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J.N.T.U.H COLLEGE OF ENGINEERING HYDERABAD  
(AUTONOMOUS)  
B.TECH. ECE FOUR YEAR DEGREE COURSE  
(ELECTRONICS AND COMMUNICATION ENGINEERING)  
COURSE STRUCTURE

## II YEAR

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Summer between III & IV Year: Industry Oriented Mini Project
J.N.T.U.H COLLEGE OF ENGINEERING HYDERABAD  
(AUTONOMOUS)  
B.TECH. ECE FOUR YEAR DEGREE COURSE  
(ELECTRONICS AND COMMUNICATION ENGINEERING)  
COURSE STRUCTURE

### IV YEAR  
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Professional Elective – 1
1. Operating Systems
2. OOPS through Java
3. Data Analytics

Professional Elective - 2
1. Cellular and Mobile Communications
2. Information Theory and Coding
3. Neural Networks & Applications

Professional Elective - 3
1. Digital Image Processing
2. Speech Processing
3. Scripting Languages

Professional Elective - 4
1. Network Security and Cryptography
2. Bio-Medical Electronics
3. Electronic Measurements and Instrumentation

Professional Elective - 5
1. Radar Systems
2. EMI & EMC
3. Optical Communications

Professional Elective - 6
1. Satellite Communications
2. Nano Materials and Technology
3. Television Engineering

Open Elective - 1
System Design through IoT

Open Elective - 2
Electronic Sensors

Open Elective - 3
Principles of Communications
MATHEMATICS - I
(LINEAR ALGEBRA AND CALCULUS)

1 Year B.Tech. I-Sem

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Pre-requisites: Mathematical Knowledge of 12th / intermediate level

Course Objectives:
1. Types of matrices and their properties.
2. Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
3. Concept of Eigen values and Eigenvectors and to reduce the quadratic form to canonical form
4. Concept of Sequence.
5. Concept of nature of the series.
6. Geometrical approach to the mean value theorems and their application to the mathematical problems
7. Evaluation of surface areas and volumes of revolutions of curves.
8. Evaluation of improper integrals using Beta and Gamma functions.
9. Partial differentiation, concept of total derivative
10. Finding maxima and minima of function of two and three variables.

Course Outcomes: After learning the contents of this paper the student must be able to
1. Write the matrix representation of a set of linear equations and to analyze the solution of the system of equations
2. Find the Eigen values and Eigenvectors
3. Reduce the quadratic form to canonical form using orthogonal transformations.
4. Analyze the nature of sequence and series.
5. Solve the applications on the mean value theorems.
6. Evaluate the improper integrals using Beta and Gamma functions
7. Find the extreme values of functions of two variables with/ without constraints.

UNIT-I: MATRICES Types of Matrices, Symmetric; Hermitian ; Skew-symmetric; Skew-Hermitian; orthogonal matrices; Unitary Matrices; Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method; System of linear equations; solving system of Homogeneous and Non Homogeneous equations, Gauss elimination method; Gauss Seidel Iteration Method.

UNIT-II: EIGEN VALUES AND EIGEN VECTORS Linear Transformation and Orthogonal Transformation: Eigen values and Eigenvectors and their properties: Diagonalization of a matrix; Cayley-Hamilton Theorem (without proof); finding inverse and power of a matrix by Cayley-Hamilton Theorem; Quadratic forms and Nature of the Quadratic Forms; Reduction of Quadratic form to canonical forms by Orthogonal Transformation

UNIT-III: SEQUENCES & SERIES Sequence: Definition of a Sequence, limit; Convergent, Divergent and Oscillatory sequences. Series: Convergent, Divergent and Oscillatory Series; Series of positive terms; Comparison test, p-test, D Alembert’s ratio test; Raabe’s test; Cauchy’s Integral test; Cauchy’s root test; logarithmic test. Alternating series: Leibnitz test; Alternating Convergent series: Absolute and Conditionally Convergence.

UNIT-IV: CALCULUS Mean value theorems: Rolle’s Theorem, Lagrange’s Mean value theorem with their Geometrical Interpretation and applications, Cauchy’s Mean value Theorem. Taylor’s Series. Applications of definite integrals to evaluate surface areas and volumes of
revolutions of curves (Only in Cartesian coordinates), Definition of Improper Integral: Beta and Gamma functions and their applications.

UNIT-V: MULTIVARIABLE CALCULUS (PARTIAL DIFFERENTIATION AND APPLICATIONS) Definitions of Limit and continuity. Partial Differentiation; Euler’s Theorem; Total derivative; Jacobian; Functional dependence & independence, Maxima and Minima of functions of two variables and three variables using method of Lagrange multipliers.

TEXT BOOKS:

REFERENCES:
BASIC ELECTRICAL ENGINEERING

I Year B.Tech. I-Sem

Pre-requisites: --

Course Objectives:
1. To introduce the concepts of electrical circuits and its components
2. To understand magnetic circuits, DC circuits and AC single phase & three phase circuits
3. To study and understand the different types of DC/AC machines and Transformers.
4. To import the knowledge of various electrical installations.
5. To introduce the concept of power, power factor and its improvement.

Course Outcomes:
1. To analyze and solve electrical circuits using network laws and theorems.
2. To understand and analyze basic Electric and Magnetic circuits
3. To study the working principles of Electrical Machines
4. To introduce components of Low Voltage Electrical Installations


UNIT-II: A.C. CIRCUITS  Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance in series R-L-C circuit. Three-phase balanced circuits, voltage and current relations in star and delta connections.


UNIT-V: ELECTRICAL INSTALLATIONS  Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

TEXT BOOKS:

REFERENCES:
Course Objectives:
1. To bring adaptability to the concepts of chemistry and to acquire the required skills to become a perfect engineer.
2. To impart the basic knowledge of atomic, molecular and electronic modifications which makes the student to understand the technology based on them.
3. To acquire the knowledge of electrochemistry, corrosion and water treatment which are essential for the Engineers and in industry.
4. To acquire the skills pertaining to spectroscopy and to apply them for medical field etc.
5. To impart then knowledge of stereochemistry and synthetic aspects useful for understanding reaction pathways

Course Outcomes: The basic concepts included in this course will help the student to gain:
1. The knowledge of atomic, molecular and electronic changes, band theory related to conductivity.
2. The required principles and concepts of electrochemistry, corrosion and in understanding the problem of water and its treatments.
3. The required skills to get clear concepts on basic spectroscopy and application to medical field etc.
4. The knowledge and configurationally and conformational analysis of molecules and reaction mechanisms.

UNIT-I: MOLECULAR STRUCTURE AND THEORIES OF BONDING
Atomic and Molecular orbitals. Linear Combination of Atomic Orbitals (LCAO), molecular orbitals of diatomic molecules, molecular orbital energy level diagrams of N2, O2 and F2 molecules. π Molecular orbitals of butadiene and benzene. Crystal Field Theory (CFT): Salient Features of CFT – Crystal Field Splitting of transition metal ion d- orbitals in Tetrahedral, Octahedral and square planar geometries. Band structure of solids and effect of doping on conductance.

UNIT-II: WATER AND ITS TREATMENT

UNIT-III: ELECTROCHEMISTRY AND CORROSION


TEXT BOOKS:

REFERENCES:
1. Physical Chemistry, by P.W. Atkins
2. Engineering Chemistry (NPTEL Web-book), by B.L. Tembe, Kamaluddin and M.S. Krishnan
4. Fundamentals of Molecular Spectroscopy, by C.N. Banwell
ENGLISH

I Year B.Tech. I-Sem

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INTRODUCTION
In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire language skills, the syllabus of English has been designed to develop linguistic, communicative and critical thinking competencies of Engineering students. In English classes, the focus should be on the skills development in the areas of vocabulary, grammar, reading and writing. For this, the teachers should use the prescribed text for detailed study. The students should be encouraged to read the texts leading to reading comprehension and different passages may be given for practice in the class. The time should be utilized for working out the exercises given after each excerpt and for supplementing the exercises with authentic materials of a similar kind, for example, newspaper articles, advertisements, promotional material etc. The focus in this syllabus is on skill development in the areas of Vocabulary, Grammar, Reading and Writing Skills, fostering ideas and practice of language skills in various contexts.

LEARNING OBJECTIVES: The course will help students to
1. Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
2. Equip students to study academic subjects more effectively and critically using the theoretical and practical components of English syllabus.
3. Develop study skills and communication skills in formal and informal situations.

COURSE OUTCOMES: Students should be able to
1. Use English Language effectively in spoken and written forms.
2. Comprehend the given texts and respond appropriately.
3. Communicate confidently in various contexts and different cultures.
4. The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

SYLLABUS
(Note: As the syllabus of English given in AICTE Model Curriculum-2018 for B.Tech First Year is Open-ended, it is required to prepare teaching/learning materials by the teachers collectively in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning and timesaving in the class.)


Unit –III Vocabulary: Acquaintance with Prefixes and Suffixes from Foreign Languages in English to form Derivatives-Words from Foreign Languages and their Use in English. Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses. Reading: Sub-skills of Reading- Skimming and Scanning Writing: Writing Introduction and Conclusion - Essay Writing.


BASIC ELECTRICAL ENGINEERING LAB

I Year B.Tech. I-Sem

Pre-requisites: Basic Electrical Engineering

Course Objectives:
1. To analyze a given network by applying various electrical laws and network theorems
2. To know the response of electrical circuits for different excitations
3. To calculate, measure and know the relation between basic electrical parameters.
4. To analyze the performance characteristics of DC and AC electrical machines

Course Outcomes:
1. Get an exposure to basic electrical laws.
2. Understand the response of different types of electrical circuits to different excitations.
3. Understand the measurement, calculation and relation between the basic electrical parameters.
4. Understand the basic characteristics of transformers and electrical machines.

List of experiments/demonstrations:
1. Verification of Ohms Law
2. Verification of KVL and KCL
3. Transient Response of Series RL and RC circuits for DC excitation
4. Transient Response of RLC Series circuit for DC excitation
5. Resonance in series RLC circuit
6. Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits
8. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)
9. Three Phase Transformer: Verification of Relationship between Voltages and Currents (StarDelta, Delta-Delta, Delta-star, Star-Star)
10. Measurement of Active and Reactive Power in a balanced Three-phase circuit
11. Performance Characteristics of a Separately/Self Excited DC Shunt/Compound Motor
12. Torque-Speed Characteristics of a Separately/Self Excited DC Shunt/Compound Motor
13. Performance Characteristics of a Three-phase Induction Motor
14. Torque-Speed Characteristics of a Three-phase Induction Motor
15. No-Load Characteristics of a Three-phase Alternator

TEXT BOOKS:

REFERENCES:
Course Objectives: The chemistry laboratory course consists of experiments related to the principles of chemistry required to the engineering student. The course will make the student to learn:

1. Estimation of hardness and chloride content in water to check its suitability for drinking purpose.
2. To determine the rate constant of reactions from concentrations as an function of time.
3. The measurement of physical properties like adsorption and viscosity.
4. To synthesize the drug molecules and check the purity of organic molecules by thin layer chromatographic (TLC) technique.

Course Outcomes: The experiments included in the chemistry laboratory will make the student to gain the skills on

1. Determination of parameters like hardness and chloride content in water.
2. Estimation of rate constant of a reaction from concentration – time relationships.
3. Determination of physical properties like adsorption and viscosity.
4. Calculation of Rf values of some organic molecules by TLC technique.

List of Experiments:
1. Determination of total hardness of water by complexometric method using EDTA
2. Determination of chloride content of water by Argentometry
3. Estimation of an HCl by Conductometric titrations
4. Estimation of Acetic acid by Conductometric titrations
5. Estimation of HCl by Potentiometric titrations
6. Estimation of Fe2+ by Potentiometry using KMnO4
7. Determination of rate constant of acid catalysed hydrolysis of methyl acetate
8. Synthesis of Aspirin and Paracetamol
9. Thin layer chromatography calculation of Rf values. eg ortho and para nitro phenols
10. Determination of acid value of coconut oil
11. Verification of freundlich adsorption isotherm-adsorption of acetic acid on charcoal
12. Determination of viscosity of castor oil and ground nut oil by using Ostwald’s viscometer.
13. Determination of partition coefficient of acetic acid between n-butanol and water.

ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB

I Year B.Tech. I-Sem

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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 both in formal and informal contexts.

Course Objectives
1. To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning
2. To sensitize students to the nuances of English speech sounds, word accent, intonation and rhythm
3. To bring about a consistent accent and intelligibility in students’ pronunciation of English by providing an opportunity for practice in speaking
4. To improve the fluency of students in spoken English and neutralize their mother tongue influence
5. To train students to use language appropriately for public speaking and interviews

Course Outcomes - Students will be able to attain Better understanding of nuances of English language through audio-visual experience and group activities
Neutralization of accent for intelligibility
Speaking skills with clarity and confidence which in turn enhances their employability skills
Syllabus English Language and Communication Skills Lab (ELCS) shall have two parts:
a. Computer Assisted Language Learning (CALL) Lab
b. Interactive Communication Skills (ICS) Lab

Listening Skills Objectives
1. To enable students, develop their listening skills so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.
   • Listening for general content
   • Listening to fill up information
   • Intensive listening
   • Listening for specific information

Speaking Skills Objectives
1. To involve students in speaking activities in various contexts
2. To enable students express themselves fluently and appropriately in social and professional contexts
   • Oral practice: Just A Minute (JAM) Sessions
   • Describing objects/situations/people
   • Role play – Individual/Group activities

The following course content is prescribed for the English Language and Communication Skills Lab based on Unit-6 of AICTE Model Curriculum 2018 for B.Tech First English. As the syllabus is very limited, it is required to prepare teaching/learning materials by the teachers collectively in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning and timesaving in the Lab)

ICS Lab: Understand: Communication at Work Place- Spoken vs. Written


**Exercise – V CALL Lab:** Understand: Listening for Specific Details. Practice: Listening Comprehension Tests.

**ICS Lab:** 1. Introduction to Interview Skills. 2. Common errors in speaking.

Minimum Requirement of infrastructural facilities for ELCS Lab: 1. Computer Assisted Language Learning (CALL) Lab: The Computer Assisted Language Learning Lab has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self- study by students. System Requirement (Hardware component): Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications: i) Computers with Suitable Configuration ii) High Fidelity Headphones

2. Interactive Communication Skills (ICS) Lab: The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio-visual aids with a Public-Address System, a LCD and a projector etc.

