SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

SEMESTER: III

CATEGORY: BSC

SUBJECT CODE: BE-31

SUBJECT NAME: ENGINEERING MATHEMATICS (Probability Distribution & Statistics)

Time: 60 HRS

COURSE OBJECTIVES: - Study and analysis of heat transfer concepts applicable for steady state with and without heat generation and transient conditions.

UNIT I (8 Hrs)

Numerical Methods – 1: Solution of polynomial and transcendental equations – Bisection method, Newton-Raphson method and Regula-Falsi method. Finite differences, Relation between operators, Interpolation using Newton's forward and backward difference formulae. Interpolation with unequal intervals: Newton's divided difference and Lagrange's formulae.

UNIT II (8Hrs)

Numerical Methods – 2 Numerical Differentiation, Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8 rules. Solution of Simultaneous Linear Algebraic Equations by Gauss's Elimination, Gauss's Jordan, Crout's methods, Jacobi's, Gauss-Seidal, and Relaxation method.

UNIT III (8Hrs)

Numerical Methods – 3: Ordinary differential equations: Taylor's series, Euler and modified Euler's methods. RungeKutta method of fourth order for solving first and second order equations. Milne's and Adam's predicator-corrector methods. Partial differential equations: Finite difference solution two dimensional Laplace equation and Poission equation, Implicit and explicit methods for one dimensional heat equation (Bender-Schmidt and CrankNicholson methods), Finite difference explicit method for wave equation.

UNIT IV (8 Hrs)

Transform Calculus: Laplace Transform, Properties of Laplace Transform, Laplace transform of periodic functions. Finding inverse Laplace transform by different methods, convolution theorem. Evaluation of integrals by Laplace transform, solving ODEs by Laplace Transform method, Fourier transforms.

UNIT V (8 Hrs)

Concept of Probability: Probability Mass function, Probability Density Function, Discrete Distribution: Binomial, Poisson's, Continuous Distribution: Normal Distribution, Exponential Distribution.

Statistics

UNIT VI (8 Hrs)

Basic Statistics: Measures of Central tendency: Moments, skewness and Kurtosis - Probability distributions: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions, Correlation and regression – Rank correlation.

UNIT VII (8 Hrs)

Applied Statistics: Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves. Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.

UNIT VIII (4 Hrs)

Small samples: Test for single mean, difference of means and correlation coefficients, test for ratio of variances -Chi-square test for goodness of fit and independence of attributes.

COURSE OUTCOMES:-

i)To develop logical understanding of the subject.

ii) To develop mathematical skill so that students are able to apply mathematical methods & principals in solving problem from engineering fields.

iii) To make aware students about the importance and symbiosis between Mathematics and Engineering.

TEXT BOOKS/REFERENCE:

1. P. Kandasamy, K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand & Company, 2nd Edition, Reprint 2012.

2. S.S. Sastry, Introductory methods of numerical analysis, PHI, 4th Edition, 2005.

3. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

4. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2010.

5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

6. Veerarajan T., Engineering Mathematics, Tata McGraw-Hill, New Delhi, 2008.

7. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003 (Reprint).

SEMESTER: III

CATEGORY: CORE

SUBJECT CODE: ET-31

SUBJECT NAME: SIGNALS AND SYSTEMS

Time: 60 HRS

COURSE OBJECTIVES: - Students will try to learn:

1. To introduce students the concept and theory of signals and systems needed in electronics and telecommunication engineering fields.
2. To introduce students to the basic idea of signal and system analysis and its characterization in time and frequency domain

UNITI (12 Hrs)

Energy and power signals, continuous and discrete time signals, continuous and discrete amplitude signals. System properties: linearity: additivity and homogeneity, shift-invariance, causality, stability, reliability.

UNIT II (12 Hrs)

Linear shift-invariant (LSI) systems, impulse response and step response, convolution, input-output behavior with aperiodic convergent inputs. Characterization of causality and stability of linear shift invariant systems. System representation through differential equations and difference equations.

