assessment and methodologies used for the same.
- The student will also be imparted the knowledge about the various laws related to EIA and also methods of EIA audit.

**UNIT-I:**

**INTRODUCTION:-**

Basic concept of EIA : Initial environmental Examination, Elements of EIA, - factors affecting E-I-A Impact evaluation and analysis, preparation of Environmental Base map, Classification of environmental parameters.

**UNIT-II:**

**EIA METHODOLOGIES:-**

E I A Methodologies: introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods and cost/benefit Analysis.

**UNIT-III**

**IMPACT OF DEVELOPMENTAL ACTIVITIES AND LAND USE:-**

Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives. Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures. E I A in surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, Air pollution sources, Generalized approach for assessment of Air pollution Impact.

**UNIT-IV:**

**ASSEMENT OF IMPACT ON VEGETATION AND WILDLIFE :**

Introduction - Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation – Causes and effects of deforestation.

ENVIRONEMNTAL AUDIT :

Introduction - Environmental Audit & Environmental legislation objectives of Environmental Audit, Types of environmental Audit, Audit protocel, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report.

**UNIT-V:**

**ENVIRONEMENTAL ACTS (PROTECTION AND PREVENTION)**

Post Audit activities, The Environmental protection Act, The water preventation Act, The Air (Prevention & Control of pollution Act.), Wild life Act.Case studies and preparation of Environmental Impact assessment statement for various Industries.

**Text Books:**

- Environmental Impact Assessment Methodologies, byY. Anjaneyulu, B.S. Publication, Sultan Bazar,Hyderabad.
- Environmental Science and Engineering, by J. Glynn and Gary W. Hein Ke – Prentice HallPublishers

**Reference Books:**

1. Environmental Science and Engineering, by Suresh K. Dhaneja – S.K.,Katari& Sons Publication., NewDelhi.
2. Environmental Pollution and Control, by Dr H.S. Bhatia – Galgotia Publication (P) Ltd, Delhi

**Course Outcomes:**

At the end of this Course the student will be able to

1. Understand the concept of Environmental impact
2. Understand the methodologies related to EIA
3. Appreciate various laws related to environmental protection
4. Prepare the environmental impact assessment statement and to evaluateit.

*Annexure-II* *R20*

**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**ENERGY CONSERVATION & MANAGEMENT**

**(Open Elective-II)**

| L | T | P | C |
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**Course Objectives:** The objectives of the course are to make the students learn about

- 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:** **09 Hrs**

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.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To know about various types of Energy Audit **L1**
- To know about various types of Energy conservation schemes and Energy Manager functions **L2**

**UNIT – II:** **09 Hrs**

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

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To know about various Lighting systems and types of lamps. **L1**
- To evaluate illumination level Illumination of inclined surface to beam and Design of Energy efficient lighting systems. **L2**

**UNIT – III:** **09 Hrs**

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.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To know about various Methods of Power Factor improvement **L1**
- To know about various Energy Instruments **L3**

**UNIT – IV:** **09 Hrs**

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

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To know about analysis of Heating and HVAC **L1**
- To know about Energy conservation methods **L2**

**UNIT – V:** **09 Hrs**

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).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:**

At the end of this unit, the student will be able to

- To know about basic concept of Analysis of Economics and different methods **L1**
- To know about Computation of Economic Aspects Calculation **L2**

**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–1stedition, 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_IndiaP art IISecI-37_25-08-2010.pdf

**Course Outcomes:**

At the end of this Course the student will be able to

- Explain energy efficiency, conservation and various technologies. **L1**
- Design energy efficient lighting systems. **L2**
- Calculate power factor of systems and propose suitable compensation techniques. **L3**
- Explain energy conservation in HVAC systems. **L4**
- Determination of the economic analysis **L5**

**B.Tech IV Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**20AME65a-PROGRAMMING OF ROBOTS AND CONTROL**

**(Open Elective-II)**

| L | T | P | C |
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**Course Objectives:** The objectives of the course are to make the students learn about

- Learn the fundamental concepts of industrial robotic technology.
- Apply the basic mathematics to calculate kinematic and dynamic forces in robot manipulator.
- Understand the robot controlling and programming methods.
- Describe concept of robot vision system.

**UNIT – I: Fundamentals of Robots:** **10 Hrs**

Introduction, definition, classification and history of robotics, robot characteristics and precision of motion, advantages, disadvantages and applications of robots.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- outline the advantages, disadvantages and applications of robot. **L2**
- compare the types of robot manipulators based on applications. **L2**

**UNIT – II: Robot Actuators And Feedback Components:** **8 Hrs**

Actuators, Pneumatic, Hydraulic actuators, Electric & Stepper motors, comparison. Position sensors - potentiometers, resolvers, encoders - velocity sensors, Tactile sensors, Proximity sensors.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Compare the types of actuators used in robot manipulator. **L2**
- List out the various types of robots and feedback components. **L1**

**UNIT – III: Robot Programming:** **8 Hrs**

Methods of programming - requirements and features of programming languages, software packages, problems with programming languages - VAL, RAIL, AML, C, C++.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- List out the various methods of robot programming **L1**
- Explain the requirements and features of programming **L2**

**UNIT – IV: Control of Manipulators** **8 Hrs**

Open-loop and close-loop control, the manipulator control problem, linear control schemes, characteristics of second-order linear systems, linear second-order SISO model of a manipulator joint, joint actuators, partitioned PD control scheme, PID control Scheme, computer Torque control, force control of robotic manipulators, description of force-control tasks, force control strategies, hybrid position/force control, impedance force/torque control.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the basic concepts of robot controlling systems. **L2**
- Outline PD and PID control schemes. **L3**
- Use the force control strategies to determine the forces in robot. **L2**
- Explain the force control and torque control techniques. **L2**

**UNIT – V: Robot Vision:** **8 Hrs**

Introduction, architecture of robotic vision system, image processing, image acquisition camera, image enhancement, image segmentation, imaging transformation, Camera transformation and calibrations, industrial applications of robot vision.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Identify the components of robot vision system. **L3**
- Explain the concept of image enhancement, segmentation and transformation. **L2**

- List the various components of robot vision system. **L1**
- Illustrate the industrial applications of robot vision system. **L2**

**Text Books:**

1. Mikell P. Groover and Mitchell Weiss, Roger N. Nagel,Nicholas G.Odrey , Industrial Robotics — McGraw Hill, 1986.
2. R K Mittal and I J Nagrath, Robotics and control, Illustrated Edition, Tata McGraw Hill India 2003.
3. S.R.DEB

**Reference Books:**

1. Saeed B. Niku, Introduction to Robotics – Analysis, System, Applications, 2/e, John Wiley & Sons, 2010.
2. H. Asada and J.J.E. Slotine, Robot Analysis and Control, 1/e, Wiley- Inter science, 1986.
3. Robert J. Schillin, Fundamentals of Robotics: Analysis and control, Prentice-Hall Of India Pvt. Limited, 1996.
4. Mohsen shahinpoor, A robot Engineering text book, Harper & Row Publishers,1987.
5. John.J.Craig Addison, Introduction to Robotics: Mechanics and Control, Wesley, 1999.
6. K.S. FU, R.C. Gonzalez and C.S.G Lee, Robotics: Control, sensing, vision, and intelligence. Mc Graw Hill, 1987.
7. Richard D. Klafter, Thomas Robotic Engineering an integrated approach, PHI publications 1988.

**Course Outcomes:**

At the end of this Course the student will be able to

- Explain fundamentals of Robots. **L2**
- Apply kinematics and differential motions and velocities. **L3**
- Demonstrate control of manipulators. **L2**
- Understand robot vision. **L2**
- Develop robot cell design and programming. **L3**

**Online Learning Resources:**

- https://nptel.ac.in/courses/112105249
- https://onlinecourses.nptel.ac.in/noc20_de11/preview
- https://nptel.ac.in/courses/112104308
- https://nptel.ac.in/courses/112104288
- https://nptel.ac.in/courses/112101099
- https://www.iare.ac.in/sites/default/files/lecture_notes/ROBOTICS_LECURE_NOTES.pdf

Head
Mechanical Engineering Department.
JNTUA College of Engineering,

**B.Tech IV Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**20AME65b-NON-CONVENTIONAL SOURCES OF ENERGY**

**(Open Elective-II)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:** The objectives of the course are to make the students learn about

- Familiarize with concept of various forms of renewable energy.
- Understand division aspects and utilization of renewable energy sources for both domestics and industrial applications.
- Expose the students in an environmental and cost economics of using renewable energy sources compared to fossil fuels.

**UNIT – I: Introduction** **10 Hrs**

**Introduction to energy resources:** Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the basic concepts of solar radiation and solar collectors **L2**
- develop sun path diagrams **L3**
- Explain environmental impact of solar power. **L2**
- Discuss the instruments for measuring solar radiation and sun shine. **L6**

**UNIT – II: Solar Energy Collection & Storage** **8 Hrs**

**Solar Energy Collection**: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

**Solar Energy Storage and Applications** :

Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications solar heating technique, solar distillation and drying, photovoltaic energy conversion.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Classify solar energy collectors. **L1**
- Describe orientation and thermal analysis of solar energy collectors. **L2**
- Explain photovoltaic energy conversion. **L2**
- Illustrate the various solar energy applications. **L2**

**UNIT – III: Wind Energy & Bio-Mass** **8 Hrs**

**Wind Energy** : Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria

**Bio-Mass**: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C. Engine operation and economic aspects.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Compare vertical axis and horizontal axis windmills. **L3**
- Illustrate the performance characteristics of vertical axis and horizontal axis windmills. **L2**
- Discus the principles of Bio-conversion. **L6**
- Explain combustion characterises of bio-gas. **L2**

**UNIT – IV: Geothermal Energy & Ocean Energy** **8 Hrs**

**Geothermal Energy**: Resources, types of wells, methods of harnessing the energy, potential in India.

**Ocean Energy**: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. **Tidal and wave energy:** Potential and conversion techniques, mini-hydel power plants, and their economics.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the concept of geothermal and ocean energy. **L2**
- Discus OTEC and principles utilization. **L6**
- Explain mini-hydel power plants and their economics. **L2**

**UNIT – V: Direct Energy Conversion** **8 Hrs**

Need for DEC, Carnot cycle, limitations, principles of DEC. Thermo-electric generators, Seebeck, Peltier and Joule Thomson effects, Figure of merit, materials, applications, MHD generators, principles, dissociation and ionization, hall effect, magnetic flux, Fuel cells, principles, faraday's law's, thermodynamic aspects, selection of fuels and operating conditions.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Describe the working principle of MHD engine. **L2**
- Explain constructional details of various thermo-electric generators. **L2**
- Identify the various economic, thermodynamic aspects of electron gas dynamic conversion system. **L3**

**Text Books:**

1. Tiwari and Ghosal, Renewable energy resources, Narosa Publishing House-2004.
2. G.D. Rai, Non-Conventional Energy Sources, Khanna Publications-1988.

**Reference Books:**

1. Twidell & Weir, Renewable Energy Sources, Routledge; 3/e, 2015.
2. Sukhatme S.P., Nayak.J.P, 'Solar Energy – Principle of Thermal Storage and collection", Tata McGraw Hill, 2008.
3. Sathyajith Mathew, Wind Energy Fundamentals, Resource Analysis and Economics, Springer Publications, 2006.
4. Wei Tong, Wind Power Generation and Wind Turbine Design, WIT Press, 2010.
5. Wind Power, Revised Edition: Renewable Energy for Home, Farm, and Business, Paul Gipe, Chelsea Green Publishing, 2004.
6. S.S. Rao, B.B. Parulekar, Energy Technology (Non Conventional, Renewable and Conventional), Khanna publications, 1994.

**Course Outcomes:**

At the end of this Course the student will be able to

- Outline the various economic, thermodynamic aspects of electron gas dynamic conversion system. **L3**
- Explain the basic concepts of solar radiation and solar collectors **L2**
- Discus OTEC and principles utilization. **L6**
- Describe orientation and thermal analysis of solar energy collectors. **L2**

**Online Learning Resources:**

- https://nptel.ac.in/courses/103103206
- https://nptel.ac.in/courses/108108078
- https://onlinecourses.nptel.ac.in/noc21_ph33/preview
- https://nptel.ac.in/courses/121106014
- https://mrcet.com/downloads/digital_notes/EEE/31082020/IV-I%20SOLAR%20&%20WIND%20ELECTRICAL%20SYSTEMS%20DIGITAL%20NOTES%201.pdf
- https://www.vssut.ac.in/lecture_notes/lecture1428910296.pdf

Head
Mechanical Engineering Department
JNTUA College of Engineering

B.Tech IV Year I Semester

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**20AEC65a- INTRODUCTION TO MICROCONTROLLER AND APPLICATIONS**

**(Open Elective-II)**

L–T – P - C
3 – 0 – 0 – 3

**Course Objective:**

- To understand the basic concepts and architecture of 8051.
- To learn various instructions and addressing modes used in 8051
- To be able to program 8051 Timers and implement serial communication for a given application.
- To learn interfacing of memory, I/O devices and the usage of Interrupts.
- To know the basic architecture and interfacing of ARM microcontroller.

**UNIT I**

**Architecture of 8051:** Introduction, Block diagram of 8051 Microcontroller, Functions of each block, Pin details of 8051, ALU,ROM, RAM, Memory Organization of 8051, Special function registers, Program Counter, PSW register, Stack, I/O Ports, Timer, Interrupt, Serial Port, Oscillator and Clock, Clock Cycle, Machine Cycle, Instruction cycle, Reset, Power on Reset.

**Learning Outcomes:**

*At the end of the unit, the student will be able to:*

- Understand the architecture of 8051 microcontroller.(L2)
- Learn the functions of each block of 8051 microcontroller.(L1)

**UNIT II**

**Instruction Set of 8051:** Instruction set of 8051, Classification of 8051 Instructions, Data transfer instructions, Arithmetic Instructions, Logical instructions, Branching instructions, Bit Manipulation Instructions

**Assembler and Addressing Modes:** Assembling and running an 8051 program, Structure of Assembly Language, Assembler directives, Different addressing modes of 8051. **I/O:** Bit addresses for I/O and RAM, I/O programming, I/O bit manipulation programming.

**Learning Outcomes:**

*At the end of the unit, the student will be able to:*

- Know different instructions available in the Instruction set of 8051.(L1)
- Learn and use different types of addressing modes of 8051 microcontroller.(L1)

**UNIT III**

**Timer:** Programming 8051 Timers, Timer registers, Different modes of Timer, Programming timer in different modes, Counter programming, Different modes of Counter, Sample programs.

**Serial Communication:** Basics of Serial communication, UART, RS 232 Protocol, 8051 interface to RS 232, 8051 UART Programming, SPI and $I^2C$ implementation on 8051.

**Learning Outcomes:**

*At the end of the unit, the student will be able to:*

- Write programs to use the 8051 Timers for a given application.(L6)
- Use different types of serial communication devices based on the application.(L3)

**UNIT IV**

**Interrupt:** 8051 Interrupts, Programming Timer Interrupts, Programming external hardware interrupts, Programming the serial communication interrupt, Interrupt priority in 8051.**IC 8255:** IC 8255, Block Diagram, Modes of 8255, Interfacing with 8051.

**Interfacing Techniques:** Interfacing external memory to 8051, Sensor interfacing, ADC interfacing, DAC interfacing, Keyboard interfacing, Seven segment LED Display Interfacing, Stepper Motor interfacing.

**Learning Outcomes:**

*At the end of the unit, the student will be able to:*

- Interface memory and I/O devices for specific applications.(L4)
- Learn and apply Interrupts based on the application and usage.(L3)

UNIT V

**ARM Cortex-M Microcontrollers:** A Memory-centric System Model. Basics of Chip Design. The Arm Cortex-M Processor Architecture. Interconnects. The Advanced Microcontroller Bus Architecture (AMBA). Interfacing with the External World. Peripherals. Memory System. FPGA SoC Architecture.

**Learning Outcomes:**

*At the end of the unit, the student will be able to:*

- Learn about the ARM based processor and its architecture.(L3)
- Interface ARM controllers for practical applications.(L3)

**TEXT BOOKS**

1. Muhammed Ali Mazidi, Janice GillispieMazidi andRolin D McKinlay, "The 8051 Microcontroller and Embedded Systems Using Assembly and C", 2nd Edition, Pearson Education, 2008.
2. Ajit pal, "Microcontrollers, Principles and Applications", – PHI Ltd., - 2011.

**REFERENCE BOOKS**

1. Ajay V Deshmukh, "Microcontrollers: Theory and Applications", TATA McGraw Hill publications, 2007.
2. Krishna Kanth, "Microprocessors and Microcontrollers", PHI Publications, 2010
3. Fundamentals of System-on-Chip Design on Arm Cortex-M Microcontrollers Paperback – 2 Aug. 2021by Rene Beuchat , Andrea Guerrieri , SahandKashani.

**Course outcomes:**

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

- Understand the basic concepts and architecture of 8051.(L2)
- Know the usage of various instructions and addressing modes in 8051(L1)
- Program 8051 Timers and implement serial communication for a given application.(L6)
- Interface memory, I/O devices and use Interrupts.(L4).
- Learn the basic architecture and interfacing of ARM microcontroller(L3).

B.Tech IV Year I Semester

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**20AEC65b- PRINCIPLES OF DIGITAL SIGNAL PROCESSING**

**(Open Elective-II)**

**L–T – P - C**
**3 – 0 – 0 – 3**

**Course Objectives:**

- To understand the frequency domain analysis of discrete time signals.
- To learn the properties of discrete fourierseries and fourier transforms.
- To design & analyze IIR digital filters from analog filters.
- To know various structures used in implementation of FIR digital filters.
- To grasp the importance and applications of Multirate Digital signal processing.

**UNIT I**

**Introduction to Digital Signal Processing:** Discrete time signals & sequences, Classification of Discrete time systems, stability of LTI systems, LTI system Properties. Solution of Linear constant coefficient difference equations, frequency domain representation of discrete time signals and systems. Review of Z-transforms.

**Learning Outcomes:**

*At the end of the unit, the student will be able to*:

- Analyze and process signals in the discrete domain.(L4)
- Determine time domain representations and frequency domain analysis of discrete-time signals and systems (L3)

**UNIT II**

**Discrete Fourier Series and Fourier Transforms:** Properties of discrete Fourier series, DFS representation of periodic sequences, Discrete Fourier transforms: Properties of DFT, linear filtering methods based on DFT, Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency FFT Algorithms, Inverse FFT.