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Pre-requisites: Practical skill

Course Objectives:

1. To Study of different hand operated power tools, uses and their demonstration.
2. To gain a good basic working knowledge required for the production of various engineering products.
3. To provide hands on experience about use of different engineering materials, tools, equipment and processes those are common in the engineering field.
4. To develop a right attitude, team working, precision and safety at work place.
5. It explains the construction, function, use and application of different working tools, equipment and machines.
6. To study commonly used carpentry joints.
7. To have practical exposure to various welding and joining processes.
8. Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.
9. To understand the computer hardware and practice the Assembly of computer parts.
10. To practice the process of Installation of operating system windows.


III. IT Workshop I: Computer hardware, identification of parts, Disassembly, Assembly of computer to working condition, simple diagnostic exercises. IT Workshop II: Installation of operating system windows and linux simple diagnostic exercises.


Course Outcomes: At the end of the course, the student will be able to: 1. Practice on manufacturing of components using workshop trades including pluming, fitting, carpentry, foundry, house wiring and welding. 2. Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling. 3. Apply basic electrical engineering knowledge for house wiring practice.
MATHEMATICS-II
(ADVANCED CALCULUS)

I Year B.Tech. II-Sem

Pre-requisites: Mathematical Knowledge of 12th / intermediate level

Course Objectives:
1. Methods of solving the differential equations of first and higher order.
2. Evaluation of multiple integrals and their applications
3. The physical quantities involved in engineering field related to vector valued functions
4. The basic properties of vector valued functions and their applications to line, surface and volume integrals

Course Outcomes: After learning the contents of this paper the student must be able to:
Identify whether the given differential equation of first order is exact or not
Solve higher differential equation and apply the concept of differential equation to real world problems
Evaluate the multiple integrals and apply the concept to find areas, volumes, centre of mass and gravity for cubes, sphere and rectangular parallel piped
Evaluate the line, surface and volume integrals and converting them from one to another

UNIT-I: FIRST ORDER ODE Exact, linear and Bernoulli’s equations; Applications: Newton’s law of cooling, Law of natural growth and decay; Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut’s type

UNIT-II: ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDER Second order linear differential equations with constant coefficients: Non-Homogeneous terms of the type polynomials in , and ; method of variation of parameters; Equations reducible to linear ODE with constant coefficients: Legendre’s equation, Cauchy-Euler equation.

UNIT-III: MULTIVARIABLE CALCULUS (INTEGRATION) Evaluation of Double Integrals (Cartesian and polar coordinates); change of order of integration (only Cartesian form); Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals. APPLICATIONS: Areas (by double integrals) and volumes (by double integrals and triple integrals), Centre of mass and Gravity (constant and variable densities) by double and triple integrals (applications involving cubes, sphere and rectangular parallel piped).


UNIT-V: VECTOR INTEGRATION Line, Surface and Volume Integrals. Theorems of Green, Gauss and Stokes (without proofs) and their applications

TEXT BOOKS:

REFERENCES:
APPLIED PHYSICS

I Year B.Tech. II-Sem

Course Objectives:
1. Understand basic principle of quantum mechanics
2. Gain the knowledge of carrier concentration and recombination process of semiconductor materials.
3. Learn about various types of optoelectronic devices
4. Various types of lasers and significance of optical fibers in communication system
5. Learn about material properties like dielectrics and magnetic materials.

Course Outcomes:
1. Analyze the wave particle duality and about energy levels and uncertainty principle
2. Evaluate the mobility of charge carrier concentration of a given semiconductor material.
3. Justify how the graded index optical fiber is more efficient than step index optical fiber in fiber optic communication system.
4. Will be to learn about working of LED, solar cell and photo detector
5. Gain the knowledge and applications of dielectric and magnetic materials

UNIT-I: QUANTUM MECHANICS
Introduction to quantum physics, Black body radiation, Planck’s law, photoelectric effect Compton effect, wave-particle duality, de Broglie hypothesis, Davisson and Germer experiment, Heisenberg’s uncertainty principle, Born’s interpretation of the wave function, Schrodinger’s time independent wave equation, particle in one dimensional box, potential barrier.

UNIT-II: SEMICONDUCTOR PHYSICS

UNIT-III: OPTOELECTRONICS

UNIT- IV: LASERS AND FIBRE OPTICS

UNIT-V: DIELECTRIC AND MAGNETIC PROPERTIES OF MATERIALS
Dielectrics: Introduction, Types of polarizations (Electronic, Ionic and Orientation Polarizations) and calculation of their polarizabilities, internal fields in a solid, Clausius-Mossotti relation. Magnetism: Introduction, Bohr magneton, classification of Dia, Para and Ferro magnetic
materials on the basis of magnetic moment, Hysteresis curve based on domine theory, Soft and hard magnetic materials, Properties of anti-Ferro and ferri magnetic materials.

**TEXT BOOKS:**

**REFERENCES:**
1. Richard Robinett, Quantum Mechanics.
3. Online Course: “Optoelectronic Materials and Devices” by Monica Katiyar and Deepak Gupta on NPTEL.
PROGRAMMING FOR PROBLEM SOLVING

I Year B.Tech. II-Sem

Course Objectives:
1. To learn the fundamentals of computers.
2. To understand the various steps in Program development.
3. To learn the syntax and semantics of C Programming Language.
4. To learn the usage of structured programming approach in solving problems.

Course Outcomes: After the end of this course student able to:
1. Write algorithms and to draw flowcharts for solving problems.
2. Translate the algorithms/flowcharts to programs (in C language).
3. Code and test a given logic in C programming language.
4. Formulate simple algorithms for arithmetic and logical problems.
5. Decompose a problem into functions and to develop modular reusable code.
6. Use arrays, pointers, strings and structures to formulate algorithms and programs.
7. Searching and sorting problems.

INTRODUCTION TO C LANGUAGE – Background, Simple C programs, Identifiers, Basic data types, Variables, Constants, Input / Output, Operators. Expressions, Precedence and Associatively, Expression Evaluation, Type conversions, Bit wise operators, Statements, Simple C Programming examples.

UNIT-II: STATEMENTS – if and switch statements, Repetition statements – while, for, do-while statements, Loop examples, other statements related to looping – break, continue, go to, Simple C Programming examples. DESIGNING STRUCTURED PROGRAMS- Functions, basics, user defined functions, inter function communication, Scope, Storage classes-auto, register, static, extern, scope rules, type qualifiers, recursion- recursive functions, Preprocessor commands, example C programs.


UNIT-IV: POINTERS – Introduction (Basic Concepts), Pointers for inter function communication, pointers to pointers, compatibility, memory allocation functions, array of pointers, programming applications, pointers to void, pointers to functions, command –line arguments. INPUT AND OUTPUT – Concept of a file, streams, standard input / output functions, formatted input / output functions, text files and binary files, file input / output operations, file status functions (error handling), C program examples.

UNIT-V: DERIVED TYPES – Structures – Declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit fields, enumerated types, C programming examples. SORTING AND SEARCHING – Selection sort, Bubble sort, Insertion sort, Linear search and Binary search methods.
TEXT BOOKS:
3. The C Programming Language, B.W. Kernighan and Dennis M.Ritchie, PHI/Pearson Education

REFERENCES:
3. C Programming & Data Structures, P. Dey, M Ghosh R Thereja, Oxford University Press
Pre-requisites: Nil

Course objectives:
1. To provide basic concepts in engineering drawing.
2. To impart knowledge about standard principles of orthographic projection of objects.
3. To draw sectional views and pictorial views of solids.

Course Outcomes: At the end of the course, the student will be able to:
1. Preparing working drawings to communicate the ideas and information.
2. Read, understand and interpret engineering drawings.


UNIT-IV Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views – Sections of Sphere. Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone


TEXT BOOKS:
1. Engineering Drawing N.D. Bhatt / Charotar

REFERENCES:
1. A Text Book of Engineering Drawing / Dhawan R K / S. Chand
Course Objectives:

1. To provide an experimental foundation for the theoretical concepts introduced in the lectures.
2. To teach how to make careful experimental observations and how to think about and draw conclusions from such data.
3. To help students understand the role of direct observation in physics and to distinguish between inferences based on theory and the outcomes of experiments.

Course Outcomes: At the end of the course students will be able:
1. Make careful experimental observations and draw conclusions from such data.
2. Distinguish between inferences based on theory and the outcomes of experiments.
3. Write a technical report which communicates scientific information in a clear and concise manner.

LIST OF EXPERIMENTS:
1. Energy gap of P-N junction diode: To determine the energy gap of a semiconductor diode.
2. Solar Cell: To study the V-I Characteristics of solar cell.
3. Light emitting diode: Plot V-I and P-I characteristics of light emitting diode.
4. Stewart – Gee’s experiment: Determination of magnetic field along the axis of a current carrying coil.
5. Hall Effect: To determine Hall co-efficient of a given semiconductor.
6. Photoelectric effect: To determine work function of a given material.
7. LASER: To study the characteristics of LASER sources.
8. Optical fiber: To determine the bending losses of Optical fibers.
9. LCR Circuit: To determine the Quality factor of LCR Circuit.
10. R-C Circuit: To determine the time constant of R-C circuit.
11. BJT: Characteristics of NPN transistor.
12. Zener diode: To study the V-I Characteristics of Zener diode.

Note: Any 8 experiments are to be performed by each student.
PROGRAMMING FOR PROBLEM SOLVING LAB

I Year B.Tech. II-Sem

Course Objectives:
1. To learn the fundamentals of computers.
2. To understand the various steps in Program development.
3. To learn the syntax and semantics of C Programming Language.
4. To learn the usage of structured programming approach in solving problems.

Course Outcomes: At the end of this course student will able to:
1. Write algorithms and to draw flowcharts for solving problems.
2. Translate the algorithms/flowcharts to programs (in C language).
3. Code and test a given logic in C programming language.
4. Formulate simple algorithms for arithmetic and logical problems.
5. Decompose a problem into functions and to develop modular reusable code.
6. Use arrays, pointers, strings and structures to formulate algorithms and programs.
7. Searching and sorting problems.

Week 1:
1. Write a C program to find the sum of individual digits of a positive integer.
2. Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and
   1. Subsequent terms are found by adding the preceding two terms in the sequence.
3. Write a C program to generate the first n terms of the sequence.
4. Write a C program to generate all the prime numbers between 1 and n, where n is a value
   supplied by the user.
5. Write a C program to find the roots of a quadratic equation.

Week 2:
6. Write a C program to find the factorial of a given integer.
7. Write a C program to find the GCD (greatest common divisor) of two given integers.
8. Write a C program to solve Towers of Hanoi problem.
9. Write a C program, which takes two integer operands and one operator from the user,
   performs the operation and then prints the result. (Consider the operators +, -, *, /, % and use
   Switch Statement)

Week 3:
10. Write a C program to find both the largest and smallest number in a list of integers.
11. Write a C program that uses functions to perform the following:
   i) Addition of Two Matrices
   ii) Multiplication of Two Matrices

Week 4:
12. Write a C program that uses functions to perform the following operations:
   i) To insert a sub-string in to a given main string from a given position.
   ii) To delete n Characters from a given position in a given string.
13. Write a C program to determine if the given string is a palindrome or not
14. Write a C program that displays the position or index in the string S where the string T
    begins, or – 1 if S doesn’t contain T.
15. Write a C program to count the lines, words and characters in a given text.
Week 5:
16. Write a C program to generate Pascal’s triangle.
17. Write a C program to construct a pyramid of numbers

18. Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression: 1+x+x2+x3+.............+xn For example: if n is 3 and x is 5, then the program computes 1+5+25+125. Print x, n, the sum Perform error checking. For example, the formula does not make sense for negative exponents – if n is less than 0. Have your program print an error message if n<0, then go back and read in the next pair of numbers of without computing the sum. Are any values of x also illegal? If so, test for them too.

Week 6:
19. 2’s complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2’s complement of 11100 is 00100. Write a C program to find the 2’s complement of a binary number.
20. Write a C program to convert a Roman numeral to its decimal equivalent.

Week 7:
21. Write a C program that uses functions to perform the following operations: i) Reading a complex number ii) Writing a complex number iii) Addition of two complex numbers iv) Multiplication of two complex numbers (Note: represent complex number using a structure.)

Week 8:
22. i) Write a C program which copies one file to another.
ii) Write a C program to reverse the first n characters in a file. (Note: The file name and n are specified on the command line.)
23. i) Write a C program to display the contents of a file.
ii) Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file)

Week 9:
24. Write a C program that implements the following sorting methods to sort a given list of integers in ascending order i) Bubble sort ii) Selection sort iii) Insertion sort

Week 10:
25. Write C programs that use both recursive and non recursive functions to perform the following searching operations for a Key value in a given list of integers: i) Linear search ii) Binary search

TEXT BOOKS:
3. The C Programming Language, B.W. Kernighan and Dennis M.Ritchie, PHI/Pearson Education

REFERENCES:
3. C Programming & Data Structures, P. Dey, M Ghosh R Thereja, Oxford University Press
Pre-Requisites: Physics

Course Objectives

1. To introduce components such as diodes, BJTs and FETs.
2. To know the applications of components.
3. To know the switching characteristics of components.
4. To give understanding of various types of amplifier circuits.

Course Outcomes

Upon completion of the Course, the students will be able to:
1. Analyze the characteristics of various semiconductor devices.
2. Apply diode characteristics to rectifiers, clippers and clampers.
3. Design biasing circuits for BJTs and FETs to act as amplifiers.
4. Design and analyze small signal amplifier circuits.

UNIT I
Diode and its Applications: Diode - Static and Dynamic resistances, Equivalent circuit, Load line analysis, Diffusion and Transition Capacitances, Diode Applications: Switch-Switching times.
Rectifier - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Rectifiers With Capacitive Filter, Clippers-Clipping at two independent levels, Clampers-Clamping Operation, types, Clamping Circuit Theorem, Comparators.

UNIT II
Bipolar Junction Transistor (BJT): Principle of Operation and characteristics - Common Emitter, Common Base, Common Collector Configurations, Operating point, DC & AC load lines, Transistor Hybrid parameter model, Determination of h-parameters from transistor characteristics, Conversion of h-parameters.

UNIT III
Transistor Biasing and Stabilization: Bias Stability, Fixed Bias, Collector to Base bias, Self Bias, Bias Compensation using Diodes and Transistors.