UNIT III (12 Hrs)

Periodic and semi-periodic inputs to an LSI system, the notion of a frequency response and its relation to the impulse response, Fourier series representation, the Fourier Transform, convolution/multiplication and their effect in the frequency domain, magnitude and phase response, Fourier domain duality. The Discrete-Time Fourier Transform (DTFT) and the Discrete Fourier Transform (DFT). Parseval's Theorem. The idea of signal space and orthogonal bases.

UNIT IV (12 Hrs)

The Laplace Transform, notion ofeigen functions of LSI systems, a basis of eigen functions, region of convergence, poles and zeros of system, Laplace domain analysis, solution to differential equations and system behavior.

The z-Transform for discrete time signals and systems- eigen functions, region of convergence, z-domain analysis.

UNIT V (12 Hrs)

State-space analysis and multi-input, multi-output representation. The state-transition matrix and its role. The Sampling Theorem and its implications- Spectra of sampled signals. Reconstruction: ideal interpolator, zero-order hold, first-order hold, and so on. Aliasing and its effects. Relation between continuous and discrete time systems.

COURSE OUTCOMES:

At the end of this course students will demonstrate the ability to

1. Analyze different types of signals
2. Represent continuous and discrete systems in time and frequency domain using different Transforms
3. Investigate whether the system is stable
4. Sampling and reconstruction of a signal

TEXT/REFERENCE BOOKS:

1. A.V. Oppenheim, A.S. Willsky and I.T. Young, "Signals and Systems", Prentice Hall, 1983.

2. R.F. Ziemer, W.H. Tranter and D.R. Fannin, "Signals and Systems - Continuous and Discrete", 4^{th} edition, Prentice Hall, 1998.

3. Papoulis, "Circuits and Systems: A Modern Approach", HRW, 1980.

4. B.P. Lathi, "Signal Processing and Linear Systems", Oxford University Press, c1998.

5. Douglas K. Lindner, "Introduction to Signals and Systems", McGraw Hill International Edition:c 1999.

6. Simon Haykin, Barry van Veen, "Signals and Systems", John Wiley and Sons (Asia) Private Limited, c1998.

7. Robert A. Gabel, Richard A. Roberts, "Signals and Linear Systems", John Wiley and Sons, 1995.

8. M. J. Roberts, "Signals and Systems - Analysis using Transform methods and MATLAB", TMH,2003.

9. J. Nagrath, S. N. Sharan, R. Ranjan, S. Kumar, "Signals and Systems", TMH New Delhi, 2001.

10. Ashok Ambardar,"Analog and Digital Signal Processing", 2nd Edition, Brooks/ Cole Publishing Company (An international Thomson Publishing Company), 1999.

SEMESTER: III

CATEGORY: CORE

SUBJECT CODE: ET32

SUBJECT NAME: ELECTRONIC DEVICES

Time: 60 HRS

COURSE OBJECTIVES:-

Students will try to learn:

1. To understand operation of semiconductor devices.
2. To understand DC analysis and AC models of semiconductor devices.
3. To apply concepts for the design of Regulators and Amplifiers
4. To verify the theoretical concepts through laboratory and simulation EXPERIMENTS.
5. To implement mini projects based on concept of electronics circuit concept

UNIT-I (12 Hrs)

Semiconductor intrinsic and extrinsic, p-type and n-type, energy band diagrams, majority and minority carrier, charge density in semiconductor, generation and recombination of charges, process of diffusion, diffusion and drift currents, Hall effects and its applications. p-n junction, depletion layer, potential barrier, electric field, forward and reverse biased junction, current components in p-n diode, current equation, V-I characteristics, cut in voltages of Si and Ge diode, transition and diffusion capacitance, power dissipation.

