Course Structure

for

Electronics and Communication Engineering
For First two Semesters all subjects are common to all branches, and there is no electronics subject introduced in first Year
LAPLACE TRANSFORM - Laplace transform with its simple properties, applications to the solutions of ordinary and partial differential equations having constant coefficients with special reference to wave and diffusion equations.


FOURIER TRANSFORM - Complex form of Fourier Transform and its inverse, Fourier sine and cosine transforms and their inversion. Applications of Fourier Transform to solutions of partial differential equations having constant coefficients with special reference to heat equation and wave equation.

COMPLEX VARIABLES - Analytic functions, Cauchy-Riemann equations, Elementary conformal mapping with simple applications, Line integral in complex domain, Cauchy's theorem; Cauchy’s integral formula. Taylor’s series; Laurent’s series; Poles, Residues, Evaluation of simple definite real integrals using the theorem of residue; Simple contour integration.

Suggested Books
1. Engineering Mathematics, T Veerarajan, TMH
2. Mathematical Techniques, Jordan, Oxford
3. Advance Engineering Mathematics, Potter, Oxford
5. Mathematical Methods, Dutta, D., New Age
NETWORK THEOREMS AND ELEMENTS: Introduction to basic circuit elements; KVL, KCL, Ohm’s Law. Theorems - Thevenin’s, Norton’s, Reciprocity, Superposition, Compensation, Miller’s, Tellegen’s and maximum power transfer theorems. Networks with dependent sources. Inductively coupled circuits – mutual inductance, coefficient of coupling and mutual inductance between portions of same circuits and between parallel branches. Transformer equivalent, inductively and conductively coupled circuits.


NETWORK GRAPH THEORY: Network Graph, Tree, Fundamental loop, Cutset, Incidence matrix, augmented Incidence matrix.

Suggested Books
1. Circuits And Networks: Analysis And Synthesis, Sudhakar, TMH
2. Schaum’s Outlines Of Electric Circuits (Sie), Nahvi, TMH
3. Electronic Circuits: Analysis And Design (Sie), Donald Neamen, TMH
4. Electric Circuits & Networks, Suresh Kumar, Pearson
5. Electric Circuits, Nilsson, Pearson
6. Linear Circuits Analysis, Decarlo, Oxford
7. Linear Circuits (Includes CD), Ramakalyan, Oxford
9. Basic Engineering Circuit Analysis, Irwin, Wiley
10. Network Analysis & Synthesis, Kuo, Wiley
12. Basic Circuit Theory, Lawrence P. Huelsman, PHI
SEMICONDUCTOR PHYSICS: Introduction of Semiconductor, Mobility and conductivity, Fermi Dirac distribution, carrier concentrations and Fermi levels in Semiconductors, Generation and recombination of charges, diffusion and continuity equations, Mass action Law, Hall effect.

DIODES AND THEIR CHARACTERISTICS: Junction diodes - Photo transistor, Photo Diode, LED, Zener Diode & Tunnel Diode; Diode as a circuit element, load line concept, clipping and clamping circuits, Voltage multipliers. Construction, characteristics and working principles of UJT and Photo transistors.


Suggested Books
1. Electronic principles, Boylsteed
2. Integrated Electronics, Millman & Halkias, TMH
3. Microelectronic Circuits, Sedra Smith, Oxford Press, India
4. Electronic Devices And Circuits, I.J. Nagrath, PHI
Digital Electronics - Course Outlines

**NUMBER SYSTEMS & BOOLEAN ALGEBRA:** Binary Arithmetic & Radix representation of different numbers. Sign & magnitude representation, Fixed point representation, complement notation, various codes & arithmetic in different codes & their inter conversion. Features of logic algebra, postulates of Boolean algebra. Theorems of Boolean algebra. Boolean function.

**BASIC LOGIC GATES:** AND, OR, NOT, NOR, EX-OR and EX-NOR Gates. Realization of AND, OR, NOT Gate with diodes & transistors. Universal Logic gates, realization of Logic circuits with the help of Universal gates.

**BASIC CONCEPTS AND COMBINATIONAL CIRCUITS:** Sum of products and product of sums, Minterms and Maxterms, Karnaugh map and Tabulation method – problem formulation and design of combinational circuits, Adder, Subtractor, Encoder/decoder, three state devices, Priority Encoder, Mux/Demux, Code converters, Comparators, Implementation of combinational logic using standard ICs, ROM, EPROM and EEPROM.


**LOGIC FAMILIES:** TTL, ECL, IIL, DTL, NMOS, CMOS, BiCMOS logic. Electrical behavior-static and dynamic of CMOS and its input and output structures of CMOS logic families, low voltage CMOS logic & interfacing-Bipolar logic Realization of NAND and NOR logic.

**Suggested Books:**
Electronic Measurements and Instrumentation- Course Outlines

SCIENCE OF MEASUREMENT: Measurement Systems, Instrumentation, Characteristics of measurement systems - Static and Dynamic, Errors in Measurements; Calibration and Standards.

TRANSUCERS: Classification of Transducers – Variable Resistive transducers, Strain gauges, Thermistor, RTD, Variable Inductive transducers, LVDT, RVDT, Variable Capacitive Transducers, Capacitor microphone, Photo electric transducers, Piezo electric transducers, Thermocouple. IC sensors - Fibre optic sensors, Smart/intelligent sensors.


Suggested Books
1. Electronic Instrumentation, H S Kalsi, TMH
2. Electronic Measurements & Instrumentation, Bernard Oliver, TMH
3. Instrumentation Measurement & Analysis, B.C.Nakra, K.K. Chaudhry, TMH
4. Electronic Measurements & Instrumentation, Bernard Oliver, John Cage, TMH
5. Elements Of Electronic Instrumentation And Measurement, Carr, Pearson
6. Electronic Measurements And Instrumentation, Dally, Wiley
7. Theory And Design For Mechanical Measurements, Figliola, Wiley
8. Electronic Instrumentation And Measurements, David A. Bell, PHI
9. Introduction To Measurements And Instrumentation, Arun K. Ghosh, PHI
10. A Course In Electrical & Electronic Measurement & Instrumentation, A.K.Sawhney,
Object Oriented Programming Language- Course Outlines

OOP FUNDAMENTALS: Concept of class and object, attributes, public, private and protected members, derived classes, single & multiple inheritance.

PROGRAMMING IN C++: Enhancements in C++ over C, Data types, operators and functions. Inline functions, constructors and destructors. Friend function, function and operator overloading. Working with class and derived classes. Single, multiple and multilevel inheritances and their combinations, virtual functions, pointers to objects. Input output flags and formatting operations. Working with text files.

JAVA: Variation from C++ to JAVA. Introduction to Java byte code, virtual machine, applications & applets of Java, integer, floating point, characters, Boolean, literals and array declarations.

OPERATORS AND CONTROL STATEMENTS: Arithmetic operators, bit wise operators, relational operators, Boolean logic operators, the assignment operators, ?: operators, operator precedence. Switch and loop statements.

PACKAGE AND INTERFACES: Packages, access protection, importing & defining packages. Defining and implementing interfaces.

