JECRC™
UNIVERSITY
BUILD YOUR WORLD

Faculty
of
Engineering & Technology

Academic Programs

2012-2016

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

JECRC UNIVERSITY
Faculty of Engineering & Technology
B.Tech in Electronics and Communication Engineering Semester III
Contact Hours(L-T-P): 3-1-0
Engineering Mathematics-III Course Outlines

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 SERIES & Z TRANSFORM – Expansion of simple functions in Fourier series. Half range series, Change of intervals, Harmonic analysis. Z Transforms: Introduction, Properties, Inverse Z Transform.
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
4. Advanced Engineering Mathematics, Irvin Kreyszig, Wiley
5. Mathematical Methods, Dutta, D., New Age
6. Text BOOK Of Engineering Mathematics, Dutta, New Age

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Contact Hours(L-T-P): 3-1-0
Network theory- course outlines

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.
TRANSIENTS ANALYSIS: Response of circuits to Impulse, step, ramp and sinusoidal inputs. Analysis of first order and second order circuits. Time domain & frequency domain analysis. Initial and final value theorem. Complex periodic waves and their analysis by Fourier analysis. Different kinds of symmetry. Power in a circuit.
NETWORK FUNCTIONS & SYNTHESIS : Terminals and terminal pairs, driving point impedance transfer functions, poles and zeros. Procedure of finding network functions for general two terminal pair networks. Stability & causality. Hurwitz polynomial, positive real function. RL & RC networks synthesis, Foster First & Second forms, Cauer forms.
TWO PORT NETWORKS: Two port parameters and their interrelations, z –parameter, yparameters, h-parameters, ABCD parameters. Equivalence of two ports, transformer equivalent, interconnection of two port networks; Image parameters. Attenuation and phase shift in symmetrical T- and O - networks.
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
8. Circuits And Network: Analysis, Design, And Synthesis, Sukhija, Oxford
9. Basic Engineering Circuit Analysis, Irwin, Wiley
10. Network Analysis & Synthesis, Kuo, Wiley
11. Network Theory: Analysis And Synthesis, Smarjit Ghosh, PHI
12. Basic Circuit Theory, Lawrence P. Huelsman, PHI
13. Electric Circuit Analysis, Xavier, S.P. Eugene, New Age

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Contact Hours(L-T-P): 3-1-0
Electronic Devices and Circuits- Course Outlines

SEMICONDUCTOR PHYSICS: Introduction of Semiconductor, Mobility and conductivity, Fermi Dirac distribution, carrier concentrations and Fermi levels in Semiconductos, Generation and recombination of charges, diffusion and continuity equations, Mass action Law, Hall effect.
DIODES AND THEIR CHARACTERSTICS: 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.
TRANSISTORS: Transistor at low frequencies, Graphical Analysis of the CE, CC, CB configuration, Two-Port devices and the hybrid Model, Transistor hybrid model, h-parameters, conversion formulas for the parameters of the three transistor configuration, analysis of a transistor amplifier circuit using h-parameters, Emitter follower, comparison of transistor amplifier configurations, linear analysis of a transistor circuit, cascading transistor amplifiers, Simplified Common-Emitter Hybrid Model, Simplified calculations for the Common-Collector Configuration, .Ebers-Moll model. Biasing & stabilization techniques. Thermal runaway; Thermal stability.
FET & MOSFET: Construction and characteristics of FET and MOSFET, Small-Signal models, The Low-Frequency Common-Source and Common-Drain Amplifiers, The FET as a Voltage-variable Resistor (VVR).
SMALL SIGNAL AMPLIFIERS AT LOW FREQUENCIES: Analysis of BJT and FET, DC and RC coupled amplifiers. Frequency response, midband gain, gains at low and high frequencies. Analysis of DC and differential amplifiers, Cascading Transistor amplifiers, Darlington pair; Emitter follower, The Common-Emitter Amplifier with an emitter resistance.