UNIT IV

UNIT V
TEXTBOOKS

1. Electronic Devices and Circuits - Jacob Millman, McGraw Hill Education.

REFERENCES

1. The Art of Electronices , Horowitz, 3rd Edition Cambridge University Press, 2018
4. Electronic Devices and Circuits, S. Salivahanan, N.Suresh Kumar, A Vallvaraj, 2nd Edition, TMH.
NETWORK ANALYSIS AND TRANSMISSION LINES

Pre-Requisites: NIL

Course Objectives

1. To understand the basic concepts on RLC circuits.
2. To know the behaviour of the steady and transient states in RLC circuits.
3. To Design and analyze networks using two port network parameters.
4. To study the propagation, reflection and transmission of plane waves in bounded media.

Course Outcomes

Upon successful completion of the course, students will be able to:

1. Analyze the Steady and transient state behaviour of RLC Circuits.
2. Design and analyze the application of two port network parameters.
3. Use transmission line parameters to establish distortion less conditions
4. Calculate transmission line parameters using Smith chart for stub matching

UNIT I
Network Topology, Basic cutset and tie set matrices for planar networks, Magnetic Circuits, Self and Mutual inductances, dot convention, impedance, reactance concept, Impedance transformation and coupled circuits, co-efficient of coupling, equivalent T for Magnetically coupled circuits, Ideal Transformer.

UNIT II
Transient and Steady state analysis of RC, RL and RLC Circuits, Sinusoidal, Step and Square responses. 2nd order series and parallel RLC Circuits, Root locus, damping factor, over damped, under damped, critically damped cases, quality factor and bandwidth for series and parallel resonance, resonance curves.

UNIT III
Two port Network parameters- Z, Y, ABCD, h and g parameters, Characteristic impedance, Image transfer constant, image and iterative impedance, network function, driving point and transfer functions – using transformed (S) variables, Poles and Zeros. Standard T, π, L Sections, Characteristic impedance, image transfer constants, Design of Attenuators, impedance matching network.

UNIT IV

UNIT V
TEXT BOOKS


REFERENCES

3. Electromagnetics with Applications – JD. Kraus, 5th Ed., TMH
Pre-Requisites: Mathematics

Course Objectives

This subject gives the knowledge of Signals and Systems required for all Electrical Engineering related courses.

1. Classify signals and systems and their analysis in time and frequency domains.
2. Study the concepts of distortion less transmission through LTI systems, convolution and correlation properties.
3. Identify the need for sampling of CT signals, types and merits and demerits of each type.
4. Understand Laplace and Z-transforms their properties for analysis of signals and systems.

Course Outcomes

Upon completing this course, the student will be able to:

1. Distinguish different signals, systems and their time and frequency domain analysis.
2. Identify the conditions for transmission of signals through systems and physical realization of systems.
3. Identify the significance of sampling types and applications of correlation functions.
4. Discover the significance of LT, ZT and their relation

UNIT I
Signal Analysis
Analogy between Vectors and Signals, Orthogonal Signal Space, Signal approximation using Orthogonal functions, Mean Square Error, Closed or complete set of Orthogonal functions, Orthogonality in Complex functions, Classification of Signals and systems, Exponential and Sinusoidal signals, Concepts of Impulse function, Unit Step function, Signum function.

UNIT II
Fourier series
Representation of Fourier series, Continuous time periodic signals, Properties of Fourier Series, Dirichlet’s conditions, Trigonometric Fourier Series and Exponential Fourier Series, Complex Fourier spectrum.

Fourier Transforms

UNIT III
Signal Transmission through Linear Systems
Linear System, Impulse response, Response of a Linear System, Linear Time Invariant(LTI) System, Linear Time Variant (LTV) System, Transfer function of a LTI System, Filter characteristic of Linear System, Distortion less transmission through a system, Signal bandwidth,
System Bandwidth, Ideal LPF, HPF, and BPF characteristics, Causality and Paley-Wiener criterion for physical realization, Relationship between Bandwidth and rise time, Convolution and Correlation of Signals, Concept of convolution in Time domain and Frequency domain, Graphical representation of Convolution.

UNIT IV
Sampling theorem
Graphical and analytical proof for Band Limited Signals, Impulse Sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, Effect of under sampling – Aliasing, Introduction to Band Pass Sampling.
Correlation

UNIT V
Laplace Transforms
Z–Transforms
Concept of Z- Transform of a Discrete Sequence, Distinction between Laplace, Fourier and Z Transforms, Region of Convergence in Z-Transform, Constraints on ROC for various classes of signals, Inverse Z-transform, Properties of Z-transforms.

TEXT BOOKS

REFERENCES
Pre-Requisites: Engineering Mathematics

Course Objectives

1. To understand common forms of number representation in logic circuits.
2. To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
3. To understand the concepts of combinational logic circuits and sequential circuits.
4. To understand the Realization of Logic Gates Using Diodes & Transistors.

Course Outcomes

Upon completing this course, the student will be able to
1. Use the numerical data in different forms and Boolean algebra theorems.
2. Use postulates of Boolean algebra and minimize combinational logic functions.
3. Design and analyze combinational and sequential circuits.
4. Identify the logic families in logic gates and use in realization of logic circuits.

UNIT I
Number Systems
Number systems, Complements of Numbers, Codes- Weighted and Non-weighted codes and its Properties, Parity check code and Hamming code.

Boolean Algebra

UNIT II
Minimization of Boolean functions
Karnaugh Map Method - Up to five Variables, Don’t Care Map Entries, Tabular Method,

Combinational Logic Circuits
Adders, Subtractors, comparators, Multiplexers, Demultiplexers, Encoders, Decoders and Code converters, Hazards and Hazard Free Relations.

UNIT III
Sequential Circuits Fundamentals
Basic Architectural Distinctions between Combinational and Sequential circuits, SR Latch, Flip Flops: SR, JK, JK Master Slave, D and T Type Flip Flops, Excitation Table of all Flip Flops, Timing and Triggering Consideration, Conversion from one type of Flip-Flop to another.

Registers and Counters
Shift Registers – Left, Right and Bidirectional Shift Registers, Applications of Shift Registers - Design and Operation of Ring and Twisted Ring Counter, Operation of Asynchronous and Synchronous Counters.
UNIT IV
Sequential Machines
Finite State Machines, Synthesis of Synchronous Sequential Circuits- Serial Binary Adder, Sequence Detector, Parity-bit Generator, Synchronous Modulo N – Counters, Finite state machine-capabilities and limitations, Mealy and Moore models.

UNIT V
Realization of Logic Gates Using Diodes & Transistors
AND, OR and NOT Gates using Diodes and Transistors, DCTL, RTL, DTL, TTL and CML Logic Families and its Comparison, Classification of Integrated Circuits.

TEXT BOOKS

REFERENCE
4. Switching Theory and Logic Design – A Anand Kumar, PHI,2013
Pre-requisite: Mathematics

Course Objectives

1. This gives basic understanding of random signals and processing.
2. Utilization of Random signals and systems in Communications and Signal Processing areas.
3. To known the Spectral and temporal characteristics of Random Process.
4. To Learn the Basic concepts of Noise sources.

Course Outcomes

Upon completing this course, the student will be able to
1. Estimate characteristics of Random variables.
2. Find the response of linear time Invariant system for a Random Processes.
4. Noise estimation in Communication systems and build various source coding techniques.

UNIT I


UNIT II


UNIT III
Random processes – Temporal characteristics: The Random Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, concept of Stationarity and Statistical Independence. First-Order Stationary Processes, Second-Order and Wide-Sense Stationarity, (N-Order) and Strict-Sense Stationarity, Time Averages and

UNIT IV

UNIT V
Noise sources & Information theory: Resistive/Thermal Noise Source, Arbitrary Noise Sources, Effective Noise Temperature, Noise equivalent bandwidth, Average Noise Figures, Average Noise Figure of cascaded networks, Narrow Band noise, Quadrature representation of narrow band noise & its properties. Entropy, Information rate, Source coding: Huffman coding, Shannon-Fano coding, Mutual information, Channel capacity of discrete channel, Shannon-Hartley law; Trade-off between bandwidth and SNR.

TEXT BOOKS
2. Principles of Communication systems by Taub and Schilling (TMH), 2008

REFERENCES
1. Random Processes for Engineers-Bruce Hajck, Cambridge unipress, 2015
List of Experiments (Minimum of Ten experiments to be done):
Design and Simulate using Multisim or Pspice or Equivalent Simulation Software: Conduct experiment Using Discrete components/ kits

1. PN Junction diode characteristics  A) Forward bias B) Reverse bias.
2. Zener diode characteristics and Zener as voltage Regulator
3. Full Wave Rectifier with & without filters
4. Measurement of h-parameters of transistor in CB, CE, CC configurations
5. Input and Output characteristics of FET in CD configuration
6. SCR Characteristics.
7. Common Emitter Amplifier Characteristics
8. Common Base Amplifier Characteristics
9. Common Source Amplifier Characteristics
10. Types of Clippers and at different reference voltage
11. Types of Clampers and at different reference voltage
12. The steady state output waveform of clampers for a square wave input
13. Comparison: Operation of different types of Comparators
Note:
- Minimum of 12 experiments are to be designed and realized using digital ICs/Components.

List of Experiments

1. Realization of Boolean Expressions using Gates
2. Design and realization logic gates using universal gates
3. Generation of clock using NAND / NOR gates
4. Design a 4 – bit Adder / Subtractor
5. Design and realization of Asynchronous counters using flip-flops
6. Design and realization of 8x1 using 2x1 multiplexer, design any digital circuit using MUX.
7. Verification of truth tables and excitation tables of SR,JK,T and D Flip Flops.
8. Design and realization a 4 – bit gray to Binary and Binary to Gray Converter
9. Design and realization of a 4 bit pseudo random sequence generator using logic gates.
11. Design and realization a Synchronous counters using flip-flops
12. Design and realization 2 bit comparator
13. Realization of logic gates using DTL, TTL, ECL, etc.,
14. Design of a finite state machine as a sequence detector.
BASIC SIMULATION LABORATORY

II Year B.Tech. ECE I Semester

Note:
- All the experiments are to be simulated using MATLAB or equivalent software
- MATLAB or Equivalent Live Scripts are to be incorporated in conducting all simulations
- Minimum of 12 experiment are to be completed/Simulated.

List of Experiments:
1. Generation of Various Signals and Sequences: Periodic and Aperiodic, Unit Impulse, Unit Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sinc.
3. Finding the Even and Odd parts of Signal/Sequence and Real and Imaginary parts of Signal.
5. Auto Correlation and Cross Correlation of Signals and Sequences.
7. Sinusoidal responses of the given LTI system and verifying its realizability and stability properties.
11. To plot pole-zero diagram in S-plane / Z-plane of given signal/sequence.
12. Generation of Gaussian noise and find its mean, Skew, Kurtosis, PDF and PSD.
13. Verification of Sampling Theorem.
15. Extraction of Periodic Signal masked by noise using Correlation.
16. App Designer for building UIs for Android/iOS sensor based step counter and location identification using GPS.
Environmentai Science

II Year B.Tech. ECE I Semester

Pre-requisite: NIL

Course Objectives
1. Creating the awareness about environmental problems among students.
2. Imparting basic knowledge about the environment and its allied problems.
3. Developing an attitude of concern for the environment.
4. Motivating students to participate in environment protection and environment improvement.

UNIT-I:
MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES:
Definition, Scope and Importance – Need for Public Awareness.

NATURAL RESOURCES: 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.

UNIT-II:
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)

UNIT-III:
ENVIRONMENTAL POLLUTION: 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

UNIT-IV:
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-V:

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

REFERENCE BOOKS:
1. Textbook of Environmental Sciences and Technology by M. Anji Reddy, BS Publication.

Course Outcomes:
At the end of the course, it is expected that students will be able to:
1. Identify and analyze environmental problems as well as the risks associated with these problems
2. Understand what it is to be a steward in the environment
Studying how to live their lives in a more sustainable manner
MATHEMATICS- III  
(NUMERICAL METHODS AND COMPLEX VARIABLES)

II Year B.Tech. ECE II Semester

Pre-requisites: Mathematics courses of first year of study.

Objectives: To learn

- Concept, properties of Laplace transforms
- Solving ordinary differential equations using Laplace transforms techniques.
- Various methods to the find roots of an equation.
- Concept of finite differences and to estimate the value for the given data using interpolation.
- Evaluation of integrals using numerical techniques
- Solving ordinary differential equations using numerical techniques.
- Differentiation and integration of complex valued functions.
- Evaluation of integrals using Cauchy’s integral formula and Cauchy’s residue theorem.
- Expansion of complex functions using Taylor’s and Laurent’s series.

UNIT I
Laplace Transforms
Laplace Transforms; Laplace Transform of standard functions; first shifting theorem; Laplace transforms of functions when they are multiplied and divided by ‘t’. Laplace transforms of derivatives and integrals of function; Evaluation of integrals by Laplace transforms; Laplace transforms of Special functions; Laplace transform of periodic functions.
Inverse Laplace transform by different methods, convolution theorem (without Proof), solving ODEs by Laplace Transform method.

UNIT II
Numerical Methods-I
Solution of polynomial and transcendental equations – Bisection method, Iteration Method, Newton-Raphson method and Regula-Falsi method.
Finite differences- forward differences- backward differences-central differences-symbolic relations and separation of symbols; Interpolation using Newton’s forward and backward difference formulae. Central difference interpolation: Gauss’s forward and backward formulae; Lagrange’s method of interpolation

UNIT III
Numerical Methods-II
Ordinary differential equations: Taylor’s series; Picard’s method; Euler and modified Euler’s methods; Runge-Kutta method of fourth order.

UNIT IV
Complex Variables (Differentiation)
Limit, Continuity and Differentiation of Complex functions. Cauchy-Riemann equations (without proof), Milne- Thomson methods, analytic functions, harmonic functions, finding
harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm) and their properties.