UNIT-II (12 Hrs)

Diode Family and Applications: Diodes Family: Characteristics and application of p-n junction diode, Zener diode, avalanche diode, Varactor diode, Schottky diode, Tunnel Diode, PIN diode, LED, photodiodes, phototransistors, p-n junction. Applications: diode as rectifier, clipper and clamper, The diode as a circuit element, The Load line concept, The Pieceswise linear diode modal, Clipping circuits, Clipping at two independent levels, Comparators, Sampling Gate, Rectifiers, Other full wave circuits, Capacitor filter additional diodes circuits.

UNIT-III (12 Hrs)

Bipolar junction transistor - Construction, basic operation, current components and equations,. CB, CE and CC-configuration, input and output characteristics, Early effect, region of operation, active, cutoff and saturation region Ebers-Moll model, , power dissipation in transistor (Pdmax rating), Photo transistor, Uni-junction Transistor (UJT) : Principle of operation, characteristics.

UNIT-IV (12 Hrs)

Amplifier Basics, Transistor as an amplifier, load line, Q-point and its selection criteria, designing of fixed bias and self-bias, stability of biasing circuits, calculation of stability factor. Transistor at low frequency: frequency response, bandwidth, h-parameter analysis of CC, CB and CE configuration, simplified model, gain and impedance calculation of single stage amplifier. Transistor at high frequency, high frequency model (hybrid-π), Parameters and their definition, Miller capacitance and its effect on voltage gain.

UNIT-V (12 Hrs)

FET construction- Construction, n channel and p channel, characteristics, parameters, Equivalent model and voltage gain, Enhancement and depletion MOSFET and its Characteristics, analysis of FET in various configuration.

COURSE OUTCOMES:

At the end of this course students will demonstrate the ability to

1. Understand the principles of semiconductor Physics
2. Understand and utilize the mathematical models of semiconductor junctions and MOS-transistors for circuits and systems.

REFERENCE:

1. Boylestad and Nashelsky: Electronic Devices and Circuit Theory, Pearson Education
2. Millman and Halkias: Integrated electronics, TMH
3. Graham Bell: Electronic Devices and Circuits, PHI

4. Sendra and Smith: Microelectronics, Oxford Press.

5. Donald A Neamen: Electronic Circuits Analysis and Design, TMH.

LIST OF EXPERIMENTS:

All EXPERIMENTS (wherever applicable) should be performed through the following steps.

Step 1: Circuit should be designed/drafted on paper.

Step 2: The designed/drafted circuit should be simulated using Simulation Software

Step 3: The designed/drafted circuit should be tested on the bread board and compare the results With the simulated results.

Step 4: The bread board circuit should be fabricated on PCB by one batch using PCB machine.

1. V-I characteristics of various Diodes (p-n, Zener, Varactor, Schottky, Tunnel, Photodiode etc)
2. Application of diode as clamper, clipper, half wave and full wave rectifier.
3. Characteristics of Transistors (BJT and FET)
4. Study of Power electronic devices (MOSFET, IGBT etc).

SEMESTER: III

CATEGORY: CORE

SUBJECT CODE: ET33

SUBJECT NAME: DIGITAL SYSTEM DESIGN

Time:60 HRS

COURSE OBJECTIVES:-

Students will try to learn:

1. To understand number representation and conversion between different representation in digital electronic circuits.
2. To analyze logic processes and implement logical operations using combinational logic circuits.
3. To understand characteristics of memory and their classification.
4. To understand concepts of sequential circuits and to analyze sequential systems in terms of state machines.
5. To understand concept of Programmable Devices, PLA, PAL, CPLD and FPGA and implement digital system using VHDL.
6. To implement combinational and sequential circuits using VHDL**.**

UNIT I (12 Hrs)

Logic Simplification and Combinational Logic Design: Review of Boolean algebra and De Morgan's Theorem, SOP & POS forms, Canonical forms, Karnaugh maps up to 6 variables, Binary codes, Code Conversion.

UNIT II (12 Hrs)

Introduction to logic gates, Universal gate, MSI devices like Comparators, Multiplexers, Encoder, Decoder, Driver & Multiplexed Display, Half and Full Adders, Subtractors, Serial and Parallel Adders, BCD Adder, Barrel shifter and ALU.