Suggested Books
1. Object Oriented Programming With C++, Sahay,
2. Object Oriented Programming With C++, Josuttis, Oxford
4. Object Oriented Programming With C++, Shukla, Wiley
5. OOP, Timothy Budd, Wiley
6. Object Oriented Programming With C++, Balagurusamy, Pearson
7. Programming With C++ (Sie) (Schaum's Outline Series), Hubbard, TMH
8. Mastering C++, Venugopal, TMH
9. Programming With C++, Ravichandran, TMH
JECRC UNIVERSITY
Faculty of Engineering & Technology
B.Tech. Electronics and communications Engineering Semester III
Contact Hours per week: 2 hrs
Digital Electronics Lab
List of Experiments
1 Design and implementation of Adder and Subtractor using logic gates
2 Design and implementation of code converters using logic gates
   (i) BCD to excess-3 code and vice versa
   (ii) Binary to gray and vice-versa
3 Design and implementation of 4 bit binary Adder/subtractor and BCD adder
   using IC 7483
4 Design and implementation of 2 bit Magnitude Comparator using logic gates and
   4 Bit Magnitude Comparator using IC 7485
5 Design and implementation of 16 bit odd/even parity checker generator using
   IC74180.
6 Design and implementation of Multiplexer and De-multiplexer using logic gates,
   IC74150 and IC 74154
7 Design and implementation of encoder and decoder using logic gates, IC7445
   and IC74147
8 Construction and verification of 4 bit ripple counter and Mod-10 / Mod-12
   Ripple Counters
9 Design and implementation of 3-bit synchronous up/down counter
10 Implementation of SISO, SIPO, PISO and PIPO shift registers using Flip-flops
Object Oriented Programming Lab

List of Experiments

Programs in C++
1. Write a program to perform the complex arithmetic.
2. Write a program to perform the rational number arithmetic.
3. Write a program to perform the matrix operations. (Transpose, addition, subtraction, multiplication, test if a matrix is symmetric/ lower triangular/ upper triangular)
4. Implement Morse code to text conversion and vice-versa.
5. To calculate Greatest Common Divisor of given numbers.
6. To implement tower of Hanoi problem.

Program in Java
7. To implement spell checker using dictionary.
8. To implement a color selector from a given set of colors.
9. To implement a shape selector from a given set of shapes.
10. By mapping keys to pens of different colors, implement turtle graphics.
11. To implement a calculator with its functionality.
12. To implement a graph and display BFS/DFS order of nodes.
Electronic Measurement and Instrumentation Lab

List of Experiments
1. Measurement of displacement using LVDT.
2. Measurement of distance using LDR.
3. Measurements of temperature using R.T.D.
5. Measurements of pressure using Strain Gauge.
7. Measurements of distance using capacitive pick up.
10. Measurements of speed of DC Motor using Photo Electric Pick up.
List of Experiments
1. Study of lab equipments and components: CRO, Multimeter, Function Generator, Power supply; Active and Passive Components & Bread Board.
2. P-N Junction Diode: Characteristics of PN Junction diode-Static and dynamic resistance measurement from graph.
4. Properties of junctions Zener diode characteristics. Graphical measurement of forward and reverse resistance.
6. Characteristic of BJT: BJT in CB and CE configuration- Graphical measurement of hparameters from input and output characteristics. Measurement of Av, AI, Ro and Ri of CE amplifier with potential divider biasing.
7. Characteristic of FET: FET in common source configuration. Graphical measurement of its parameters gm, rd & m from input and output characteristics.
9. To plot V-I Characteristics of DIAC.
10. To draw V-I characteristics of TRIAC for different values of Gate Currents
Engineering Mathematics-IV - Course Outlines


NUMERICAL ANALYSIS - Integration - Trapezoidal rule, Simpson’s one third and threeeighth rules. Numerical solution of ordinary differential equations of first order - Picard’s method, Euler’s and modified Euler’s methods, Miline’s method and Runge-Kutta fourth order method. Differentiation.

SPECIAL FUNCTIONS – Bessel’s functions of first and second kind, simple recurrence relations, orthogonal property of Bessel’s, Transformation, Generating functions, Legendre’s function of first kind. Simple recurrence relations, Orthogonal property, Generating function.

STATISTICS AND PROBABILITY - Elementary theory of probability, Baye’s theorem with simple applications. Expected value, theoretical probability distributions-Binomial, Poisson and Normal distributions. Lines of regression, co-relation and rank correlation.

CALCULUS OF VARIATIONS - Functional, strong and weak variations simple variation problems, the Euler’s equation.

Suggested Books:
3. Applied Statics & Probability, Montgomery, Wiley
Applied Electronics-Course Outlines


OSCILLATORS Barkhausen criteria for oscillator – Analysis of RC oscillators, Phase shift, Wein bridge oscillators, LC oscillators – Colpitt, Hartley, Clapp, Crystal, Armstrong, Franklin and Ring Oscillators


MULTIVIBRATORS AND TIME BASE GENERATORS Switching characteristics of transistors – Bistable, Monostable and A stable operation, Collector coupled and Emitter coupled circuits, Schmitt trigger, Voltage sweep generators, Current sweep generators.

RECTIFIERS AND POWER SUPPLIES Halfwave and fullwave rectifiers with filters, Ripple factor, Series Voltage Regulator analysis and design of IGBT. Working and characteristics – AC voltage control using thyristors – SMPS, DC/DC convertors, Buck, Boost, Buck-Boost analysis and Design.

Suggested Books:
Data Structures and Algorithms - Course Outlines


STACKS - Representation in array & linked lists, basic operation, Applications of stacks in parenthesis matching, towers of Hanoi etc. Queues - Representation in array & linked lists, applications, circular queues.

TREES - Binary Tree, representation in array & linked lists, basic operation on binary trees, binary tree traversal (preorder, post order, in order). Search Trees - Binary search tree, indexed binary search tree, basic operation, AVL tree, B-tree.


Suggested Books
1. Data Structures (Spl. Indian Edition) (Schaum's Outlines Series), Lipschutz & Pai, TMH
2. Data Structures And Algorithms, Pai, TMH
3. Data Structure Using C (Sigma Series), Mukherjee, TMH
4. Introduction To Data Structures With Applications, Tremblay, TMH
5. Data Structure Using C, Krishnamoorthy, TMH
6. Data Structures, Keogh, Wiley
Principle of Communication Systems - Course Outlines

NOISE EFFECTS IN COMMUNICATION SYSTEMS: Resistor noise, Networks with reactive elements, Noise temperature, Noise bandwidth, effective input noise temperature, Noise figure. Noise figure & equivalent noise temperature in cascaded circuits.


PULSE ANALOG MODULATION: Practical aspects of sampling: Natural and flat top sampling. PAM, PWM, PPM modulation and demodulation methods, PAM-TDM.

TELEPHONE TRANSMISSION: Telephone set, Touch tone dial types, two wire/ four wire transmission, Echo suppressors & cancellors, cross talk. Multi-channel systems - Frequency division & time division multiplexing.


Suggested Books:
2. Analog Communication, Chandrasekhar, Oxford
3. An Introduction To Analog & Digital Communications-, Haykins, Wiley
4. Digital And Analog Communication Systems-, Shammugam, Wiley
5. Communications Systems, 4ed-, Haykins, Wiley
7. Communication Systems, R Singh, S. Sapre, TMH
8. Analog Communication, K. N. Hari Bhat, Pearson
STATIC ELECTRIC FIELD Introduction to co-ordinate systems, Gradient, Divergence, Curl, Divergence theorem, Stokes theorem, Coulomb's law, Electric field intensity, Principle of superposition, Electric scalar potential, Electric flux density, Gauss's law and its application, Permittivity, Polarization, Boundary relation, Capacitance, Dielectric strength, Energy and Energy density, Poisson and Laplace equations and their application, Numerical problems


TIME VARYING ELECTRIC AND MAGNETIC FIELDS Faraday's law, Transformer and Mutual induction, Maxwell's equation, Self and Mutual inductance, Displacement current, Ampere's law and its inconsistency for time varying fields, Boundary relation, Poynting vector, Comparison of field and circuit theory.

PLANE EM WAVES IN ISOTROPIC MEDIA Wave equation from Maxwell's Equation, Uniform plane waves in perfect dielectric and conductors, Polarization, Reflection and Refraction of plane waves at different boundaries, Surface impedance, Numerical problems

TRANSMISSION LINE Types of transmission lines, general transmission line equation, line constant, equivalent circuits, infinite line, and reflection on a line, SWR of line with different type of terminations. Distortion less and dissipation less lines, Coaxial cables, Transmission lines at audio and radio frequencies, Losses in transmission line. Characteristics of quarter wave, half wave and lines of other lengths.


Suggested Books:
Random Variables and Stochastic Processes - Course Outlines

Random Variables
Discrete and Continuous random variables – Moments, Moment generating functions – Binomial, Poisson, Geometric, Uniform, Exponential, Gamma, Weibull and Normal distributions – Functions of a random variable.