**Learning Outcomes:**

*At the end of the unit, the student will be able to*:

- Understand the pproperties of discrete fourier series.(L2)
- Describe DFT using FFT algorithms.(L1)

**UNIT III**

**Design of IIR Digital Filters and Realizations:** Analog filter approximations – Butter worth and Chebyshev, Design of IIR Digital filters from analog filters, Design Examples, Analog and Digital frequency transformations. Basic structures of IIR systems, Transposed forms.

**Learning Outcomes:**

*At the end of the unit, the student will be able to*:

- Design IIR digital filters from analog filters.(L6)
- Construct IIR digital filters with different realization techniques.(L6)

**UNIT IV**

**Design of FIR Digital Filters and Realizations:** Characteristics of FIR Digital Filters, frequency response. Design of FIR digital filters using window techniques and frequency sampling technique, comparison of IIR & FIR filters, basic structures of FIR systems.

**Learning Outcomes:**

*At the end of the unit, the student will be able to*:

- Design FIR digital filters using window techniques.(L6)
- Construct the basic structures of FIR systems.(L6)

**UNIT V**

**DSP Applications:**Introduction to programmable DSPs, Multirate signal processing: Decimation, Interpolation, Sampling rate conversion by a rational factor; Adaptive filters: Introduction, Basic principles of Forward Linear Predictive filter and applications such as system identification, echo cancellation, equalization of channels, and beam forming using block diagram representation study only.

**Learning Outcomes:**

*At the end of the unit, the student will be able to:*

- Apply Interpolation and Decimation with help of sampling and filtering.(L3)
- Understand the principle and applications of Forward Linear Predictive filter.(L2)

**Text Books:**

1. John G. Proakis andDimitris G. Manolakis, "Digital Signal Processing, Principles, Algorithmsand Applications", Pearson Education, 2007.
2. A.V.Oppenheim and R.W. Schaffer, "Discrete Time Signal Processing",PHI.
3. B.Venkataramani and M. Bhaskar, "Digital Signal Processors – Architecture, Programming and Applications", TATA McGraw Hill, 2002.

**References:**

1. Andreas Antoniou, "Digital Signal Processing", TATA McGraw Hill, 2006
2. MH Hayes, "Digital Signal Processing", Schaum's Outline series, TATA Mc-Graw Hill, 2007.
3. Robert J. Schilling and Sandra L. Harris, "Fundamentals of Digital Signal Processing using Matlab", Thomson, 2007.

**Course outcomes:**

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

- Articulate the frequency domain analysis of discrete time signals.(L3)
- Understand the properties of discrete fourierseries and fourier transforms.(L2)
- Design& analyze IIR digital filters from analog filters.(L6)
- Design various structures used in implementation of FIR digital filters.(L6)
- Summarize the importance and applications of Multirate Digital signal processing.(L2)

**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA**

**20ACS65A- MACHINE LEARNING APPLICATIONS**

**(Open Elective-II)**

| L | T | P | C |
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| 3 | 0 | 0 | 3 |

**Course Objectives:**

- To be able to formulate machine learning problems corresponding to different applications.
- To understand a range of machine learning algorithms along with their strengths and weaknesses.
- To understand the basic theory underlying machine learning.

**UNIT-I: INTRODUCTION**

**Introduction:** An illustrative learning task, and a few approaches to it. What is known from algorithms? Theory, Experiment. Biology. Psychology. Overview of Machine learning, related areas and applications. Linear Regression, Multiple Regression, Logistic Regression, logistic functions.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Argue the importance and role of software architecture in large-scale software systems. **L2**
- Design and motivate software architecture for large-scale software systems. **L3**

**UNIT-II: DECISION TREE LEARNING**

**Decision Tree Learning:** - Minimum Description Length Principle. Occam's razor. Learning with active queries Introduction to information theory, Decision Trees, Cross Validation and Over fitting. Neural Network Learning: Perceptions and gradient descent back propagation, multilayer networks and back propagation.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Design and motivate software architecture for large-scale software systems. **L3**
- Recognize major software architectural styles and frameworks. **L4**

**UNIT-III SAMPLE COMPLEXITY AND OVER FITTING**

**Sample Complexity and Over fitting:** Errors in estimating means. Cross Validation and jackknifing VC dimension. Irrelevant features: Multiplicative rules for weight tuning. Support Vector Machines: functional and geometric margins.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Recognize major software architectural styles and frameworks. **L3**
- Describe a software architecture using various documentation approaches and architectural description languages. **L4**

**UNIT-IV: INSTANCE-BASED TECHNIQUES**

**Instance-based Techniques**: Lazy vs. eager generalization. K nearest neighbor, case- based reasoning. Clustering and Unsupervised Learning: K-means clustering, Gaussian mixture density estimation, model selection

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Describe a software architecture using various documentation approaches and architectural description languages. **L5**
- Generate architectural alternatives for a problem and selection among them. **L3**

**UNIT-V: Genetic Algorithms**

**Genetic Algorithms:** Different search methods for induction - Explanation-based Learning: using prior knowledge to reduce sample complexity. Dimensionality reduction: feature selection, principal component analysis.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Use well-understood paradigms for designing new systems. **L3**
- Identify and assess the quality attributes of a system at the architectural level. **L4**

**Text Books:**

1. Tom Michel, Machine Learning, McGraw Hill, 1997
2. Trevor Has tie, Robert Tibshirani & Jerome Friedman. The Elements of Statically Learning, Springer Verlag, 2001.

**Reference Books:**

1. Machine Learning Methods in the Environmental Sciences, Neural Networks, William W Hsieh, Cambridge Univ Press.
2. Richard o. Duda, Peter E. Hart and David G. Stork, pattern classification, John Wiley & Sons Inc.,2001
3. Chris Bishop, Neural Networks for Pattern Recognition, Oxford University Press, 1995.

**Course Outcomes:**

At the end of this Course the student will be able to

- Student should be able to understand the basic concepts such as decision trees and neural networks.Ability to formulate machine learning techniques to respective problems. **L2**
- Apply machine learning algorithms to solve problems of moderate complexity. **L3**

**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA**

**20ACS65B- OBJECT ORIENTED PROGRAMMING**

**(Open Elective-II)**

| L | T | P | C |
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**Course Objectives:**

- Study the syntax, semantics and features of Java Programming Language
- Study the Object Oriented Programming Concepts of Java Programming language
- Learn the method of creating Multi-threaded programs and handle exceptions
- Learn Java features to create GUI applications & perform event handling

**UNIT-I: INTRODUCTION**

**Introduction to Java**: The key attributes of object oriented programming, simple program, The Java keywords, Identifiers, Data types and operators, Program control statements, Arrays, Strings, String Handling

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the basics of computer graphics, different graphics systems and applications of computer graphics. **L2**
- Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis. **L3**

**UNIT-II: CLASSES**

**Classes**: Classes, Objects, Methods, Parameters, Constructors, Garbage Collection, Access modifiers, Pass Objects and arguments, Method and Constructor Overloading, Understanding static, Nested and inner classes.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Use of geometric transformations on graphics objects and their application in composite form. **L2**
- Extract scene with different clipping methods and its transformation to graphics display device. **L3**

**UNIT-III INHERITANCE**

**Inheritance** – Basics, Member Access, Usage of Super, Multi level hierarchy, Method overriding, Abstract class, Final keyword.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explore projections and visible surface detection techniques for display of 3D scene on 2D screen. **L3**
- Render projected objects to naturalize the scene in 2D view and use of illumination models for this **L4**

**UNIT-IV: INTERFACES**

**Interfaces** – Creating, Implementing, Using, Extending, and Nesting of interfaces.

**Packages** – Defining, Finding, Member Access, Importing

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the basics of Multimedia basics, different graphics systems and applications of computer graphics. **L5**
- Discuss various multimedia datastructures. **L5**

**UNIT-V: EXCEPTION HANDLING**

**Exception handling**: Hierarchy, Fundamentals, Multiple catch clauses, subclass exceptions, Nesting

try blocks, Throwing an exception, Using Finally and Throws, Built-in exceptions, User-defined exceptions.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the basics of Multimedia Authoring systems **L4**
- Understand the how videos are placed **L5**

**Text Books:**

1. "Java Fundamentals - A Comprehensive Introduction", Herbert Schildt and Dale Skrien, Special Indian Edition, McGrawHill, 2013.
2. "Java The Complete Reference" Herbert Schildt, 8th Edition, 2011, Oracle press, TataMcGraw-Hill
3. "Java – How to Program", Paul Deitel, Harvey Deitel, PHI.

**Reference Books:**

1. "Programming with Java" T.V.Suresh Kumar, B.Eswara Reddy, P.Raghavan Pearson Edition.
2. "Core Java", Nageswar Rao, Wiley Publishers.
3. "Thinking in Java", Bruce Eckel, Pearson Education.
4. "A Programmers Guide to Java SCJP", Third Edition, Mughal, Rasmussen, Pearson.
5. "Head First Java", Kathy Sierra, Bert Bates, O'Reilly
6. "SCJP – Sun Certified Programmer for Java Study guide" – Kathy Sierra, Bert Bates, McGrawHill
7. "Java in Nutshell", David Flanagan, O'Reilly
8. "Core Java : Volume I – Fundamentals, Cay S. Horstmann, Gary Cornell, The Sun Micro Systems Press

**Course Outcomes:**

At the end of this Course the student will be able to

Introduction to computer graphics

- Gain knowledge of client-side scripting, validation of forms and AJAX programming **L3**
- Understand server-side scripting with PHP language **L4**
- Understand what XML is and how to parse and use XML Data with Java **L5**
- To introduce Server-side programming with Java Servlets and JSP **L6**

**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA**

**20ACS65C- WEB DESIGN**

**(Open Elective-II)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- To Learn the basic concepts in HTML, CSS, JavaScript
- To Understand the responsive design and development
- To learn the web project management and maintenance process
- To Design a Website with HTML, JS, CSS / CMS - Word press

**UNIT-I: WEB DESIGN - HTML MARKUP FOR STRUCTURE**

Working of Web - HTML Markup for Structure - Creating simple page - Marking up text - Adding Links - Adding Images - Table Markup - Forms - HTML5.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Argue the importance and role of software architecture in large-scale software systems. **L2**
- Design and motivate software architecture for large-scale software systems. **L3**

**UNIT-II: CSS AND JAVASCRIPT**

CSS - Formatting text - Colours and Background - Padding, Borders and Margins – Floating and positioning - Page Layout with CSS - Transition, Transforms and Animation – JavaScript - Using Java Script.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Design and motivate software architecture for large-scale software systems. **L3**
- Recognize major software architectural styles and frameworks. **L4**

**UNIT-III RESPONSIVE WEB DESIGN**

Sass for Responsive Web Design - Marking Content with HTML5 - Mobile-First or DesktopFirst - CSS Grids, CSS Frameworks, UI Kits, and Flexbox for RWD - Designing small UIs by Large Finger - Images and Videos in Responsive Web Design - Meaningful Typography for Responsive Web Design.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Recognize major software architectural styles and frameworks. **L3**
- Describe a software architecture using various documentation approaches and architectural description languages. **L4**

**UNIT-IV: WEB PROJECT MANAGEMENT**

Project Life Cycle - Project Definition - Discovery and Requirements - Project Schedule and Budgeting - Running the project - Technical Documentation - Development, Communicaton, Documentation - QA and testing -Deployment - Support and operations.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Describe a software architecture using various documentation approaches and architectural description languages. **L5**
- Generate architectural alternatives for a problem and selection among them. **L3**

**UNIT-V: PROJECT CASE STUDY**

Using HTML, CSS, JS or using Opensource CMS like Word press, design and develop a Website having Aesthetics, Advanced and Minimal UI Transitions based on the project - Host and manage the project live in any public hosting.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Use well-understood paradigms for designing new systems. **L3**
- Identify and assess the quality attributes of a system at the architectural level. **L4**

**Text Books:**

1. Jennifer Niederst Robbins, "Learning Web Design", O'REILLY 4th Edition
2. Ricardo Zea, "Mastering Responsive Web Design", PACKT Publishing, 2015
3. Justin Emond, Chris Steins, "Pro Web Project Management", Apress,2011

**Reference Books:**

1. Jon Duckett, "HTML and CSS: Design and Build Websites", John Wiley and Sons, edition 2014
2. Jon Duckett, Jack Moore, "JavaScript & JQuery: Interactive Front-End Web Development", John Wiley and Sons, edition 2014
3. Uttam K. Roy "Web Technologies" Oxford University Press, 13th impression, 2017 4. Word press - http://www.wpbeginner.com/category/wp-tutorials/

**Course Outcomes:**

At the end of this Course the student will be able to

- Recognize the method of using layered approach for design . **L2**
- Explain the functionality of each layer of a computer network. **L3**
- Apply the knowledge of layered approach for the design of computer network software. **L4**
- Analyze the performance of protocols of a computer network. **L4**
- Recommend the protocols for different applications. **L5**
- Propose new protocols for a computer networks. **L6**

**B.Tech IV Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA**

**20ACS71A- SOFTWARE PROJECT MANAGEMENT**

**(Professional Elective-III)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- To outline the need for Software Project Management
- To highlight different techniques for software cost estimation and activity planning.

**UNIT – I: Project Evaluation and Project Planning**

Importance of Software Project Management – Activities Methodologies – Categorization of Software Projects – Setting objectives – Management Principles – Management Control – Project portfolio Management – Cost-benefit evaluation technology – Risk evaluation – Strategic program Management – Stepwise Project Planning.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Develop the model from the conventional software product to the modern **L1**
- Analyze and design the software architecture **L1**

**UNIT – II: Project Life Cycle and Effort Estimation**

Software process and Process Models – Choice of Process models - mental delivery – Ràpid Application development – Agile methods – Extreme Programming – SCRUM – Managing interactive processes – Basics of Software estimation – Effort and Cost estimation techniques – COSMIC Full function points - COCOMO II A Parametric Productivity Model - Staffing Pattern.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Have an exposure for organizing and managing a software project. **L2**
- Apply, analyze, design and develop the software project. **L2**

**UNIT – III: Activity Planning and Risk Management**

Objectives of Activity planning – Project schedules – Activities – Sequencing and scheduling – Network Planning models – Forward Pass & Backward Pass techniques – Critical path (CRM) method – Risk identification – Assessment – Monitoring – PERT technique – Monte Carlo simulation – Resource Allocation – Creation of critical patterns – Cost schedules.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Design various estimation levels of cost and effort **L2**
- Acquire the knowledge of managing, economics for conventional, modern and future software projects **L3**

**UNIT-IV: Project Management and Control**

Framework for Management and control – Collection of data Project termination – Visualizing progress – Cost monitoring – Earned Value Analysis- Project tracking – Change control- Software Configuration Management – Managing contracts – Contract Management.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Categorize various peer instruction levels **L3**
- Sketch various artifacts sets for better understanding of software development. **L4**

**UNIT – V: Staffing in Software Projects**

Managing people – Organizational behavior – Best methods of staff selection – Motivation – The Oldham-Hackman job characteristic model – Ethical and Programmed concerns – Working in teams – Decision making – Team structures – Virtual teams – Communications genres – Communication plans.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Identify and describe the key phases of project management **L4**
- Determine an appropriate project management approach through an evaluation of the business context and scope of the project. **L5**

**Text Books:**

1. Bob Hughes, Mike Cotterell and Rajib Mall: Software Project Management – Fifth Edition, Tata McGraw Hill, New Delhi, 2012.

**Reference Books:**

1. Robert K. Wysocki "Effective Software Project Management" – Wiley Publication
2. Walker Royce: "Software Project Management"- Addison-Wesley
3. Gopalaswamy Ramesh

**Course Outcomes:**

At the end of this Course the student will be able to

- At the end of the course the students will be able to practice Project Management principles while developing a software. **L5**

**B.Tech IV Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA**

**20ACS71B- SOFTWARE TESTING**

**(Professional Elective-III)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- To study fundamental concepts in software testing
- To discuss various software testing issues and solutions in software unit test, integration and system testing.
- To expose the advanced software testing topics, such as object--oriented software testing methods.

**UNIT – I: Introduction**

Faults, Errors, and Failures, Basics of software testing, Testing objectives, Principles of testing, Requirements, behavior and cor-rectness, Testing and debugging, Test metrics and measurements, Verification, Validation and Testing, Types of testing, Software Quality and Reliability, Software defect tracking.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- List a range of different software testing techniques and statergies and be able to apply specific (automated) unit testing method to the projects. **L1**
- Distinguish characterstics of structural testing methods **L1**

**UNIT – II: White Box and Black Box Testing**

White box testing, static testing, static analysis tools, Structural testing: Module/Code functional testing, Code coverage testing, Code complexity testing, Black Box testing, Requirements based testing, Boundary value analysis, Equivalence partitioning, state/ graph based testing, Model based testing and model checking, Differences between white box and Black box testing.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible. **L2**
- Discuss about the functional and system testing methods **L2**

**UNIT – III: Integration, System, and Acceptance Testing**

Top down and Bottom up integration, Bi-directional integration, System integration, Scenario Testing, Defect Bash, Functional versus Non-functional testing, Design/Architecture verification, Deployment testing, Beta testing, Scalability testing, Reliability testing, Stress testing, Acceptance testing: Acceptance criteria, test cases selection and execution.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Discuss about the functional and system testing methods. **L2**
- Demonstrate various issues for object oriented testing. **L3**

**UNIT-IV: Test Selection & Minimization for Regression Testing**

Regression testing, Regression test process, Initial Smoke or Sanity test, Selection of regression tests, Execution Trace, Dynamic Slicing, Test Minimization, Tools for regression testing, Ad hoc Testing: Pair testing, Exploratory testing, Iterative testing, Defect seeding.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Distinguish characterstics of structural testing methods. **L3**
- Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible. **L4**

**UNIT – V: Test Management and Automation**

Test Planning, Management, Execution and Reporting, Software Test Automation: Scope of automation, Design & Architecture for automation, Generic requirements for test tool framework, Test tool selection, Testing in Object Oriented Systems.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Discuss about the functional and system testing methods. **L4**
- Demonstrate various issues for object oriented testing. **L5**

**Text Books:**

1. Desikan and G. Ramesh, "Software Testing: Principles and Practices", Pearson Education.

**Reference Books:**

1. Aditya P. Mathur, "Fundamentals of Software Testing", Pearson Education.
2. Naik and Tripathy, "Software Testing and Quality Assurance", Wiley K. K. Aggarwal and Yogesh Singh, "Software Engineering", New Age International Publication.