UNIT V
Complex Variables (Integration)
Line integrals, Cauchy’s theorem, Cauchy’s Integral formula, Liouville’s theorem, Maximum-Modulus theorem (All theorems without proof); zeros of analytic functions, singularities, Taylor’s series, Laurent’s series; Residues, Cauchy Residue theorem (without proof)

Course outcomes:
After learning the contents of this paper the student must be able to
- Use the Laplace transforms techniques for solving ODE’s
- Find the root of a given equation.
- Estimate the value for the given data using interpolation
- Find the numerical solutions for a given ODE’s
- Analyse the complex function with reference to their analyticity, integration using Cauchy’s integral and residue theorems
- Taylor’s and Laurent’s series expansions of complex function

TEXT BOOKS


REFERENCES

**ELECTROMAGNETIC FIELDS AND WAVES**

II Year B.Tech. ECE II Semester

Pre-requisite: Mathematics

**Course Objectives**

1. To learn the Basic Laws, Concepts and proofs related to Electrostatic Fields and Magnetostatic Fields, and apply them to solve physics and engineering problems.
2. To distinguish between static and time-varying fields, and understand the significance and utility of Maxwell’s Equations and Boundary Conditions, and gain ability to provide solutions to communication engineering problems.
3. To analyze the characteristics of Uniform Plane Waves (UPW), determine their propagation parameters and estimate the same for dielectric and dissipative media.
4. To conceptually understand the waveguides and to determine the characteristics of rectangular waveguides, microstrip lines.

**Course Outcomes**

Upon completing this course, the student will be able to

1. Apply the knowledge of Basic Laws, Concepts and proofs related to Electrostatic Fields and Magnetostatic Fields to solve engineering problems.
2. Distinguish between the static and time-varying fields, establish the corresponding sets of Maxwell’s Equations and Boundary Conditions.
3. Analyze the Wave Equations for good conductors, good dielectrics and evaluate the UPW Characteristics for several practical media of interest.
4. To analyze completely the rectangular waveguides, their mode characteristics, and design waveguides for solving practical problems.

**UNIT I**

**Electrostatics**


**UNIT II**

**Magnetostatics**


**UNIT III**

**Maxwell’s Equations for Time Varying Fields**

UNIT IV

EM Wave Characteristics
Reflection and Refraction of Plane Waves – Normal and Oblique Incidences for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance, Poynting Vector and Poynting Theorem.

UNIT V

Waveguides
Rectangular Waveguides – Solution of Wave Equations in Rectangular Coordinates, TE/TM mode analysis, Expressions for Fields, Characteristic Equation and Cut-off Frequencies, Dominant and Degenerate Modes, Sketches of TE and TM mode fields in the cross-section, Phase and Group Velocities, Wavelengths and Impedance Relations, Equation of Power Transmission, Impossibility of TEM Mode. Microstrip Lines – $Z_0$ Relations, Effective Dielectric Constant.

TEXT BOOKS


REFERENCES

Pre-requisite: Signals and Systems

Course Objectives
1. To develop ability to analyze system requirements of analog and digital communication systems.
2. To understand the generation, detection of various analog and digital modulation techniques.
3. To acquire theoretical knowledge of each block in AM, FM transmitters and receivers.
4. To understand the concepts of baseband transmissions.

Course Outcomes
Upon completing this course, the student will be able to
1. Analyze baseband and bandpass analog and digital modulation techniques.
2. Estimate the effect of noise present in analog and digital communication systems and in channel.
3. Design AM, FM Transmitters and Receivers.

UNIT I
Amplitude Modulation

UNIT II
Angle Modulation

UNIT III
Transmitters
Classification of Transmitters, AM Transmitters, FM Transmitters – Variable reactance, Phase Modulator and FM.

 Receivers
Radio Receiver - Receiver Types - Tuned radio frequency receiver, Super heterodyne receiver, RF section and Characteristics - Frequency changing and tracking, Intermediate frequency, Image frequency, AGC, Amplitude limiting, FM Receiver, Comparison with AM Receiver.
UNIT IV
Pulse Modulation
Types of Pulse modulation - PAM, PWM and PPM. Comparison of FDM and TDM.
Pulse Code Modulation
PCM Generation and Reconstruction, Quantization Noise Power, Non Uniform Quantization and Companding, DPCM, Adaptive DPCM, DM and Adaptive DM, Noise in DM.

UNIT V
Digital Modulation Techniques
ASK- Modulator, Coherent ASK Detector, FSK- Modulator, Non Coherent FSK Detector, BPSK- Modulator, Coherent BPSK Detection. Differential PSK, Principles of QPSK and QAM.

TEXTBOOKS

REFERENCES
LINEAR AND DIGITAL INTEGRATED CIRCUITS

II Year B.Tech. ECE II Semester

Pre-requisite: Switching Theory and Logic Design.

Course Objectives
The main objectives of the course are:
1. To introduce the basic building blocks of linear integrated circuits.
2. To introduce the theory and applications of analog multipliers and PLL.
3. To introduce the concepts of waveform generation and introduce some special function ICs.
4. To understand and implement the working of basic digital circuits.

Course Outcomes
Upon completing this course, the student will be able to

1. Design linear integrated circuits using operational amplifiers.
2. Design various applications using IC 555 and IC 565.
3. Convert different frequency signals from Analog to Digital form and vice-versa.
4. Implement various digital circuits using Sequential and combinational logic ICs.

UNIT I
Operational Amplifier

UNIT II
Op-Amp, IC-555 & IC 565 Applications

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

UNIT IV
Combinational Logic ICs
Specifications and Applications of TTL-74XX & CMOS 40XX Series ICs - Code Converters, Decoders, LED & LCD Decoders with Drivers, Encoders, Priority Encoders, Multiplexers, Demultiplexers, Priority Generators/Checkers, Parallel Binary Adder/Subtractor, Magnitude Comparators.
UNIT V
Sequential Logic IC’s and Memories
Familiarity with commonly available 74XX & CMOS 40XX Series ICs – All Types of Flip-flops, Synchronous Counters, Decade Counters, Shift Registers.
Memories - ROM Architecture, Types of ROMS & Applications, RAM Architecture, Static & Dynamic RAMs.

TEXT BOOKS


REFERENCES

Pre-requisite: Electronic Devices and Circuits

Course Objectives
The main objectives of the course are:
1. To learn the concepts of high frequency behaviour of transistors.
2. To understand various types of amplifier circuits such as small signal, cascaded, large signal and tuned amplifiers.
3. To get familiarize with the Concept of feedback in amplifiers so as to differentiate between negative and positive feedback.
4. To learn multivibrators using transistors and sweep circuits.

Course Outcomes
Upon completing this course, the student will be able to
1. Design multistage amplifiers and understand the concepts of High Frequency Analysis of Transistors.
2. To differentiate between positive and negative feedback amplifiers and design stable amplifiers and oscillators.
3. Design and realize different classes of Power Amplifiers and tuned amplifiers useable for audio and Radio applications.
4. Design multivibrators and sweep circuits for various applications.

UNIT I
Multistage Amplifiers
Classification of Amplifiers, Distortion in amplifiers, Different coupling schemes used in amplifiers, Frequency response and Analysis of multistage amplifiers, Cascode amplifier, Darlington pair.

Transistor at High Frequency
Hybrid - \(\pi\) model of Common Emitter transistor model, \(f_a\), \(f_b\), and unity gain bandwidth, Gain-bandwidth product.

UNIT II
Feedback Amplifiers

UNIT III
Oscillators
UNIT IV
Large Signal Amplifiers

Tuned Amplifiers
Single Tuned Amplifiers – Q-factor, frequency response of tuned amplifiers, Concept of stagger tuning and synchronous tuning.

UNIT V
Multivibrators
Types of Triggering, Analysis and Design of Bistable, Monostable, Astable Multivibrators and Schmitt trigger using Transistors.

Time Base Generators
General features of a Time base Signal, Methods of Generating Time Base Waveform, concepts of Transistor Miller and Bootstrap Time Base Generator, Methods of Linearity improvement.

TEXT BOOKS

1. Integrated Electronics, Jacob Millman, Christos C Halkias, McGraw Hill Education, 2nd Ed., 2010

REFERENCES

Note:
- Minimum 12 experiments should be conducted.
- All these experiments are to be simulated first either using MATLAB, Commsim or any other simulation package and then to be realized in hardware

1. (i) Amplitude modulation and demodulation (ii) spectrum analysis of AM
2. (i) Frequency modulation and demodulation (ii) spectrum analysis of FM
3. DSB-SC Modulator & Detector
4. SSB-SC Modulator & Detector (Phase Shift Method)
5. Frequency Division Multiplexing & Demultiplexing
6. Pulse Amplitude Modulation & Demodulation
7. Pulse Width Modulation & Demodulation
8. Pulse Position Modulation & Demodulation
9. PCM Generation and Detection
10. Delta Modulation and Demodulation
11. Frequency Shift Keying: Generation and Detection
12. Binary Phase Shift Keying: Generation and Detection
13. Generation and Detection (i) DPSK (ii) QPSK
14. Sampling Theorem and Amplitude Modulation using App Designer
Note:
- Minimum 12 experiments should be conducted.
- Verify the functionality of the IC in the given application.

**Design and Implementation of:**

1. Inverting and Non-inverting Amplifiers using Op Amps.
4. Integrator Circuit using IC 741.
6. Active Filter Applications – LPF, HPF (first order)
7. IC 741 Waveform Generators – Sine, Square wave and Triangular waves.
11. IC 565 – PLL Applications.
12. Voltage Regulator using IC 723.
List of Experiments:

- Minimum 12 experiments should be conducted:

  1. Current Shunt Feedback amplifier
  2. Voltage Series Feedback amplifier
  3. Cascode amplifier
  4. Darlington Pair
  5. RC Phase shift Oscillator
  6. Hartley and Colpitt’s Oscillators
  7. Class A power amplifier
  8. Class B Complementary symmetry amplifier
  9. Two Stage RC Coupled Amplifier
  10. Wien Bridge Oscillator using Transistors
  11. Design a Bistable Multivibrator and draw its waveforms
  12. Design an Astable Multivibrator and draw its waveforms
  13. Design a Monostable Multivibrator and draw its waveforms
  14. Response of Schmitt Trigger circuit for loop gain less than and greater than one
  15. The output-voltage waveform of Boot strap sweep circuit
  16. The output-voltage waveform of Miller sweep circuit
  17. Pulse Synchronization of An Astable circuit
  18. Response of a transistor Current sweep circuit
Course Objectives:
Students will be able to:
1. Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
2. To address the growth of Indian opinion regarding modern Indian intellectuals’ Constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
3. To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

UNIT 1:
History of Making of the Indian Constitution: History Drafting Committee, (Composition & Working)

UNIT 2:
Philosophy of the Indian Constitution: Preamble, Salient Features

UNIT 3:
Contours of Constitutional Rights & Duties:

UNIT 4:
Organs of Governance:
Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions

UNIT 5:
Local Administration:

UNIT 6:
Election Commission:
Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.
Suggested reading
1. The Constitution of India, 1950 (Bare Act), Government Publication.

Course Outcomes:
Students will be able to:
1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
3. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
Course Objective:
To prepare engineering students to analyze cost/ revenue/ financial data and to make economic and financial analysis in decision making process and to examine the performance of companies engaged in engineering.

Course Outcome:
To perform and evaluate present and future worth of the alternate projects and to appraise projects by using traditional and DCF Methods. To carry out cost benefit analysis of projects and to calculate BEP of different alternative projects.


UNIT- III: Production, Cost, Market Structures & Pricing:

Unit- IV: Capital Budgeting Techniques: Significance of Capital Budgeting - cash flows- Time Value of Money- Choosing between alternative investment proposals- Methods of Appraisal Techniques- Pay Back Period - Average Rate of Return – Net Present Value- Internal Rate of Return – Profitability Index.


Suggested Readings:
III Year B.Tech. ECE I Semester

Pre-requisite:

Course Objectives
1. To familiarize the architecture of microprocessors and micro controllers
2. To provide the knowledge about interfacing techniques of bus & memory.
3. To provide the concepts of ARM architecture
4. To emphasize the basic concepts of Advanced ARM processors

Course Outcomes
Upon completing this course, the student will be able to
1. To explore the internal architecture, organization and assembly language programming of 8086 processors for designing memory and I/O interfaces.
2. To explore the internal architecture, organization and assembly language programming of 8051/controllers to design micro controller based SDK blocks.
3. To explore the internal architecture of ARM processors and basic concepts of advanced ARM processor band systems.

UNIT I
8086 Architecture
8086 Architecture-Functional diagram, Register Organization, Memory Segmentation, Programming Model, Memory addresses, Physical Memory Organization, Architecture of 8086, Signal descriptions of 8086, interrupts of 8086.

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

UNIT II
Introduction to Microcontrollers
Overview of 8051 Microcontroller, Architecture, I/O Ports, Memory Organization, Addressing Modes and Instruction set of 8051.

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

UNIT III
I/O And Memory Interface
LCD, Keyboard, External Memory RAM, ROM Interface, ADC, DAC Interface to 8051.

Serial Communication and Bus Interface
Serial Communication Standards, Serial Data Transfer Scheme, On board Communication Interfaces-I2C Bus, SPI Bus, UART; External Communication Interfaces-RS232,USB.

UNIT IV
ARM Architecture
ARM Processor fundamentals, ARM Architecture – Register, CPSR, Pipeline, exceptions and interrupts interrupt vector table, ARM instruction set – Data processing, Branch instructions, load store instructions, Software interrupt instructions, Program status register instructions, loading constants, Conditional execution, Introduction to Thumb instructions.
Unit V
ARM Processors
Introduction to CORTEX Processor and its architecture, OMAP Processor and its Architecture.

TEXT BOOKS
2. ARM System Developers guide, Andrew N Sloss, Dominic Symes, Chris Wright, Elsevier, 2012

REFERENCES
Pre-requisite: Digital Communications

Course Objectives
1. To understand the source and channel coding schemes.
2. To introduce the fundamental various types of computer networks.
3. To demonstrate the TCP/IP and OSI models with merits and demerits.
4. To introduce the concepts of various layers.

Course Outcomes
Upon completing this course, the student will be able to

1. Compare network models, network types and transmission media.
2. Analyze the Data link layer Protocols, And Routing algorithms
3. Utilizing the connection oriented and connectionless service, and web applications

UNIT I
Computer Networks and the Internet
Internet, Network Edge, the Network Core, Delay and Loss in Packet-Switched Networks, Protocol Layers and Their Service Models.

Network Models

Transmission Media
Guided Media, Unguided Media- Wireless.

UNIT II
Data Link Layer
Channel coding- Hamming coding, Block Coding, Cyclic Codes, Checksum, Framing, Flow and Error Control, Noiseless Channels, Noisy Channels, HDLC, Point-to-Point Protocol (PPP), Random Access, Controlled Access, Channelization.