Two-Dimensional Random Variables
Joint distributions, Marginal and Conditional distributions, Covariance, Correlation and Linear regression, Transformation of random variables, Central limit theorem (for independent and identically distributed random variables).

Random Processes
Classification – Stationary process – Markov process - Poisson process – Random telegraph process.

Correlation and Spectral Densities

Linear Systems with Random Inputs
Linear time invariant systems, System transfer function, Linear systems with random inputs, Auto-correlation and Cross-correlation functions of input and output, White noise.

Suggested Books
JECRC UNIVERSITY
Faculty of Engineering & Technology
B.Tech. Electronics and communications Engineering Semester IV
Contact Hours per week: 2 hrs
Advanced Electronics Lab
List of Experiments
1 Design a two stage RC coupled amplifier and determine the effect of cascading on gain and bandwidth
2 Study the effect of voltage series, current series, voltage shunt, and current shunt feedback on amplifier using discrete components.
3 Design fabrication and testing of k-derived filters (LP/HP).
4 Study of Hartley and Colpitt oscillators and observe the effect of variation of C on oscillator frequency.
5 Study of Push Pull amplifier. Measure variation of output power and distortion with load.
6 Study of Wein bridge oscillator and observe the effect of variation in R & C on oscillator frequency.
7 Study of R C phase shift oscillator and observe the effect of variation in R & C on oscillator frequency.
8 To plot the characteristics of UJT.
9 Plot and study the characteristics of small signal amplifier using FET.
10 Study of digital storage oscilloscope.
Electronics Workshop

List of Experiments
1. Introduction & Hands on experience to use circuit creation & simulation software like TINA PRO, P-SPICE or ORCAD.
2. Design a full wave centre tapped rectifier on PCB & study the effect of capacitive filter & its output on a virtual oscilloscope.
3. Design a RLC resonance circuit on PCB & verify the transient, phase response for different values of R, L & C.
4. Design a circuit on bread board for a fixed power supply.
5. Design a half adder using discrete components & verify the timing diagrams on breadboard.
6. Convert the power supply circuit into PCB & simulate its 2D & 3D view.
7. PCB printing using screen printing or any other technique.
8. Study of UV exposure and Drilling on PCB.
9. Fabrication & placing of components as per above power supply circuit.
10. Identification and testing of various electronics components.
Data Structure Lab

List of Experiments
1. Write a program to search an element in a two-dimensional array using linear search.
2. Using iteration & recursion concepts write programs for finding the element in the array using Binary Search Method.
3. Write a program to perform following operations on tables using functions only
   (a) Addition (b) Subtraction (c) Multiplication (d) Transpose
4. Write a program using iteration & recursion concepts for Quick Sort Technique.
5. Write a program to implement the various operations on string such as length of string concatenation, reverse of a string & copy of a string to another.
6. Write a program for swapping of two numbers using ‘call by value’ and ‘call by reference’ strategies.
7. Write a program to create a linked list & perform operations such as insert, delete, update, reverse in the link list.
8. Create a linked list and perform the following operations on it
   (a) add a node (b) Delete a node
9. Write a program to simulate the various graph traversing algorithms.
10. Write a program which simulates the various tree traversal algorithms.
Linear Integrated Circuit-Course Outlines


OPERATIONAL AMPLIFIER APPLICATIONS: Integrator, Differentiator, Voltage to frequency & Frequency to voltage converters. Oscillators: Phase shift, Wien bridge, Quadrature, square wave, triangular wave, sawtooth oscillators. Voltage controlled oscillators.

ACTIVE FILTERS: Low pass, high pass, band pass, band reject filters and all pass filter, Switched capacitor filter, Butterworth filter design, Chebyshev Filter design.

PHASE-LOCKED LOOPS: Operating Principles of PLL, Linear Model of PLL, Lock range, Capture range, Applications of PLL as FM detector, FSK demodulator, AM detector, frequency translator, phase shifter, tracking filter, signal synchronizer and frequency synthesizer. Building blocks of PLL, LM 565 PLL.

LINEAR IC’s: Four quadrant multiplier & its applications, Basic blocks of linear IC voltage regulators, Three terminal voltage regulators, Positive and negative voltage regulators. 555 timer as an astable and a monostable multivibrator. Zero crossing detector, Schmitt trigger.

Suggested Books:
1. Linear Circuits (Includes Cd), Ramakalyan-, Oxford
2. Linear Circuit Analysis, Decarlo, Oxford
3. Linear Integrated Circuits, Nair, Wiley
4. Analysis And Design Of Analog Integrated Circuits, Gray, 5e, Wiley
5. Analog Mos Integrated Circuits For Signal Processing-Gregorian, Gregorian, 1e, Wiley
6. Linear Integrated Circuits, S Salivahanan, TMH
7. Electronic Circuits: Discrete And Integrated, Donald Schilling, TMH
8. Op-Amps And Linear Integrated Circuits, Gayakwad, Ramakant A, PHI
Java Programming - Course Outlines

1. Data Types, Variable, and Arrays: Java is a strongly typed language, the simple types, integers, floating-point types, characters, Booleans, a closer look at literals, variables, type conversion and casting, automatic type promotion in expressions, arrays, a few works about string, a note to C/C++ programmers about pointers, operators-arithmetic operators, the bitwise operators, relational operators, Boolean logical operators, the assignment operator, the conditional operator, operator precedence, using parentheses, control statements-java’s selection statements, iteration statements, jump statements. [6]

2. Classes: Class fundamentals, declaring objects, assigning object reference variables, introducing methods, constructors, the this keyword, garbage collection, the finalize () method, a stack class, overloading methods, using objects as parameters, a closer look at argument passing, returning objects, recursion, introducing access control, understanding static, introducing final, arrays revisited, introducing nested and inner classes, exploring the string class, using command-line arguments. [5]

3. Inheritance: Inheritance basics, using super, creating a multilevel hierarchy, when constructors are called, method overriding, dynamic method dispatch, using abstract classes, using final with inheritance, the object class. [4]

4. Package, Interfaces and Exception Handling: Packages, access protection, importing packages, interfaces, exception-handling fundamentals, exception types, uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws, finally, Java’s built-in exceptions, creating your own exception subclasses, using exceptions. [5]

5. Multithreaded Programming: The java thread model, the main thread, creating a thread, creating multiple threads, using isAlive () and join (), thread priorities, synchronization, inter thread communication, suspending, resuming, and stopping threads, using multithreading. [3]

6. I/O, Applets, and String Handling: I/O basics, reading console input, writing console output, the Print Writer class, reading and writing files, applet fundamentals, the transient and volatile modifiers, using instance of strict fp, native methods, problems with native methods, string constructors, string length, special string operations, character extraction, string comparison, searching strings, modifying a string, data conversion using value of (), changing the case of characters within a string, String Buffer.
Microwave Engineering-Course Outlines


KLYSTRONS: Construction and operation of two cavity & multicavity klystrons. Velocity modulation and electron bunching (analytical treatment), Applegate diagram and applications of two cavity klystrons. Construction, working and operation of Reflex klystron. Velocity modulation, power output and frequency characteristics of a Reflex klystron.

TRAVELLING WAVE TUBES AND MAGNETRON: Construction, operation and practical consideration of helix type TWT. Pulsed dual mode TWT. Coupled cavity TWT. Types of Magnetron- Construction, operation, analysis and practical consideration of cavity or travelling wave magnetron. Introduction to coaxial, frequency angle and voltage tunable magnetrons.

ATTENUATORS & FILTERS: Elements of telephone transmission networks, symmetrical and Asymmetrical two port networks. Different Attenuators, pi-section & T-section attenuators, stub matching, Transmission equalizers Filters, constant K-section, Ladder type, pi--section, Tsection filter, m-derived filter sections, Lattice filter section

MICROWAVE MEASUREMENTS: Detection of microwaves, Microwave power measurement, Impedance measurement, Measurement of scattering parameters, Frequency measurement, VSWR measurements. Introduction to microstrip lines, Parallel striplines, Coplanar striplines, Shielded striplines, Slot lines, Integrated Fin line, Non-radiative guide, Transitions, Bends and Discontinuities.