**Course Outcomes:**

At the end of this Course the student will be able to

- List a range of different software testing techniques and statergies and be able to apply specific(automated) unit testing method to the projects. **L4**
- Distinguish characterstics of structural testing methods. **L3**
- Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible. **L3**
- Discuss about the functional and system testing methods. **L2**
- List a range of different software testing techniques and statergies and be able to apply specific(automated) unit testing method to the projects. **L5**

**B.Tech IV Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA**

**20ACS71C- SOFTWARE ARCHITECTURE**

**(Professional Elective-III)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- Understand architectural requirements
- Identify architectural structures
- Develop architectural documentation
- Generate architectural alternatives

**UNIT – I: Basic Concepts**

Concepts of Software Architecture, Models, Processes, Stakeholders.

Designing Architectures: The Design Process, Architectural Conception.

Refined Experience in Action: Styles and Architectural Patterns, Architectural Conception in Absence of Experience.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Argue the importance and role of software architecture in large **L1**
- Design and motivate software architecture for large **L1**

**UNIT – II: Modeling**

Modeling Concepts, Ambiguity, Accuracy, and Precision, Complex Modeling: Mixed Content and Multiple Views, Evaluating Modeling Techniques, Specific Modeling Techniques.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Design and motivate software architecture for large-scale software systems. **L2**
- Recognize major software architectural styles and frameworks. **L2**

**UNIT – III: Analysis**

**Analysis**- Analysis Goals, Scope of Analysis, Architectural Concern being Analyzed, Level of Formality of Architectural Models, Type of Analysis, Analysis Techniques.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Recognize major software architectural styles and frameworks. **L2**
- Describe a software architecture using various documentation approaches and architectural description languages. **L3**

**UNIT-IV: Implementation and Deployment**

Implementation and Deployment- Concepts, Existing Frameworks, Software Architecture and Deployment, Software Architecture and Mobility

Conventional Architectural styles- Pipes and Filters, Event- based, Implicit Invocation, Layered systems, Repositories, Interpreters, Process control

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Describe a software architecture using various documentation approaches and architectural description languages. **L3**
- Generate architectural alternatives for a problem and selection among them. **L4**

**UNIT – V: Applied Architectures and Styles**

Applied Architectures and Styles-Distributed and Networked Architectures, Architectures for Network-Based Applications, Decentralized Architectures, Service-Oriented Architectures and Web Services.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Use well-understood paradigms for designing new systems. **L4**
- Identify and assess the quality attributes of a system at the architectural level. **L5**

**Text Books:**

1. Software Architecture: Foundations, Theory, and Practice, by Richard N.Taylor, Nenad Medvidovic, Eric Dashofy, ISBN: 978-0-470-16774-8
2. M. Shaw: Software Architecture Perspectives on an Emerging Discipline, Prentice-Hall.
3. Len Bass, Paul Clements, Rick Kazman: Software Architecture in Practice, Pearson

**Reference Books:**

1. Pattern Oriented Software Architecture, By Frank Buchnanetal, Wiley India.
2. The Art of Software Architecture, By Stephen T. Albin

**Course Outcomes:**

At the end of this Course the student will be able to

- Argue the importance and role of software architecture in large-scale software systems. **L4**
- Design and motivate software architecture for large-scale software systems. **L3**
- Recognize major software architectural styles and frameworks. **L3**
- Describe a software architecture using various documentation approaches and architectural description languages. **L2**
- Generate architectural alternatives for a problem and selection among them. **L5**
- Use well-understood paradigms for designing new systems. **L4**
- Identify and assess the quality attributes of a system at the architectural level. **L5**

**B.Tech IV Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA**

**20ACS72A- MICRO SERVICES**

**(Professional Elective-IV)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- To study fundamental concepts in software testing
- To discuss various software testing issues and solutions in software unit test, integration and system testing.
- To expose the advanced software testing topics, such as object--oriented software testing methods.

**UNIT – I: Motivations for micro services**

What are micro services, Benefits from micro services, What to avoid with micro services, How is this different than service-oriented architecture?, Case studies and most common architectural patterns.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- List a range of different software testing techniques and statergies and be able to apply specific(automated) unit testing method to the projects. **L1**
- Distinguish characterstics of structural testing methods **L1**

**UNIT – II: Elements of a microservices architecture**

Characteristics of micro services architecture, Designing micro services, REST API and messaging, The future of micro services.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible. **L2**
- Discuss about the functional and system testing methods **L2**

**UNIT – III: Microservices and DevOps**

Why you should use DevOps, DevOps capabilities for microservices architecture., Microservices governance, DevOps capabilities: Testing strategies for microservices.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Discuss about the functional and system testing methods. **L2**
- Demonstrate various issues for object oriented testing. **L3**

**UNIT-IV: Developing microservices in Bluemix**

Bluemix introduction, Developing microservices using Bluemix DevOps, Deployment, testing, monitoring, and scaling services in Bluemix DevOps, Communication, session persistence, and logging in Bluemix, Considerations and opportunities.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Distinguish characterstics of structural testing methods. **L3**
- Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible. **L4**

**UNIT – V: Microservices Case Studies In Ibm**

Microservices implementation in IBM DevOps Services, Microservices case study in Bluemix console, Microservices case study in IBM Watson services.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Discuss about the functional and system testing methods. **L4**

- Demonstrate various issues for object oriented testing. **L5**

**Text Books:**

1. "Microservices from Theory to Practice: Creating Applications in IBM Bluemix Using the Microservices Approach", First Edition (August 2015).

**Reference Books:**

1. ALIGNING PRINCIPLES, PRACTICES, AND CULTURE, "Microservice Architecture", OREILLY.

**Course Outcomes:**

At the end of this Course the student will be able to

- List a range of different software testing techniques and statergies and be able to apply specific(automated) unit testing method to the projects. **L4**
- Distinguish characterstics of structural testing methods. **L3**
- Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible. **L3**
- Discuss about the functional and system testing methods. **L2**
- List a range of different software testing techniques and statergies and be able to apply specific(automated) unit testing method to the projects. **L5**

**B.Tech IV Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA**

**20ACS72B- CLOUD COMPUTING**

**(Professional Elective-IV)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- Apply principles of best practice in cloud application design and management.
- Identify and define technical challenges for cloud applications and assess their importance
- Analyze the problems and solutions to cloud application problems

**UNIT – I: Introduction to Cloud Computing**

Evolution of Cloud Computing –Principles of Parallel and Distributed Computing – Cloud Characteristics, Recent trends in Computing- Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Web services.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the fundamental principles of distributed computing. **L2**
- Understand how the distributed computing environments known as Grids can be built from lower level services. **L2**

**UNIT – II: CLOUD ARCHITECTURE, SERVICES AND STORAGE**

Layered Cloud Architecture Design – NIST Cloud Computing Reference Architecture. Characteristics – Cloud Services –(IaaS, PaaS, SaaS) –Deployment Models- Public, Private, Hybrid and community Cloud.Advantages of Cloud Storage – Cloud Storage Providers – S3.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the importance of virtualization in distributed computing and how this has enabled the development of Cloud Computing. **L3**
- Analyze the performance of Cloud Computing **L3**

**UNIT – III: CLOUD ENABLING TECHNOLOGIES**

Basics of Virtualization – Types of Virtualization - Implementation Levels of Virtualization - Virtualization Structures - Tools and Mechanisms - Virtualization of CPU, Memory, I/O Devices - Virtual Clusters and Resource management – Virtualization for Data-center Automation.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the concept of Cloud Security. **L4**
- Learn the Concept of Cloud Infrastructure Model. **L4**

**UNIT-IV: RESOURCE MANAGEMENT AND SECURITY IN CLOUD**

Inter Cloud Resource Management – Resource Provisioning and Resource Provisioning Methods Global Exchange of Cloud Resources – Security Overview – Cloud Security Challenges – Software-as-a-Service Security – Security Governance – IAM –Security Standards.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the importance of virtualization in distributed computing and how this has enabled the development of Cloud Computing. **L5**
- Understand the concept of Cloud Security. **L5**

**UNIT – V: CLOUD TECHNOLOGIES AND ADVANCEMENTS**

Hadoop – MapReduce – Virtual Box — Google App Engine – Programming Environment for Google App Engine — Open Stack – Federation in the Cloud – Four Levels of Federation – Federated Services and Applications – Future of Federation.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Analyze the performance of Cloud Computing. **L5**
- Learn the Concept of Cloud Infrastructure Model. **L5**

**Text Books:**

1. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, Distributed and Cloud Computing, From Parallel Processing to the Internet of Things, Morgan Kaufmann Publishers, 2012.
2. Essentials of Cloud Computing By K. Chandrasekaran-India © 2015 by Taylor & Francis Group, LLC.

**Reference Books:**

1. Tim Mather, Subra Kumaraswamy, and Shahed Latif, Cloud Security and Privacy, Oreilly, 2009.
2. Barrie Sosinsky, Cloud Computing Bible, Wiley-India, 2011
3. RajkumarBuyya, James Broberg, Andrzej M. Goscinski, Cloud Computing: Principles and Paradigms, Wiley, 2011.

**Course Outcomes:**

At the end of this Course the student will be able to

- Understand the fundamental principles of distributed computing. **L2**
- Analyze the performance of Cloud Computing. **L3**
- Understand the importance of virtualization in distributed computing and how this has enabled the development of Cloud Computing **L4**
- Understand how the distributed computing environments known as Grids can be built from lower level services. **L5**

**B.Tech IV Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA**

**20ACS72C- ADHOC & SENSOR NETWORKS**

**(Professional Elective-IV)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- Identify and Distinguish between the notion of Wired and Wireless Networks.
- Analyze the basic concepts for designing a routing Protocol for MANETs.
- Learn the concepts of Security issues for designing a routing protocol for MANETs.
- Learn the Basic concepts of Sensor Networks for Communication in Mobile computing.
- Apply Fundamental principles Characteristics for designing Sensor Networks for Communications

**UNIT – I: Introduction**

Fundamentals of Wireless Communication Technology -The Electromagnetic Spectrum - Radio propagation Mechanisms - Characteristics of the Wireless channel mobile ad hoc networks (MANETs) - Wireless Sensor Networks (WSNs): concepts and architectures - Applications of Ad Hoc and Sensor Networks - Design Challenges in Ad hoc and Sensor Networks.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the Fundamental Concepts and applications of ad hoc and wireless sensor networks **L2**
- Describe the MAC protocol issues of ad hoc networks **L3**

**UNIT – II: MAC PROTOCOLS FOR AD HOC WIRELESS NETWORKS**

Issues in designing a MAC Protocol - Issues in Designing a MAC Protocol for Ad Hoc Wireless Networks - Design Goals of a MAC Protocol for Ad Hoc Wireless Networks - Classification of MAC Protocols -Contention based protocols - Contention based protocols with Reservation Mechanisms - Contention based protocols with Scheduling Mechanisms - Multi channel MAC - IEEE 802.11.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Describe routing protocols for ad hoc wireless networks with respect to TCP design issues **L3**
- Explain the concepts of network architecture and MAC layer protocol for WSN **L3**

**UNIT – III: ROUTING PROTOCOLS AND TRANSPORT LAYER IN AD HOC WIRELESS**

Routing Protocol: Issues in designing a routing protocol for Ad hoc networks - Classification- proactive routing - reactive routing (on-demand) - hybrid routing - Transport Layer protocol for Ad hoc networks - Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks -Classification of Transport Layer solutions-TCP over Ad hoc wireless - Network Security - Security in Ad Hoc Wireless Networks - Network Security Requirements.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Discuss the WSN routing issues by considering QoS measurements **L4**
- Explain the concepts of network architecture and MAC layer protocol for WSN **L5**

**UNIT-IV: WIRELESS SENSOR NETWORKS (WSNS) AND MAC PROTOCOLS**

Single node architecture: hardware and software components of a sensor node -WSN Network architecture: typical network architectures -data relaying and aggregation strategies -MAC layer protocols: self-organizing - Hybrid TDMA/FDMA and CSMA based MAC -IEEE 802.15.4.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Describe the MAC protocol issues of ad hoc networks **L5**
- Describe routing protocols for ad hoc wireless networks with respect to TCP design issues **L5**

**UNIT – V: WSN ROUTING, LOCALIZATION & QOS**

Issues in WSN routing –OLSR - Localization –Indoor and Sensor Network Localization - absolute and relative localization - triangulation - QOS in WSN - Energy Efficient Design – Synchronization.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the concepts of network architecture and MAC layer protocol for WSN **L5**
- Discuss the WSN routing issues by considering QoS measurements **L5**

**Text Books:**

1. C. Siva Ram Murthy, and B. S. Manoj, "Ad Hoc Wireless Networks: Architectures and Protocols ", Pearson Education, 2008.
2. Labiod. H, "Wireless Adhoc and Sensor Networks", Wiley, 2008

**Reference Books:**

1. Carlos De Morais Cordeiro, Dharma Prakash Agrawal "Ad Hoc & Sensor Networks: Theory and Applications", World Scientific Publishing Company, 2nd edition, 2011.
2. Feng Zhao and Leonides Guibas, "Wireless Sensor Networks", Elsevier Publication

**Course Outcomes:**

At the end of this Course the student will be able to

- Explain the Fundamental Concepts and applications of ad hoc and wireless sensor networks **L2**
- Describe the MAC protocol issues of ad hoc networks **L3**
- Describe routing protocols for ad hoc wireless networks with respect to TCP design issues **L4**
- Explain the concepts of network architecture and MAC layer protocol for WSN **L5**
- Discuss the WSN routing issues by considering QoS measurements **L5**

**B.Tech IV Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA**

**20ACS73A- BLOCK CHAIN TECHNOLOGIES**

**(Professional Elective-V)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- To give students the understanding of emerging abstract models for Block chain Technology and to familiarize with the functional/operational aspects of crypto currency eco-system.

**UNIT – I: Introduction**

**Introduction:** Types of Multimedia Information, Multimedia Database Applications, and Multimedia Objects: Characteristics, Multimedia Database Management System: Components.

**MULTIMEDIA STORAGE AND RETRIEVAL:** Multimedia Object Storage, File Retrieval Structures, Disk Scheduling, Server Admission Control, Concluding Remarks.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Describe the basic concepts and technology used for block chain. **L1**
- Describe the primitives of the distributed computing and cryptography related to block chain. **L1**

**UNIT – II: METADATA FOR MULTIMEDIA**

Metadata: Classification, Metadata for Text, Metadata for Speech, Metadata for Images, Metadata for Video.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Illustrate the concepts of Bitcoin and their usage. **L2**
- Implement Ethereum block chain contract **L2**

**UNIT – III: MULTIMEDIA DATA ACCESS**

Access to Text Data, Access to Speech Data, Access to Image Data, Access to Image Data.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Apply security features in block chain technologies. **L2**
- Use smart contract in real world applications. **L3**

**UNIT-IV: MULTIMEDIA INFORMATION MODELING**

**MULTIMEDIA INFORMATION MODELING:** Object-Oriented Modeling, Temporal Models, Spatial Models, Multimedia Authoring.

**QUERYING MULTIMEDIA DATABASES:** Query Processing, Query Languages.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Illustrate the concepts of Bitcoin and their usage. **L3**
- Implement Ethereum block chain contract. **L4**

**UNIT – V: MULTIMEDIA COMMUNICATION**

**MULTIMEDIA COMMUNICATION:** Retrieval Schedule Generation, Multimedia Server-Client Interaction, Network Support for Multimedia Communication.

**MMDBMS ARCHITECTURE:** Distributed MMDBMS Architecture, Implementation Considerations.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Describe the basic concepts and technology used for block chain. **L4**
- Describe the primitives of the distributed computing and cryptography related to block chain. **L5**

**Text Books:**

1. **"Multimedia Database Management Systems"** by B. Prabhakaran, Springer Science+Business Media, LLC.

**Reference Books:**

1. Narayanan, Bonneau, Felten, Miller and Goldfeder, "Bitcoin and Cryptocurrency Technologies – A Comprehensive Introduction", Princeton University Press.
2. Josh Thompson, 'Blockchain: The Blockchain for Beginnings, Guild to Blockchain Technology and Blockchain Programming', Create Space Independent Publishing Platform, 2017.

**Course Outcomes:**

At the end of this Course the student will be able to

- Describe the basic concepts and technology used for blockchain. **L4**
- Describe the primitives of the distributed computing and cryptography related to blockchain. **L3**
- Illustrate the concepts of Bitcoin and their usage. **L3**
- Implement Ethereum block chain contract. **L2**
- Apply security features in blockchain technologies **L5**

**B.Tech IV Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA**

**20ACS73B- VIRTUAL REALITY**

**(Professional Elective-V)**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- This course is designed to give historical and modern overviews and perspectives on virtual reality. It describes the fundamentals of sensation, perception, technical and engineering aspects of virtual reality systems.

**UNIT – I: Introduction to Virtual Reality**

Defining Virtual Reality, History of VR, Human Physiology and Perception, Key Elements of Virtual Reality Experience, Virtual Reality System, Interface to the Virtual World-Input & output- Visual, Aural & Haptic Displays, Applications of Virtual Reality.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Describe the basic concepts of Human Physiology and Perception. **L1**
- Describe the primitives of Interface to the Virtual World-Input & output- Visual, Aural & Haptic Displays. **L1**

**UNIT – II: Representing the Virtual World**

Representation of the Virtual World, Visual Representation in VR, Aural Representation in VR and Haptic Representation in VR.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Illustrate the concepts of Visual Representation in VR. **L2**
- Implement Aural Representation in VR and Haptic Representation in VR **L2**

**UNIT – III: The Geometry of Virtual Worlds &The Physiology of Human Vision**

Geometric Models, Changing Position and Orientation, Axis-Angle Representations of Rotation, Viewing Transformations, Chaining the Transformations, Human Eye, eye movements & implications for VR.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Apply Axis-Angle Representations of Rotation. **L2**
- Able to understand the eye movements & implications for VR. **L3**

**UNIT-IV: Visual Perception & Rendering**

Visual Perception - Perception of Depth, Perception of Motion, Perception of Color, Combining Sources of Information Visual Rendering -Ray Tracing and Shading Models, Rasterization, Correcting Optical Distortions, Improving Latency and Frame Rates.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Illustrate the concepts of Perception of Motion. **L3**
- Implement Correcting Optical Distortions. **L4**

**UNIT – V: Motion & Tracking**

Motion in Real and Virtual Worlds- Velocities and Accelerations, The Vestibular System, Physics in the Virtual World, Mismatched Motion and Vection Tracking- Tracking 2D & 3D Orientation, Tracking Position and Orientation, Tracking Attached Bodies

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Describe the basic concepts of Velocities and Accelerations. **L4**
- Describe the Tracking 2D & 3D Orientation. **L5**

**Text Books:**

1. Virtual Reality, Steven M. LaValle, Cambridge University Press, 2016.
2. Understanding Virtual Reality: Interface, Application and Design, William R Sherman and Alan B Craig, (The Morgan Kaufmann Series in Computer Graphics)". Morgan Kaufmann Publishers, San Francisco, CA, 2002.
3. Developing Virtual Reality Applications: Foundations of Effective Design, Alan B Craig, William R Sherman and Jeffrey D Will, Morgan Kaufmann, 2009.