UNIT III (12 Hrs)

Sequential Logic Design: Building blocks like S-R, JK and Master-Slave JK FF, Edge triggered

FF, Rippleand Synchronous counters, Shift registers, Finite state machines, Design of synchronous FSM,Algorithmic State Machines charts. Designing synchronous circuits like Pulse train generator, PseudoRandom Binary Sequence generator, Clock generation.

UNIT IV (12 Hrs)

Logic Families and Semiconductor Memories: TTL NAND gate, Specifications, Noise margin, Propagation delay, fan-in, fan-out, Tristate TTL, ECL, CMOS families and their interfacing, Memory elements, Conceptof Programmable logic devices like FPGA. Logic implementation using Programmable Devices.

UNIT V (12 Hrs)

Input Output Organization: Modes of data transfer – program controlled, interrupt driven and direct memory access, Interrupt structures, I/O Interface, Asynchronous data transfer, I/O processor. Data transfer – Serial / parallel, synchronous/asynchronous, simplex/half duplex and full duplex. Memory organization: Memory Maps, Memory Hierarchy, Cache Memory - Organization and mappings. Associative memory. Virtual memory, Memory Management Hardware.

COURSE OUTCOMES:

At the end of this course students will demonstrate the ability to

1. Design and analyze combinational logic circuits
2. Design & analyze modular combinational circuits with MUX/DEMUX, Decoder, Encoder
3. Design & analyze synchronous sequential logic circuits
4. Use HDL & appropriate EDA tools for digital logic design and simulation

TEXT/REFERENCE BOOKS:

1. R.P. Jain, Modern digital Electronics, Tata McGraw Hill, 4th edition, 2009.
2. Douglas Perry, VHDL, Tata McGraw Hill, 4th edition, 2002.
3. W.H. Gothmann, “Digital Electronics- An introduction to theory and practice”, PHI, 2nd edition ,2006.

4. D.V. Hall, “Digital Circuits and Systems”, Tata McGraw Hill, 1989

5. Charles Roth, “Digital System Design using VHDL”, Tata McGraw Hill 2nd edition 2012.

LIST OF EXPERIMENTS (Expandable):

All EXPERIMENTS (wherever applicable) should be performed through the following steps.

Step 1: Circuit should be designed/ drafted on paper.

Step 2: The designed/drafted circuit should be simulated using Simulation S/W (TINA-V7/ PSPICE/ Labview/ CIRCUIT MAKER).

Step 3: The designed/drafted circuit should be tested on the bread board and compare the results with the simulated results.

Step 4: The bread board circuit should be fabricated on PCB prepared on PCB machine.

1. To study and test of operation of all logic gates for various IC’s (IC#7400,IC#7403,IC# 7408,IC#74332,IC#7486).
2. Verification of Demorgan’s theorem.
3. To construct of half adder and full adder
4. To construct of half subtractor and full subtractor circuits
5. Verification of versatility of NAND gate.
6. Verification of versatility of NOR gate.
7. Designing and verification of property of full adder.
8. Design a BCD to excess-3 code converter.
9. Design a Multiplexer/ Demultiplexer.

SEMESTER: III

CATEGORY: CORE

SUBJECT CODE: ET 34

SUBJECT NAME: NETWORK THEORY

Time: 60 HRS

COURSE OBJECTIVES:

Understand basic concepts of DC and AC circuit behavior. Use complex numbers to develop impedance and admittance concepts and solve ac steady state circuits, and determine dc and single phase ac power in simple passive circuits. Learn the concepts of Two-port Network theory.

UNIT I (12 Hrs)

Introduction to circuit elements R,L,C and their characteristics in terms of linearity & time dependant nature, voltage & current sources controlled & uncontrolled sources KCL and KVL analysis, Nodal & mesh analysis, analysis of magnetically coupled circuits, Transient analysis :- Transients in RL, RC&RLC Circuits, initial conditions, time constants. Steady state analysis- Concept of phasor & vector, impedance & admittance, Network topology, concept of Network graph, Tree, Tree branch & link, Incidence matrix, cut set and tie set matrices, dual networks, Dot convention, coupling co-efficient, tuned circuits, Series & parallel resonance.