Suggested Books:
1. Microwave Engineering, Annapurna Das, Sisir Das, TMH
2. Foundations For Microwave Engineering, R.E. Collin, Wiley
3. Microwave Devices And Circuits, Samuel Y. Liao, Pearson
4. Microwave Engineering, Pozar, Wiley
5. Microwave Engineering, M.L. Sisodiya, New Age
7. Microwave Engineering By, Pozar, Wiley
8. Microwave Engineering, Annapurna Das, Sisir Das, TMH
9. Microwave Devices And Circuits, 3, Samuel Y. Liao, Pearson
10. Microwave Devices And Circuit Design, Ganesh Prasad Srivastava, Vijay Laxmi Gupta, PHI
11. Microwave Semiconductor Devices, Roy Mitra, PHI
Microprocessor- Course Outlines

**INTRODUCTION:** CPU, address bus, data bus and control bus. Input/Output devices, buffers, encoders, latches and memories.

**8085 MICROPROCESSOR ARCHITECTURE:** Internal data operations and registers, pins and signals, peripheral devices and memory organization, interrupts. CISC and RISC architecture overview.

**8085 MICROPROCESSOR INSTRUCTIONS:** Classification, format and timing. Instruction set. Programming and debugging, 8 bit and 16 bit instructions.

**8085 MICROPROCESSOR INTERFACING:** 8259, 8257, 8255, 8253, 8155 chips and their applications. A/D conversion, memory, keyboard and display interface (8279).

**INTRODUCTION TO 8051 MICROCONTROLLER:** General features & architecture of 8051. Memory, timers and interrupts. Pin details. Interfacing and applications.

**Suggested Books**

1. *8051 Microcontroller: Hardware, Software And Application.*, V Udayashankara, M Mallikarjunaswamy, TMH
2. *Introduction To Microprocessors*, Mathur, TMH
5. *Microprocessor Interfacing And Applications*, B.P. Singh, New Age
JECRC UNIVERSITY
Faculty of Engineering & Technology
B.Tech in Electronics and Communication Engineering Semester V
Contact Hours (L-T-P): 3-0-0

Computer Architecture-Course Outlines


Central Processing Unit: General register organization, stack organization, Instruction formats, Data transfer and manipulation, program control. RISC, CISC characteristics. Pipeline and Vector processing: Pipeline structure, speedup, efficiency, throughput and bottlenecks. Arithmetic pipeline and Instruction pipeline.

Computer Arithmetic: Adder, Ripple carry Adder, carry look Ahead Adder, Multiplication - Add and Shift, Array multiplier and Booth Multiplier, Division - restoring and Non-restoring Techniques. Floating Point Arithmetic - Floating point representation, Add, Subtract, Multiplication, Division.

Memory Organization: RAM, ROM, Memory Hierarchy, Organization, Associative memory, Cache memory, and Virtual memory - Paging and Segmentation.

Input-Output Organization: Input-Output Interface, Modes of Transfer, Priority Interrupt, DMA, IOP processor.

Suggested Books:
Software Engineering – Course Outlines
1. **Software Development**: Attributes of effective software, software life cycle, models, software engineering approaches. [6]
2. **Software Estimation**: Objectives, LOC and FP estimation, effort estimation, COCOMO model, cost estimation and validation, risk management. [6]
3. **Requirement Analysis**: System analysis, types of systems, principles of system building, system entropy, system performance, system modeling, structured system analysis - DFD, DD, SFC, SRS details, introduction to object-oriented analysis. [5]
4. **System Design**: Fundamental design concepts, modularization, design notations, design techniques, introduction to object-oriented design. [5]
5. **Coding and Testing**: Structured coding techniques, coding styles, software testing fundamentals, test case design, white box testing, basis path testing, control structure testing, black box testing, testing for client/server architecture, real time systems and GUIs. [6]
7. **Advance Topics**: Software re-use, re-engineering, computer aided software engineering. [4]
Digital Communication System - Course Outlines

PCM & DELTA MODULATION SYSTEMS: Uniform and Non-uniform quantization. PCM and delta modulation. Signal to quantization noise ratio in PCM and delta modulation. DPCM, ADM, T1 Carrier System, Matched filter detection. Error probability in PCM system.

BASE BAND TRANSMISSION: Line coding (RZ, NRZ) - Polar, Bipolar, Manchester, AMI. Inter symbol interference, Pulse shaping, Nyquist criterion, Raised cosine spectrum.

DIGITAL MODULATION TECHNIQUES: Geometric interpretation of signals, Orthogonalization. ASK, BPSK, BFSK, QPSK, MSK modulation techniques and Coherent detection of these techniques. Calculation of error probabilities.

INFORMATION THEORY: Amount of Information, Average Information, Entropy, Information rate, Increase in Average information per bit by coding, Shannon's Theorem and Shannon's bound, Capacity of a Gaussian Channel, BW-S/N trade off.

CODING: Coding and decoding of Information. Hamming code, Single Parity-Bit Code, Linear Block code, cyclic code & convolution codes.

Suggested Books:
1. Analog And Digital Communication, Hwei Hsu, Debjani Mitra, TMH
2. Digital Communication, Amitabha Bhattacharya, TMH
3. Schaums Outline And Digital Communication, Hwei Hsu, TMH
4. Taub’s Principles Of Communication Systems, Taub & Schilling, TMH
5. Electronic Communication Systems, Kennedy, TMH
6. Analog And Digital Communication, Sudakshina Kundu, Pearson
7. Digital Communication, Sklar & Ray, Pearson
8. Digital Communication, Ian Glover, Pearson
10. Digital Communications, Simon Haykin, Wiley
11. Digital And Analog Communication Systems, K.Sam Shanmugam, Wiley
12. An Introduction To Analog And Digital Communication System, Simon Haykin, Wiley
13. Information Theory And Network Coding, Raymond W, Springer
List of Experiments
A Design and fabrication of:
1 Full- and suppressed-carrier AM DSB modulator using 633
2 Demodulator for full-carrier AM DSB signal.
3 ASK and PSK modulator using 633
4 Integrate and dump filter.
5 PCM system using LM 398, ADC 0809 and DAC 0800.
6 Encoder and decoder for Hamming code.
7 Delta modulator and demodulator
8 Frequency modulator using 8038.
9 FM demodulator using 565.
10 Frequency multiplier by a given factor N and demonstrate carrier recovery using 565.
11 FSK generator using 566 and FSK demodulator using 565.
12 PPM and PWM circuits

Communications Lab - II
List of Experiments
1 (a) To observe sampling of analog signal. Identify & solve the aliasing problem.
   (b) To observe the Transmission of two signals over a single channel using sampling
      methods.
2 TDM-PAM: Modulation & demodulation
3 Operation of a PCM encoder & decoder.
4 TDM-PCM: Modulation & demodulation.
5 Observe the performance of a Delta modulation system & to derive from it a delta sigma modulation
6 To generate and study the various data formatting schemes (Unipolar, Bi-polar, Manchester,AMI etc.).
7 Generate ASK signals, with and without carrier suppression. Demodulation of these two
   types of modulated signal.
8 Generate the FSK wave forms & demodulate the FSK signals based on the properties of
   (a) Tuned circuits (b) PLL
9 Generate the PSK signals and demodulate it.
10 Simulation using any virtual Instrumentation Software:
11 To carry out convolution in both continuous time and discrete time systems.
12 . Companding and multiplexing of PCM signals.
13 Perform various keying Techniques: PSK, ASK, FSK & MSK.
JECRC UNIVERSITY
Faculty of Engineering & Technology
B.Tech. Electronics and communications Engineering Semester V
Contact Hours per week: 2 hrs
Microprocessors Lab
List of Experiments
A 8085 based experiments
1. Assembly Language Programming of 8085
B 8086 based experiments
1. Programs for 16 bit Arithmetic, Sorting, Searching and String operations,
2. Programs for Digital clock, Interfacing ADC and DAC
3. Interfacing and Programming 8279, 8259, and 8253.
4. Serial Communication between two Microprocessor Kits using 8251.
5. Interfacing and Programming of Stepper Motor and DC Motor Speed control and Parallel Communication between two Microprocessor Kits using Mode 1 and Mode 2 of 8255.
6. Macroassembler Programming for 8086
C 8051 based experiments
1. Programming using Arithmetic, Logical and Bit Manipulation instructions of 8051 microcontroller.
2. Programming and verifying Timer, Interrupts and UART operations in 8051 microcontroller.
3. Interfacing – DAC and ADC and 8051 based temperature measurement
4. Interfacing – LED and LCD
5. Interfacing – stepper motor traffic light control
6. Communication between 8051 Microcontroller kit and PC.
7. R8C based applications
List of Experiments