**Reference Books:**

1. Gerard Jounghyun Kim, "Designing Virtual Systems: The Structured Approach", 2005.
2. Doug A Bowman, Ernest Kuijff, Joseph J LaViola, Jr and Ivan Poupyrev, "3D User Interfaces, Theory and Practice", Addison Wesley, USA, 2005.
3. Oliver Bimber and Ramesh Raskar, "Spatial Augmented Reality: Meging Real and Virtual Worlds", 2005

**http://lavalle.pl/vr/book.html**

**Course Outcomes:**

At the end of this Course the student will be able to

- Describe how VR systems work and list the applications of VR. **L4**
- Understand the design and implementation of the hardware that enables VR systems tobe built. **L3**
- Understand the system of human vision and its implication on perception and rendering. **L3**
- Explain the concepts of motion and tracking in VR systems. **L2**
- Describe the importance of interaction and audio in VR systems. **L5**

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

## MANAGEMENT SCIENCE

**(Common to all Branches)**

| L | T | P | C |
|---|---|---|---|
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**Course Objectives:**

- Understand the role of entrepreneurship in economic development.
- Identify the general characteristics of entrepreneurs.

**UNIT – 1**

**INTRODUCTION TO MANAGEMENT**

Concepts of Management - Nature, importance and Functions of Management - Taylor's Scientific Management Theory, Fayol's Principles of Management, Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Leadership Styles, Social responsibilities of Management.

**DESIGNING ORGANIZATIONAL STRUCTURES**

Basic concepts related to Organisation - Departmentation and Decentralization, Types of mechanistic and organic structures of organization (Line organization, Line and staff organization, functional organization, Committee organization, matrix organization, team structure) their merits, demerits and suitability.

**Learning Outcomes:**

At the end of this unit, the student will be able to

| | |
|---|---|
| • Understand the concept of management and organization. | **L1** |
| • Apply the concepts & principles of management in real life industry. | **L2** |

**UNIT – II**

**OPERATIONS MANAGEMENT:**

Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production), Work Study. Statistical Quality Control: *c* chart, *p* chart, (simple Problems) Deming's contribution to quality.

**MATERIALS MANAGEMENT:** EOQ, Purchase Procedure and Stores Management. Inventory — functions. Types, inventory classification techniques.

**Marketing:** Functions of Marketing, Marketing Mix, and Marketing Strategies based on Product Life Cycle, Channels of distribution.

**Learning Outcomes:**

At the end of this unit, the student will be able to

| | |
|---|---|
| • Understand the core concepts of Management Science and Operations Management. | **L1** |
| • Evaluate Materials departments & Determine EOQ. | **L2** |

**UNIT – III**

**HUMAN RESOURCES MANAGEMENT (HRM):**

Concepts of HRM, Personnel Management and Industrial Relations (PMIR), Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Placement, Wage and Salary Administration, Promotion, Transfer, Separation, Performance Appraisal, Grievance Handling and Welfare Administration, Job Evaluation, Merit Rating and methods.

**Learning Outcomes:**

At the end of this unit, the student will be able to

| | |
|---|---|
| • Understand the concepts of HRM in Recruitment, Selection, Training & Development. | **L1** |

| | |
|---|---|
| • Apply Managerial and operative Functions. | L2 |

**UNIT – IV**

**STRATEGIC MANAGEMENT:**

Vision, Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of Corporate Planning Process, Environmental Scanning, Value Chain Analysis, SWOT Analysis, Steps in Strategy Formulation and Implementation, Generic Strategy alternatives.

**PROJECT MANAGEMENT (PERT/CPM):**

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

**Learning Outcomes:**

At the end of this unit, the student will be able to

| | |
|---|---|
| • Understand Mission, Objectives, Goals & strategies for an enterprise. | L1 |
| • Evaluate PERT and CPM Techniques. | L2 |

**UNIT – V**

**CONTEMPORARY MANAGEMENT PRACTICES:**

Basic concepts of MIS, Materials Requirement Planning (MRP), Just-In-Time (JIT) System, Total Quality Management (TQM), Six sigma concept, Supply Chain Management, Enterprise Resource Planning (ERP), Performance Management, Business Process outsourcing (BPO), Business Process Re-engineering and Bench Marking, Balanced Score Card.

**Learning Outcomes:**

At the end of this unit, the student will be able to

| | |
|---|---|
| • Analyze CRM, MRP, TQM. | L1 |
| • Understand modern management techniques. | L2 |

**Text Books:**


1. **Management Science**,Aryasri: TMH, 2004.
2. **Management** ,Stoner, Freeman, Gilbert, 6th Ed, Pearson Education,New Delhi, 2004.


**Reference Books:**


1. **Marketing Mangement** , Kotler Philip & Keller Kevin Lane: 12/e, PHI,2005.
2. **Essentials of Management** ,Koontz & Weihrich:, 6/e, TMH, 2005.
3. **Management—Principles and Guidelines**, Thomas N.Duening & John M.Biztantra, 2003.
4. **Production and Operations Management**, Kanishka Bedi, , Oxford University Press, 2004.


**Course Outcomes:**

At the end of this Course the student will be able to

| | |
|---|---|
| • Equipping engineers for a lifelong career addressing the critical technical and managerial needs of private and public organizations. | L1 |
| • Exploring and developing analytic abilities, making better decisions, developing and executing strategies while also leading people who innovate. | L2 |
| • Cultivating the technical skills as well as the behavioral challenges of running organizations and complex systems. | L3 |
| • Emphasizing quantitative analytic skills and an entrepreneurial spirit | L4 |
| • Have an introductory understanding of global entrepreneurship concepts. | L5 |

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

## BUSINESS ENVIRONMENT
(Common to all Branches)

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- To make the student understand about the business environment.
- To enable them in knowing the importance of fiscal and monitory policy.

**UNIT – 1: BUSINESS ENVIRONMENT**

Meaning – Various environments affecting business – Social Economic; Political and Legal; Culture; Competitive Demographic; Technological and International environments.

**Learning Outcomes:**

At the end of this unit, the student will be able to

| | |
|---|---|
| • Understand the concept of Business environment. | L1 |
| • Explain various types of business environment. | L2 |

**UNIT – II: FISCAL & MONETARY POLICY**

**FISCAL POLICY** - Public Revenues - Public Expenditure - Public debt - Development activities financed by public expenditure - Evaluation of recent fiscal policy of Government of India - Highlights of Budget - **MONETARY POLICY** - Demand and Supply of Money – RBI - Objectives of monetary and credit policy - Recent trends - Role of Finance Commission.

**Learning Outcomes:**

At the end of this unit, the student will be able to

| | |
|---|---|
| • Understand the concept of public revenue and public Expenditure | L1 |
| • Explain the functions of RBI and its role. | L2 |

**UNIT – III: TRADE POLICY**

**INDIA'S TRADE POLICY** - Magnitude and direction of Indian International Trade - Bilateral and Multilateral Trade Agreements - EXIM policy and role of EXIM bank - **BALANCE OF PAYMENTS** – Structure & Major components - Causes for Disequilibrium in Balance of Payments - Correction measures.

**Learning Outcomes:**

At the end of this unit, the student will be able to

| | |
|---|---|
| • Understand the role of Indian international trade. | L1 |
| • Analyze causes for Disequilibrium and correction measure. | L2 |

**UNIT – IV: WORLD TRADE ORGANIZATION**

**WORLD TRADE ORGANIZATION** - Nature and Scope - Organization and Structure - Role and functions of WTO in promoting world trade - Agreements in the Uruguay Round – TRIPS, TRIMS, and GATT - Disputes Settlement Mechanism - Dumping and Anti-dumping Measures.

**Learning Outcomes:**

At the end of this unit, the student will be able to

| | |
|---|---|
| • Understand the Dispute Settlement Mechanism. | L1 |
| • Compare and contrast the Dumping and Anti-dumping Measures. | L2 |
| | |
| **UNIT – V: MARKETS** | |
| **MONEY MARKETS AND CAPITAL MARKETS** - Features and components of Indian financial systems - Objectives, features and structure of money markets and capital markets - Reforms and recent development – SEBI - Stock Exchanges - Investor protection and role of SEBI. | |
| **Learning Outcomes:** | |
| At the end of this unit, the student will be able to | |
| • Apply the knowledge in future investments. | L1 |
| • Understand the role of SEBI in investor protection. | L2 |
| | |
| **Text Books:** | |
| 1. Francis Cherunilam (2009), "International Business": Text and Cases, Prentice Hall of India. | |
| 2. K. Aswathappa, "Essentials of Business Environment": Texts and Cases & Exercises 13th Revised Edition.HPH2016. | |
| | |
| **Reference Books:** | |
| 1. K. V. Sivayya, V. B. M Das (2009), Indian Industrial Economy, Sultan Chand Publishers, New Delhi, India. | |
| 2. Sundaram, Black (2009), International Business Environment Text and Cases, Prentice Hall of India, New Delhi, India. | |
| 3. Chari. S. N (2009), International Business, Wiley India. | |
| 4. E. Bhattacharya (2009), International Business, Excel Publications, New Delhi. | |
| | |
| **Course Outcomes:** | |
| At the end of this Course the student will be able to | |
| • Apply the knowledge of Money markets in future investment. | L1 |
| • Analyze India's Trade Policy. | L2 |
| • Evaluate fiscal and monitory policy. | L3 |
| • Develop a personal synthesis and approach for identifying business opportunities. | L4 |
| • `Understand various types of business environment. | L5 |

**B.Tech IV Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA**

**20ACS70- ADVANCED WEB TECHNOLOGIES**

**(Skill Oriented Course-V)**

| L | T | P | C |
|---|---|---|---|
| 1 | 0 | 2 | 2 |

**Course Objectives:**

- On completion of this course, a student will be familiar with client server architecture and able to develop a web application using java technologies To create fully functional website/web application with MVC architecture.

**List of Experiments:**

1. Create a simple webpage using HTML.
2. Use frames to Include Images and Videos.
3. Add a Cascading Style sheet for designing the web page.
4. Design a dynamic web page with validation using JavaScript.
5. Design an HTML having a text box and four buttons viz Factorial, Fibonacci, Prime, and Palindrome. When a button is pressed an appropriate javascript function should be called to display
    a. Factorial of that number
    b. Fibonacci series up to that number
    c. Prime numbers up to that number
    d. Is it palindrome or not
6. Write java script programs to demonstrate
    a. Math Object with at least five methods.
    b. String Object with at least five methods.
    c. Array Object with at least five methods.
    d. Date Object with at least five methods.
7. Write JavaScript programs on Event Handling
    a. Validation of registration form
    b. Open a Window from the current window
    c. Change color of background at each click of button or refresh of a page
    d. Display calendar for the month and year selected from combo box
    e. On Mouse over event

**Course Outcomes:**

At the end of this Course the student will be able to

- *Students are able to develop a dynamic webpage by the use of java script and DHTML.*
- *Students will be able to write a well formed / valid XML document.*
- *Students will be able to connect a java program to a DBMS and perform insert, update and delete operations on DBMS table.*
- *Students will be able to write a server side java application called Servlet to catch form data sent from client, process it and store it on database.*
- *Students will be able to write a server side java application called JSP to catch form data sent from client and store it on database.*

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech. VII-Sem (R20)

MATHEMATICAL MODELING

(Open Elective -III)

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**Course Objectives:**

- To provide the basic knowledge to understand a Mathematical model.
- To formulate a Mathematical model related to a real world problems of engineering, biological science etc.

**UNIT – 1: Mathematical Modeling & Mathematical modeling Through Ordinary differential equations of First Order :** **9 Hrs**

**Mathematical Modeling :** Need, Techniques, Classifications and Simple illustrations.

**Mathematical modeling Through Ordinary differential equations of First Order :**

Mathematical modeling Through differential equations; Linear growth and decay models; Non-Linear Growth and Decay models; Mathematical modeling in dynamics through ordinary differential equations of first order.

**Learning Outcomes:**

At the end of this unit, the student will be able to

| | |
|---|---|
| • Learn various mathematical techniques in modeling a problem. | **L2** |
| • Learn modeling in dynamics through ordinary differential equations of first order. | **L3** |

**UNIT – II: Mathematical modeling Through System of Ordinary differential equations of First Order:**

Mathematical modeling in population dynamics; Mathematical modeling of Epidemics through system of ordinary differential equations of first order; Compartment models through Systems of ordinary differential equations; Mathematical modeling in dynamics through systems of ordinary differential equations of first order.

**Learning Outcomes:**

At the end of this unit, the student will be able to

| | |
|---|---|
| • Develop a modeling of Epidemics through system of ordinary differential equations of first order. | **L4** |
| • Analyze a modeling in dynamics through systems of ordinary differential equations of first order. | **L3** |

**UNIT – III: Mathematical modeling Through Ordinary differential equations of Second Order:**

Mathematical modeling of Planetary motion ; Mathematical modeling of Circular motion and motion of satellites; Mathematical modeling through linear differential equations of second order.

**Learning Outcomes:**

At the end of this unit, the student will be able to

| | |
|---|---|
| • Evaluate a mathematical modeling of Planetary motion. | **L5** |
| • Analyze a mathematical modeling of Circular motion and motion of satellites | **L3** |

**UNIT – IV: Mathematical modeling Through Difference equations :**

Need for Mathematical modeling Through Difference equations and simple models; Basic theory of Linear difference equations with constant coefficients; Mathematical modeling Through Difference equations in population dynamics and genetics; Mathematical modeling Through Difference equations in

| | |
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| Probability theory. | |
| **Learning Outcomes:** | |
| At the end of this unit, the student will be able to | |
| • Analyze mathematical modeling through difference equations in population dynamics and genetics. | **L4** |
| • Analyze mathematical modeling through difference equations in probability theory. | **L4** |
| | |
| **UNIT – V: Mathematical modeling Through Functional, Integral, Delay- Differential and Differential-Difference Equations :** | |
| Mathematical modeling Through Functional equations; Mathematical modeling Through Integral equations; Mathematical modeling Through Delay- Differential and Differential-Difference Equations. | |
| **Learning Outcomes:** | |
| At the end of this unit, the student will be able to | |
| • Analyze a mathematical modeling through functional equations and integral equations. | **L4** |
| • Analyze a mathematical modeling Through Delay- Differential and Differential-Difference Equations | **L4** |
| | |
| **Text Books:** | |
| 1. J. N. Kapoor. Mathematical Modeling , NEW AGE INTERNATIONAL PUBLISHERS. | |
| | |
| **Reference Books:** | |
| 1. A. C. Fowler. Mathematical Models in Applied Sciences, Cambridge University Press. | |
| | |
| **Course Outcomes:** | |
| At the end of this Course the student will be able to | |
| • Understand the basic concepts in mathematical modeling. | **L1** |
| • Have better insight of the real word problems through mathematical modeling . | **L2** |
| • Apply various concepts of mathematics in modeling. | **L3** |
| • Analyze the real word problems through the techniques of modeling. | **L4** |
| • Evaluate the real word problems through mathematical modeling. | **L5** |

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA
DEPARTMENT OF PHYSICS
IV B.TECH – I SEMESTER-R20 (Open elective-Interdisciplinary) –OE-ID.1(THEORY

# SENSORS AND ACTUATORS FOR ENGINEERING APPLICATIONS

**(Common to all branches)**

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**Course Objectives:**

1. To understand basics of sensors, actuators and their operating principles.
2. To educate the students on different types of microfabrication techniques for designing and developing sensors.
3. To explain working of various types of electrochemical sensors and actuators.
4. To provide an understanding on characteristic parameters to evaluate sensor performance.

## UNIT – 1: Introduction to Sensors and Actuators — 9 Hrs

**Content of the Unit – I**

**Sensors**: Types of sensors: temperature, pressure, strain, active and passive sensors, General characteristics of sensors (Principles only), Materials used and their fabrication process: Deposition: Chemical Vapor Deposition, Pattern: photolithography and Etching: Dry and Wet Etching.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- **Classify** different types of Sensors and their characteristics — **L2**
- **Explain** about different fabrication process of Sensors — **L1**
- **Illustrate** Dry and wet etching — **L2**

## UNIT – II: Temperature and Mechanical Sensors — 9 Hrs

**Temperature Sensors**: Types of temperature sensors and their basic principle of working: Thermo-resistive sensors: Thermistors, Resistance temperature sensors, Silicon resistive sensors, Thermo-electric sensors: Thermocouples, PN junction temperature sensors

**Mechanical Sensors**: Types of Mechanical sensors and their basic principle of working: Force sensors,strain gauges, Pressure sensors: semiconductor, piezoresistive, capacitive, Variable reluctance pressure (VRP) sensors.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- **Summarize** various types of Temperature sensors — **L2**
- **Explain** basic working principle of different types mechanical sensors — **L1**
- **Summarize** various types of Mechanical sensors — **L2**
- **Explain** the working principle of different types mechanical sensors — **L1**

## UNIT – III: Optical, Acoustic and Chemical Sensors — 9 Hrs

**Content of the Unit – III**

**Optical Sensors**: Basic principle and working of: Photodiodes, Phototransistors and Photo-resistors based sensors, Photomultipliers, Infrared sensors: thermal, PIR, thermopiles

**Acoustic Sensors**: Principle and working of Ultrasonic sensors, Piezo-electric resonators, Microphones.

**Chemical Sensors**: Principle and working of Electro-chemical, Thermo-chemical, Gas, pH, Humidity and moisture sensors.