UNIT III
Network Layer

UNIT IV
Transport Layer
Transport-Layer Services, Multiplexing and Demultiplexing, Connectionless Transport - UDP, Principles of Reliable Data Transfer, Connection-Oriented Transport-TCP, Principles of Congestion Control.

Application Layer
UNIT V
Wireless and Mobile Networks
Introduction, Wireless Links and Network Characteristics, Wi-Fi, IEEE 802.11 Wireless LANs, IEEE 802.15, IEEE 802.16, Concept of OFDM with Block Diagram.

TEXT BOOKS

REFERENCES
CONTROL SYSTEMS

III Year B.Tech. ECE I Semester

Pre-requisite: Network Analysis & Transmission lines

Course Objectives: Objectives of course are
1. To introduce the principles and applications of control systems in everyday life
2. To introduce the basic concepts of block diagram reduction, time domain analysis solutions to time invariant systems
3. To understand different aspects of stability analysis of systems in frequency domain and time domain.

Course Outcomes:
After completing this course, the student will be able to
1. Knowledge on Open and closed loop and also modeling and transfer function derivations of translational and rotational systems.
2. Represent transfer functions through block diagrams and signal flow graphs.
3. Designing control systems using time domain and frequency domain techniques.
4. Time response analysis, stability analysis, frequency response analysis of different ordered systems through their characteristic equation and time-domain specifications.

UNIT I
Introduction
Concepts of Control Systems- Open Loop and closed loop control systems and their differences-examples of control systems- Classification of control systems, Feed-Back Characteristics, Effects of feedback.
Mathematical models – Differential equations, Impulse Response and transfer functions - Translational and Rotational mechanical systems.
Transfer Function Representation
Transfer Function of DC Servo motor - AC Servo motor- Synchro transmitter and Receiver, Block diagram representation of systems considering electrical systems as examples -Block diagram algebra – Representation by Signal flow graph - Reduction using mason’s gain formula.

UNIT II
Time Response Analysis

UNIT III
Stability Analysis
The concept of stability - Routh stability criterion – qualitative stability and conditional stability.
Root Locus Technique
The root locus concept - construction of root loci-effects of adding poles and zeros to G(s) H(s) on the root loci.
Frequency Response Analysis
Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots.
UNIT IV
Stability Analysis In Frequency Domain
Polar Plots, Nyquist Plots and applications of Nyquist criterion for stability – Effects of adding poles and zeros.
Classical Control Design Techniques
Compensation techniques – Lag, Lead, and Lead-Lag Controllers design in frequency Domain, PID Controllers.

UNIT V
State Space Analysis Of Continuous Systems
Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization, Solving the Time invariant state Equations, State Transition Matrix and its Properties.

TEXT BOOKS


REFERENCES

OPERATING SYSTEMS
(PE 1)

III Year B.Tech. ECE I Semester

Prerequisites: Computer Programming and Data Structures

Course Objectives
1. Provide an introduction to operating system concepts (i.e., processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystems and protection).
2. Introduce the issues to be considered in the design and development of operating system.
3. To know the basic Unix commands, system call interface for process management, interprocess communication and I/O in Unix.

Course Outcomes
After completing this course, the student will be able to

1. Gain practical knowledge of operating systems and architectures interact.
2. Knowledge on Scheduling, deadlocks, process management and synchronization.
3. Acquaintance to Memory Management and Virtual Memory.
4. Ability to recognize and resolve user problems with standard operating environments.

UNIT I

UNIT II
System call interface for process management-fork, exit, wait, waitpid, exec

UNIT – III
Deadlocks - System Model, Deadlocks Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock.
Interprocess Communication Mechanisms: IPC between processes on a single computer system, IPC between processes on different systems, using pipes, FIFOs, message queues, shared memory.

UNIT IV
UNIT V


TEXT BOOKS


REFERENCE

2. Operating System A Design Approach-Crowley, TMH.
4. Unix programming environment, Kernighan and Pike, PHI. / Pearson Education.
Prerequisites: Computer Programming & Data Structures

Course Objectives
1. Introduces object oriented programming concepts using the Java language.
2. To know the principle of inheritance and polymorphism and demonstrates how they relate to the design of abstract classes
3. Able to implement packages, interfaces, exception handling, event handling and multithreading
4. To design of Graphical User Interface using applets and swings

Course Outcomes
After completing this course, the student will be able to

1. Learn the object oriented concepts using the JAVA programming
2. Understand benefits of inheritance, creating packages and implement of interfaces
3. Differentiate between multi threading and multitasking.
4. Understand the concepts of Exception, Event handling, Applets and Swing.

UNIT I
Object oriented thinking and Java Basics - Need for oop paradigm, summary of oop concepts, coping with complexity, abstraction mechanisms. A way of viewing world – Agents, responsibility, messages, methods, History of Java, Java buzzwords, data types, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and casting, simple java program, concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, method binding, inheritance, overriding and exceptions, parameter passing, recursion, nested and inner classes, exploring string class.

UNIT II
Inheritance, Packages and Interfaces – Hierarchical abstractions, Base class object, subclass, subtype, substitutability, forms of inheritance- specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance. Member access rules, super uses, using final with inheritance, polymorphism- method overriding, abstract classes, the Object class.
Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages, differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces.
Exploring java.io.

UNIT III
Exception handling and Multithreading-- Concepts of exception handling, benefits of exception handling, Termination or resumptive models, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes.
String handling, Exploring java.util, Differences between multi threading and multitasking, thread life cycle, creating threads, thread priorities, synchronizing threads, interthread communication, thread groups, daemon threads.
Enumerations, autoboxing, annotations, generics.

UNIT IV
Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes.
The AWT class hierarchy, user interface components- labels, button, canvas, scrollbars, text components, check box, check box groups, choices, lists panels – scrollpane, dialogs, menubar, graphics, layout manager – layout manager types – border, grid, flow, card and grid bag.

UNIT V
Applets – Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets.

TEXT BOOKS
1. Java the complete reference, 7th edition, Herbert Schildt, TMH.
2. Understanding OOP with Java, updated edition, T. Budd, Pearson Education.

REFERENCES
2. Introduction to Java programming, Y. Daniel Liang, Pearson Education.
3. An introduction to Java programming and object oriented application development, R.A. Johnson- Thomson.
DATA ANALYTICS
(PE 1)
III Year B.Tech. ECE I Semester

Course Objectives
1. To gain the knowledge in data management, Processing and Analytics.
2. To know the concepts of Regression and its models.
3. To know the concepts of Segmentation and its models.
4. To gain the knowledge on Data Visualization and its techniques.

Course Outcomes
After completing this course, the student will be able to
1. Know the data management and its processing.
2. Capable to model the data using tools.
3. Differentiate between regression and Segmentation of data.
4. Learn various Visualization techniques.

UNIT – I
Data Management: Design Data Architecture and manage the data for analysis, understand various sources of Data like Sensors/Signals/GPS etc. Data Management, Data Quality (noise, outliers, missing values, duplicate data) and Data Processing.

UNIT – II
Data Analytics: Introduction to Analytics, Introduction to Tools and Environment, Application of Modeling in Business, Databases & Types of Data and variables, Data Modeling Techniques, Missing Imputations etc. Need for Business Modeling.

UNIT – III
Regression – Concepts, Blue property assumptions, Least Square Estimation, Variable Rationalization, and Model Building etc.
Logistic Regression: Model Theory, Model fit Statistics, Model Construction, Analytics applications to various Business Domains etc.

UNIT – IV
Object Segmentation: Regression Vs Segmentation – Supervised and Unsupervised Learning, Tree Building – Regression, Classification, Overfitting, Pruning and Complexity, Multiple Decision Trees etc.
Time Series Methods: Arima, Measures of Forecast Accuracy, STL approach, Extract features from generated model as Height, Average Energy etc and Analyze for prediction

UNIT – V
Data Visualization: Pixel-Oriented Visualization Techniques, Geometric Projection Visualization Techniques, Icon-Based Visualization Techniques, Hierarchical Visualization Techniques, Visualizing Complex Data and Relations.

TEXT BOOKS
1. Student’s Handbook for Associate Analytics – II, III.

REFERENCES
1. Introduction to Data Mining, Tan, Steinbach and Kumar, Addision Wisley, 2006.
2. Data Mining Analysis and Concepts, M. Zaki and W. Meira
Cycle 1: Using 8086 Processor Kits and/or Assembler (5 Weeks)

- Assembly Language Programs to 8086 to Perform
  1. Arithmetic, Logical, String Operations on 16 Bit and 32 Bit Data.
  2. Bit level Logical Operations, Rotate, Shift, Swap and Branch Operations.

Cycle 2: Using Microcontroller Kit (6 weeks)

- Introduction to IDE
  1. Assembly Language Programs to Perform Arithmetic (Both Signed and Unsigned) 16 Bit Data Operations, Logical Operations (Byte and Bit Level Operations), Rotate, Shift, Swap and Branch Instructions
  2. Time delay Generation Using Timers of Microcontroller
  4. Program Using Interrupts to Generate Square Wave 10 KHZ Frequency.
  5. Using Timer Microcontroller in 8bit Auto reload Mode and Connect a 1HZ Pulse to Interrupt pin and Display on GPIO. Assume Crystal Frequency as 11.0592MHZ

Cycle 3: Interfacing I/O Devices to Microcontroller (5 Weeks)

1. 7 Segment Display to Microcontroller and display digit 0 to 9.
2. 4*4 Matrix Keypad to Microcontroller.
4. 8bit ADC Interface to Microcontroller for different analog signals.
5. Triangular, Square and Ramp Wave form Generator through DAC interfaces to Microcontroller.
6. Location identification through GPS interface.

BOOKS

COMPUTER NETWORKS LABORATORY

III Year B.Tech. ECE I Semester

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Note:

A. Minimum of 12 Experiments have to be conducted
B. All the Experiments may be Conducted using Network Simulation software like NS-2/NS 3/ NSG-2.1/Wire SHARK/ etc..

Note: For Experiments 2 to 10 Performance may be evaluated through simulation by using the parameters Throughput, Packet Delivery Ratio, Delay etc.

1. Writing a TCL Script to create two nodes and links between nodes
2. Writing a TCL Script to transmit data between nodes
3. Evaluate the performance of various LAN Topologies
4. Evaluate the performance of Drop Tail and RED queue management schemes
5. Evaluate the performance of CBQ and FQ Scheduling Mechanisms
6. Evaluate the performance of TCP and UDP Protocols
7. Evaluate the performance of TCP, New Reno and Vegas
8. Evaluate the performance of AODV and DSR routing protocols
9. Evaluate the performance of AODV and DSDV routing protocols
10. Evaluate the performance of IEEE 802.11 and IEEE 802.15.4
11. Evaluate the performance of IEEE 802.11 and SMAC
12. Capturing and Analysis of TCP and IP Packets
13. Simulation and Analysis of ICMP and IGMP Packets
14. Analyze the Protocols SCTP, ARP, NetBIOS, IPX VINES
15. Analysis of HTTP, DNS and DHCP Protocols

* Simulation of the above experiments to be conducted using NS-2, NSG 2.1, Wire Shark.
ADVANCED ENGLISH LANGUAGE AND COMMUNICATION SKILLS (AECS) LABORATORY

III Year B.Tech. ECE I Semester

0 0 2 1

1. Introduction

The introduction of the Advanced English 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 English Communication Skills (AECS) Lab:

1. Activities on Fundamentals of Inter-personal Communication and Building Vocabulary
   - Starting a conversation – responding appropriately and relevantly – using the right body language – Role Play in different situations & Discourse Skills- using visuals - Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.

2. Activities on Reading Comprehension
   - General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading & effective googling.

3. Activities on Writing Skills
4. **Activities on Presentation Skills** – Oral presentations (individual and group) through JAM sessions/seminars/PPTs and written presentations through posters/projects/reports/e-mails/assignments etc.

5. **Activities on Group Discussion and Interview Skills** – Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation- Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video-conference and Mock Interviews.

4. **Minimum Requirement:**
The Advanced English Communication Skills (AECS) Laboratory shall have the following infrastructural 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
- T. V, a digital stereo & Camcorder
- Headphones of High quality

5. **Suggested Software:**
The software consisting of the prescribed topics elaborated above should be procured and used.
- Oxford Advanced Learner’s Compass, 7th Edition
- DELTA’s key to the Next Generation TOEFL Test: Advanced Skill Practice.
- Lingua TOEFL CBT Insider, by Dreamtech
- TOEFL & GRE( KAPLAN, AARCO&BARRONS, USA, Cracking GRE by CLIFFS)

6. **Books Recommended:**

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ANTENNAS AND PROPAGATION

III Year B.Tech. ECE II Semester

Pre-requisite: Network Analysis and Transmission Lines, Electromagnetic Fields and Waves

Course Objectives
The course objectives are:
1. To understand the significance of antenna parameters, to derive and analyze the radiation characteristics of various antennas
2. To analyze the characteristics and design relations of UHF, VHF and Microwave Antennas and to identify the antenna array requirements, to determine the characteristics of various Antenna Arrays.
3. To understand the concepts and set-up requirements for microwave measurements, and familiarize with the procedure to enable antenna measurements.
4. To define and distinguish between different phenomenon of wave propagation (ground wave, space wave and sky wave), their frequency dependence, and estimate their characteristics, identifying their profiles and parameters involved.

Course Outcomes
Upon completing this course,

1. Should be able to Characterize the antennas based on frequency and geometrical configuration
2. Should be able to plot the radiation patterns of VHF, UHF and Microwave antennas and also antenna arrays.
3. Specify the requirements for microwave measurements and arrange a setup to carry out the antenna far zone pattern and gain measurements in the laboratory.
4. Classify the different wave propagation mechanisms, determine the characteristic features of different wave propagations, and estimate the parameters involved.

UNIT I
Antenna Basics
Basic Antenna Parameters – Radiation Patterns, Beam Area, Beam width, Radiation Intensity, Beam Efficiency, Directivity, Gain, Resolution, Antenna Aperture, Effective Height. Antenna Theorems, Retarded Potentials, Helmholtz Theorem.