UNIT II (12 Hrs)

Network Theorems for AC & DC circuits- Thevenins & Norton's, Superposition's, Reciprocity, Compensation, Substitution, Maximum power transfer, and Millman's theorem, Tellegen's theorem, problems with dependent & independent sources.

UNIT III (12 Hrs)

Frequency domain analysis – Laplace transform solution of Integro-differential equations, transform of waveform synthesized with step ramp, Gate and sinusoidal functions, Initial & final value theorem, Network Theorems in transform domain

UNIT IV (12 Hrs)

Concept of signal spectra, Fourier series co-efficient of a periodic waveform, symmetries as related to Fourier coefficients, Trigonometric & Exponential form of Fourier series.

UNIT V(12 Hrs)

Network function & Two port networks – concept of complex frequency, Network & Transfer functions for one port & two ports, poles and zeros, Necessary condition for driving point & transfer function. Two port parameters – Z,Y, ABCD, Hybrid parameters, their inverse & image parameters, relationship between parameters, Interconnection of two ports networks, Terminated two port network.

COURSE OUTCOMES:

At the end of this course students will demonstrate the ability to

1. Understand basics electrical circuits with nodal and mesh analysis.
2. Appreciate electrical network theorems.
3. Apply Laplace Transform for steady state and transient analysis.
4. Determine different network functions.
5. Appreciate the frequency domain techniques.

REFERENCE:

1. M.E. Van Valkenburg, Network Analysis, (PHI)
2. F.F.Kuo, Network Analysis.
3. Mittal GK; Network Analysis; Khanna Publisher
4. Mesereau and Jackson; Circuit Analysis- A system Approach; Pearson.
5. Sudhakar & Pillai; Circuit & Networks- Analysis and Synthesis; TMH
6. Hayt W.H. & J.E. Kemmerly; Engineering Circuit Analysis; TMH
7. Decarlo lin; Linear circuit Analysis; Oxford
8. William D Stanley : Network Analysis with Applications, Pearson Education
9. Roy Choudhary D; Network and systems; New Age Pub
10. Charles K. Alexander & Matthew N.O. Sadiku: Electrical Circuits :TMH

11. Chakraborti :Circuit theory: Dhanpat Rai
12. B.Chattopadhyay & P.C.Rakshit; Fundamental of Electrical circuit theory; S Chand
13. Nilson & Riedel, Electric circuits ;Pearson

LIST OF EXPERIMENTS (Expandable):

All EXPERIMENTS (wherever applicable) should be performed through the following steps.

Step 1: Circuit should be designed/ drafted on paper.

Step 2: The designed/drafted circuit should be simulated using Simulation S/W (TINA-V7/ PSPICE/ Labview/ CIRCUIT MAKER).

Step 3: The designed/drafted circuit should be tested on the bread board and compare the results with the simulated results.

Step 4: The bread board circuit should be fabricated on PCB prepared on PCB machine.

1. To Verify Thevenin Theorem.
2. To Verify Superposition Theorem.
3. To Verify Reciprocity Theorem.
4. To Verify Maximum Power Transfer Theorem.
5. To Verify Millman's Theorem.
6. To Determine Open Circuit parameters of Two Port Network.
7. To Determine Short Circuit parameters of a Two Port Network.
8. To Determine A,B, C, D parameters of a Two Port Network
9. To Determine h parameters of a Two Port Network
10. To Find Frequency Response of RLC Series Circuit.
11. To Find Frequency Response of RLC parallel Circuit.