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

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Contact Hours (L-T-P) : 3-0-0
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.
SEQUENTIAL CIRCUITS :Flip flops – SR, JK, T, D, Master/Slave Flip-flop, triggering of Flip-flop, Analysis of clocked sequential circuits – their design, state minimization, moore/mealy model, state assignment, circuit implementation. Shift registers, Ripple counters, Synchronous counters, Timing signal, RAM, Memory decoding,
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:

1. Morris Mano, " Digital logic ", Prentice Hall of India, 1998
2. John. F. Wakerly, "Digital design principles and practices", Pearson Education Fourth Edition, 2007 .
3. Charles H. Roth, Jr, "Fundamentals of Logic Design", Fourth edition, Jaico Books, 2002
4. William I. Fletcher, "An Engineering Approach to Digital Design", Prentice- Hall

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Contact Hours(L-T-P): 3-0-0
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.
TRANSDUCERS: 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.
SIGNAL CONDITIONING AND SIGNAL ANALYZERS: DC and AC bridges – Wheatstone, Kelvin, Maxwell, Hay and Schering Bridges; Preamplifier; Isolation amplifier, Filters – Data acquisition systems. Spectrum Analyzers –Wave and Logic analyzers.
DIGITAL INSTRUMENTS Digital Voltmeters, Millimeters, automation in Voltmeter, Accuracy and Resolution in DVM, Guarding techniques, Frequency counter, Data Loggers, Introduction to IEEE 488/GPIB Buses.
DATA DISPLAY AND RECORDING SYSTEMS OSCILLOSCOPES: CRT Construction, Basic CRO circuits, CRO Probes, Oscilloscope Techniques of Measurement of frequency, Phase Angle and Time Delay, Multibeam, multi trace, storage & sampling Oscilloscopes. Curve tracers Dual trace CRO – Digital storage and Analog storage oscilloscope.

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,

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

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
3. An Inteoduction To Programming & Oo Design Using Java, J.Nino&F.A.Hosch, Wiley
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

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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

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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.

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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.
4 Measurements of temperature using Thermocouple.
5 Measurements of pressure using Strain Gauge.
6 Measurements of pressure using Piezo – Electric Pick up.
7 Measurements of distance using capacitive pick up.
8 Measurements of distance using inductive transducer.
9 Measurements of speed of DC Motor using Magnetic Pick up.
10 Measurements of speed of DC Motor using Photo Electric Pick up.

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Electronics Lab

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.
3 Applications of PN junction diode: Half & Full wave rectifier- Measurement of Vrms, Vdc, and ripple factor; use of filter- ripple reduction (RC Filter)-Clipper & Clamper.
4 Properties of junctions Zener diode characteristics. Graphical measurement of forward and reverse resistance.
5 Application of Zener diode: Zener diode as voltage regulator. Measurement of percentage regulation by varying load resistor.
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.
8 Characteristic of silicon-controlled rectifier.
9 To plot V-I Characteristics of DIAC.
10 To draw V-I characteristics of TRIAC for different values of Gate Currents

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

Engineering Mathematics-IV- Course Outlines

NUMERICAL ANALYSIS - Finite differences – Forward, Backward and Central differences. Newton's forward and backward differences, interpolation formulae. Stirling's formula, Lagrange's interpolation formula.
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 Runga-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:
1. Advanced Engg. Mathematics-4, S.K.Dadhich, N.K.
2. Advanced Engg. Mathematics, Irvin Kreyszig, Wiley
3. Applied Statics & Probability, Montgomery, Wiley

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Applied Electronics-Course Outlines

FEEDBACK AMPLIFIERS AND STABILITY Basic feedback concepts – Properties of Negative feedback – Four feedback topologies with amplifier circuit. Examples – Analysis of series – shunt feedback amplifiers – stability problem – Frequency compensation.

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

TUNED AMPLIFIERS Basic principles – Inductor losses – Use of transformers – Single tuned amplifier frequency analysis - Amplifier with multiple tuned circuits – Cascade – Synchronous tuning – Stagger tuning – Stability of tuned amplifiers using Neutralization techniques.