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| **Learning Outcomes:** | |
| At the end of this unit, the student will be able to | |
| • **Explain** the working and principle of various optical sensors | **L1** |
| • **Explain** the working principle of different Acoustic sensors | **L1** |
| • **Explain** the working and principle of various chemical sensors | **L1** |
| | |
| **UNIT – IV: Magnetic, Electromagnetic and Radiation Sensors** | **9 Hrs** |
| Inductive sensors (LVDT, RVDT, and Proximity), Hall Effect sensors, Magneto-resistive sensors, Magneto-strictive sensors,<br>**Radiation Sensors**: Principle and working of Ionization detectors, Scintillation detectors, Geiger-Mueller counters, Semiconductor radiation detectors and Microwave sensors (resonant, reflection, transmission) | |
| **Learning Outcomes:** | |
| At the end of this unit, the student will be able to | |
| • **Explain** the working principle of different magnetic and electromagnetic sensors | **L1** |
| • **Explain** the working principle of different radiation sensors | **L1** |
| • **Identifies** the applications Electronic sensors in various fields | **L1** |
| • **Identify** the various optical, solid state system components | **L1** |
| | |
| **UNIT – V: Actuators Types, Principle, Magnetic, Electromagnetic actuators** | **9 Hrs** |
| **Introduction,** Functional diagram of actuators, Types of actuators and their basic principle of working: Hydraulic, Pneumatic, Mechanical, Electrical, Magnetic, Electromagnetic, piezo-electric and piezo-resistive actuators, Simple applications of Actuators.<br>Motors as actuators (linear, rotational, stepping motors),Magneto-strictive actuators, Voice coil actuators (speakers and speaker-like actuators). | |
| **Learning Outcomes:** | |
| At the end of this unit, the student will be able to | |
| • **Illustrates** the different types of Actuators | **L2** |
| • **Explains** the basic principle of working of Actuators | **L1** |
| • **Identifies** the applications of Actuators sensors | **L1** |
| | |
| **Text Books:** | |
| 1. Sensors and Actuators – Clarence W. de Silva, CRC Press, 2nd Edition, 2015 | |
| 2. Sensors and Actuators, D.A.Hall and C.E.Millar, CRC Press, 1999 | |
| | |
| **Reference Books:** | |
| 1. Sensors and Transducers- D.Patranabhis, Prentice Hall of India (Pvt) Ltd. 2003 | |
| 2. Measurement, Instrumentation, and Sensors Handbook-John G.Webster, CRC press 1999 | |
| 3. Sensors – A Comprehensive Sensors- Henry Bolte, John Wiley. | |
| 4. Handbook of modern sensors, Springer, Stefan Johann Rupitsch. | |
| 5. Principles of Industrial Instrumentation By D. Patranabhis | |
| **Course Outcomes:** | |
| At the end of this Course the student will be able to | |
| ➢ to identify the needs of sensors and actuators | **L1** |
| ➢ to understand working principles of various sensors and actuators | **L2** |
| ➢ to identify different type of sensors and actuators used in real life applications | **L1** |
| ➢ to explore common methods for converting a physical parameter into an electrical quantity | **L3** |
| ➢ to summaries use of sensors and actuators for different applications | **L2** |

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

| B.Tech – IV-I-Sem | L | T | P | C |
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**Chemistry of Nanomaterials and applications** (OE.3)
(common to all branches)

**Course Objectives:**

- To understand synthetic principles of Nanomaterials by various methods
- Characterize the synthetic nanomaterials by various instrumental methods
- To enumerate the applications of nanomaterials in engineering
- Understand the use of alternatives assessments that combine chemical, environmental health, regulatory, and business considerations to develop safer products.

| UNIT-I: **Introduction to nanoscience** | 7 Hrs |
|---|---|

Introduction,importance of nanomaterials, nanoscience in nature, classification of nanostructured materials, properties and scope of nanoscience and applicationsof nanotechnology.

**Learning Outcomes:**
At the end of this unit, the student will be able to:

- Classify the nanostructure materials(L2)
- Describe scope of nano science and technology(L2)
- Explain different synthetic methods of nano materials(L2)
- Identify the synthetic methods of nanomaterial which is suitable for preparation of particular material(L3)

| UNIT-II: **Synthesis of nanomaterials** | 8Hrs |
|---|---|

Bottom-Up approach:- Sol-gel synthesis, microemulsions or reverse micelles, co-precipitation method, solvothermal synthesis, hydrothermal synthesis.
Top-Down approach:- Arc discharge Plasma arc method, aerosol synthesis, ion sputtering, laser pyrolysis,laser ablation, chemical vapour deposition method, electrodeposition method, and high energy ball milling

**Learning Outcomes:**
At the end of this unit, the student will be able to:

- Describe the top down approach(L2)
- Explain aerosol synthesis and plasma arc technique(L2)
- Differentiate chemical vapour deposition method and electrodeposition method(L2)
- Discuss about high energy ball milling(L3)

| **UNIT-III: Characterization of nanomaterials** | 7 Hrs |
|---|---|

Techniques for characterization:Dynamic light scattering for particle size determination, Diffraction technique, electron microscopy techniques, BET method for surface area analysis.

**Learning Outcomes:**
After completing the course, the student will be able to:

- Discuss different technique for characterization of nanomaterial(L3)

- Explain electron microscopy techniques for characterization of nanomaterial(L3)
- Describe BET method for surface area analysis (L2)
- Apply different spectroscopic techniques for characterization(L3)

| UNIT-IV: Structural studies of nanomaterials | 8 Hrs |
|---|---|

Properties of nanomaterials: fullerenes, carbon nanotubes, core-shell nanoparticles. Nano-crystalline materials, magnetic nanoparticles and important properties in relation to nano-magnetic materials, thermoelectric materials, non-linear optical materials, liquid crystals

**Learning Outcomes:**

After completing the course, the student will be able to:

- Explain synthesis and properties and applications of nanaomaterials(L2)
- Discuss about fullerenes and carbon nanotubes(L3)
- Differentiate nanomagnetic materials and thermoelectric materials(L2)
- Describe liquid crystals(L2)

| UNIT-V: **Applications of Nanomaterials** | 7Hrs |
|---|---|

Engineering, medicine. aerospace applications of nanomaterials. Technologies based on nano materials.

**Learning Outcomes:**

After completing the course, the student will be able to:

- Illustrate applications of nanaomaterials(L2)
- Discuss the magnetic applications of nanomaterials(L3)
- List the applications of non-linear optical materials(L1)
- Describe the applications fullerenes, carbon nanotubes(L2)

**Text Books:**


1. NANO: The Essentials: T Pradeep, MaGraw-Hill, 2007
2. Textbook of Nanoscience and nanotechnology: B S Murty, P Shankar, BaldevRai, BB Rath and James Murday, Univ. Press, 2012


**Reference Books:**


1. Ludovico Cademrtiri and Geoffrey A. Ozin& Geoffrey A. Ozin, Concepts of Nanochemistry; Wiley-VCH, 2011.
2. Guozhong Cao, Nanostructures & Nanomaterials; Synthesis, Properties & Applications:, Imperial College Press, 2007
3. C. N. R. Rao, Achim Muller, K.Cheetham, Nanomaterials Chemistry, , Wiley-VCH, 2007


**Course Outcomes:**

At the end of this Course the student will be able to

- Understand the state of art synthesis of nano materials(L1)
- Characterize nano materials using ion beam, scanning probe methodologies, position sensitive atom probe and spectroscopic ellipsometry(L2)
- Analyze nanoscale structure in metals, polymers and ceramics(L3)
- Analyze structure-property relationship in coarser scale structures(L3)

- Understand structures of carbon nano tubes(L1)

B.Tech IV Year I Semester

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA**

**20ACE75A- DISASTER MANAGEMENT AND MITIGATION**

**(OPEN ELECTIVE-III)**

| L | T | P | C |
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**Course Objectives:**

- The objectives of this are to give the basic knowledge of Environmental Hazards and disasters. The syllabus includes the basics of Endogenous and Exogenous hazard's and gives a suitable picture on the different types ofhazardas.

**UNIT-I:**

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

**UNIT-II:**

Classification of hazards & Disasters: Natural hazards and Disasters - Man Made hazards & Disasters - Planetary Hazards/ Disasters - Extra Planetary Hazards/ disasters - Planetary Hazards- Endogenous Hazards - Exogenous Hazards

**UNIT-III**

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

**UNIT-IV:**

Exogenous hazards/ disasters - Infrequent events- Cumulative atmospheric hazards/ disasters Infrequent events: Cyclones – Lightning – Hailstorms Cyclones: Tropical cyclones & Local storms - Destruction by tropical cyclones & local storms (causes, distribution human adjustment, perception & mitigation)Cumulative atmospheric hazards/ disasters : - Floods- Droughts- Cold waves- Heat waves. Floods:- Causes of floods- Flood hazards India- Flood control measures ( Human adjustment, perception & mitigation).Droughts:- Impacts of droughts- Drought hazards in India- Drought control measures- Extra Palnetary Hazards/ Disasters- Man induced Hazards /Disasters- Physical hazards/ Disasters-Soil Erosion Soil Erosion:-- Mechanics & forms of Soil Erosion- Factors & causes of Soil Erosion- Conservation measures of Soil Erosion. Chemical hazards/ disasters:-- Release of toxic chemicals, nuclear explosion- Sedimentation processes. Sedimentation processes:- Global Sedimentation problems- Regional Sedimentation problems- Sedimentation & Environmental problems- Corrective measures of Erosion & Sedimentation-Biological hazards/ disasters:- Population Explosion.

**UNIT-V:**

Emerging approaches in Disaster Management- Three Stages

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

**Text Books:**

1. Disaster Management by Rajib Shah, Universities Press, India,2003
2. Disaster Mitigation: Experiences And Reflections by PardeepSahni
3. Natural Hazards & Disasters by Donald Hyndman & David Hyndman – Cengage Learning
4. National Disaster Management Authority-Guidelines

**Reference Books:**

1. Kates,B.I& White, G.F The Environment as Hazards, oxford, New York, 1978
2. R.B. Singh (Ed) Disaster Management, Rawat Publication, New Delhi, 2000
3. H.K. Gupta (Ed) Disaster Management, Universiters Press, India, 2003
4. R.B. Singh, Space Technology for Disaster Mitigation in India (INCED), University of Tokyo,1994
5. Dr.Satender,Disaster Management in Hills, Concept Publishing Co., New Delhi, 2003

**Course Outcomes:**

At the end of this Course the student will be able to

- Understand the nature, cause and effects of disasters
- Comprehend the importance of Disaster Management and the need of awareness
- Acquire knowledge on disaster preparedness, recovery remedial measures and personal precautions

*Annexure-III* *R20*

**B.Tech IV Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**IOT APPLICATIONS IN ELECTRICAL ENGINEERING**

**(Open Elective-III)**

| L | T | P | C |
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**Course Objectives:** The objectives of the course are to make the students learn about

- To learn about a few applications of Internet of Things
- To distinguish between motion less and motion detectors as IOT applications
- To know about Micro Electro Mechanical Systems (MEMS) fundamentals in design and fabrication process
- To understand about applications of IOT in smart grid
- To introduce the new concept of Internet of Energy for various applications

**UNIT – I: SENSORS** **10 Hrs**

Definitions, Terminology, Classification, Temperature sensors, Thermoresistive, Resistance, temperature detectors, Silicon resistive thermistors, Semiconductor, Piezoelectric, Humidity and moisture sensors. Capacitive, Electrical conductivity, Thermal conductivity, time domain reflectometer, Pressure and Force sensors: Piezoresistive, Capacitive, force, strain and tactile sensors, Strain gauge, Piezoelectric

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To know about basic principles of sensors and their classification **L1**
- To learn about various motion less sensors **L2**

**UNIT – II: Occupancy and Motion detectors** **10 Hrs**

Capacitive occupancy, Inductive and magnetic, potentiometric - Position, displacement and level sensors, Potentiometric, Capacitive, Inductive, magnetic velocity and acceleration sensors, capacitive, Piezoresistive, piezoelectric cables, Flow sensors, Electromagnetic, Acoustic sensors - Resistive microphones, Piezoelectric, Photo resistors

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To know about Capacitive occupancy **L1**
- To understand about Motion detectors **L2**

**UNIT – III: MEMS** **10 Hrs**

Basic concepts of MEMS design, Beam/diaphragm mechanics, electrostatic actuation and fabrication, Process design of MEMS based sensors and actuators, Touch sensor, Pressure sensor, RF MEMS switches, Electric and Magnetic field sensors

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To understand about the basic concept of MEMS **L1**
- To know about electrostatic actuation **L2**

**UNIT – IV: IOT FOR SMART GRID** **10 Hrs**

Driving factors, Generation level, Transmission level, Distribution level, Applications, Metering and monitoring applications, Standardization and interoperability, Smart home

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To get exposure fundamental applications of IoT to Smart grid **L1**
- To learn about driving factors of IoT in Generation level **L2**

**UNIT – V: IOE - Internet of Energy** **10 Hrs**

Concept of Internet of Energy, Evaluation of IoE concept, Vision and motivation of IOE, Architecture, Energy routines, information sensing and processing issues, Energy internet as smart grid.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- To get exposed the new concept of internet of energy **L1**
- To learn about architecture of IOE **L2**

**Text Books:**

1. Jon S. Wilson, Sensor Technology Hand book, Newnes Publisher, 2004
2. Tai Ran Hsu, MEMS and Microsystems: Design and manufacture, 1st Edition, Mc Grawhill Education, 2017
3. ErsanKabalci and YasinKabalci, From Smart grid to Internet of Energy, 1st Edition, Academic Press, 2019

**Reference Books:**

1. Raj Kumar Buyya and Amir VahidDastjerdi, Internet of Things: Principles and Paradigms, Kindle Edition, Morgan Kaufmann Publisher, 2016
2. Yen Kheng Tan and Mark Wong, Energy Harvesting Systems for IoT Applications: Generation, Storage and Power Management, 1st Edition, CRC Press, 2019
3. RMD SundaramShriram, K. Vasudevan and Abhishek S. Nagarajan, Internet of Things, Wiley, 2019

**Course Outcomes:**

At the end of this Course the student will be able to

- To get exposed to recent trends in few applications of IoT in Electrical Engineering **L1**
- To understand about usage of various types of motionless sensors **L2**
- To understand about usage of various types of motion detectors **L3**
- To get exposed to various applications of IoT in smart grid **L4**
- To get exposed to future working environment with Energy internet **L5**

**B.Tech IV Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**20AME75a-INTRODUCTION TO COMPOSITE MATERIALS**

**(Open Elective-III)**

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**Course Objectives:** The objectives of the course are to make the students learn about

- Introduce composite materials and their applications.
- Build proper background for stress analysis in the design of composite structures.
- Familiarize various properties of composite materials.
- Focus on biodegradable composites.

**UNIT – I: Introduction to composites:** **10 Hrs**

Fundamentals of composites – Definition – classification– based on Matrix – based on structure – Advantages and applications of composites - Reinforcement – whiskers – glass fiber – carbon fiber - Aramid fiber – ceramic fiber – Properties and applications.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the fundamentals of composites. **L2**
- Classify the composites based on matrix and structure. **L2**
- Identify the practical applications of composites. **L3**
- Summarize the properties and advantages of reinforcement materials. **L2**

**UNIT – II: Polymer matrix composites** **8 Hrs**

Polymers - Polymer matrix materials – PMC processes - hand layup processes – spray up processes – resin transfer moulding – Pultrusion – Filament winding – Auto clave - Injection moulding – sheet moulding compound – properties and applications of PMCs.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the properties of polymer matrix composites. **L2**
- Identify the polymer matrix composites. **L3**
- Explain various process used in making the polymer matrix composites. **L2**
- Discuss the auto clave based methods. **L6**

**UNIT – III: Metal matrix composites:** **8 Hrs**

Metals - types of metal matrix composites – Metallic Matrices. Processing of MMC – Liquid state processes – solid state processes – In-situ processes. Properties and applications of MMCs.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Outline the various types of metal matrix composite. **L2**
- Explain liquid state processes and solid state processes in MMCs preparation. **L2**
- Demonstrate In-situ processes. **L2**
- Identify the properties and applications of MMCs. **L2**

**UNIT – IV: Ceramic matrix composites:** **8 Hrs**

Ceramic matrix materials – properties – processing of CMCs –Sintering - Hot pressing – Infiltration – Lanxide process – In-situ chemical reaction techniques – solgel polymer pyrolsis –SHS - Cold isostatic pressing (CIPing) – Hot isostatic pressing (HIPing). Properties and Applications of CCMs.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Summarize the various types of ceramic matrix materials. **L2**
- Explain the sintering, hot pressing, infiltration and lanxide process. **L3**
- Contrast between cold and hot isostatic pressing. **L2**
- Examine the properties and applications of CCMs. **L2**

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**UNIT – V: Advances & Applications of composites:** **8 Hrs**

Advantages and Limitations of carbon matrix composites – chemical vapour deposition of carbon on carbon fibre perform. Properties and applications of Carbon-carbon composites. Composites for aerospace applications. Bio degradability - introduction to bio composites, classification, processing and, applications of bio composites - Mechanical, Biomedical, automobile Engineering.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the advantages and disadvantages of carbon matrix. **L2**
- Identify composites for aerospace applications. **L3**
- Apply chemical vapour deposition of carbon on carbon fibre perform. **L3**
- Select the carbon - carbon composites. **L1**
- Classify various bio- degradable composites. **L3**

**Text Books:**

1. Chawla K.K, Composite materials, 2/e, Springer – Verlag, 1998.
2. Mathews F.L. and Rawlings R.D., Chapman and Hall, Composite Materials: Engineering and Science, 1/e, England, 1994.

**Reference Books:**

1. H K Shivanand, B V Babu Kiran, Composite Materials, ASIAN BOOKS, 2011.
2. A.B. Strong , Fundamentals of Composite Manufacturing, SME Publications, 1989.
3. S.C. Sharma, Composite materials, Narosa Publications, 2000.
4. Maureen Mitton, Hand Book of Bio plastics & Bio composites for Engineering applications, John Wiley publications, 2011.

**Course Outcomes:**

At the end of this Course the student will be able to

- Identify the practical applications of composites. **L3**
- Identify the polymer matrix composites. **L3**
- Classify of bio- degradable composites. **L2**
- Outline the various types of ceramic matrix materials. **L2**

**Online Learning Resources:**

- https://nptel.ac.in/courses/112104229
- https://nptel.ac.in/courses/112104168
- https://nptel.ac.in/courses/101104010
- https://nptel.ac.in/courses/105108124
- https://nptel.ac.in/courses/112104221

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**B.Tech IV Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**20AME75b-CUSTOMER RELATIONSHIP MANAGEMENT**

**(Open Elective-III)**

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**Course Objectives:** The objectives of the course are to make the students learn about

- Introduce basic concepts and principles of customer relationship management (CRM).
- Familiarize with appreciate the role and changing face of CRM as an IT enabled function.
- Describe concept of managing and sharing customer data.
- Explain the principles of CRM links in e-Business.
- Expose the students on Enterprise resource planning (ERP),supply chain management (SCM) and Supplier relationship management (SRM).