1. Study of offset voltage/current and slew rate characteristics of 741.
2. Design of inverting and non-inverting amplifiers.
3. Design of clipper, clamper, peak detector and precision rectifiers using 741.
4. Design of low voltage and high voltage regulators using 723, and fixed voltage regulators using 78xx and 79xx.
5. Log and antilog amplifier design using 741, design of multiplier circuit.
8. Design and test comparator circuits including window comparator using 741 and 311.
9. Design and test of Wein Bridge oscillator.
10. Generation of different waveforms using VCOs 566 and 8038.
12. Operation of D/A converter 0800.
JECRC UNIVERSITY
Faculty of Engineering & Technology
B.Tech. Electronics and communications Engineering Semester V

Contact Hours per week: 2 hrs

Microwave Engineering Lab

List of Experiments
1 Study of microwave sources and components.
2 Study of crystal detector characteristics.
3 Measurement of VSWR, impedance and frequency.
4 Measurement of attenuation and dielectric constant.
5 Measurement of phase shift.
6 Measurement of Q of a cavity resonator.
7 Measurement of directional coupler characteristics.
8 Study of tee junctions.
9 Study and measurement of transmission line characteristics.
10 Measurement of antenna characteristics.
11 Study of Spectrum Analyzer.
12 Study of Network Analyzer.
Power Electronics – Course Outlines

1. **Devices and Characteristics:** Introduction, power diodes, diode characteristics, types of power diodes, series and parallel operation of diodes, power transistors, bipolar junction transistors (BJT), metal oxide semiconductor field effect transistors (MOSFET), metal oxide semiconductor insulated gate transistors (MOSIGT), silicon controlled rectifiers (SCR), physical and electrical principles underlying operating modes of an SCR, two transistor analogy of an SCR, mechanical construction of an SCR, ratings of SCRs, gate characteristics and switching characteristics of SCRs, $\text{di/dt}$ and $\text{dv/dt}$ behavior of SCRs, series parallel operation of SCRs, SCR protection techniques, thyristor characteristics, gate turn-off thyristors, turn-on and turn-off of a GTO, series and parallel operation of a GTO, protection of a GTO.

2. **Controlled Converters:** Single pulse converters feeding resistive and inductive loads with and without a free wheeling diode, R-E and R-L-E types of loads with and without a free wheeling diode, two pulse midpoint and bridge converters feeding different types of loads, three pulse mid point converters and three phase six-pulse bridge converters, four quadrant converters, dual converters using bridge converters, circulating current-free operation of dual converters, ac to dc conversion using GTO, speed control of a dc motor using converters.

3. **AC Voltage Controllers:** Voltage control at constant frequency, single phase and three phase ac voltage controllers, features of phase control of ac voltage controllers, gate pulse requirements to trigger the SCRs of ac voltage controllers, integral cycle control.

4. **Cycloconverters:** Principle of operation, types of cycloconverters, features of cycloconverters, load commutation of cycloconverters, advantages and disadvantages of cycloconverters.

5. **DC to DC Conversion:** Principle of forced commutation, dc chopper circuits, control strategies, time ratio control, current limit control, regenerative chopper, two quadrant and four quadrant choppers, GTO thyristors in dc to dc conversion.

6. **Inverters:** General considerations, process of inversion, classification of inverters, principle of naturally commutated inverters, forced commutation in inverters, commutation in inverters, performance parameters of inverters, parallel inverters, bridge inverters, auxiliary commutated single phase inverters, complementary commutated inverters, three phase inverters, pulse width modulated inverters, operation of an induction motor on a square wave inverter.
CONTROL SYSTEM ANALYSIS AND COMPONENTS: Examples and application of open loop and close loop systems. Brief idea of multivariable control system, Brief idea of Z transform and digital control systems. Differential equations. Determination of transfer function by block diagram reduction technique & signal flow graph method.


FREQUENCY DOMAIN METHODS: Bode plot, Design specification in frequency domain and their co-relation with time domain.


Suggested Books:
1. Control System Engineering, S Palani, TMH
2. Control Systems, Manjita Srivastava, Mahesh Srivastava, Smriti Bhatnagar, TMH
3. Schaum’s Outline Of Feedback And Control Systems, Allen Stubberud, Ivan Williams, Joseph Distefano, TMH
5. Control Systems Engineering, S. K. Bhattacharya, Pearson
6. Design Feedback Control System, Stefani, Oxford
7. Systems And Control, Zak, Oxford
8. Automatic Control Systems, B. C. Kuo, Wiley
11. Control System Engineering, J.Nagrath, New Age
12. Control System, Ghosh, Pearson

FOURIER SERIES REPRESENTATION OF SIGNALS: Fourier series representation of continuous periodic signal & its properties, Fourier series representation of Discrete periodic signal & its properties, Continuous time filters & Discrete time filters described by difference equation.

FOURIER TRANSFORM: The continuous time Fourier transform for periodic and aperiodic signals, Properties of CTFT. Discrete time Fourier transform for periodic and aperiodic signals. Properties of DTFT. The convolution and modulation property.


Suggested Books:
2. Signal & Systems 3e, Chen 3rd, Oxford
3. Fundamentals Of Signals And Systems, Wiley
4. Signals And Systems, P Rao, TMH
5. Signals And Systems: A Simplified Approach, Ganesh Rao, 4e, Pearson
6. Signals And Systems: Continuous And Discrete, Roger E Ziemer, 4e, PHI
7. Signals And Systems, Ravi Kumar, PHI
INTRODUCTION TO MOS TECHNOLOGY - Basic MOS transistors, Enhancement Mode transistor action, Depletion Mode transistor action, NMOS and CMOS fabrication.

BASIC ELECTRICAL PROPERTIES OF MOS CIRCUITS - Ids versus Vds relationship, Aspects of threshold voltage, Transistor Transconductance gm, nMOS inverter, Pull up to Pulldown ratio for a NMOS Inverter and CMOS Inverter (Bn/Bp), MOS transistor circuit Model, Noise Margin.

CMOS LOGIC CIRCUITS - Inverter, Combinational Logic, NAND, NOR gate, Compound Gates, 2 input CMOS Multiplexer, Memory latches and registers, Transmission Gate, Gate delays, CMOS-Gate Transistor sizing, Power dissipation.


Introduction to VHDL, Prolog and other design tools. VHDL Code for simple Logic gates, flipflops, shift registers.