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:

1 David .A. Bell, Solid state pulse circuits, Prentice Hall of India,1992.
2. F. Bogart Jr. Electronic Devices and Circuits 6th Edition, Pearson Education,2007.
3 Paul Gray, Hurst, Lewis, Meyer," Analysis and Design of Analog Integrated Circuits", 4th Edition ,. John Willey
& Sons 2005

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

Data Structures and Algorithms-Course Outlines

PERFORMANCE MEASUREMENT: Space complexity and Time complexity, big oh,omega and theta notations and their significance. Linear Lists - Array and linked representation, Singly & Doubly linked lists. Concept of circular linked lists.

ARRAY & MATRICES - Row and Column Major mapping & representation, irregular 2D array, Matrix operations, Special matrices: diagonal, tri-diagonal, triangular, symmetric. Sparse matrices representation and its transpose.

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, indexedbinary search tree, basic operation, AVL tree, B-tree.

GRAPHS - Representation of un weighted graphs, BFS, DFS, Minimum cost spanning trees, Single source shortest path. Sorting - Bubble sort, insertion sort, merge sort, selection sort, quick sort, heap sort.

Suggested Books

1. Data Structures (Spl. Indian Edition) (Schaums' 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

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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.

AMPLITUDE MODULATION: Frequency translation, Recovery of base band signal, Spectrum & power relations in AM systems. Methods of generation & demodulation of AMDSB, AM-DSB/SC and AM-SSB signals. Modulation & detector circuits for AM systems. AM transmitters & receivers.

FREQUENCY MODULATION: Phase & freq. modulation & their relationship, Spectrum & band width of a sinusoidally modulated FM signal, phasor diagram, Narrow band & wide band FM. Generation & demodulation of FM signals. FM transmitters & receivers. Comparison of AM, FM & PM. Pre emphasis & de-emphasis. Threshold in FM, PLL demodulator.

NOISE IN AM AND FM: Calculation of signal-to-noise ratio in SSB-SC, DSB-SC and DSB with carrier, Noise calculation of square law demodulator & envelope detector. Calculation of S/N ratio in FM demodulators, Super heterodyne receivers.

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.

AUTOMATIC TELEPHONY & TELEGRAPHY: Trunking concepts, Grade of service, Traffic definitions, Introduction to switching networks, classification of switching systems. Principle of Electronic Exchange, EPABX and SPC Digital telephone exchange, numbering Plan, Fascimile services.

Suggested Books:

1. Modern Digital & Analog Communication Systems, Lathi, Oxford
2. Analog Communication, Chandrasekhar, Oxford
3. An Introduction To Analog & Digital Communications-, Haykins, Wiley
4. Digital And Analog Communication Systems-, Shanmugam, Wiley
5. Communications Systems, 4ed-, Haykins, Wiley
6. Principles Of Communication Systems, Herbert Taub, Donald Schilling, Goutam Saha-TMH
7. Communication Systems, R Singh, S. Sapre, TMH
8. Analog Communication, K. N. Hari Bhat, Pearson
9. Digital & Analog Communication Systems, Leon W. Couch, Pearson

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Contact Hours (L-T-P): 3-1-0
Electromagnetic Fields Theory- Course Outlines

STATIC ELECTRIC FIELD Introduction to co-ordinate systems , Gradient , Divergence , Curl , Divergence theorem, Stokes theorem , Coulombs 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 equation and their application, Numerical problems
STATIC MAGNETIC FIELD Magnetic field of a current carrying element ,Ampere's law , The Biot-Savart Law ,Magnetic flux Density and Field intensity , Gauss law for magnetic fields , Torque, Magnetic moment ,Magneto motive force , Permeability , Vector potential , Field computation. Inductance, Energy in an Inductor and Energy density, Boundary relation, Hysterisis, Reluctance and Permeance. 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.
TRANSMISSION LINE APPLICATIONS: Smith chart and its application. Transmission line applications, Impedance matching Network. Single & double Stub matching. Measurement of parameters of transmission line, measurement of attenuation, insertion loss, reflection coefficient and standing wave ratio.
Suggested Books:
1. Karl E.Longman and Sava V.Savov, "Fundamentals of Electro-Magnetics" , Prentice Hall of India, 2006
2. Kraus, Fleisch, "Electromagnetics with Applications", McGraw-Hill, 2005
3. W.H.Hayt and A.Buck,"Engineering ElectroMagnetics" , 7th Edition, Mcgra Hill,2006
4. Ashutosh Pramanik," ElectroMagnetism" ,Prentice Hall of India, 2006
5. Nannapaneni Narayana Rao," Elements of Engineering Electro Magnetics", 6th edition, Prentice Hall of India,
2006
6. David .K.Cheng, "Field and wave Electromagnetics" , 2nd edition, Pearson education, 2004.
7. Mathew.N.O.Sadiku, "Elements of Electromagnetics", Oxford University Press,2006

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

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 Auto-correlation functions – Crosscorrelation functions – Properties of Power spectral density, Cross-spectral density.