**UNIT – I: CRM concepts** **10 Hrs**

CRM concepts - Acquiring customers, - Customer loyalty and optimizing customer relationships - CRM defined - success factors, the three levels of Service/ Sales Profiling - Service Level Agreements (SLAs), creating and managing effective SLAs.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the concepts of customer relationship management. **L2**
- Define customer relationship management (CRM). **L1**
- Illustrate the service level agreements (SLAs). **L2**

**UNIT – II: CRM in Marketing :** **8 Hrs**

CRM in Marketing - One-to-one Relationship Marketing - Cross Selling & Up Selling - Customer Retention, Behaviour Prediction - Customer Profitability & Value Modeling - Channel Optimization - Event-based marketing. - CRM and Customer Service - The Call Centre, Call Scripting - Customer Satisfaction Measurement.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the concept of one-to-one relationship marketing. **L2**
- Develop the skills related to predict the behaviour and retention of the customer. **L6**
- Discus about customer profitability and value modeling. **L6**
- Illustrate the various methods for CRM and customer service. **L2**

**UNIT – III: Sales Force Automation** **8 Hrs**

Sales Force Automation - Sales Process, Activity, Contact- Lead and Knowledge Management - Field Force Automation. - CRM links in e-Business - E-Commerce and Customer Relationships on the Internet - Enterprise Resource Planning (ERP), - Supply Chain Management (SCM), - Supplier Relationship Management (SRM), - Partner relationship Management (PRM). - Case studies.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the concept of CRM links in e-Business. **L1**
- Discus E-commerce and customer relationship on the internet. **L6**
- Describe Enterprise resource planning (ERP), Supply chain management (SCM). **L2**
- Explain terms supplier relationship management and partner relationship management. **L2**

**UNIT – IV: Analytical CRM** **8 Hrs**

Analytical CRM - Managing and sharing customer data - Customer information databases - Ethics and legalities of data use - Data Warehousing and Data Mining concepts - Data analysis - Market Basket Analysis (MBA), Click stream Analysis, Personalization and Collaborative Filtering.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain how to manage and sharing the customer data. **L2**

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- List the various ethics and legalities of customer database use. **L1**
- Describe various data warehousing and data mining concepts **L3**
- Discus about market basket analysis (MBA). **L6**

**UNIT – V: CRM Implementation** **8 Hrs**

CRM Implementation - Defining success factors - Preparing a business plan requirements, justification and processes. - Choosing CRM tools - Defining functionalities - Homegrown versus out-sourced approaches - Managing customer relationships - conflict, complacency, Resetting the CRM strategy. Selling CRM internally - CRM development Team - Scoping and prioritizing - Development and delivery - Measurement.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Define success factors for implementing the customer relationship management. **L1**
- Define functionalities of CRM. **L1**
- Explain the functions of CRM development team. **L2**
- Compare Home grown and out-sourced approaches. **L2**

**Text Books:**

1. Alok Kumar Rai, Customer Relationship Management Concept & Cases, Prentice Hall Of India Private Limted, New Delhi. 2011.
2. S. Shanmugasundaram, Customer Relationship Management, Prentice Hall Of India Private Limted, New Delhi, 2008.

**Reference Books:**

1. Kaushik Mukherjee, Customer Relationship Management, Prentice Hall Of India Private Limted, New Delhi, 2008.
2. Jagdish Seth, Et Al, Customer Relationship Management.
3. V. Kumar & Werner J., Customer Relationship Management, Willey India, 2008.

**Course Outcomes:**

At the end of this Course the student will be able to

- Summarizes the how CRM works in industries. **L2**
- Discuss about market basket analysis (MBA). **L6**
- Develop the skills related to predict the behaviour and retention of the customer. **L6**
- Explain the concepts of customer relationship management. **L2**

**Online Learning Resources:**

- https://nptel.ac.in/courses/110105145
- https://onlinecourses.swayam2.ac.in/imb19_mg10/preview
- https://www.classcentral.com/course/swayam-customer-relationship-management-13977
- https://www.edx.org/course/customer-relationship-management

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

## 20AEC75a- FUNDAMENTALSTO IMAGE PROCESSING

(Open Elective-III)

L – T – P - C
3 – 0 – 0 – 3

**Course Objectives:**

- To learn the fundamentals of Image Processing and learn the different types of image transforms.
- To study different types of filtering techniques for image enhancement.
- To understand various types of image segmentation and thresholding techniques.
- To gain knowledge on wavelets and multi resolution image processing techniques.
- To comprehend various types of image compression and colour image processing methods.

**UNIT I**

**Digital Image Fundamentals:** Fundamental steps of digital image processing, Components of Digital Image processing, image sampling and quantization, basic relationships between pixels – neighbourhood, adjacency, connectivity, distance measures. Applications of Digital Image Processing.

**Image Transforms:** Fourier Transform and its properties in one dimensional and Two dimensional, Discrete Fourier Transform, Discrete Cosine Transform, Discrete Sine transform, Walsh transform, Hadamard transform, Slant transform, KL Transforms and its properties.

**Learning Outcomes:**

*At the end of the unit, the student will be able to*:

- Understand the fundamentals of digital image processing.(L2)
- Analyze the image transforms in one and two dimensions.(L4)

**UNIT II**

**Image Enhancements and Filtering:** Gray level transformations, Histogram processing, histogram equalization, Enhancement of Frequency domain, Homomorphic filtering, Filtering in the frequency domain. Image Restoration: A Model of the Image Degradation \ Restoration Process, Noise Models, Inverse filtering, Minimum Mean Square Error (Weiner) Filtering, Constrained least squares filtering.

**Learning Outcomes:**

*At the end of the unit, the student will be able to*:

- Analyze the filters in spatial and frequency domains. (L4)
- Understand the image restoration model and various types of noises in image restoration.(L2)

**UNIT III**

**Image Segmentation:** Detection of Discontinuities: Point detection, Line detection, Edge detection, Edge linking and boundary detection, Thresholding, Region based segmentation.

**Learning Outcomes:**

*At the end of the unit, the student will be able to*:

- Learn the concept of image segmentation.(L1)
- Analyze various types of thresholding techniques.(L4)

**UNIT IV**

**Wavelets and Multi-resolution image processing:** Back ground, Image Pyramids, Sub band coding, The HaarTransform.Multi resolution Expansions: Series Expansions, Scaling Functions, Wavelet Functions, Wavelet Transform in One dimension: The wavelet series expansions, The Discrete wavelet transform, The Continuous Wavelet Transform, The Fast wavelet Transform, Wavelet transform in two dimensions, Wavelet Packets.

**Learning Outcomes:**

*At the end of the unit, the student will be able to*:

- Understand the wavelets in one dimension and two dimensions.(L2)
- Explain the multi-resolution expansions and fast wavelet transform.(L1)

UNIT V:

**Image Compression:** Redundancy, coding, inter-pixel and psycho-visual: Loss less compression Huffmann coding, predictive coding: Lossy Image compression- predictive and transform coding: Image compression standards.

**Color Image Processing:** Color Fundamentals, Color models–RGB, CMY, HSI; Pseudo color Image Processing, Basics of Full color Image Processing.

**Learning Outcomes:**

*At the end of the unit, the student will be able to:*

- Understand the need for image compression and its types.(L2)
- Learn the color image processing and various types of color models. (L1)

**TEXT BOOKS:**

1. R.C. Gonzalez and R.E. Woods, "Digital Image Processing", Second Edition, Pearson Education, 2008.
2. Anil Kumar Jain, "Fundamentals of Digital Image Processing", Prentice Hall of India, 2nd edition 2004.

**REFERENCES:**

1. Rafael C. Gonzalez, Richard E woods and Steven L. Eddins, "Digital Image processing using MATLAB", Tata McGraw Hill, 2010.
2. S Jayaraman, S Esakkirajan and T Veerakumar, "Digital Image processing", Tata McGraw Hill.
3. William K. Pratt, "Digital Image Processing", John Wiley, 3rd Edition, 2004.

**Course outcomes:**

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

- Understand the fundamentals of Image Processing and apply different types of image transforms. (L2)
- Correlate different types of filtering techniques for image enhancement. (L4)
- Understand various types of image segmentation and thresholding techniques.(L2)
- Gain knowledge on wavelets and multi resolution image processing techniques.(L1)
- Summarize different types of image compression and colour image processing methods.(L2)

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

## 20AEC75b- BASICS OF VLSI DESIGN

(Open Elective-III)

L – T – P - C
3 – 0 – 0 – 3

**Course Objectives:**

- To give exposure to different steps involved in the fabrication of ICs and electrical properties of MOS devices.
- To know the design rules in drawing the layout of any logic circuit.
- To design different types of logic gates using CMOS inverter and analyze their transfer characteristics.
- To learn the concepts scaling and designing building blocks of data path of any system using gates.
- Understand the design and operation of basic programmable logic devices.

**UNIT I**

**MOS Technology**: Introduction to IC Technology. The IC Era, MOS and related VLSI Technology, Basic MOS Transistors, Enhancement and Depletion modes of transistor action, nMOS and CMOS Fabrication processes.

**Basic Electrical Properties of MOS Circuits:** $I_{ds}$ versus $V_{ds}$ Relationships, Aspects of MOS transistor Threshold Voltage, MOS transistor Transconductance and Output Conductance, nMOS Inverter, Determination of Pull-up to Pull-down Ratio for nMOS inverter driven by another nMOS inverter, CMOS Inverter.

**Learning Outcomes:**

*At the end of the unit, the student will be able to*:

- Understand different steps involved in the fabrication of ICs and electrical properties of MOSdevices.(L2).
- Analyze the operation of NMOS, CMOS and BiCMOS inverters.(L4)

**UNIT II**

**MOS Circuit Design Processes**: MOS Layers, Stick Diagrams, Design Rules and Layout, General observations on the Design rules, 2μm Double Metal, Double Poly CMOS rules, Layout Diagrams-A Brief Introduction, Symbolic Diagrams-Translation to Mask Form.

**Learning Outcomes:**

*At the end of the unit, the student will be able to*:

- Know the VLSI design flow and stick diagrams.(L1)
- Understand the design rules in drawing the layout of any logic circuit.(L2)

**UNIT III**

**Basic Circuit Concepts**: Sheet Resistance. Sheet Resistance concept applied to MOS transistors and Inverters, Area Capacitance of Layers, standard unit of capacitance, area Capacitance calculations, the Delay Unit, Inverter Delays, Driving large capacitive loads, Propagation Delays, Wiring Capacitances.

**Learning Outcomes:**

*At the end of the unit, the student will be able to*:

- Understand different types of logics in gate level design.(L2)
- Learn and compare different performance parameters in gate level design.(L1)

**UNIT IV**

**Scaling of MOS Circuits:** Scaling models and scaling factors, Scaling factors for device parameters, Limitations of scaling.

**Sub System Design and Layout:** Switch logic, Gate logic, Examples of Structured Design, parity generator, multiplexers, grey to binary code converter.

**Learning Outcomes:**

*At the end of the unit, the student will be able to:*

- Appreciate the importance, models and limitations of scaling.(L1)
- Explain the building blocks of data path of any system using gates.(L1)

**UNIT V**

**Programmable Logic Devices:** Read only memories, Programmable Logic Arrays (PLA), Programmable Array Logic (PAL), Complex programmable logic devices, Field programmable gate arrays.

**Learning Outcomes:**

*At the end of the unit, the student will be able to:*

- Explain different programmable logic devices.(L1)
- Compare the performance parameters and applications of different programmable logic devices.(L2)

**TEXTBOOKS:**

1. Kamran Eshraghian. Douglas, A. Pucknell and SholehEshraghian, "Essentials of LSI Circuits and Systems", Prentice Hall of India Private Limited, 2005 Edition.
2. Neil H.E.WESTE, David HarrisandAyan Banerjee, "CMOS VLSI Design A Circuits and systems perspective", Pearson Education, 2006 Third Edition

**REFERENCES:**

1. Richa Jain and Amrita Rai, "Principles of VLSI and CMOS Integrated Circuits", S.Chandand Company Limited. First edition.2012.
2. Wayne Wolf, "Modern VLSI Design", Pearson Education, 3rd Edition.

**Course Outcomes:**

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

- Understand different steps involved in the fabrication of ICs and electrical properties of MOS devices. (L2)
- Know the design rules in drawing the layout of any logic circuit.(L1)
- Compare different types of logic gates using CMOS inverter and their transfer characteristics.(L2)
- Learn the concepts to design building blocks of data path of any system using gates.(L1)
- Gain knowledge about basic programmable logic devices and testing of CMOS circuits.(L1)

B.Tech IV Year I Semester

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA**

**20ACS75A- APPLICATIONAS OF AI**

**(Open Elective-III)**

| L | T | P | C |
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| 3 | 0 | 0 | 3 |

**Course Objectives:**

- Define Artificial Intelligence and establish the cultural background for study Understand various learning algorithms
- Explore the searching and optimization techniques for problem solving
- Provide basic knowledge on Natural Language Processing and Robotics

**UNIT – I: Introduction**

What is AI, Foundations of AI, History of AI, The State of Art. Intelligent Agents: Agents and Environments, Good Behaviour: The Concept of Rationality, The Nature of Environments, The Structure of Agents.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Recognize the importance of Artificial Intelligence **L1**
- Identify how intelligent agent is related to its environment **L2**

**UNIT – II: Solving Problems by searching:**

Problem Solving Agents, Example problems, Searching for Solutions, Uninformed Search Strategies, Informed search strategies, Heuristic Functions, Beyond Classical Search: Local Search Algorithms and Optimization Problems, Local Search in Continues Spaces, Searching with Nondeterministic Actions, Searching with partial observations, online search agents and unknown environments.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain how an agent can formulate an appropriate view of the problem it faces. **L2**
- Solve the problems by systematically generating new states **L2**

**UNIT – III: Reinforcement Learning:**

Introduction, Passive Reinforcement Learning, Active Reinforcement Learning, Generalization in Reinforcement Learning, Policy Search, applications of RL 10 Page Natural Language Processing: Language Models, Text Classification, Information Retrieval, Information Extraction..

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Examine how an agent can learn from success and failure, reward and punishment. **L5**
- Develop programs that make queries to a database, extract information from texts, and retrieve relevant documents from a collection using Natural Language Processing. **L6**

**UNIT-IV: Natural Language for Communication**

Phrase structure grammars, Syntactic Analysis, Augmented Grammars and semantic Interpretation, Machine Translation, Speech Recognition Perception: Image Formation, Early Image Processing Operations, Object Recognition by appearance, Reconstructing the 3D World, Object Recognition from Structural information, Using Vision.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Develop programs that translate from one language to another, or recognize spoken words. **L6**
- Explain the techniques that provide robust object recognition in restricted context. **L2**

**UNIT – V: Robotics:**

Introduction, Robot Hardware, Robotic Perception, Planning to move, planning uncertain movements, Moving, Robotic software architectures, application domains Philosophical foundations: Weak AI, Strong AI, Ethics and Risks of AI, Agent Components, Agent Architectures, Are we going in the right

direction, What if AI does succeed.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the role of Robot in various applications.
- List the main philosophical issues in AI.

**Text Books:**

1. Stuart J.Russell, Peter Norvig, "Artificial Intelligence A Modern Approach", 3rd Edition, Pearson Education, 2019.

**Reference Books:**

1. Nilsson, Nils J., and Nils Johan Nilsson. Artificial intelligence: a new synthesis. Morgan Kaufmann, 1998.
2. Johnson, Benny G., Fred Phillips, and Linda G. Chase. "An intelligent tutoring system for the accounting cycle: Enhancing textbook homework with artificial intelligence." Journal of Accounting Education 27.1 (2009): 30-39.

**Course Outcomes:**

At the end of this Course the student will be able to

- Apply searching techniques for solving a problem **L3**
- Design Intelligent Agents **L6**
- Develop Natural Language Interface for Machines **L6**
- Design mini robots **L6**
- Summarize past, present and future of Artificial Intelligence **L5**

B.Tech IV Year I Semester

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA**

**20ACS75B- MOBILE APPLICATION DEVELOPMENT**

**(Open Elective-III)**

| L | T | P | C |
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| 3 | 0 | 0 | 3 |

**Course Objectives:**

- Android Application Development course is designed to quickly get you up to speed with writing apps for Android devices. The student will learn the basics of Android platform and get to understand the application lifecycle

**UNIT – I:**

**Introduction Android Programming**: What is Android, Activities, Linking Activities Using Intents, Fragments, Calling Built – in Applications using Intents, Displaying Notifications.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- demonstrate their understanding of the fundamentals of Android operating systems **L2**
- demonstrate their skills of using Android software development tools **L2**

**UNIT – II:**

**Android User Interface**: Understanding the Components of a Screen, Adapting to Display Orientation, Managing Changes to Screen Orientation, Utilizing the Action Bar, Listening for UI Notifications.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- demonstrate their ability to develop software with reasonable complexity on mobile platform **L3**
- demonstrate their ability to deploy software to mobile devices **L3**

**UNIT – III:**

**Designing User Interface with Views**: Basic Views, Picker Views, Using List Views to Display Long Lists.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- demonstrate their ability to debug programs running on mobile devices **L4**
- demonstrate their ability to deploy software to mobile devices **L4**

**UNIT-IV:**

**Displaying pictures and menus with views and Data Persistence**: Views to Display pictures, menus with views, additional views, saving and loading user preferences, persisting data to files, creating and using databases.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- demonstrate their skills of using Android software development tools **L4**
- demonstrate their ability to develop software with reasonable complexity on mobile platform **L5**

**UNIT – V:**

**Content Providers:** Sharing data in android, using a content provider, creating your own content providers.

**Messaging and Networking**: SMS Messaging, Sending E-Mail, Networking

**Location-Based Services**: Displaying Maps, Getting Location Data.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- demonstrate their ability to deploy software to mobile devices **L5**
- demonstrate their ability to debug programs running on mobile devices **L5**

**Text Books:**

1. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India
2. Beginning Swift Programming, Wei-Meng Lee, December 2014, ISBN: 978-1-119-00931-3

**Reference Books:**

1. Enterprise J2ME: Developing Mobile Java Applications, Michael Juntao Yuan, Pearson Education, 2004.
2. Android Application Development for Java programming by James C. Sheusi, Cengage Learning
3. Android A Programmers Guide by Jerome DiMargio, TMH.

**Course Outcomes:**

At the end of this Course the student will be able to

- demonstrate their understanding of the fundamentals of Android operating systems **L3**
- demonstrate their skills of using Android software development tools **L4**
- demonstrate their ability to develop software with reasonable complexity on mobile platform **L5**

**III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**Network Security and cyber Laws**

**(Honor-Network Security)**

| L | T | P | C |
|---|---|---|---|
| 3 | 1 | 0 | 4 |

**Course Objectives:**

- Explain the concepts of Cyber security
- Illustrate key management issues and solutions.
- Familiarize with Cryptography and very essential algorithms
- Introduce cyber Law and ethics to be followed.