Suggested Books:
1. CMOS Digital Integrated Circuits Analysis, Sung-Mo (Steve) Kang, TMH
2. Essentials Of Vlsi Circuits And Systems, Kamran Eshraghian, Eshraghian, PHI
3. Introduction To Vlsi Circuits And Systems, John P. Uyemura, John Wiley & Sons
8. Vlsi Design And Technology, Bose, D.N., New Age International
JECRC UNIVERSITY  
Faculty of Engineering & Technology  
B.Tech in Electronics and Communication Engineering Semester VI  
Contact Hours (L-T-P): 3-0-0

**Industrial Electronics-Course Outlines**  
**SEMICONDUCTOR POWER DEVICES** - Basic characteristics & working of Power Diodes, Diac, SCR, Triac, Power Transistor, MOSFETs, IGBT and GTO.  
**RECTIFIERS & INVERTERS** - Working principles of single and three phase bridge rectifiers, Voltage and current source inverters.  
**MOTOR CONTROL:** Introduction to speed control of DC motors using phase controlled converters and choppers, Basic idea of speed control of three phase induction motors using voltage and frequency control methods.  
**Stepper Motors:** Variable reluctance, Permanent magnet and hybrid stepper motors. Induction and dielectric heating control.  
**Suggested Books:**  
1. *Power Electronics Principles & Applications*, Joseph Vithayathil, TMH  
2. *Power Electronics*, Ravish Singh, TMH  
3. *Industrial Electronics And Control*, Titi, TMH  
5. *Power Electronics*, Moorthi, Oxford  

8051 ASSEMBLY LANGUAGE PROGRAMMING: Addressing modes, External data moves, Push and Pop opcodes, Logical operations, Byte level and Bit level logical operations. Arithmetic operations, Jump and call instructions, Interrupts & Returns.

REAL TIME CONTROL: Interrupts, Multiple sources of interrupts, Non maskable sources of interrupts, Interrupt structure in 8051. Timers, Free running counters & Real Time control.

INTERFACING: Serial I/O interface, Parallel I/O interface, Digital and Analog signal interfacing methods, LED arrays, Keyboard, Printer and Flash memory interfacing.


Suggested Books:
1. B. B. Brey: The Intel Microprocessors, Architecture, Programming and Interfacing, Pearson Education.
3. D. V. Hall: Microprocessors and Interfacing, TMH
   The 8051 microcontroller, Third Edition, Cengage Learning
5. A. V. Deshmukh: Microcontroller (Theory and Application), TMH.
6. Raj Kamal: Embedded Systems- Architecture, Programming and Design, TMH,
7. V. Udayashankara and M. S. Mallikarjunaswamy: 8051 Microcontroller, TMH,
Microcontrollers and Embedded Systems Lab
List of Experiments

1. (a) To develop program for basic mathematical operation.
   (b) To develop program for block operation.
2. To develop program for different operations for look-up table.
3. To develop program to arrange numbers in ascending and descending order.
4. To develop program to generate square waves at port pins.
5. To develop program to read keyboard and code it.
6. A voltage waveform \( v(t) \) is available as an input to the Microcontroller. We must continuously check the waveform and record the maximum value of the waveform and display the maximum value on the LCD display. Test the program by using a DC supply to generate \( v(t) \) and varying the DC value.
7. Modern Microcontrollers usually have an in-built Digital-to-Analog and Analog to-Digital converter. Use the built-in DAC to generate voltage waveforms such as (a) pulse train (b) triangular waveform (c) sinusoidal waveform. Observe these waveforms on an oscilloscope.
8. Build a simple security device based on the Microcontroller kit. Interface an external motion sensor to the Microcontroller. An alarm must be generated if motion is sensed in a specified region. There must be a provision to record the time at which the intrusion was detected. Similarly, there must be a provision to turn the alarm off by pressing a key.
9. (a) Blink an LED which is connected to your Microcontroller using the built-in timer in the Microcontroller. Assume that the LED should be on for x milliseconds and off for y milliseconds; assume that these values are stored in memory locations X and Y. We should be able to change the value of x and y and rerun the program.
   (b) Consider an alternate way to program this application. Here, the microcontroller turns the LED on and waits in a busy loop to implement a delay of x milliseconds. Then it turns the LED off and waits in a busy loop to implement a delay of y milliseconds. How do you compare these two solutions?
10. If your Microcontroller kit has an LCD interface, write a program to display a character String on the LCD. Assume that the string is stored at a location.
11. Your Microcontroller may have a built-in ADC. Build a voltmeter that can measure stable voltages in a certain range. The measured value must be displayed on the LCD display. Measure the same voltage using a Multimeter and record the error in measurement. Tabulate the error for several values of the voltage.
JECRC UNIVERSITY

Faculty of Engineering & Technology

B.Tech in Electronics and Communication Engineering Semester VII

Contact Hours (L-T-P): 3-1-0

Digital Signal Processing-Course Outlines

**SAMPLING** - Discrete time processing of Continuous-time signals, continuous time processing of discrete-time signals, changing the sampling rate using discrete-time processing.

**TRANSFORM ANALYSIS OF LTI SYSTEMS** - Introduction, The frequency response of LTI systems, System functions for systems characterized by LCCD (Linear Constant Coefficient Difference) equations, All-pass systems, Minimum-Phase systems, Linear systems with linear phase.

**STRUCTURES FOR DISCRETE-TIME SYSTEMS** - Block diagram and signal flow graph representation of LCCD (LCCD – Linear Constant Coefficient Difference) equations, Basic structures for IIR and FIR systems, Transposed forms.


**The Discrete Fourier transform (DFT)**, Properties of the DFT, Linear Convolution using DFT. Efficient computation of the DFT - Decimation–in–Time and Decimation-in frequency FFT Algorithms. Processing of speech signals - Vocoders, linear predictive coders.

**Suggested Books:**

1. Digital Signal Processing, Sanjit K Mitra, TMH
2. Digital Signal Processing, S.Salivahanan A Vallavaraj, C.Gnanapriya, TMH
5. Digital Signal Processing, Thomas J. Cavicchi, John Wiley & Sons
6. Digital Signal Processing, Emmanuel Iftiachor, Barry Jervis, Pearson
7. Digital Signal Processing, Chi-Tsong Chen, Oxford
8. Digital Signal Processing, Engelberg, Shlomo, Springer
9. Digital Signal Processing For Measurement , D Antona, Gabriele, New Age International
Integrated Circuit technology-Course Outlines

INTRODUCTION TO TECHNOLOGIES- Semiconductor Substrate, Crystal defects, Electronic Grade Silicon, Czochralski Growth, Float Zone Growth, Characterization & evaluation of Crystals; Wafer Preparation- Silicon Shaping, Etching and Polishing, Chemical cleaning.

DIFFUSION & ION IMPLANTATION- Ficks diffusion Equation in One Dimension, Atomic model, Analytic Solution of Ficks Law, Correction to simple theory, Diffusion in SiO2. Ion Implantation and Ion Implantation Systems. Oxidation. Growth mechanism and Deal-Grove Model of oxidation, Linear and Parabolic Rate co-efficient, Structure of SiO2. Oxidation techniques and Systems and Oxide properties.

CHEMICAL VAPOUR DEPOSITION AND LAYER GROWTH- CVD for deposition of dielectric and polysilicon – a simple CVD system, Chemical equilibrium and the law of mass action, Introduction to atmospheric CVD of dielectric, Low pressure CVD of dielectric and semiconductor. Epitaxy- Vapour Phase Epitaxy, Defects in Epitaxial growth, Metal Organic Chemical Vapor Deposition, Molecular beam epitaxy.

PATTERN TRANSFER- Introduction to photo/optical lithography, Contact/proximity printers, Projection printers, Mask generation, photoresists. Wet etching, Plasma etching and Reaction ion etching.

VLSI PROCESS INTEGRATION- Junction and Oxide Isolation, LOCOS methods, Trench Isolation, SOI; Metallization, Planarization. Fundamental consideration for IC Processing. NMOS IC Technology, CMOS IC Technology and Bipolar IC Technology.

Suggested Books:
1. Vlsi Technology, Sze, TMH
2. Semiconductor Devices: Modelling And Technology, Nandita Dasgupta, Amitava Dasgupta, PHI
6. Micro-Nanofabricationtechnologies And Applications, Cui, Zheng, Springer
Optimization techniques-Course Outlines

INTRODUCTION - Historical development, Engineering applications of optimization, Formulation of design problems for a mathematical programming problem, Classification of optimization problems.

LINEAR PROGRAMMING - Simplex methods, Revised simplex method, Duality in linear programming, Post optimality analysis.