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

1. Yates, R.D. and Goodman, D.J., "Probability and Stochastic Processes", John Wiley and Sons, 2nd edition,
(2005).
2. Stark, H. and Woods, J.W., "Probability and Random Processes with Applications to Signal Processing",
Pearson Education, Asia, 3rd edition, (2002).
3. Miller, S.L. and Childers, D.G.,"Probability and Random Processes with Applications to Signal Processing and
Communications", Academic Press, (2004).
4. Hwei Hsu, "Schaum's Outline of Theory and Problems of Probability, Random Variables and Random Processes", Tata McGraw Hill edition, New Delhi, (2004).
5. Ibe, O.C.,"Fundamentals of Applied Probability and Random Processes", Elsevier, 1st Indian Reprint, (2007).
6. Peebles, P.Z., "Probability, Random Variables and Random Signal Principles", Tata McGraw Hill, 4th edition,
New Delhi, (2002).

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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.

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Electronics Workshop

List of Experiments

1 Introduction & Hands on experience to use circuit creation & simulation software like TINAPRO , 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 bread board.

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.

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Contact Hours per week: 2 hrs

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.

JECRC UNIVERSITY
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B.Tech in Electronics and Communication Engineering Semester V
Contact Hours (L-T-P): 3-0-0

Linear Integrated Circuit-Course Outlines

OPERATIONAL AMPLIFIERS: Basic differential amplifier analysis, Single ended and double ended configurations, Op-amp configurations with feedback, Op-amp parameters, Inverting and Non-Inverting configuration, Comparators, Adder**.**

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

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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.

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Microwave Engineering-Course Outlines

WAVEGUIDES: Introduction of Microwaves and their applications. Rectangular Waveguides, Solution of Wave equation in TE and TM modes. Power transmission and Power losses. Excitation of modes in Rectangular waveguides, circular waveguides - Basic idea of TE, TM and TEM mode of propagation. Rectangular cavity and circular cavity resonators. Waveguide Tees, Magic Tees. Hybrid ring, Circulators and isolators.

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
6. Foundations For Microwave Engineering – R.E. Collin, R.E. Collin, Wiley
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

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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

3. Modern Microprocessors, Korneev, Wiley

4. The 8085 Microprocessor: Architecture, Programming And Interfacing, K. Udaya Kumar, Pearson

5. Microprocessor Interfacing And Applications, B.P.Singh, New Age

6. Microprocessor: Architecture, Programming And Application For 8085, Goankar, Penram International

7. Microprocessor: Architecture, Programming And System Featuring In 8085, William A.Routt, Delmur Pub

8. The 8051 Microcontrollers & Embedded Systems, Mazidi, Pearson

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Computer Architecture-Course Outlines

Introduction to Computer Architecture and Organization: Von Neuman Architecture, Flynn Classification. Register Transfer and Micro operations - Register transfer language, Arithmetic Micro-operations, Logic Micro-operations, Shift Micro-operations, Bus and memory transfers. Computer Organization and Design - Instruction cycle, computer registers, common bus system, computer instructions, addressing modes, design of a basic computer

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:

1. Computer Organization and Architecture - William Stallings (Pearson Education Asia)

2. Computer Organization and Architecture -John P. Hayes (McGraw -Hill)

3. Computer Organization -V. Carl. Hamacher (McGraw-Hill)

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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]
6. **Web Engineering:** Attributes of web-based applications, web e-process and formulation, analyzing web-based systems. [4]
7. **Advance Topics:** Software re-use, re-engineering, computer aided software engineering. [4]

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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
9. Modern Digital And Analog Communication Systems, Lathi, Oxford
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
14. Principle Of Digital Communication, J.Das, New Age
15. Digital Commnunication, Barry John, Le, Edward, David.G, Springer

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Communications Lab

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.