**UNIT – 1: Introduction** **9 Hrs**

Cyber Attacks, Defense Strategies and Techniques, Guiding Principles, Basics of Cryptography - Preliminaries, Elementary Substitution Ciphers, Elementary Transport Ciphers, Secret Key Cryptography – Product Ciphers, DES Construction .

**Learning Outcomes:**

At the end of this unit, the student will be able to

Able to understand the Guiding Principles. **L1**

Able to understand the Elementary Transport Ciphers. **L2**

**UNIT – II: Introducing RSA**

Public Key Cryptography and RSA – RSA Operations, Why Does RSA Work?, Performance, Applications, Practical Issues, Public Key Cryptography Standard (PKCS), Cryptographic Hash - Introduction, Properties, Construction, Applications and Performance, The Birthday Attack..

**Learning Outcomes:**

At the end of this unit, the student will be able to

Able to understand the Public Key Cryptography Standard (PKCS). **L3**

Able to understand the Cryptographic Hash. **L4**

**UNIT – III: Digital Certificates**

Key Management - Introduction, Digital Certificates, Public Key Infrastructure, Identity–based Encryption, Authentication–I - One way Authentication, Mutual Authentication, Dictionary Attacks.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Able to understand the One way Authentication. **L4**
- Able to understand the Dictionary Attacks. **L5**

**UNIT – IV: Authentication:**

Authentication, Confidentiality and Integrity, Viruses, Worms, and Other Malware, Firewalls – Basics, Practical Issues, Intrusion Prevention and Detection - Introduction, Prevention Versus Detection, Types of Instruction Detection Systems, DDoS Attacks Prevention/Detection.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Able to understand the DDoS Attacks Prevention/Detection. **L5**
- Able to understand the Prevention Versus Detection. **L5**

**UNIT – V: IT act aim and objectives**

IT act aim and objectives, Scope of the act, Major Concepts, Important provisions, Attribution, acknowledgement, and dispatch of electronic records, Secure electronic records and secure digital signatures.

**Learning Outcomes:**

At the end of this unit, the student will be able to

Able to understand the IT act aim and objectives. **L5**

Able to understand the Secure electronic records and secure digital signatures. **L6**

**Text Books:**

1. Cryptography, Network Security and Cyber Laws – Ber nard Menezes, Cengage Learning, 2010 edition (Chapters1,3,4,5,6,7,8,9,10,11,12,13,14,15,19(19.1-19.5),21(21.1-21.2),22(22.1-22.4),25.
1. Programming with Java, E. Balagurusamy.

**Reference Books:**

1. Cryptography and Network Security- Behrouz A Forouzan, Debdeep Mukhopadhyay, Mc-GrawHill, 3rd Edition, 2015.
2. Cryptography and Network Security- William Stallings, Pearson Education, 7th Edition
3. Cyber Law simplified- Vivek Sood, Mc-GrawHill, 11th reprint , 2013
4. Cyber security and Cyber Laws, Alfred Basta, Nadine Basta, Mary brown, ravindra kumar, Cengage learning.

**Course Outcomes:**

At the end of this Course the student will be able to

describe the hardware, software, and services that comprise an enterprise network, and be able to articulate how these components integrate to form a network solution. **L1**

build multiple host and network architectures, given business requirements and constraints; student will configure operating systems, network specific services, routing, switching, and remote access solutions. **L2**

describe the components of a computer, their role and function, and discuss how cpu, memory, storage, and network resources are leveraged by systems software; articulate the various forms of virtualization. **L3**

**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**Social Networking**

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|---|---|---|---|
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**Course Objectives:**

. Understand social media fundamentals

- Understand basic social media etiquette
- Create a social media campaign
- Publish social media updates and engage with a community
- 5. Apply social media best practices to enhance their personal brand

**UNIT – I: Social Networking**:

Definition, Overview of Social Networking Sites, **Types of Social Networking Sites:** General purpose, Niche Advantages of Social Networking Sites, Drawbacks of Social Networking Sites, Features And Need of Social Networking, Security Issues with Social Networking Sites,

.

**Learning Outcomes:**

At the end of this unit, the student will be able to

Describe the basic concepts of **Social Networking**. **L1**

**UNIT – II: Enterprise Content Management**

ECM Introduction, Definition, Process, Types of Content, Examples Content Management System(CMS) Overview and examples, **Electronic Document Management(EDM)** : introduction, Need,

**Learning Outcomes:**

At the end of this unit, the student will be able to

Illustrate the concepts of **Enterprise Content Management**. **L2**

**UNIT – III: e-Learning**

Definition, Introduction, Types of e-Learning: 1.Learner-led eLearning 2.facilitated e-Learning 3.Instructor-led e-Learning 4. Embedded e-Learning Telemonitoring And e-Coaching **e-Learning Models:** 1. WBT 2.CBT 3.LMS 4.LCMS 5.Virtual School Systems **e-Learning Tools And Technologies:**EMail,Online Discussion, Chat and Instant Messaging,Voting,Whiteboard, Application Sharing,Conferencing, Online Meeting Tools Standards for e-Learning Case Study .

**Learning Outcomes:**

At the end of this unit, the student will be able to

Apply security features **e-Learning**. **L2**

Use smart contract in **e-Learning Tools And Technologies**. **L3**

**UNIT – IV: Popular social medias**

Facebook , Twitter , LinkedIN

**Learning Outcomes:**

At the end of this unit, the student will be able to

Illustrate the concepts of Facebook , Twitter , LinkedIN **L3**

**UNIT – V: e/m-Commerce:**

e-Commerce definition, Models of eCommerce, **Electronic Payment Systems**: Credit/Debit Cards, Smart Cards, Paypal, e-Billing,eMicropayments **Point Of Sales System(POS):** Meaning, Uses **m-Commerce**: Overview of mobileCommerce, Attributes of m-Commerce, Drivers of m-Commerce, m-Commerce Security issues, Mobile ATM(ICICI Bank Case Study) **Applications of m-Commerce:** 1.Mobile Financial Applications, m-wallet 2.Mobile Shopping 3.Advertising And Content provision Case-Study 10 20 3,4.

**Learning Outcomes:**
At the end of this unit, the student will be able to
Describe the basic concepts of **e/m-Commerce.** **L4**

To know about the **Applications of m-Commerce.** **L5**

**Text Books:**

- E-Learning Tools and Technologies William Hortan, Katherine Hortan,Wiley Pub.
- Cloud Computing Bible Barrie Sosinsky,Wiley India pub
- E-Commerce C.S.V. Murthy,Himalaya Pub.
- E-World (Excel Publications) Arpita Gopal and Chandrani Singh
- Electronic Commerce A Managerial Perspective Efraim Turban, Pearson Pub.

**Reference Books:**

- Decision Support Systems and Intelligent Systems Efraim Turban, Jay Aronson, Pearson,7th Ed .
- Cloud computing Michael Miller, Pearson Pub. 8. Internet (Use of Search Engines Google & yahoo etc).

**Course Outcomes:**
At the end of this Course the student will be able to

- Drive traffic to their blog using social media **L4**
- Create a content calendar **L3**
- Understand social media advertising **L3**
- Measure site traffic using Google Analytics **L2**
- Create and follow a social media policy **L2**

**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**STORAGE AREA NETWORKS**

| L | T | P | C |
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**Course Objectives:**

- Evaluate storage architectures,
- Define backup, recovery, disaster recovery, business continuity, and replication
- Examine emerging technologies including IP-SAN
- Understand logical and physical components of a storage infrastructure
- Identify components of managing and monitoring the data center
- Define information security and identify different storage virtualization technologies

**UNIT – I: Storage System**

Introduction to Information Storage: Evolution of Storage Architecture, Data Center Infrastructure, Virtualization and Cloud Computing. Data Center Environment: Application, Host (Compute), Connectivity, Storage.

**Learning Outcomes:**

At the end of this unit, the student will be able to

Describe the basic concepts of storage. **L1**

Describe the primitives of the cloud computing. **L1**

**UNIT – II: Data Protection:**

Data Protection: RAID: RAID Implementation Methods, RAID Techniques, RAID Levels, RAID Impact on Disk Performance. Intelligent Storage Systems: Components of Intelligent Storage System, Storage Provisioning.

**Learning Outcomes:**

At the end of this unit, the student will be able to

Illustrate the concepts of RAID techniques. **L2**

Implement The storage systems. **L2**

**UNIT – III: Storage Networking Technologies**

Fibre Channel Storage Area Networks: Components of FC SAN, FC connectivity, Fibre Channel Architecture, Zoning, FC SAN Topologies, Virtualization in SAN. IP SAN and FCoE: iSCSI, FCIP, FCoE.

**Learning Outcomes:**

At the end of this unit, the student will be able to

Apply security features Fibre Channel Storage Area Networks. **L2**

Use smart contract in FCIP. **L3**

**UNIT – IV: Network Attached Storage**

Network Attached Storage: Components of NAS, NAS I/O Operation, NAS File-Sharing Protocols, File-Level Virtualization, Object-Based Storage and Unified Storage: Object-Based Storage Devices, Content-Addressed Storage, Unified Storage.

**Learning Outcomes:**
At the end of this unit, the student will be able to
Illustrate the concepts of NAS, NAS I/O Operation. **L3**
Describe the Unified Storage. **L4**

**UNIT – V: Securing and Managing Storage Infrastructure**
Securing and Storage Infrastructure: Information Security Framework, Risk Triad, Storage Security Domains, Security Implementations in Storage Networking, Securing Storage Infrastructure in Virtualized and Cloud Environments.

**Learning Outcomes:**
At the end of this unit, the student will be able to
Describe the basic concepts of Information Security Framework. **L4**

To know about the Cloud Environments. **L5**

**Text Books:**
1. EMC Education Services, Information Storage and Management, Wiley India Publications, 2009. ISBN: 9781118094839

**Reference Books:**
1.. Storage Virtualization, Author: Clark Tom, Publisher: Addison Wesley Publishing Company ISBN : 9780321262516 Reference Books: NIL.

**Course Outcomes:**
At the end of this Course the student will be able to
- Identify key challenges in managing information and analyze different storage networking technologies and virtualization **L4**
- Explain components and the implementation of NAS **L3**
- Describe CAS architecture and types of archives and forms of virtualization **L3**
- Ilustrate the storage infrastructure and management activities **L2**

**B.Tech IV Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**High Performance Computing**

| L | T | P | C |
|---|---|---|---|
| 3 | 1 | 0 | 4 |

**Course Objectives:**

- To Study various computing technology architecture.
- To know Emerging trends in computing technology.
- To highlight the advantage of deploying computing technology.

**UNIT – I: Cluster Computing**

Introduction to Cluster Computing, Scalable Parallel Computer Architectures, Cluster Computer and its Architecture, Classifications, Components for Clusters, Cluster Middleware and Single System Image, Resource Management and Scheduling, Programming Environments and Tools, Applications.

**Learning Outcomes:**

At the end of this unit, the student will be able to

Describe the basic concepts of Cluster Computing. **L1**

Describe the Applications. **L1**

**UNIT – II: Load Sharing and Balancing**

Evolution, Job and Resource Management Systems, State-of-the-Art in RMS and Job, Rigid Jobs with Process Migration, Communication-Based Scheduling, Batch Scheduling, Fault Tolerance, Scheduling Problem for Network Computing.

**Learning Outcomes:**

At the end of this unit, the student will be able to

Illustrate the concepts of Fault Tolerance. **L2**

Implement The Job and Resource Management Systems. **L2**

**UNIT – III: Grid Computing**

Introduction to Grid Computing, Virtual Organizations, Architecture, Applications, Computational, Data, Desktop and Enterprise Grids, Data-intensive Applications, High-Performance Commodity Computing, High-Performance Schedulers, Grid Middleware: Connectivity, Resource and Collective Layer, Globus Toolkit.

**Learning Outcomes:**

At the end of this unit, the student will be able to

Apply security features Virtual Organizations. **L2**

Use smart contract in Grid Middleware. **L3**

**UNIT – IV: Cloud Computing**

Introduction to Cloud Computing, Types: Deployment and Service Models, Characteristics, Applications, Service-Level Agreement, Virtualization, High-Throughput Computing: Task Computing and Task-based Application Models, Market-Based Management of Clouds, Energy-Efficient and Green Cloud Computing Architecture, Resource Allocation.

**Learning Outcomes:**
At the end of this unit, the student will be able to
Illustrate the concepts of Service-Level Agreement. **L3**
Implement Market-Based Managementof Clouds. **L4**

**UNIT – V: Task Scheduling**
, CLS and CMMS, Workflow Scheduling, Montage, Epigenomics, SIPHT, LIGO, CyberShake, Task Consolidation, Introduction to CloudSim, Cloudlet, Virtual Machine and its Provisioning, Time and Space-shared Provisioning.

**Learning Outcomes:**
At the end of this unit, the student will be able to
Describe the basic concepts of Cloudlet. **L4**

To know about the Virtual Machine and its Provisioning. **L5**

**Text Books:**


1. R. Buyya, High Performance Cluster Computing: Architectures and Systems, Volume 1, Pearson Education, 2008.
2. (Edited By) I. Foster and C. Kesselman, The Grid: Blueprint for a New Computing Infrastructure, Morgan Kaufmann, Elsevier, 2004.
3. D. Janakiram, Grid Computing, Tata McGraw-Hill, 2005.
4. R. Buyya, C. Vecchiola and S. T. Selvi, Mastering Cloud Computing Foundations and Applications Programming, Morgan Kaufmann, Elsevier, 2013.


**Reference Books:**


1. A. Chakrabarti, Grid Computing Security, Springer, 2007.
2. B. Wilkinson, Grid Computing: Techniques and Applications, CRC Press, 2009.
3. C. S. R. Prabhu, Grid and Cluster Computing, PHI, 2008.
4. B. Sosinsky, Cloud Computing Bible, Wiley, 2011.


**Course Outcomes:**
At the end of this Course the student will be able to
Describe the basic concepts of Cloudlet. **L4**
To know about the Secure electronic. **L3**

To know about the Virtual Machine and its Provisioning. **L3**

Implement Market-Based Managementof Clouds. **L2**

**III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**User Interface Design**

**(Minor-Web Development)**

| L | T | P | C |
|---|---|---|---|
| 3 | 1 | 0 | 4 |

**Course Objectives:**

To explain different interaction style and their use.

To explain when to use graphical and textual information presentation

To explain the practical activities in the user interface design process

**UNIT – 1: The User Interface** **9 Hrs**

The User Interface-Introduction, Overview, The importance of user interface – Defining the user interface, The importance of Good design, Characteristics of graphical and web user interfaces, Principles of user interface design.

**Learning Outcomes:**

At the end of this unit, the student will be able to

Able to understand the Characteristics of graphical and web user interfaces. **L1**

Able to understand The importance of Good design. **L2**

**UNIT – II: The User Interface Design process**

The User Interface Design process- Obstacles, Usability, Human characteristics in Design, Human Interaction speeds, Business functions-Business definition and requirement analysis, Basic business functions, Design standards.

**Learning Outcomes:**

At the end of this unit, the student will be able to

Able to understand the Human characteristics in Design. **L3**

Able to understand the Business functions-Business definition and requirement analysis. **L4**

**UNIT – III: System menus and navigation schemes:**

System menus and navigation schemes- Structures of menus, Functions of menus, Contents of menus, Formatting of menus, Phrasing the menu, Selecting menu choices, Navigating menus, Kinds of graphical menus.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Able to understand the Phrasing the menu. **L4**
- Able to understand the Navigating menus. **L5**

**UNIT – IV: Windows:**

Windows - Characteristics, Components of window, Window presentation styles, Types of window, Window management, Organizing window functions, Window operations, Web systems, Characteristics of device based controls.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Able to understand the Organizing window functions. **L5**
- Able to understand the Window operations. **L5**

**UNIT – V: Screen based controls**

Screen based controls- Operable control, Text control, Selection control, Custom control, Presentation control, Windows Tests-prototypes, kinds of tests.

**Learning Outcomes:**

At the end of this unit, the student will be able to

Able to understand the Selection control. **L5**

Able to understand the Windows Tests-prototypes. **L6**

**Text Books:**

1. Wilbert O. Galitz, "The Essential Guide to User Interface Design", John Wiley & Sons, Second Edition 2002.

**Reference Books:**

1. Ben Sheiderman, "Design the User Interface", Pearson Education, 1998.

2. Alan Cooper, "The Essential of User Interface Design", Wiley- Dream Tech Ltd.,2002.

**Course Outcomes:**

At the end of this Course the student will be able to

- Design the User Interface, design, menu creation ,windows creation and connection between menus and windows. **L1**

**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**Advanced Java Script(Minor-Degree)**

| L | T | P | C |
|---|---|---|---|
| 3 | 1 | 0 | 4 |

**Course Objectives:**

- Understand the JavaScript language & the Document Object Model.
- Alter, show, hide and move objects on a web page.
- Check information inputted into a form.
- Javascript allows programming to be performed without server interaction.
- Javascript can respond to events, such as button clicks.
- Javascript can validate data before sending out a request.

**UNIT – I:** Introduction to JavaScript:

Core JavaScript, Client-Side JavaScript, Lexical Structure: Character Set, Comments, Literals, Identifiers and Reserved Words, Optional Semicolons, Types, Values, and Variables: Numbers, Text, Boolean Values, null and undefined, The Global Object, Wrapper Objects, Type Conversions, Variable Declaration, Variable Scope.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Describe a Type Conversions. **L1**
- Design and motivate Wrapper Objects **L1**

**UNIT – II:** Expressions and Operators:

Primary Expressions, Object and Array Initializers, Function Definition Expressions, Property Access Expressions, Invocation Expressions, Object Creation Expressions, Operator Overview, Arithmetic Expressions, Relational Expressions, Logical Expressions, Assignment Expressions, Evaluation Expressions, Miscellaneous Operators.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Able to understand the Object Creation Expressions. **L2**
- Able to understand the Assignment Expressions. **L2**

**UNIT – III:** Statements

Expression Statements, Compound and Empty Statements, Declaration Statements, Conditionals, Loops, Jumps, Miscellaneous Statements, Objects: Creating Objects, Querying and Setting Properties, Deleting Properties, Testing Properties, Enumerating Properties.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Describe a Compound and Empty Statements. **L2**
- Describe a Testing Properties. **L3**

**UNIT – IV:** Objects & Arrays

Creating Objects, Querying and Setting Properties, Deleting Properties, Testing Properties, Enumerating Properties, Creating Arrays, Reading and Writing Array Elements, Sparse Arrays, Array Length, Adding and Deleting Array Elements, Iterating Arrays.