APPLICATIONS OF LINEAR PROGRAMMING, Transportation and Assignment problems.

NONLINEAR PROGRAMMING - Unconstrained optimization techniques, Direct search methods, Descent methods, Constrained optimization, Direct and Indirect methods.

DYNAMIC PROGRAMMING: Introduction, multi-decision processes, computational procedures.

Suggested Books:
   Publishing Co. Ltd. New Delhi.
JECRC UNIVERSITY

Faculty of Engineering & Technology
B.Tech in Electronics and Communication Engineering Semester VII

Contact Hours (L-T-P): 3-1-0

Radar and satellite Communication-Course Outlines


MOVING TARGET INDICATOR (MTI): Delay line Cancellers, Blind velocity Pulse Doppler Radar. Tracking radar sequential lobbing, Conical scan and Monopulse radar, Types of display, Radar receivers, Noise figure. Introduction.

INTRODUCTION TO SATELLITE COMMUNICATION: Orbital mechanics and launching, Earth station and satellite sub systems, Satellite link, Design and Analysis.

MULTIPLEXING TECHNIQUES: Multiple accesses for satellite links: FDMA, TDMA, CDMA & DAMA. Propagation effects.

DBS-TV, GPS, VSAT: Network architecture, Access control protocol & Link Analysis.

Suggested Books:
1. Radar Principles, By Peyton Z. Peebles, Oxford
2. Radar Handbook, By Merrill I. Skolnik, Oxford
3. Fundamentals Of Satellite Communications, K.N. Raja Rao, Phi
4. Wireless Broadband Networks, David T. Wong, Peng-Yong Kong, John Wiley & Sons
Introduction to Engineering Economics: Origin, principles, engineering economics and the design process, engineering for economic competitiveness, engineering economy and the engineer.

2. Elements of Economics: Definition, demand and supply, income, equilibrium, utility.

3. Economics Applied to Industries: Market demand analysis, production analysis for decision making, cost analysis, pricing techniques in regards of goods and services, break-even analysis, interest, annuities and profits.


5. Optimization Techniques: Economics and optimization, price mechanism and optimal resource allocation, optimization under constraints, optimization under risk and uncertainty, optimization with multiple objectives.
Computer Networks - Course Outlines

QUEUING THEORY - Pure birth, Pure death & Birth-death processes, Mathematical models for M/M/1, M/M/1, M/M/m, M/M/1/K and M/M/m/m queues. Little's formula. M/G/1 Queuing model basics.

DATA LINK LAYER - Packet & Circuit switching, OSI & TCP/IP Reference Models, Framing, Simplex protocol, Simplex stop & wait protocol, Sliding window protocol, Go back N protocol, Selective repeat, HDLC and Data link layer in internet.

MEDIUM LAYER - Static & dynamic channel allocation, Multiple Access Protocols: ALOHA, Slotted ALOHA, CSMA, Token Bus, Token Ring, FDDI, IEEE standards 802.2, 802.3 Hubs, Bridges, Routers & Gateways.


Suggested Books:
1. Computer Network, Leon And Garcia, TMH
2. Data Communication And Networking(Sie), Forouzan, TMH
3. Computer Network, Tanenbaum, Pearson
4. Computer Networking, Kurose, Pearson
5. Computer Networking And Internet, Halsel, Pearson
6. Digital Telephony, 3rd Ed, James Irvine & David Harle, Wiley
7. Line Communication System: Telecommunication Switching Approach, Das, Apurba,

DIGITAL IMAGE FUNDAMENTALS: Image sampling and quantization, Representing digital images, Spatial and gray-level resolution, Aliasing and Moiré patterns, Zooming and Shrinking digital images.

IMAGE RESTORATION: Image restoration model, Noise Models, Spatial and frequency properties of noise, Noise probability density functions, Noise - only spatial filter, Mean filter, Statistic filter and Adaptive filter. Frequency domain filters - Band reject filter, Band pass filter and Notch filter.

IMAGE COMPRESSION: Compression Fundamentals - Coding Redundancy, Inter pixel redundancy, Psycho visual redundancy and Fidelity criteria. Image Compression models, Source encoder and decoder, Channel encoder and decoder, Lossy compression and compression standards. Color space formats, Scaling methodologies (like horizontal, vertical up/down scaling). Display format (VGA, NTSC,PAL).

EXPERT SYSTEM AND PATTERN RECOGNITION: Use of computers in problem solving, Information representation, Searching, Theorem proving, and Pattern matching with substitution. Methods for knowledge representation, Searching, spatial, Temporal and Common sense reasoning, and logic and probabilistic inferencing. Applications in Expert systems and Robotics

Suggested Books:
2. Applications of Pattern Recognition, Fu, K.S., CRC Press
8. Pattern Recognition: Human and Mechanical, Watanabe, S., Wiley
JECRC UNIVERSITY
Faculty of Engineering & Technology
B.Tech in Electronics and Communication Engineering Semester VII
Contact Hours (L-T-P): 3-0-0

ASIC & FPGA-Course Outlines

INTRODUCTION TO ASICs, CMOS LOGIC AND ASIC LIBRARY DESIGN: Types of ASICs - Design flow - CMOS transistors, CMOS Design rules - Combinational Logic Cell – Sequential logic cell - Data path logic cell - Transistors as Resistors - Transistor Parasitic Capacitance- Logical effort –Library cell design - Library architecture.

PROGRAMMABLE ASICs, LOGIC CELLS AND I/O CELLS: Anti fuse - static RAM - EPROM and EEPROM technology - PREP benchmarks - Actel ACT - Xilinx LCA –Altera FLEX - Altera MAX DC & AC inputs and outputs - Clock & Power inputs - Xilinx I/O blocks.


LOGIC SYNTHESIS, SIMULATION AND TESTING: Verilog and logic synthesis - VHDL and logic synthesis - types of simulation -boundary scan test - fault simulation - automatic test pattern generation, Introduction to JTAG.

ASIC CONSTRUCTION, FLOOR PLANNING, PLACEMENT & ROUTING: System partition - FPGA partitioning - partitioning methods - floor planning - placement - physical design flow –global routing - detailed routing - special routing - circuit extraction - DRC.

Suggested Books:
3. Mohammed Ismail and Terri Fiez, "Analog VLSI Signal and Information Processing",
List of Experiments

1. Write a VHDL program for all Gates using different styles of Modelling.
2. Write a VHDL program for Adder (half, full) and Subtractor (half and full).
3. Write a VHDL program for 2*1, 4*1, 16*1 Multiplexers using different styles of Modelling.
4. Write a VHDL program for 2*4, 4*16, 3*8 Decoders using different styles of Modelling.
5. Write a VHDL program for 4 bit comparator using different styles of Modelling.
6. Write a VHDL program for BCD to 7 segment display.
7. Write a VHDL program for shift registers.
8. Write a VHDL program for counters.
9. Schematic design and make Device Level Layout of BJT/FET Amplifier in various configuration.
10. Schematic design and make Device Level Layout of Counters, Shift Registers & Sequence Decoders.
List of Experiments

**A Modeling and simulation using MAT LAB**
1. Realising a given block diagram having multiplier, adder/subtractor and system (Discrete/Continuous) with given Impulse response. Calculating output for given input.
2. To simulate the transmitter and receiver for BPSK
3. To design and simulate FIR digital filter (LP/HP).
4. To design and simulate IIR digital filter (LP/HP).

**B DSP Lab using TMS320C6XXX DSP Kits**
5. To study the architecture of TMS320C6XXX DSP kits using Bloom with DSP
6. To generate wave forms (SINE, COSINE, SQUARE & TRIANGULAR).
7. Verification of Sampling Theorem.
8. Verification of linear/circular convolution.
9. To design FIR and IIR digital filter (LP/HP).
Wireless and Mobile Communication-Course Outlines


LINE-OF-SIGHT MICROWAVE COMMUNICATION- Link Engineering, Frequency planning, Free space loss, Fresnel zone clearance bending of radio beam, Effective earth radius, Building blocks of Transmitter & Receiver.