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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

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Electronics Engineering Design Lab

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 using741.

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.

6 Design of Schmitt trigger using 741.

7 Assembly and test of a sample-and-hold circuit using 398.

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.

11 Generation of square and triangular waveforms using 741.

12 Operation of D/A converter 0800

13 Operation of A/D converter 0809 and demonstration of continuous conversion,cascading of A/D and D/A converter.

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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.

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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, di/dt and 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.

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Control System-Course Outlines

CONTROL SYSTEM ANALYSIS AND COMPONENTS: Examples and application of open loop and close loop systems. Brief idea of multivariable control system, Brief idea of Ztransform and digital control systems. Differential equations. Determination of transfer function by block diagram reduction technique & signal flow graph method.
TIME RESPONSE ANALYSIS OF FIRST ORDER & SECOND ORDER SYSTEMS: Transient response analysis. Steady state error & error constants. Dynamic error and dynamic error coefficient, Performance Indices.
FREQUENCY DOMAIN METHODS: Bode plot, Design specification in frequency domain and their co-relation with time domain.
SYSTEM STABILITY: Absolute stability and relative stability. Routh's stability criterion, Hurwitz criterion. Root locus method of analysis. Polar plots, Nyquist stability criterion. M and N loci, Nicholas charts.
STATE VARIABLE ANALYSIS: Concepts of state, state variable and state model. State models for linear continuous time systems. Brief idea of state variable analysis in discrete time domain. Transfer functions, Solution of state equation. Concepts of controllability & observability

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
4. Control Systems: Principles & Design, M. Gopal, TMH
5. Control Systems Engineering, S. K. Bhattacharya, Pearson
6. Design Feedback Controk System, Stefani, Oxford
7. Systems And Control, Zak, Oxford
8. Automatic Control Systems, B. C. Kuo, Wiley
9. Control Systems Engg., Norman S. Nise, Wiley
10. Control System, N.K.Sinha, New Age
11. Control System Engineering, J.Nagrath, New Age
12. Control System, Ghosh, Pearson

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Signals and Systems-Course Outlines

INTRODUCTION: Continuous time and discrete time systems, Properties of systems. Linear time invariant systems - continuous time and discrete time. Properties of LTI systems and their block diagrams. Convolution, Discrete time systems described by difference equations.

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.

Z-TRANSFORM & LAPLACE TRANSFORM: Introduction. The region of convergence for the Z-transform. The Inverse Z-transform. Two dimensional Z transform. Properties of Z transform. Laplace transform, Properties of Laplace Transform, Application of Laplace transform to system analysis.

SAMPLING: Mathematical theory of sampling. Sampling theorem. Ideal & Real sampling. Interpolation technique for the reconstruction of a signal from its samples. Aliasing. Sampling in freq. domain. Sampling of discrete time signals.

Suggested Books:

1. Principles Of Linear Systems And Signals, 2e (Intl. Version), Lathi 2nd, Oxford

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

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VLSI Design- Course Outlines

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.

Layouts - Simple Gates and Layout issues. Layout issues for inverter, Layout for NAND and NOR Gates, Complex Logic gates Layout, Layout optimization for performance.

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

4. Modern Vlsi Design, Wayne Wolf, Pearson

5. Principles Of Cmos Vlsi Design, Neil H.E.Weste, Pearson

6. Cmos Logic Circuit Design, Uyemura, John P., Springer

7. Vlsi Design, Shanthi, A. Kavitha, A., New Age International

8. Vlsi Design And Technology, Bose, D.N., New Age International

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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.

POWER SUPPLIES: Principle of operation of choppers. Step up, Step down and reversible choppers. High frequency electronic ballast, Switch Mode Power Supply: Fly back converter, forward/buck converter, Boost converter and buck-boost converter. Uninterruptible Power Supply.