**Learning Outcomes:**
At the end of this unit, the student will be able to

- Describe a Deleting Properties, Testing Properties. **L3**
- Describe a Iterating Arrays. **L4**

**UNIT – V:** Functions:

Defining Functions, Invoking Functions, Function Arguments and Parameters, Functions As Values, Functions As Namespaces, Closures, Function Properties, Methods, and Constructor, Functional Programming.

**Learning Outcomes:**
At the end of this unit, the student will be able to

- Use well-understood paradigms for Function Arguments and Parameters. **L4**
- Identify and assess the quality attributes of a Functional Programming. **L5**

**Text Books:**

1. JAVA SCRIPT,6th edition,David Flanagan,O'REILY.

**Course Outcomes:**

At the end of this Course the student will be able to

Create SVG Graphics. • **L4**

Create CSS stylesheets. **L3**

Lay out HTML elements using CSS margin and padding. **L3**

Implement program logic using JavaScript. **L2**

Implement HTML5 APIs using JavaScript. **L5**

**B.Tech III Year II Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**Advanced Web Technologies(Minor-Degree)**

| L | T | P | C |
|---|---|---|---|
| 3 | 1 | 0 | 4 |

**Course Objectives:**

- On completion of this course, a student will be familiar with client server architecture and able to develop a web application using java technologies. Students will gain the skills and project-based experience needed for entry into web application and development careers.

**UNIT – I:** XML and Ajax:

XML – Declaration, Root Element, Child Elements, Element Attributes, Entity References, Comments, Ajax – XML HttpRequest Object, Sending Ajax requests, Handling Ajax Responses, Adding Ajax Functionality in JavaScript, Adding Ajax Functionality to a Web Page

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Argue the importance and role of Root Element, Child Elements. **L1**
- Design and motivate Handling Ajax Responses. **L1**

**UNIT – II:** Installation:

Apache & MySQL: Software Prerequisites, Installing Apache and PHP, Starting and Testing Apache, Testing PHP with phpinfo(), Installing MySQL, Starting and Testing MySQL, 125-145 Installing the php-mysql Module, Checking the php-mysql Module.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Design and motivate Installing Apache and PHP, Starting and Testing Apache. **L2**
- Recognize major Starting and Testing MySQL, 125-145 Installing the php-mysql Module. **L2**

**UNIT – III:** PHP:

Hypertext Preprocessor: Getting Started with PHP - Basic PHP Syntax, Data Types, Variables, Constants, Operators, Control Structures, Functions, Connecting to MySQL using PHP, Building a Web Page using PHP.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Recognize major Getting Started with PHP - Basic PHP Syntax. **L2**
- Describe a Connecting to MySQL using PHP. **L3**

**UNIT – IV:** Web Application Creation:

Creating a Web Application – putting it all together, The MVC Design Pattern – Basic Web Architecture, MVC Architecture, Coding Considerations, Setting up our Development Environment, Building our MVC Framework, Building a PHP Application on our MVC framework.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Describe a Coding Considerations **L3**
- Generate a PHP Application on our MVC framework. **L4**

**UNIT – V:** HTML 5:
Introduction, Common Infrastructure, Semantics, structure, and APIs of HTML documents, Elements, links, Tabular data, Forms & Script elements, Web Application APIs, The XHTML syntax, User Interaction & Loading web pages.

**Learning Outcomes:**
At the end of this unit, the student will be able to

- Able to understand the Common Infrastructure. **L4**
- Identify and assess the quality attributes of a Web Application APIs. **L5**

**Text Books:**
1. Advanced web technologies Vardhman Mahaveer Open University, Kota.

**Course Outcomes:**

At the end of this Course the student will be able to

- Students are able to develop a dynamic webpage by the use of java script and DHTML. **L4**
- Students will be able to write a well formed / valid XML document. **L3**
- Students will be able to connect a java program to a DBMS and perform insert, update and delete operations on DBMS table **L3**
- Students will be able to write a server side java application called Servlet to catch form data sent from client, process it and store it on database. **L2**
- Students will be able to write a server side java application called JSP to catch form data sent from client and store it on database. **L5**

**B.Tech IV Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**MongoDB(Minor-Degree)**

| L | T | P | C |
|---|---|---|---|
| 3 | 1 | 0 | 4 |

**Course Objectives:**

- This course elucidates concepts related to Mongodb. The students will get hands- on experience in working with NoSQL and Mongodb.

**UNIT – I: MongoDB Overview**

Database, Collection, Document, Sample document, MongoDB Advantages, Advantages of MongoDB over RDBMS, Why should use MongoDB, Where should use MongoDB?, MongoDB Environment, Install MongoDB On Windows,Install MongoDB on Ubuntu.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Argue the importance and role of MongoDB. **L1**
- Design and motivate MongoDB Environment. **L1**

**UNIT – II: MongoDB DataBase**

MongoDB Create Database, MongoDB Drop Database MongoDB Drop Database, The dropDatabase () Method, MongoDB Create Collection, The createCollection() Method, MongoDB Drop Collection, The drop() Method.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Design and motivate MongoDB Create Collection. **L2**
- Recognize major MongoDB Create Collection. **L2**

**UNIT – III: MongoDB Datatypes**

Data types, MongoDB - Insert Document, MongoDB - Query Document, The find() Method, The pretty() Method, RDBMS Where Clause Equivalents in MongoDB, AND in MongoDB, OR in MongoDB, Using AND and OR together, MongoDB Update() method, MongoDB Save() Method. MongoDB Delete Document, Remove only one, Remove All documents.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Recognize major The find() Method. **L2**
- Describe a MongoDB Update() method. **L3**

**UNIT – IV: Implementation and Deployment**

MongoDB Limit Records, MongoDB Skip() Method, MongoDB Sort Documents, MongoDB Indexing, MongoDB Aggregation, Pipeline Concept, MongoDB Replication, How replication works in MongoDB, Replica set features, Set up a replica set, Add members to replica set.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Describe a Pipeline Concept. **L3**
- Generate Set up a replica set. **L4**

**UNIT – V: Applied Architectures and Styles**

MongoDB Sharding, Sharding in MongoDB, MongoDB Create Backup, Dump MongoDB Data, MongoDB Deployment, mongostat, mongotop, MongoDB Java, Installation, Connect to database, Create a collection,, Getting/ selecting a collection, Insert a document, Retrieve all documents.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Use well-understood paradigms for MongoDB Java. **L4**
- Identify and assess the quality attributes of a Connect to database. **L5**

**Text Books:**

1. http://mdslab.unime.it/sites/default/files/mongodb_tutorial.pdf

**Course Outcomes:**

At the end of this Course the student will be able to

- the students will be able to understand the working of NoSQL, Mongodb, its features **L4**

**III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**Data Analytics with Python**

**(Minor-Data Science)**

| L | T | P | C |
|---|---|---|---|
| 3 | 1 | 0 | 4 |

**Course Objectives:**

This course is designed to teach students how to analyze different types of data using Python. Students will learn how to prepare data for analysis, perform simple statistical analysis, create meaningful data visualizations and predict future trends from data.

**UNIT – 1: Introduction to data analytics and Python fundamentals** **9 Hrs**

**Python Fundamentals:** Language features of python, Data types, data structures, Control of flow, functions, loading a simple delimited data file, subsetting rows and columns.

**Learning Outcomes:**

At the end of this unit, the student will be able to

Able to understand the sub setting rows and columns. **L1**

Able to understand the data structures. **L2**

**UNIT – II: Basics of Data Analytics**

**Fundamentals to Data Analytics:** data and its importance, types of data analytics, Interrelation between statistics, analytics and data science, four different levels of data

**Central tendency:** Mean, Median, Percentile

**Dispersion:** Skewness, Kurtosis, Range, Interquartile range, Variance, Standard score, Coefficient of variation.

**Learning Outcomes:**

At the end of this unit, the student will be able to

Able to understand the Variance. **L3**

Able to understand the Coefficient of variation. **L4**

**UNIT – III: Probability, Probability distributions:**

**Introduction to probability**: Different ways of assigning probabilities, apply marginal, union, joint, and conditional probabilities, laws of probabilities, Bayes' rule.

**Probability Distributions:** Discrete Distribution, Cumulative Distribution Function, Covariance, Continuous distribution, Binomial distribution, Poisson distribution, Uniform distribution, Normal Distribution.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Able to understand the Poisson distribution. **L4**
- Able to understand the Normal Distribution. **L5**

**UNIT – IV: Sampling and sampling distribution:**

Sampling, random sampling, descriptive and inferential statistics, Distribution of sample means, population and variance, Confidence interval estimation.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Able to understand the Confidence interval estimation. **L5**
- Able to understand the Distribution of sample means. **L5**

**UNIT – V: Hypothesis testing and ANOVA**

Hypothesis testing, Null and Alternative hypotheses, Errors in hypothesis testing, Population mean and proportion, Examples of hypothesis sampling.

**ANOVA:** Sample size calculation, one way Anova.

**Learning Outcomes:**

At the end of this unit, the student will be able to

Able to understand the ANOVA **L5**

Able to understand the Null and Alternative hypotheses. **L6**

**Text Books:**

1. McKinney, W. (2012). Python for data analysis: Data wrangling with Pandas, NumPy, and IPython. " O'Reilly Media, Inc.".

2.Swaroop, C. H. (2003). A Byte of Python. Python Tutorial.

3.Ken Black, sixth Editing. Business Statistics for Contemporary Decision Making. "John Wiley & Sons, Inc".

**Reference Books:**

1. Data Science from Scratch: First Principles with Python, Joel Grus O'Reilly Media (2015).

2. Anderson Sweeney Williams (2011). Statistics for Business and Economics. "Cengage Learning".

3. Douglas C. Montgomery, George C. Runger (2002). Applied Statistics & Probability for Engineering. "John Wiley & Sons, Inc"

4. Jay L. Devore (2011). Probability and Statistics for Engineering and the Sciences. "Cengage Learning".

**Course Outcomes:**

At the end of this Course the student will be able to

1 Understanding basics of python for performing data analysis. **L1**

2. Understanding the data, performing preprocessing, processing and data visualization to get insights from data. **L2**

3.Use different python packages for mathematical, scientific applications and for web data analysis. **L3**

4.Develop the model for data analysis and evaluate the model performance. **L4**

**III Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**DATA SCIENCE**

**(Minor-Data Science)**

| L | T | P | C |
|---|---|---|---|
| 3 | 1 | 0 | 4 |

**Course Objectives:**

This course is designed to analyse the data and to understanding the key technologies of data science and apply algorithms to build machine intelligence.

**UNIT – 1: Introduction to data science** **9 Hrs**

Fundamental of data science, Integrated development environment (IDE), Tools used for data science: Introduction to Jupiter and spyder and R Programming, libraries for data Science.

**Data operations:** Reading, selecting, filtering, manipulating, sorting, grouping, rearranging, ranking, and plotting.

**Learning Outcomes:**

At the end of this unit, the student will be able to

Identify the Tools used for data science. **L1**

Illustrate the working of a manipulating. **L2**

**UNIT – II: Statistics and Data analysis**

Descriptive statistics, data preparation. Exploratory Data, Analysis data summarization, data distribution, measuring asymmetry. Sample and estimated mean, variance and standard score.

**Learning Outcomes:**

At the end of this unit, the student will be able to

Able to understand the Analysis data summarization **L3**

Able to understand the Sample and estimated mean. **L4**

**UNIT – III: Supervised Learning:**

First step, learning curves, training-validation and test.

Regression and classification, Regression: linear regression simple linear regression, Logistic regression multiple & Polynomial regression

Algorithms: Linear regression, Logistics regression, Decision trees, KNN, Support vector machine, random forest. Examples.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Able to understand the KNN. **L4**
- Able to understand the Support vector machine. **L5**

**UNIT – IV: Unsupervised Learning:**

Unsupervised learning, clustering, similarity and distances, quality measures of clustering

Algorithms: K-means clustering, Hierarchical clustering, Aprior Algorithm.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Able to understand the K-means clustering. **L5**
- Able to understand the Hierarchical clustering. **L5**

**UNIT – V: Network Analysis:**

**Advanced JAVA Concepts:** Graphs, social networks, centrality, drawing centrality of Graphs,

Page Rank, Ego-Networks, community Detection.

**Learning Outcomes:**

At the end of this unit, the student will be able to

Able to understand the centrality. **L5**

Able to understand the Ego-Networks. **L6**

**Text Books:**

1. Data Science from Scratch: First Principles with Python, Joel Grus O'Reilly Media (2015).
2. Desikan and G. Ramesh, "Introduction to Data Science", CRC Press[2]..

**Reference Books:**

1. David W. Hosmer, Stanley Lemeshow (2000). Applied logistic regression (Wiley Series in probability and statistics). "Wiley-Interscience Publication".

**Course Outcomes:**

At the end of this Course the student will be able to

- Understand the basic data science tools. **L1**
- Understand the preparation and analysis of data **L2**
- Execute stasticial analysis by using tools / software **L3**
- Use of the supervised and unsupervised learning algorithms **L4**
- Designing the graphs and social networks **L5**

**B.Tech IV Year I Semester**

**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA**

**DATA VISUALIZATION**

| L | T | P | C |
|---|---|---|---|
| 3 | 1 | 0 | 4 |

**Course Objectives:**

To learn basics of R and Python.

- To learn usage of Watson studio.
- To learn about packages Numpy, pandas and matplotlib.
- To learn functionalities and usages of Seaborn.

**UNIT – I:** Introduction to Statistics:

Introduction to Statistics, Difference between inferential statistics and descriptive statistics, Inferential Statistics- Drawing Inferences from Data, Random Variables, Normal Probability Distribution, Sampling, Sample Statistics and Sampling Distributions.

**R overview and Installation**- Overview and About R, R and R studio Installation, Descriptive Data analysis using R, Description of basic functions used to describe data in R.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Argue the importance and role of Drawing Inferences from Data. **L1**
- Design and motivate R and R studio Installation. **L1**

**UNIT – II:** Data manipulation with R:

Data manipulation packages, Data visualization with R . Data visualization in Watson Studio: Adding data to data refinery, Visualization of Data on Watson Studio.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Design and motivate Data visualization with R. **L2**
- Recognize major Data visualization in Watson Studio. **L2**

**UNIT – III:** Python:

Introduction to Python, How to Install, Introduction to Jupyter Notebook, Python scripting basics, Numpy and Pandas.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Recognize major How to Install, Introduction to Jupyter Notebook. **L2**
- Describe a Connecting to Python scripting basics. **L3**

**UNIT – IV:** Data Visualization Tools in Python:

Introduction to Matplotlib, Basic plots using matplotlib, Specialized Visualization Tools using Matplotlib, Advanced Visualization Tools using MatplotlibWaffle Charts, Word Clouds.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Describe a Word Clouds. L3
- Generate a Specialized Visualization Tools using Matplotlib. L4

**UNIT – V:** Introduction to Seaborn:
Seaborn functionalities and usage, Spatial Visualizations and Analysis in Python with Folium, Case Study.

**Learning Outcomes:**
At the end of this unit, the student will be able to
- Able to understand the Spatial Visualizations and Analysis in Python with Folium. L4
-

**Text Books:**
1. Core Python Programming - Second Edition, R. Nageswara Rao, Dreamtech Press.
2. R Graphics Essentials for Great Data Visualization by Alboukadel Kassambara

**Course Outcomes:**

At the end of this Course the student will be able to
- Gain knowledge on R and Python L4
- Understand usage of various packages in R and Python. L3
- Demonstrate knowledge of Watson studio. L3
- Apply data visualization tools on various data sets. L2

III B.Tech II SEMESTER
JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA
MACHINE LEARNING

| L | T | P | C |
|---|---|---|---|
| 3 | 1 | 0 | 4 |

**Course Objectives:**

- To be able to formulate machine learning problems corresponding to different applications.
- To understand a range of machine learning algorithms along with their strengths and weaknesses.
- To understand the basic theory underlying machine learning.

**UNIT – 1: INTRODUCTION**

**Introduction:** An illustrative learning task, and a few approaches to it. What is known from algorithms? Theory, Experiment. Biology. Psychology. Overview of Machine learning, related areas and applications. Linear Regression, Multiple Regression, Logistic Regression, logistic functions.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Argue the importance and role of software architecture in large-scale software systems. L2
- Design and motivate software architecture for large-scale software systems. L3

**UNIT – II: DECISION TREE LEARNING**

**Decision Tree Learning:** - Minimum Description Length Principle. Occam's razor. Learning with active queries Introduction to information theory, Decision Trees, Cross Validation and Over fitting. Neural Network Learning: Perceptions and gradient descent back propagation, multilayer networks and back propagation.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Design and motivate software architecture for large-scale software systems. L3
- Recognize major software architectural styles and frameworks. L4

**UNIT – III: SAMPLE COMPLEXITY AND OVER FITTING**

**Sample Complexity and Over fitting:** Errors in estimating means. Cross Validation and jackknifing VC dimension. Irrelevant features: Multiplicative rules for weight tuning. Support Vector Machines: functional and geometric margins.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Recognize major software architectural styles and frameworks. L3
- Describe a software architecture using various documentation approaches and architectural description languages. L4

**UNIT – IV: INSTANCE-BASED TECHNIQUES**

**Instance-based Techniques**: Lazy vs. eager generalization. K nearest neighbor, case- based reasoning. Clustering and Unsupervised Learning: K-means clustering, Gaussian mixture density estimation, model selection

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Describe a software architecture using various documentation approaches and architectural description languages. L5
- Generate architectural alternatives for a problem and selection among them. L3

**UNIT – V: Genetic Algorithms**

**Genetic Algorithms:** Different search methods for induction - Explanation-based Learning: using prior knowledge to reduce sample complexity. Dimensionality reduction: feature selection, principal component analysis.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Use well-understood paradigms for designing new systems. **L3**
- Identify and assess the quality attributes of a system at the architectural level. **L4**

**Text Books:**

1. Tom Michel, Machine Learning, McGraw Hill, 1997
2. Trevor Has tie, Robert Tibshirani & Jerome Friedman. The Elements of Statically Learning, Springer Verlag, 2001.

**Reference Books:**

1. Machine Learning Methods in the Environmental Sciences, Neural Networks, William W Hsieh, Cambridge Univ Press.
2. Richard o. Duda, Peter E. Hart and David G. Stork, pattern classification, John Wiley & Sons Inc.,2001
3. Chris Bishop, Neural Networks for Pattern Recognition, Oxford University Press, 1995.

**Course Outcomes:**

At the end of this Course the student will be able to

- Student should be able to understand the basic concepts such as decision trees and neural networks.Ability to formulate machine learning techniques to respective problems. **L2**
- Apply machine learning algorithms to solve problems of moderate complexity. **L3**