SEMESTER: III

CATEGORY: LC

SUBJECT CODE: BE34

SUBJECT NAME: SOFTWARE LAB-I (JAVA PROGRAMMING)

Time: 60 HRS

COURSE OBJECTIVES:

- To learn why Java is useful for the design of desktop and web applications.
- To learn how to implement object-oriented designs with Java.
- To identify Java language components and how they work together in applications.
- To design and program stand-alone Java applications.
- To learn how to design a graphical user interface (GUI) with Java Swing.
- To understand how to use Java APIs for program development.

UNIT-I (12 Hrs)

Basic Java Features - C++ Vs JAVA, JAVA virtual machine, Constant & Variables, Data Types, Class, Methods, Objects, Strings and Arrays, Type Casting, Operators, Precedence relations, Control Statements, Exception Handling, File and Streams, Visibility, Constructors, Operator and Methods Overloading, Static Members, Inheritance: Polymorphism, Abstract methods and Classes.

UNIT–II (12 Hrs)

Java Collective Frame Work - Primitive Types, Dynamic Memory Allocation, Linked List, Stack, Queues, Trees, Introduction, Overloading Generic Methods, Generic Classes, Collections: Interface Collection and Class Collections, Lists, Array List and It Collections Algorithms: Algorithm sorts, Algorithm shuffle, Algorithms reverse, fill, copy, max and min Algorithm binary Search, Algorithms add All, Stack Class of Package java. Util, Class Priority Queue and Interface Queue, M Collections.

UNIT–III (12 Hrs)

Advance Java Features - Multithreading: Thread States, Priorities and Thread Scheduling, Life Cycle of a Thread, Thread Synchronization, Creating and Executing Threads, Multithreading with GUI, Monitors and Monitor Locks. Networking: Manipulating URLs, Reading a file on a Web Server, Socket programming, Security and the Network, RMI, Networking, Accessing Databases with JDBC: Relational Database, SQL, MySQL, Oracle

UNIT–IV (12 Hrs)

Advance Java Technologies - Servlets: Overview and Architecture, Setting Up the Apache Tomcat Server, Handling HTTP get Requests, Deploying a web Application, Multitier Applications, Using JDBC from a Servlet, Java Server Pages (JSP): Overview, First JSP Example, Implicit Objects, Scripting, Standard Actions, Directives, Multimedia: Applets and Application: Loading, Displaying and Scaling Images, Animating a Series of Images, Loading and playing Audio clips.

UNIT–V (12 Hrs)

Advance Web/Internet Programming (Overview): J2ME, J2EE, EJB, XML.

Course Outcome:-

Student able to implement java programming.

REFERENCE:

1. Deitel & Deitel, “JAVA, How to Program”; PHI, Pearson.
2. E. Balaguruswamy, “Programming In Java”; TMH Publications
3. The Complete Reference: Herbert Schildt, TMH
4. Peter Norton, “Peter Norton Guide To Java Programming”, Techmedia.
5. Merlin Hughes, et al; Java Network Programming, Manning Publications/Prentice Hall
6. Cay Horstmann, Big JAVA, Wiely India.

List of Program to be perform (Expandable)

1. Installation of J2SDK
2. Write a program to show Scope of Variables
3. Write a program to show Concept of CLASS
4. Write a program to show Type Casting in JAVA
5. Write a program to show How Exception Handling is in JAVA
6. Write a Program to show Inheritance
7. Write a program to show Polymorphism
8. Write a program to show Access Specifiers (Public, Private, and Protected in JAVA
9. Write a program to show use and Advantages of CONTRUCTOR
10. Write a program to show Interfacing between two classes
11. Write a program to add a Class to a Package
12. Write a program to show Life Cycle of a Thread
13. Write a program to demonstrate AWT.
14. Write a program to hide a Class
15. Write a Program to show Data Base Connectivity Using JAVA
16. Write a Program to show “HELLO JAVA” in Explorer using Applet
17. Write a Program to show Connectivity using JDBC
18. Write a program to demonstrate multithreading using Java.
19. Write a program to demonstrate applet life cycle.
20. Write a program to demonstrate concept of servlet.