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, Ttti, TMH

4. Power Electronics: Converters Applications., Mohan, Robbins, Wiley

5. Power Electronics, Moorthi, Oxford

6. Elements Of Power Electronics, Krein, Oxford

7. Power Electronics, R.S.Murthy, Pearson

8. Power Electronics: Circuits, Devices And Applications, Muhammad.H.Rashid, Pearson

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Microcontroller and Embedded System- Course Outlines

THE 8051 MICROCONTROLLER: Introduction, The 8051 microcontroller hardware, I/O pins, Ports, External memory, Counters and Timers, Serial Data Transfer. Interrupts.

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.

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

INTRODUCTION TO EMBEDED SYSTEM: Application of Microcontrollers in interfacing, Robotics and MCU based measuring instruments. Real Time Operating Systems for System Design, Multitasking Systems, Task Definition in a Multitasking System, Round Robin Scheduling. Full Pre-emptive Scheduling, Basic study and Features of Commercial RTOS : Embedded Window and Linux.

Suggested Books:

1. B. B. Brey: The Intel Microprocessors, Architecture, Programming and Interfacing, Pearson Education.

2. Liu Gibson: Microcomputer Systems: The 8086/8088 Family- Architecture, Programming And Design , PHI

3. D. V. Hall: Microprocessors and Interfacing, TMH

4. Mazidi and Mazidi: The 8051 Microcontroller and Embedded Systems, Pearson Education. Ayala Kenneth:-

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,

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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

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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.

FILTER DESIGN TECHNIQUES - Introduction, Analog filter Design - Butterworth & Chebyshev. IIR filter design by impulse invariance & Bilinear transformation. Design of FIR filters by Windowing, Rectangular, Hanning, Hamming & Kaiser.

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*
3. *Digital Signal Processing: Principals, Algorithms And Applications, John G.Proakis, Dimitris G Manolakis, PHI*
4. *Digital Signal Processing, A.V. Oppenheim And R.W. Schaffer, PHI*
5. *Digital Signal Processing, Thomas J. Cavicchi, John Wiley & Sons*
6. *Digital Signal Processing, Emmanuel Ifeachor, 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*

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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 Expitaxy, 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

3. Fundamentals Of Semiconductor Fabrication, Gary S. May, S.M.Sze, John Wiley & Sons

4. Semiconductor Devices: Physics And Technology, Simon M. Sze, John Wiley & Sons

5. Introduction To System Design Using Integrated Circuits, Sonde, B.S., New Age International

6. Micro-Nanofabricationtechnologies And Applications, Cui, Zheng, Springer

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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:

1. Gillet B.E: Introduction to Operation Research, Computer Oriented Algorithmic approach - Tata McGraw Hill
Publishing Co. Ltd. New Delhi.
2. P.K. Gupta & D.S. Hira, "Operations Research", S.Chand & Co.
3. J.K. Sharma, "Operations Research: Theory and Applications", Mac Millan.
4. S.D. Sharma, "Operations Research", Kedar Nath Ram Nath, Meerut (UP).
5. S.S. Rao "Optimization Theory and Application", Wesley Eastern.
6. Tata Handy, A "Operations Research - An Introduction", Fifth Edition, Prentice Hall of India Pvt. Ltd., New Delhi.
7. Taha H.A. "Operations Research an Introduction" McMillan Publication

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Radar and satellite Communication-Course Outlines

RADAR - Radar Block diagram, Frequencies and Applications. Radar range Equation. Continuous Wave (CW) & FM radar.

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 HandOBOOK, 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

5. Satellite Communications ,Timothy Pratt, Charles Bostian And, John Wiley & Sons.

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Engineering Economics-Course Outlines

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.

4. **Replacement Analysis:** Capital recovery, depreciation methods for replacement studies.

5. **Optimization Techniques:** Economics and optimization, price mechanism and optimal resource allocation, optimization under constraints, optimization under risk and uncertainty, optimization with multiple objectives.

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Computer Networks-Course Outlines

QUEUING THEORY- Pure birth, Pure death & Birth-death processes, Mathematical models for M/M/1, M/M/ı, 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.

NETWORK LAYER- Network layer Design issues. Adaptive & Non-adaptive routing algorithms, Congestion control algorithms for TCP/IP networks, Internetworking. Network layer in the Internet: IPv4 & IPv6 Protocols, OSPF and BGP. TCP Protocol architecture.