Thin Linear Wire Antennas
Radiation From- Hertzian Dipole, Small thin Dipole, Infinitesimally thin Linear Antenna, Half Wave Dipole and Quarter Wave Monopole – Current Distributions, Field Components- Far Field and Near Field, Radiated Power, Radiation Resistance, Beam Width, Directivity, Gain, Effective Area and Effective Height. Loop Antennas - Small Loop, Comparison of Far Fields of Small Loop and Short Dipole, Radiation Resistances and Directivities of Small Loops (Qualitative Treatment).

UNIT II
Antenna Arrays
Point Sources – Definition, Patterns, and arrays of two Isotropic Sources - Different Cases. Principle of Pattern Multiplication, Uniform Linear Arrays – Broadside Arrays, End fire Arrays, EFA with Increased Directivity, Derivation of their Characteristics and Comparison, BSA with Non-uniform Amplitude Distributions – General Considerations, and Binomial Arrays.
Antenna Measurements
Introduction, Concepts - Reciprocity, Near and Far Fields, Coordinate System, Sources of Errors. Patterns to be Measured, Directivity Measurement, Gain Measurements (by Comparison, Absolute and 3-Antenna Methods).

UNIT III
VHF, UHF and Microwave Antennas - I

UNIT IV
VHF, UHF and Microwave Antennas – II

UNIT V
Propagation

TEXT BOOKS

REFERENCES
Prerequisite: Signals and Systems

Course Objectives
The course objectives are:
1. To provide background and fundamental concepts for the analysis and processing of digital signals.
2. To understand the fast computation of DFS and DFT.
3. To design digital filters and their realization structures.
4. To acquaint in Multi-rate signal processing techniques and finite word length effects.

Course Outcomes
Upon completion of this course, the student will be able to:
1. Realize various digital filters
2. Find DFTS, DFS, DFT and FFT of Digital Signal and System.
3. Design IIR and FIR digital filters from prototype approximations.
4. Implement Multirate processing system and analyze finite word length effects in DSP applications.

UNIT I
Introduction

Realization of Digital Filters

UNIT II
Discrete Fourier series

Fast Fourier Transforms
Fast Fourier Transforms (FFT) - Radix-2 Decimation-in-Time and Decimation-in-Frequency FFT Algorithms, Inverse FFT.

UNIT III
IIR Digital Filters
UNIT IV
FIR Digital Filters

UNIT V
Multirate Digital Signal Processing
Introduction, Down Sampling, Decimation, Up sampling, Interpolation, Sampling Rate Conversion.

Finite Word Length Effects
Limit cycles, Overflow Oscillations, Round-off Noise in IIR Digital Filters, Computational Output Round Off Noise, Methods to Prevent Overflow, Trade Off Between Round Off and Overflow Noise, Measurement of Coefficient Quantization Effects through Pole-Zero Movement, Dead Band Effects.

TEXT BOOKS

REFERENCES
VLSI DESIGN

III Year B.Tech. ECE II Semester

Prerequisite: Analog and Pulse circuits; Switching Theory and Logic Design

Course Objectives
The objectives of the course are to:
1. Give exposure to different steps involved in the fabrication of ICs.
2. Explain electrical properties of MOS and BiCMOS devices to analyze the behavior of inverters with various loads.
3. Give exposure to the design rules to be followed to draw the layout of any logic circuit.
4. Provide design concepts to design building blocks of data path of any system using gates.
5. Understand basic programmable logic devices and testing of CMOS circuits.

Course Outcomes
Upon completing this course, the student will be able to
1. Acquire qualitative knowledge about the fabrication process MOS ICs.
2. Draw the layout of any logic circuit to understand and estimate parasitic effect of any logic circuit.
3. Design building blocks of data path systems, memories and simple logic circuits using PLA, PAL, FPGA and CPLD.
4. Understand different types of faults that can occur in a system and learn the concept of testing.

UNIT I
Introduction
Introduction to IC Technology – MOS, PMOS, NMOS, CMOS & BiCMOS
Basic Electrical Properties
Basic Electrical Properties of MOS and BiCMOS Circuits: \( I_{ds}-V_{ds} \) relationships, MOS transistor threshold Voltage, \( g_m \), \( g_{ds} \), Figure of merit; Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter analysis and design, Bi-CMOS Inverters.

UNIT II
VLSI Circuit Design Processes

UNIT III
Gate Level Design

UNIT IV
Data Path Subsystems
Subsystem Design, Shifters, Adders, ALUs, Multipliers, Parity generators, Comparators, Zero/One Detectors, Counters.
Array Subsystems
SRAM, DRAM, ROM, Serial Access Memories.
UNIT V
Programmable Logic Devices
Design Approach – PLA, PAL, Standard Cells FPGAs, CPLDs.
CMOS Testing

TEXT BOOKS

REFERENCES
Course Objectives

The course objectives are:
1. To provide the student with an understanding of the Cellular concept, Frequency reuse, Hand-off strategies.
2. To provide the student with an understanding of Co-channel and Non-Co-channel interferences.
3. To give the student an understanding of cell coverage for signal and traffic, diversity techniques and mobile antennas.
4. To give the student an understanding of frequency management, Channel assignment and types of handoff.

Course Outcomes

Upon completing this course, the student will be able to

1. Design a basic cellular radio system.
2. Compute Co-channel and Non Co-channel interferences and diversity.
3. Estimate Cell Coverage for Signal and Traffic by analyzing impairments due to multipath fading channel.
4. Estimate dropped calls, and improves the frequency management, Channel assignment and handoff mechanisms.

UNIT I

Introduction to Cellular Mobile Radio Systems


Fundamentals of Cellular Radio System Design

Concept of Frequency Reuse, Co-Channel Interference, Co-Channel Interference Reduction Factor, Desired C/I From a Normal Case in a Omni Directional Antenna System, System Capacity Improving Coverage and Capacity in Cellular Systems- Cell Splitting, Sectoring, Microcell Zone Concept.

UNIT II

Co-Channel Interference


Non-Co-Channel Interference

Adjacent Channel Interference, Near End Far End Interference, Cross Talk, Effects on Coverage and Interference by Power Decrease, Antenna Height Decrease, Effects of Cell Site Components.

UNIT III

Cell Coverage for Signal and Traffic

Signal Reflections in Flat And Hilly Terrain, Effect of Human Made Structures, Phase Difference Between Direct and Reflected Paths, Constant Standard Deviation, Straight Line Path
Loss Slope, General Formula for Mobile Propagation Over Water and Flat Open Area, Near and Long Distance Propagation, Path Loss From a Point to Point Prediction Model in Different Conditions, Merits of Lee Model.

**Cell Site and Mobile Antennas**
Space Diversity Antennas, Umbrella Pattern Antennas, Minimum Separation of Cell Site Antennas, Mobile Antennas.

**UNIT IV**

**Frequency Management and Channel Assignment**
Numbering And Grouping, Setup Access And Paging Channels, Channel Assignments to Cell Sites and Mobile Units, Channel Sharing and Borrowing, Sectorization, Overlaid Cells, Non Fixed Channel Assignment.

**UNIT V**

**Handoffs and Dropped Calls**

**TEXT BOOKS**

**REFERENCES**
INFORMATION THEORY AND CODING  
(PE-2)

III Year B.Tech. ECE II Semester

Pre-requisite: Digital Communications

Course Objectives
1. To acquire the knowledge in measurement of information and errors.
2. Understand the importance of various codes for communication systems.
3. To design encoder and decoder of various codes.
4. To known the applicability of source and channel codes.

Course Outcomes
Upon completing this course, the student will be able to
1. Learn measurement of information and errors.
2. Designing various source codes and channel codes.
3. Design encoders and decoders for block and cyclic codes.
4. Understand the significance of codes in various applications.

UNIT I
Coding for Reliable Digital Transmission and storage
Mathematical model of Information, A Logarithmic Measure of Information, Average and Mutual Information and Entropy, Types of Errors, Error Control Strategies.
Source Codes: Shannon-Fano coding, Huffman coding

UNIT II
Linear Block Codes
Introduction to Linear Block Codes, Syndrome and Error Detection, Minimum Distance of a Block code, Error-Detecting and Error-correcting Capabilities of a Block code, Standard array and Syndrome Decoding, Probability of an undetected error for Linear Codes over a BSC, Hamming Codes. Applications of Block codes for Error control in data storage system

UNIT III
Cyclic Codes
Description, Generator and Parity-check Matrices, Encoding, Syndrome Computation and Error Detection, Decoding ,Cyclic Hamming Codes, Shortened cyclic codes, Error-trapping decoding for cyclic codes, Majority logic decoding for cyclic codes.

UNIT IV
Convolutional Codes
Encoding of Convolutional Codes- Structural and Distance Properties, state, tree, trellis diagrams, maximum likelihood decoding, Sequential decoding, Majority- logic decoding of Convolution codes. Application of Viterbi Decoding and Sequential Decoding, Applications of Convolutional codes in ARQ system.

UNIT V
BCH Codes
Minimum distance and BCH bounds, Decoding procedure for BCH codes, Syndrome computation and iterative algorithms, Error locations polynomials for single and double error correction.
TEXT BOOKS

REFERENCES
2. Introduction to Error Control Codes-Salvatore Gravano, oxford
Course Objectives:

1. To understand the biological neural network and to model equivalent neuron models.
2. To understand the architecture, learning algorithms.
3. To known the issues of various feed forward and feedback neural networks.
4. To explore the Neuro dynamic models for various problems.

Course Outcomes
Upon completing this course, the student will be able to

1. Understand the similarity of Biological networks and neural networks and perform the training of neural networks using various learning rules.
4. Understand and Construct a stable Hopfield network model.

UNIT – I:
Fundamental Concepts, Models & Learning Rules of Artificial Neural Systems
Biological Neuron Models and their Artificial Models Biological Neuron, McCulloch-Pitts Neuron Model, Neuron Modeling for Artificial Neuron Models, Models of Artificial Neural Networks; Feed Forward Network and Feed Backward Network. Neural Processing, Supervised and Unsupervised Learning


UNIT – II: Single Layer Feed Forward Networks

UNIT – III: Multilayer Feed Forward Networks
UNIT – IV: Associative Memories
Basic concepts of Linear Associator, Basic concepts of Dynamical systems, Mathematical Foundation of Discrete-Time Hopfield Networks, Mathematical Foundation of Gradient-Type Hopfield Networks, Transient response of Continuous Time Networks, Example Solution of Optimization Problems; Summing networks with digital outputs, Minimization of the Traveling salesman tour length, Solving Simultaneous Linear Equations, Boltzman machines, Bidirectional Associative Memory; Multidirectional Associative Memory, Associative Memory of Spatio-temporal Patterns.

UNIT – V: Matching and Self-Organizing Networks
Hamming net and MAXNET Unsupervised learning of clusters, Clustering and similarity measures Winner take all learning, recall mode, initialization of weights, separability limitations, Counter propagation networks, Feature mapping: Self organizing feature maps, Cluster discovery networks (ART1).

TEXT BOOKS:
1. Introduction to Artificial Neural Systems - J.M.Zurada, Jaico Publishers

REFERENCE BOOKS:
1. Elements of Artificial Neural Networks - Kishan Mehrotra, Chelkuri K. Mohan, Sanjay Ranka, Penram International
2. Artificial Neural Network –Simon Haykin, 2nd Ed., Pearson Education
4. Fundamental of Neural Networks –Laurene Fausett
Pre-requisite:

Course Objectives

The objectives of the course are to
1. To provide information on the concepts of Internet of Things and applications.
2. To learn how to use Arduino and Raspberry Pi boards.
3. To know about data handling in SDN.

Course Outcomes

Upon completing this course, the student will be able to
1. Explore various protocols of sensor networks.
2. Program and configure Arduino boards for real world connectivity.
3. Python programming and interfacing for Raspberry Pi.

UNIT I

UNIT II
Machine-to-Machine Communications, Difference between IoT and M2M, Interoperability in IoT, Introduction to Arduino Programming, Integration of Sensors and Actuators with Arduino,

UNIT III
Introduction to Python programming, Introduction to Raspberry Pi, Interfacing Raspberry Pi with basic peripherals, Implementation of IoT with Raspberry Pi

UNIT IV
Implementation of IoT with Raspberry Pi, Introduction to Software defined Network (SDN), SDN for IoT, Data Handling and Analytics,

UNIT V
Cloud Computing, Sensor-Cloud, Smart Cities and Smart Homes, Connected Vehicles, Smart Grid, Industrial IoT.

Case Study- Agriculture, Healthcare, Activity Monitoring.

TEXT BOOKS

REFERENCES
1. Internet of Things: A Hands-on Approach, by Arshdeep Bahga and Vijay Madisetti.
The Programs shall be implemented in Software (Using MATLAB / Lab View / C Programming/ Python Equivalent) and Hardware (Using TI / Analog Devices / Motorola / Equivalent DSP processors/Arduino/Raspberry pi).

MATLAB or Equivalent Live Scripts are to be incorporated in conducting all simulations

2. To find DFT / IDFT of given DT Signal.
3. To find Frequency Response of a System given in Transfer Function/ Differential equation form.
4. Implementation of FFT of given Sequence.
5. Determination of Power Spectrum of a given Signal(s).
6. Design and Implementation of LP FIR Filter for speech and audio signal.
7. Design and Implementation of HP IIR Filter for speech and audio signal.
8. Generation of Narrow Band Signal through Filtering.
11. Implementation of I/D Sampling Rate Converters on speech/audio signal using any of the above hardware.
13. Implementation of Image Inversion, Edge Detection, Color replacement using any of the above hardware.
VLSI DESIGN LABORATORY

III Year B.Tech. ECE II Semester

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Note: Any SIX of the following experiments from each part are to be conducted (Total 12)

Part-I
The following experiments are to be designed and simulated using HDL and implement using Zync/ Zed boards/ equivalent hardware. Simulate and synthesize at least four experiments to be implemented on FPGA boards.

1. Realization of all the logic gates.
2. Design of 8-to-3 encoder (without and with priority) and 2-to-4 decoder.
3. Design of 8-to-1 multiplexer and 1-to-8 demultiplexer.
4. Design of 4 bit binary to gray code converter.
5. Design of 4 bit comparator.
6. Design of Full adder using 3 modeling styles.
7. Design of flip flops: SR, D, JK, T.
8. Design of 4-bit binary, BCD counters (synchronous/ asynchronous reset) or any sequence counter.
9. Design of Finite State Machines.