MULTIPLE ACCESS TECHNIQUES - FDMA, TDMA and CDMA with reference to mobile radio and satellite systems. TDMA based networks. CDMA based networks.


Mobile Ad hoc Networks- Ad hoc Routing ,Protocols, Performance Analysis of DSR and CBRP, Cluster Techniques, Incremental Cluster Maintenance Scheme,

Suggested Books:
2. Wireless Communication And Networking, Misra, TMH
3. Fundamentals Of Satellite Communications, K.N. Raja Rao, PHI
4. Wireless Broadband Networks, David T. Wong, Peng-Yong Kong, John Wiley & Sons
5. Satellite Communications, Timothy Pratt, Charles Bostian And, John Wiley & Sons
7. Wireless Communication And Networking, William Stallings, Pearson
8. Wireless Communication, Upena Dalal, Oxford
10. Wireless And Mobile Communication, Kumar, Sanjeev, New Age International
Antenna and wave Propagation - Course Outlines


ANTENNA ARRAYS - Two element array, N-element linear arrays, Broadside, End fire, collinear and combination arrays, Multiplication of patterns, Binomial arrays. Effect of ground on antennas, Antenna loading. Antenna Measurements - Antenna impedance, radiation pattern, gain, directivity, polarization and phase measurements.

RADIO WAVE PROPAGATION - Mechanism of radio wave propagation, Reflection, Refraction interference and diffraction of radio waves. Theory of ground wave, space wave and sky wave propagation. Plane earth reflection, Reflection factors for horizontal and vertical polarizations, Duct propagation and tropospheric scattering.


Suggested Books:
1. Antennas, John Kraus, Ronald Marhefka, TMH
2. Electromagnetic Waves And Radiating Systems, E.C. Jordan And K.G. Balmain, PHI
3. Antenna Theory: Analysis And Design, Constantine A. Balanis, John Wiley & Sons
5. Antennas And Wave Propagation, G. S. N. Raju, Pearson
7. Antenna Hand
8. Antenna Theory, Y. T. Lo, S. W. Lee, Springer
9. Antenna Theory And Practice, Chatterjee, R., New Age International
JECRC UNIVERSITY
Faculty of Engineering & Technology
B.Tech in Electronics and Communication Engineering Semester VIII

Contact Hours (L-T-P): 3-0-0

Optical Communication-Couse Outlines


**OPTICAL FIBER COMMUNICATION SYSTEMS** - Source to fiber coupling, fiber to fiber joints, fiber splicing, fiber connectors. Principal components. Link design calculation, Applications, Wavelength division multiplexing.

**OPTICAL FIBER MEASUREMENTS**: Measurements of Fiber attenuation, Dispersion, refractive index profile, Numerical aperture & diameter.

**Suggested Books:**
1. Opto Electronics And Fibre Optics Communication, Sarkar, D.C,
2. Optical Fiber Communications: Principles And Practice, G P Agrawal, Wiley
3. Fiber-Optic Communications Technology, Lowell L Scheiner, PHI
4. Optical Communication System, Johan Gowar, PHI
5. Fiber Optics And Optoelectronics, Khare, Oxford
7. Optical WDM Networks - Principles and Practice, Biswanath Mukherjee, Oxford
9. Fiber Optics Communication(With Cd), Kolimbiris, Pearson
10. Fiber Optics Communication Technology, Mybaev, Pearson
11. Optical Communication, Palais, Pearson
12. Optical Fiber Communications, Keiser, Gerd, TMH
INTRODUCTION – History, Operating system services, types, responsibilities, generations, LINUX, WINDOWS.


MEMORY MANAGEMENT- Swapping, Continuous memory allocation, Paging, Pure paging, Demand paging, Page-replacement algorithms, thrashing, Example- Pentium, Disk Scheduling.


DEAD LOCKS- System model, Dead lock characterization, Deadlock prevention, Avoidance, Detection, Recovery, Classic problems of synchronization.

Suggested Books:
1. Operating Systems, Dhamdhere, TMH
2. Operating System:, Crowley, TMH
3. Modern Operating Systems, Andrew S Tanenbaum, PHI
4. Operating Systems:, Pal Chaudhury, PHI
5. Operating System Principles, Peter B. Galvin, Greg Gagne, John Wiley & Sons
6. Operating Systems, Gary Nutt, Pearson
Artificial intelligence-Course Outlines
INTRODUCTION TO AI - Importance of AI, Knowledge Base System Knowledge organization & manipulation, Conceptual Introduction to LISP and other AI programming Languages.


KNOWLEDGE ORGANIZATION & MANIPULATION- Search & control strategies, matching techniques, knowledge organization & management, Genetic Algorithms based search techniques.

KNOWLEDGE SYSTEMS ARCHITECTURE- Rule based, non-production, uncertainty knowledge system building tools.

KNOWLEDGE ACQUISITION- General concepts, learning by induction.

Suggested Books:
1. Char nick “Introduction to Artificial Intelligence”, Addision Wesley.
2. Rich & Knight, “Artificial Intelligence”.
RF Circuit Design
1. Introduction: Elements of microwave integrated circuits, evolution of MICs, hybrid technology-thin film, thick film and medium film and monolithic technology. [10]
2. MIC Elements: Components and devices for microwave integrated circuits, planar transmission lines, substrates, materials, losses, analysis, components and resonators. [12]
3. Computer Aided Design: Computer aids to circuits design for microwave integrated circuits, numerical techniques used in design-conformal mapping, FDM and MoM. [8]
4. Fabrication: Monolithic microwave integrated circuits, components, devices, materials and fabrication processes. [10]
JECRC UNIVERSITY
Faculty of Engineering & Technology
B.Tech. Electronics and communications Engineering Semester VIII
Contact Hours per week: 2 hrs
Antenna Lab
List of Experiments
1. Measurement of antenna characteristics :
Radiation Pattern on polar plots, Beam width and Gain of main lobe for the following
types of antennas.
(a) Half wave and quarter wave dipole
(b) Folded dipole
(c) Yagi UDA multiple element folded dipole
(d) Hertz Antenna
(e) End fire array and broad side array
(f) Helix antenna
(g) Paraboloid reflector antenna
(h) Loop antenna
(i) Ground plane antenna
(j) Log periodic antenna
(k) Rhombus antenna
(l) Slot
2. Demonstration of modeling of wire antenna using appropriate design software.
3. Simulation of antenna arrays using appropriate software.
4. Design and testing of microstrip rectangular patch antenna using appropriate software.
5. Investigate the transmission characteristics of the link and measure the gain of the microstrip
patch antennas.
Draw the antenna radiation diagram.
6. To plot the radiation pattern of Dipole Antenna in E & H planes on log & linear scales on polar and
Cartesian plots.
7. To measure the beamwidth (-3 dB), front to back ratio, side lobe level and its angular position, plane of
polarization and directivity and gain of Dipole Antenna.
8. To plot the Radiation Pattern of Horn Antenna in E plane.
9. 9.1 To identify whether an antenna is resonating or non-resonating type.
9.2 To measure basic antenna’s Gain Bandwidth using log periodic antenna.
10. 10.1 To study the phenomenon of Linear and Circular polarization of antennas.
10.2 To determine the Cross Polar Discrimination (XPD) for the antenna systems in
the lab.
List of Experiments
1. 1.1 To measure the rms delay spread of the wireless channel.
   1.2 To determine the coherence Bandwidth.
2. To Simulate a Mobile Adhoc Network.
3. To measure signal to noise ratio.
4. 4.1 To study the horizontal beam pattern of Base Station antenna.
   4.2 To calculate beam width and tilt angle.
5 5.1 To study the vertical beam pattern of Base Station antenna.
   5.2 To calculate beam width and tilt angle.
6. To set up Fiber Optic Analog and Digital link based on Fiber Optic Trainer
7. Measurement of Propagation loss and numerical aperture on Fiber Optic Trainer.