ATM NETWORKS- Connection Oriented Networks: X.25, Frame Relay & ATM. ISDN system architecture. Broadband ISDN. ATM Protocol architecture, Recognition Algorithm in ATM Networks and Congestion control Algorithms.

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 Inernet, Halsell, Pearson

6. Digital Telephony, 3rd Ed, James Irvine & David Harle, Wiley

7. Line Communication System: Telecommunication Switching Approach, Das, Apurba,

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Image Processing-Course Outlines

INTRODUCTION: Imaging in ultraviolet and visible band. Fundamental steps in image processing. Components in image processing. Image perception in eye. Light and Electromagnetic Spectrum, Image sensing and Acquisition using sensor array.

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:

1. Digital Image Processing Using MATLAB, Gonzalez, Woods and Eddins, Gatesmark Publishing

2. Applications of Pattern Recognition, Fu, K.S., CRC Press

3. Digital Image Restoration, Andrews, H.C. Hunt, B.R., Prentice Hall, Englewood Cliffs.

4. Applications of Digital Signal Processing, Oppenheim, A.V.,Prentice Hall Englewood Cliffs.

5. Digital Image Processing, Gonzalez, R.C. & Wintz, P.A., Reading, Addison-Wesley.

6. Digital Image Processing, Pratt, W.K., New York: Wiley

7. Digital Image Processing of Remotely Sensed Data, Hord, R.M., Academic Press.

8. Pattern Recognition: Human and Mechanical, Watanabe, S., Wiley

9. Fundamentals of Digital Image Processing, Jain, A.K., Prentice Hall

10. Algorithms for Graphics and Image Processing, Pavlidis, T., Computer Sc.Press

11. Selected Papers on Digital Image Processing, Trivedi, M.M., Optical Engg Press.

12. The Image Processing Handbook, Ross, J.C., CRC Press, Boca Raton

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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.

PROGRAMMABLE ASIC INTERCONNECT, DESIGN SOFTWARE AND LOW LEVEL DESIGN ENTRY : Actel ACT -Xilinx LCA - Xilinx EPLD - Altera MAX 5000 and 7000 - Altera MAX 9000 - Altera FLEX –Design systems - Logic Synthesis - Half gate ASIC - Schematic entry - Low level design language - PLA tools -EDIF- CFI design representation.

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:

1. M.J.S .Smith, "Application Specific Integrated Circuits ", Addison -Wesley Longman Inc.,1997

2. Andrew Brown, "VLSI Circuits and Systems in Silicon", McGraw Hill, 1991 S.D. Brown, R.J. Francis, J. Rox,

Z.G. Vranesic, "Field Programmable Gate Arrays", Kluwer Academic Publishers, 1992.

3. Mohammed Ismail and Terri Fiez, "Analog VLSI Signal and Information Processing",

4. McGraw Hill, 1994.

5. S. Y. Kung, H. J. White House, T. Kailath, "VLSI and Modern Signal Processing ",Prentice Hall, 1985.

6. Jose E. France, Yannis Tsividis, "Design of Analog & Digital VLSI Circuits for Telecommunication and SignalProcessing", Prentice Hall, 1994

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VHDL Lab

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.

11. Schematic design and make Device Level Layout of Various circuits with Op-Amp

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Signal Processing Lab - I

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).

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Wireless and Mobile Communication-Course Outlines

PROPAGATION PHENOMENA - Fundamentals of fading, Multipath channels, Spread Spectrum signals: Direct-sequence spread spectrum signals, p-n sequences, Frequency-hopped spread spectrum signals, Code-division multiplexing.

LINE-OF-SIGHT MICOWAVE 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.