Part-II
Layout using any EDA tools.
1. Basic logic gates.
2. CMOS inverter.
3. CMOS NOR/ NAND gates.
4. CMOS XOR and MUX gates.
5. Static / Dynamic logic circuit (register cell).
7. Pass transistor.
8. Layout of any combinational circuit (complex CMOS logic gate).
Note: Minimum Eight experiments should be conducted:

1. Study the features of Network and spectrum analyzer
2. Simulate the Radiation pattern for different antennas using HFSS/ ADS/Matlab and compare the measurement using Network analyzer.
   i. Dipole Antenna
   ii. Horn antenna
   iii. Microstrip Antenna etc.
3. Simulate the Radiation resistance for different antennas using HFSS/ ADS/ Matlab and compare the measurement using Network analyzer.
   i. Dipole Antenna
   ii. Horn antenna
   iii. Microstrip Antenna etc.
5. Plotting Constellation Diagram of QAM using Matlab and verify using kit.
6. OFDM generation and detection using Simulink and verify using kit.
7. Generation of different types of signals using Vector Signal Generator
10. Collecting sensor values of remote nodes using RIME broadcasting Using ICONT setup.
Pre-requisite: Antennas and Propagation

Course Objectives

1. To get familiarized with microwave frequency bands, their applications and to understand the limitations and losses of conventional tubes at these frequencies.
2. To distinguish between different types of microwave tubes, their structures and principles of microwave power generation.
3. To gain knowledge of Scattering Matrix, its formulation and utility, and establish the S-Matrix for various types of microwave components.
4. Understand the measurement concepts at microwave frequencies.

Course Outcomes

Upon completing this course, the student will be able to

1. Use microwave components for various applications.
2. Realize the need for solid state microwave sources and understand the principles of solid state devices.
3. Distinguish between the different types of waveguide and ferrite components, and select proper components for engineering applications.
4. Set up Microwave Bench for measurement of various microwave parameters.

UNIT I

Waveguide Components

UNIT II

Microwave Tubes
Electromagnetic Spectrum and Microwave bands, Applications of microwaves, Limitations of conventional Tubes at Microwave Frequencies, Microwave Tubes –Classification.
UNIT III
Helix TWTs
Types and Characteristics of Slow Wave Structures; Structure of TWT and Amplification Process (qualitative treatment), Suppression of Oscillations, Gain Considerations.

M-Type Tubes
Introduction, Cross-field Effects, Magnetrons – Different Types, Cylindrical Traveling Wave Magnetron – Hull Cut-off and Hartree Conditions, Modes of Resonance and PI-Mode Operation, Separation of PI-Mode, o/p characteristics,

UNIT IV
Microwave Solid State Devices

UNIT V
Microwave Measurements

TEXT BOOKS

REFERENCES
### Course Objectives

The objectives of this course are:

1. To provide an approach towards image processing and introduction about 2D transforms.
2. To understand various enhancement methods in time, frequency domains and restoration techniques.
3. To understand the concepts of segmentation and Morphological operations on an image.
4. To explore the concepts of various compression techniques.

### Course Outcomes

Upon completion of this course, the student will be able to:

1. Learn the fundamentals of image processing and important transformations used.
2. Perform spatial and frequency domain enhancement techniques.
3. Apply techniques for segmenting image and perform morphological operations.
4. Understand the need for compression and various compression techniques.

### UNIT I

**Digital Image Fundamentals & Image Transforms**

Digital Image Fundamentals, Sampling and Quantization, Relationship between Pixels.

**Image Transforms**


### UNIT II

**Image Enhancement (Spatial Domain)**

Introduction, Image Enhancement in Spatial Domain, Enhancement through Point Processing, Types of Point Processing, Histogram equalization, Gray Level Transformations, Median Filter, Spatial Domain Low-pass and High-Pass Filtering.

**Image Enhancement (Frequency Domain)**

Filtering in Frequency Domain: Low Pass (Smoothing) and High Pass (Sharpening) Filters.

### UNIT III

**Image Restoration**

Degradation Model, Algebraic Approach to Restoration, Inverse Filtering, Least Mean Square Filters, Constrained Least Squares Restoration, Interactive Restoration.

### UNIT IV

**Image Segmentation**

Detection of Discontinuities, Edge Linking And Boundary Detection, thresholding, Region Oriented Segmentation.

**Morphological Image Processing**

Dilation and Erosion: Dilation, Structuring Element Decomposition, Erosion, Combining Dilation and Erosion, Opening and Closing, Hit or Miss Transformation.
UNIT V
Image Compression
Redundancies and their Removal Methods, Fidelity Criteria, Image Compression Models, Huffman and Arithmetic Coding, Error Free Compression, Lossy Compression, Lossy and Lossless Predictive Coding, Transform Based Compression.

TEXT BOOKS

REFERENCES
SPEECH PROCESSING
(PE - 3)

IV Year B.Tech. ECE I Semester

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Pre-requisite: Signals and Systems and Probability Theory and Stochastic Processes

Course Objectives

The objectives of this course are to make the student

1. Understand the anatomy and Physiology of Speech Production system and perception model and to design an electrical equivalent of Acoustic model for Speech Production.
2. To analyze the speech in time domain and extract various time domain parameters which can be used for various applications like pitch extraction, end point detection, Speech Compression, Speech Synthesis etc.,
3. To study the concept of Homomorphic system and its use in extracting the vocal tract information from speech using Cepstrum which is a bye product of Homomorphic processing of Speech.
4. To study various Speech Signal Processing applications viz: Speech Enhancement, Speech Recognition, Speaker Recognition.

Course Outcomes

On completion of this course student will be able to

1. Model an electrical equivalent of Speech Production system.
2. Extract the LPC coefficients that can be used to Synthesize or compress the speech.
3. Design a Homomorphic Vocoder for coding and decoding of speech.
4. Enhance the speech and can design an Isolated word recognition system using HMM.
5. Extract the features for Automatic speaker recognition system which can used for classification.

UNIT I
Fundamentals of Digital Speech Processing

UNIT II
Time Domain Models for Speech Processing
Introduction- Window considerations, Short time energy and average magnitude Short time average zero crossing rate, Speech vs Silence discrimination using energy and zero crossing, Pitch period estimation using a parallel processing approach. The short time autocorrelation function, The short time average magnitude difference function, Pitch period estimation using the autocorrelation function.

UNIT III
Linear predictive Coding (LPC) Analysis
UNIT IV
Homomorphic Speech Processing


UNIT V
Automatic Speech & Speaker Recognition
Basic pattern recognition approaches, parametric representation of speech, evaluating the similarity of speech patterns, isolated digit Recognition System, Continuous digit Recognition System

Hidden Markov Model (HMM) for Speech
Hidden Markov Model (HMM) for speech recognition, Viterbi algorithm, Training and testing using HMMS.

Speaker Recognition
Recognition techniques, Features that distinguish speakers, Speaker Recognition Systems: Speaker Verification Systems, Speaker identification Systems.

TEXT BOOKS


REFERENCES

SCRIPTING LANGUAGES
(PE - 3)

IV Year B.Tech. ECE I Semester

Pre-requisite: Nil

Course Objectives
The objectives of this course are:
1. Understand the difference between scripting and non-scripting languages.
2. To learn strengths and weaknesses of scripting languages.
3. To understand the usage of regular expressions, text processing, client and server level scripting.

Course Outcomes
Upon completing this course, the student will be able

1. To get hands on with Linux environment and network functionality.
2. To write simple scripts to automate system administration tasks and applications.
3. To use syntax and schematics of scripting languages

UNIT I
Linux Basics
Introduction to Linux, File System of the Linux, General usage of Linux kernel & basic commands, Linux users and group, Permissions for file, directory and users, searching a file & directory, zipping and unzipping concepts.

UNIT II
Linux Networking

UNIT III
PERL Scripting
Introduction to Perl Scripting, working with simple values, Lists and Hashes, Loops and Decisions, Regular Expressions, Files and Data in Perl Scripting, References & Subroutines, Running and Debugging Perl, Modules, Object-Oriented Perl.

UNIT IV
Tcl / Tk Scripting
Tcl Fundamentals, String and Pattern Matching, Tcl Data Structures, Control Flow Commands, Procedures and Scope, Evel, Working with Unix, Reflection and Debugging, Script Libraries, Tk Fundamentals, Tk by examples, The Pack Geometry Manager, Binding Commands to X Events, Buttons and Menus, Simple Tk Widgets, Entry and List box Widgets Focus, Grabs and Dialogs.

UNIT V
Python Scripting
Introduction to Python, using the Python Interpreter, More Control Flow Tools, Data Structures, Modules, Input and Output, Errors and Exceptions, Classes, Brief Tour of the Standard Library.
TEXT BOOKS

1. Practical Programming in Tcl and Tk by Brent Welch, Updated for Tcl 7.4 and Tk 4.0.

REFERENCES

Pre-requisite: Nil

Course Objectives

1. Understand the basic requirement of in providing security in Networks.
2. To understand the threats/vulnerabilities in networks and countermeasures.
3. To understand Authentication functions with Message Authentication Codes and Hash Functions.
4. To provide familiarity in Intrusion detection and protection measures.

Course Outcomes

Upon completing this course, the student will be able to

1. Describe network security fundamental concepts and principles.
2. Encrypt and decrypt messages using standard block ciphers management.
3. Analyze key algorithms and identify their weaknesses.
4. Identify and assess different types of threats, malware, spyware, viruses, vulnerabilities and then decide firewall design principles.

UNIT I

Modern Techniques
Simplified DES, Block Cipher Principles, Data Encryption standard, Strength of DES, Block Cipher Design Principles.

UNIT II
Encryption

UNIT III
Public Key Cryptography
Principles, RSA Algorithm, Key Management, Diffie-Hellman Key exchange, Elliptic Curve Cryptography.

Number Theory
Prime and Relatively prime numbers, Modular arithmetic, Fermat’s and Euler’s theorems, Testing for primality, Euclid’s Algorithm, the Chinese remainder theorem, Discrete logarithms.

UNIT IV
Message Authentication and Hash Functions
Authentication requirements and functions, Message Authentication, Hash functions, Security of Hash functions and MACs.

Hash and Mac Algorithms
MD-5, Message digest Algorithm, Secure Hash Algorithm.

Authentication Applications
Kerberos, Electronic Mail Security: Pretty Good Privacy, MIME/MIME.

UNIT V
IP Security
Overview, Architecture, Authentication, Encapsulating Security Payload, Key Management.

Intruders, Viruses and Worms
Intruders, Viruses and Related threats.

Fire Walls
Fire wall Design Principles, Trusted systems.

TEXT BOOKS


REFERENCES

4. Introduction to Cryptography, Buchmann, Springer.
BIO-MEDICAL ELECTRONICS
(PE-4)

IV Year B.Tech. ECE I Semester

L T P C
3 0 0 3

Pre-requisite: NIL

Course Objectives
1. To Understand the application of the electronic systems in biological and medical applications.
2. To explore the process of acquiring bio data from sensors and transducers.
3. To understand the recording, process and analysis of bio signals.
4. To expertise with measuring techniques of bio parameters.

Course Outcomes
Upon completing this course, the student will be able to
1. Know the functionality of human anatomy and physiology.
2. Understand the practical limitations on the electronic components while handling bio substances.
3. Understand the functionality of biomedical recorders.
4. Measure and analyse the biomedical parameters.

UNIT I
Anatomy and Physiology
Brief introduction to human physiology, Heart and Circulatory system, Central Nervous System, Respiratory system, body temperature and reproduction system.

UNIT II
Bio-electrodes
Bio electric signal, Bio potential electrodes –External electrodes, internal electrodes, Bio chemical electrodes, Electrode tissue interface, contact impedance.

UNIT III
Biomedical transducers
Typical signals from physiological parameters, Classification of Transducers-Pressure, force, acceleration, flow, respiration sensor, Smart sensors, pulse sensor, temperature, potential, dissolved ions and gases.

UNIT IV
Bio medical Recorders
Block diagram, working principle of VCG, PCG, ECG, EMG and EEG.

UNIT V
Measurements
Blood temperature, Pressure and flow Impedance plethysmography. Ultrasonic, X-ray, CT-Scan, MRI, and nuclear imaging. Prostheses and aids: pacemakers, defibrillators, heart-lung machine, artificial kidney, aids for the handicapped. Safety aspects.

TEXT BOOKS
1. Introduction to Bio Medical Electronics-Edward J. Perkistein, Howard Bj, USA

REFERENCES
4. Modern electronic Equipment by R S Khandpur, TMH
Pre-requisite: Basic Electrical and Electronics Engineering

Course Objectives

It provides an understanding of various measuring system functioning and metrics for performance analysis.

1. Provides understanding of principle of operation, working of different electronic instruments viz. signal generators, signal analyzers, recorders and measuring equipment.
2. Understanding the concepts of various measuring bridges and their balancing conditions.
3. Provides understanding of use of various measuring techniques for measurement of different physical parameters using different classes of transducers.

Course Outcomes

Upon completing this course, the student will be able to

1. Measure electrical parameters with different meters and understand the basic definition of measuring parameters.
2. Use various types of signal generators, signal analyzers for generating and analyzing various real-time signals.
3. Operate an Oscilloscope to measure various signals.
4. Measure various physical parameters by appropriately selecting the transducers.

UNIT I
Block Schematics of Measuring Systems

UNIT II
Signal Analyzers
AF, HF Wave Analyzers, Harmonic Distortion, Heterodyne wave Analyzers, Spectrum Analyzers, Power Analyzers, Capacitance-Voltage Meters, Oscillators. Signal Generators: AF, RF Signal Generators, Sweep Frequency Generators, Pulse and Square wave Generators, Function Generators, Arbitrary Waveform Generator, Video Signal Generators, and Specifications

UNIT III
Oscilloscopes
CRT, Block Schematic of CRO, Time Base Circuits, Lissajous Figures, CRO Probes, High Frequency CRO Considerations, Delay lines, Applications: Measurement of Time, Period and Frequency Specifications.
Special Purpose Oscilloscopes
Dual Trace, Dual Beam CROs, Sampling Oscilloscopes, Storage Oscilloscopes, Digital Storage CROs.

UNIT IV
Transducers
Classification, Strain Gauges, Bounded, unbounded; Force and Displacement Transducers, Resistance Thermometers, Hotwire Anemometers, LVDT, Thermocouples, Synchros, Special Resistance Thermometers, Digital Temperature sensing system, Piezoelectric Transducers, Variable Capacitance Transducers, Magneto Strictive Transducers, gyroscopes, accelerometers.