CELLULAR WIRELESS NETWORKS-, GSM: Introduction, overview of the GSM systems, GSM codec, channel coding and interleaving, radio like control. Cordless systems and WLL, Mobile IP, Wireless access protocol. Wireless LAN's: Technology, IEEE 802.11 standards and Blue tooth. Broadband Wireless 802.16

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

Suggested Books:

1. Mobile Cellular Telecommunications, W.C.Y. Lee, TMH
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
6. Wireless Communications, Theodore S. Rappaport, Pearson
7. Wireless Communication And Networking, William Stallings, Pearson
8. Wireless Communication, Upena Dalal, Oxford
9. Broadband Wireless Communications, Jiangzhou Wang, Springer
10. Wireless And Mobile Communication, Kumar, Sanjeev, New Age International

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

Antenna and wave Propagation-Course Outlines

ANTENNA FUNDAMENTALS - Antenna parameters, Radiation from a current element in free space. Quarter & half wave antenna. Reciprocity theorem. Resonant and non-resonant antenna. Effective length, aperature gain, beamwidth, directivity, radiation resistance, efficiency, polarization, impedance and directional characteristics of antenna, antenna temperature.

TYPES OF ANTENNAS - V and Rhombic antennas, Folded dipole, Yagi-Uda antenna Frequency independent antennas, Log-periodic antennas, UHF and Microwave antennas. Antenna with parabolic reflectors, Horn and Lens antennas, Helical antennas, Square and Circular loop antennas, Fundamentals of Slot and Microstrip antennas.

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.

VARIOUS IONOSPHERIC LAYERS. Characteristics of ionosphere and its effects on wave propagation. Critical frequency, Virtual height, skip zone & maximum usable frequency. Multiple hop transmission. Oblique & vertical incidence transmission. Effect of earth's magnetic field, solar activity and meteorological conditions on wave propagation.

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

4. Antenna Theory & Design, Robert S. Elliott, John Wiley & Sons

5. Antennas And Wave Propagation, G. S. N. Raju , Pearson

6. Antennas And Wave Propagation, A.R. Harish, M. Sachidananda, Oxford

7. Antenna Hand

8. Antenna Theory, Y. T. Lo, S. W. Lee, Springer

9. Antenna Theory And Practice, Chatterjee, R., New Age International

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Optical Communication-Couse Outlines

OPTICAL FIBERS - Basic optical laws and definitions, Principles of light propagation in fibers, Ray theory, Optical fiber modes and configurations, Step index and graded index fibers. Monomode and multimode fibers, Fiber materials, fiber fabrication, Fiber optic cables. Attenuation, signal distortion in optical fibers, Dispersionintra modal & inter modal, Dispersion shifted and flattened fiber.

OPTICAL SOURCES - LED's- Structure, Materials, Characteristics, Modulation, Power & efficiency, Laser Diodes - Basic concept, Hetro Structure, properties and modulation.

OPTICAL DETECTORS - PIN and Avalanche photo diodes, photo detector noise, detector response time, Avalanche multiplication noise. Photo diode materials. Fundamental of Optical Receiver Operation.

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

6. Introduction To Optical Fiber Communications Systems, William B. Jones, Oxford

7. Optical WDM Networks - Principles and Practice, Biswanath Mukherjee, Oxford

8. Optical Fiber Communication: Principles And Practice,: John M Senior, Pearson

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

13. Optical Fiber Communication: Principles And Systems, Selvarajan, A, TMH

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

Operating System-Course Outlines

INTRODUCTION – History, Operating system services, types, responsibilities, generations, LINUX, WINDOWS.

PROCESS MANAGEMENT- Operations on process, Process state, Scheduling, Criteria, scheduling algorithms, Evaluation, Synchronization, Semaphores, Monitors.

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

INFORMATION MANAGEMENT- File and directory concept, Access methods, Protection, Free space management, Efficiency and performance, Access matrix, Capability-based systems, Program-threats, User authentication, Firewall.

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

7. Operating Systems: Internals And Design Principles, William Stallings, Pearson

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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 REPRESENTATION- Syntax Semantics, Inference Rules, Non-deductive Inference methods, and representations using rules, forward chaining and backward chaining. Fuzzy Logic & Natural languages computations. Probabilistic Reasoning. Object Oriented Representations.

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".
3. Winston, "LISP", Addison Wesley.
4. Marcellous, "Expert Systems Programming", PHI.
5. Elamie, "Artificial Intelligence", Academic Press.

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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

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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.

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Wireless and Optical Communications 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.