UNIT V
Bridges
Wheat Stone Bridge, Kelvin Bridge, and Maxwell Bridge.

Measurement of Physical Parameters

TEXT BOOKS

REFERENCES
ELECTRONIC SENSORS
(OE - 2)

IV Year B. Tech. ECE I Semester

Course Objectives

1. Learn the characteristics of sensors.
2. Know the working of Electromechanical, Thermal, Magnetic and radiation sensors.
3. Understand the concepts of Electro analytic and smart sensors.
4. Able to use sensors in different applications.

Course Outcomes

Upon completing this course, the student will be able to

1. Learn about sensor Principle, Classification and Characterization.
2. Explore the working of Electromechanical, Thermal, Magnetic, radiation and Electro analytic sensors.
3. Understand the basic concepts of Smart Sensors.
4. Design a system with sensors.

UNIT I
Sensors / Transducers
Principles, Classification, Parameters, Characteristics, Environmental Parameters (EP), Characterization

Electromechanical Sensors

UNIT II
Thermal Sensors

UNIT III
Magnetic sensors

UNIT IV
Radiation Sensors
Introduction, Basic Characteristics, Types of Photo resistors/ Photo detectors, X-ray and Nuclear Radiation Sensors, Fibre Optic Sensors.
**Electro analytical Sensors**

**UNIT V**

**Smart Sensors**
Introduction, Primary Sensors, Excitation, Amplification, Filters, Converters, Compensation, Information Coding/Processing - Data Communication, Standards for Smart Sensor Interface, the Automation

**Sensors Applications**

**TEXT BOOKS**


**REFERENCES**

LIST OF EXPERIMENTS

To setup Microwave Bench for any 10 of the following Experiments and obtain relevant measurement/characteristics.

1. Reflex Klystron Characteristics.
2. Gunn Diode Characteristics.
5. Attenuation measurement.
6. Directional coupler Characteristics.
7. Scattering parameters of wave guide components.
8. Frequency measurement.
9. Direct Frequency measurement.
10. Slot Section Frequency measurement.
11. Impedance measurement.
12. VSWR measurement.
13. Characterization of Directional couplers/ T Junctions using Vector Network Analyzer
14. Characterization of Horn Antenna using Vector Network Analyzer
Course Objective: To understand the Management Concepts, applications of Concepts in Practical aspects of business and development of Managerial Skills for Engineers.

Course Outcome: The students understand the significance of Management in their Profession. The various Management Functions like Planning, Organizing, Staffing, Leading, Motivation and Control aspects are learnt in this course. The students can explore the Management Practices in their domain area.

Unit- I Introduction to Management: Evolution of Management, Nature & Scope-Functions of Management-Role of Manager-levels of Management-Managerial Skills - Challenges-Planning-Planning Process-Types of Plans-MBO


Suggested Readings:
Pre-requisite - Analog and Digital Communications

Course Objectives

1. To explore the concepts of radar and its frequency bands.
2. To understand Doppler effect and get acquainted with the working principles of CW radar, FM-CW radar.
3. To impart the knowledge of functioning of MTI and Tracking Radars.
4. To explain the designing of a Matched Filter in radar receivers.

Course Outcomes

Upon completing this course, the student will be able to

1. Derive the complete radar range equation.
2. Understand the need and functioning of CW, FM-CW and MTI radars.
3. Known various Tracking methods.
4. Derive the matched filter response characteristics for radar receivers.

UNIT I
Basis of Radar

UNIT II
CW and Frequency Modulated Radar
Doppler Effect, CW Radar – Block Diagram, Isolation between Transmitter and Receiver, Non-zero IF Receiver, Receiver Bandwidth Requirements, Applications of CW radar.

FM-CW Radar
Range and Doppler Measurement, Block Diagram and Characteristics, FM-CW altimeter.

UNIT III
MTI and Pulse Doppler Radar
UNIT IV
Tracking Radar
Tracking with Radar, Sequential Lobing, Conical Scan, Mono pulse Tracking Radar – Amplitude Comparison Mono pulse (one- and two- coordinates), Phase Comparison Mono pulse, Tracking in Range, Acquisition and Scanning Patterns, Comparison of Trackers.

UNIT V
Detection of Radar Signals in Noise

Radar Receivers
Noise Figure and Noise Temperature, Displays – types. Duplexers – Branch type and Balanced type, Circulators as Duplexers. Introduction to Phased Array Antennas – Basic Concepts, Radiation Pattern, Beam Steering and Beam Width changes, Applications, Advantages and Limitations.

TEXT BOOKS

REFERENCES
Pre-requisite - Electromagnetic Theory and Transmission Lines

Course Objectives

1. To introduce important system concepts such as Electromagnetic interference and Electromagnetic compatibility (EMI&EMC).
2. To familiarize with unavoidable and naturally happening sources of EMI and problems to ensure EMC.
3. To study various techniques to reduce EMI from systems and to improve EMC of electronic systems.

Course Outcomes

Upon completion of this course, the student will be able to

1. Gain basic knowledge of problems associated with EMI and EMC from electronic circuits and systems.
2. Analyze various sources of EMI and various possibilities to provide EMC.
3. Understand and analyze possible EMI prevention techniques such as grounding, shielding, filtering and use of proper coupling mechanisms to improve compatibility of electronic circuits and systems in a given electromagnetic environment.

UNIT I
Sources of EMI
Definition of EMI and EMC, Classification, Natural and Man-Made EMI Sources, Switching Transients, Electrostatic Discharge, Nuclear Electromagnetic Pulse and High Power Electromagnetics.

EMI/EMC Standards

UNIT II
EMI Coupling Modes

UNIT III
EMI Controlling Techniques-1
UNIT IV
EMI Controlling Techniques-2

UNIT V
EMI Measurements

TEXT BOOKS

REFERENCES
Prerequisite: Analog Communications and Digital Communications

Course Objectives
The objectives of the course are:
1. To realize the significance of optical fiber communications.
2. To understand the construction and characteristics of optical fiber cable.
3. To develop the knowledge of optical signal sources, detectors and coupling into optical fibers.
4. To understand the design of optical systems and WDM.

Course Outcomes
At the end of the course, the student will be able to:
1. Understand and analyze the constructional parameters of optical fibers.
2. Be able to design an optical system.
3. Estimate the losses due to attenuation, absorption, scattering and bending.
4. Compare various optical detectors and choose suitable one for different applications

UNIT I


UNIT II

UNIT III

Optical Sources- LEDs, Structures, Materials, Quantum Efficiency, Power, Modulation, Power Bandwidth Product, Injection Laser Diodes- Modes, Threshold Conditions, External Quantum Efficiency, Laser Diode Rate Equations, Resonant Frequencies, Reliability of LED & ILD.

Source to Fiber Power Launching: - Output Patterns, Power Coupling, Power Launching, Equilibrium Numerical Aperture, Laser Diode to Fiber Coupling.
UNIT IV

UNIT V
Optical System Design: Considerations, Component Choice, Multiplexing, Point-to-Point Links, System Considerations, Link Power Budget with Examples, Overall Fiber Dispersion in Multi-Mode and Single Mode Fibers, Rise Time Budget with Examples, Transmission Distance, Line Coding in Optical Links, WDM, Necessity, Principles, Types of WDM, Measurement of Attenuation and Dispersion, Eye Pattern.

TEXT BOOKS


REFERENCES

SATELLITE COMMUNICATIONS
(PE-6)

IV Year B.Tech. ECE II Semester
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Pre-requisite Analog and Digital Communications

Course Objectives

1. To acquire foundation in orbital mechanics and launch vehicles for the satellites.
2. To provide basic knowledge of link design of satellite.
3. To understand multiple access systems and earth station technology.
4. To understand the concepts of satellite navigation and GPS.

Course Outcomes

Upon completing this course, the student will be able to

1. Understand basic concepts and frequency allocations for satellite communication, orbital mechanics and launch vehicles.
2. Envision the satellite sub systems and design satellite links for specified C/N.
3. Understand the various multiple access techniques for satellite communication systems and earth station technologies.
4. Explore the LEO, GEO Stationary Satellite Systems and satellite navigation.

UNIT I
Introduction

Orbital Mechanics and Launchers

UNIT II
Satellite Subsystems

UNIT III
Satellite Link Design

Multiple Access
Frequency Division Multiple Access (FDMA), Inter modulation, Calculation of C/N, Time Division Multiple Access (TDMA), Frame Structure, Examples, Satellite Switched TDMA Onboard Processing, DAMA, Code Division Multiple Access (CDMA), Spread Spectrum Transmission and Reception.
UNIT IV
Earth Station Technology

UNIT V
Low Earth Orbit and Geo-Stationary Satellite Systems
Orbit Considerations, Coverage and Frequency Consideration, Delay & Throughput Considerations, System Considerations, Operational NGSO Constellation Designs.

Satellite Navigation & Global Positioning System

TEXT BOOKS


REFERENCES

Course Objectives

1. This Course is intended to cover the basics of Nano Materials and Technology
2. To know the scaling of the devices to smaller and smaller sizes which has provided the basis for growth.
3. To understand the physical and technological processes for Nano devices.

Course Outcomes

After completion of the course the student will be able to
1. Understand the basic concepts of Nano materials and Nano technology.
2. Familiar with fabrication process of Nano Technology.
4. Known the structures of Nano Devices.

UNIT I
Nano Technology
Origin of Nanotechnology, Nano Scale, Surface to Volume Ratio, Quantum Confinement, Bottom-up Fabrication: Sol-Gel, Precipitation, Combustion Methods; Top-Down Fabrication: Chemical Vapor Deposition, Physical Vapor Deposition.

UNIT II
Nano Materials

UNIT III
Nanostructures
Bulk crystal and hetero-structure growth, Nanolithography, etching and other means for fabrication of Nanostructures and Nano devices, Techniques for characterization of Nanostructures, spontaneous formation and ordering of nanostructures, Clusters and Nano crystals, Methods of Nano tube growth, Chemical and biological methods for Nano scale fabrication, Fabrication of Nano electro-mechanical systems.

UNIT IV
Electron transport in semiconductors and nanostructures
UNIT V
Nanostructure devices

TEXT BOOKS


REFERENCES

2. Introduction to Nanotechnology by Charles P Poole Jr and Frank J Owens Wiley.
TELEVISION ENGINEERING
(PE - 6)

IV Year B.Tech. ECE II Semester

Pre-requisite: Nil

Course Objectives

1. Study the different camera and picture tubes.
2. Know about various standard TV channels.
3. Study about TV receiver, sync separation, detector etc.,
4. Study about color signal encoding, decoding and receiver.

Course Outcomes

Upon completing this course, the student will be able to

1. Known working principle and construction of various camera tubes.
2. Understand the concept of TV transmission and reception.
3. Understand the working of color TV.
4. Learn the basics of various digital TV systems.

UNIT I

Introduction
TV transmitter and receivers, synchronization. Geometric form and aspect ratio, image
continuity, interlaced scanning, picture resolution, Composite video signal, TV standards.
Camera tubes: Image Orthicon, Plumbicon, Vidicon, Silicon Diode Array Vidicon, Comparison
of camera tubes, Monochrome TV camera,

TV Signal Transmission and Propagation
Picture Signal transmission, positive and negative modulation, VSB transmission, sound signal
transmission, standard channel BW, TV transmitter, TV signal propagation, interference, TV
broadcast channels, TV transmission Antennas.

UNIT II

Monochrome TV Receiver
RF tuner, IF subsystem, video amplifier, sound section, sync separation and processing,
deflection circuits, scanning circuits, AGC, noise cancellation, video and inter carrier sound
signal detection, vision IF subsystem of Black and White receivers, Receiver sound system: FM
detection, FM Sound detectors, and typical applications.

UNIT III

Sync Separation and Detection
TV Receiver Tuners, Tuner operation, VHF and UHF tuners, digital tuning techniques, remote
control of receiver functions. Sync Separation, AFC and Deflection Oscillators: Synchronous
separation, k noise in sync pulses, separation of frame and line sync pulses. AFC, single ended
AFC circuit, Deflection Oscillators, deflection drive ICs, Receiver Antennas, Picture Tubes.
UNIT IV
Color Television
Color signal generation, additive color mixing, video signals for colors, color difference signals, encoding, Perception of brightness and colors luminance signal, Encoding of color difference signals, formation of chrominance signals, color cameras, Color picture tubes.

Color Signal Encoding and Decoding
NTSC color system, PAL color system, PAL encoder, PAL-D Decoder, chrome signal amplifiers, separation of U and V signals, color burst separation, Burst phase discriminator, ACC amplifier, Reference oscillator, Indent and color killer circuits, U& V demodulators.

UNIT V
Color Receiver
Introduction to color receiver, Electron tuners, IF subsystem, Y-signal channel, Chroma decoder, Separation of U & V Color, Phasors, synchronous demodulators, Sub carrier generation, raster circuits.

Digital TV
Introduction to Digital TV, Digital Satellite TV, Direct to Home Satellite TV, Digital TV Transmitter, Digital TV Receiver, Digital Terrestrial TV, LCD TV, LED TV, CCD Image Sensors, HDTV.

TEXT BOOKS


REFERENCES

Course Objectives

1. Basic understanding of all communication systems
2. Introduce the basic definitions of different modulation techniques.
3. Known about satellite and optical communications.
4. Learn the fundamentals of wireless technologies.

Course Outcomes

Upon completing this course, the student will be able to

1. Understand the need of modulation and distinguish various modulation techniques.
2. Known the communication concepts using satellite and optical fiber.
3. Have a basic understanding of cellular, mobile and telephone communication systems.

UNIT I
Simple description on Modulation

UNIT II Satellite Communication
Satellite Orbits, Ground Stations, Satellite Applications, basics of Global Positioning systems.

UNIT III
Optical Communication
Propagation mechanism, Types of optical fiber, LED source, PIN detector

UNIT IV
Telecommunication Systems
Telephone system, Paging systems, Internet Telephony.

Networking and Local Area Networks
Network fundamentals, Ethernet LANs, Token Ring LAN.

UNIT V
Cellular and Mobile Communications
Basic concepts of Cellular telephone systems, Evolution and standard - AMPS, GSM, CDMA, and WCDMA.

Wireless Technologies
Fundamentals - Wireless LANs, PANs and MANs.
TEXT BOOKS
2. Kennedy, Davis, Electronic Communications systems, 4e, TMH, 1999.

REFERENCES