SEMESTER: III

CATEGORY: - PDFS

SUBJECT CODE: -BE-35

SUBJECT NAME: -PROFESSIONAL DEVELOPMENT FINISHING SCHOOL

LEVEL-I

TOTAL - 36 HOURS

OBJECTIVE

The students are to be groomed with respect to personality development. In this regard, an effort is made to improve the knowledge with respect to basic in English, mathematics, aptitude and reasoning.

UNIT-I (12 Hrs)

Conversational English:

Grammar mainly Tenses, 100 small sentences of daily use tense wise, Letter Writing, Standard Format for CV writing.

UNIT-II(12 Hrs)

Basic Mathematics: Arithmetic, Algebra, UNIT Conversions.

Arithmetic

Number system, Decimals, Fractions, Simplification, HCF and LCM. Ratio and proportion, percentage, partnership, Average, profit and Losses, Simple Interest and Compound Interest, Mensuration, Time and work ,Time and Distance, Data Interpretation , Trigonometry Basics ,etc.

Algebra

Basics Algebraic Formulae, Linear Equations, quadratics Eqations, Logarithms, Functions, Permutation and Combination, Binomial Theorem , Series (AP,GP,HP).UNIT conversion SI,FPS,MKS,CGS

UNIT-III (12 Hrs)

Aptitude / Reasoning

Quantitative Aptitude and Logical Reasoning- Level-1

Problem solving on Number System, problems on Ages, Number Theory, Algebra, Clocks and Calendars. Alphabet Test, Series Completion, Coding- Decoding, Logical Sequence, Insert missing figures.

OUTCOME

The students have gained confidence after improving their English, Math, and Aptitude and reasoning abilities.

SEMESTER: IV

CATEGORY: CORE

SUBJECT CODE: ET41

SUBJECT NAME: ANALOG AND DIGITAL COMMUNICATION

Time: 60 HRS

COURSE OBJECTIVES:

This course provides the knowledge of analog and digital communication system analysis and design. After study through lectures and assignments, students will be able to 1. Gain the knowledge of components of analogue communication system. To evaluate the performance of analogue communication in the presence of noise.

UNIT I (12 Hrs)

Review of signals and systems, Frequency domain representation of signals, Principles of Amplitude Modulation Systems- DSB, SSB and VSB modulations. Angle Modulation, Representation of FM and PM signals, Spectral characteristics of angle modulated signals.

UNIT II (12 Hrs)

Review of probability and random process. Gaussian and white noise characteristics, Noise in amplitude modulation systems, Noise in Frequency modulation systems. Pre-emphasis and De-emphasis, Threshold effect in angle modulation..

UNIT III (12 Hrs)

Pulse modulation. Sampling process. Pulse Amplitude and Pulse code modulation (PCM), Differential pulse code modulation. Delta modulation, Noise considerations in PCM, Time Division multiplexing, Digital Multiplexers.

UNIT IV (12 Hrs)

Elements of Detection Theory, Optimum detection of signals in noise, Coherent communication with waveforms- Probability of Error evaluations. BasebandPulse Transmission- Inter symbol Interference and Nyquist criterion. Pass band Digital Modulation schemes- Phase Shift Keying,

Frequency Shift Keying,Quadrature Amplitude Modulation, Continuous Phase Modulation and Minimum Shift Keying..

UNIT V (12 Hrs)

Digital Modulation tradeoffs. Optimum demodulation of digital signals over band-limited channels-Maximum likelihood sequence detection (Viterbi receiver). Equalization Techniques. Synchronization and Carrier Recovery for Digital modulation. Synchronization and Carrier Recovery for Digital modulation.

COURSE OUTCOMES:

At the end of this course students will demonstrate the ability to

1. Analyze and compare different analog modulation schemes for their efficiency and bandwidth
2. Analyze the behavior of a communication system in presence of noise
3. Investigate pulsed modulation system and analyze their system performance
4. Analyze different digital modulation schemes and can compute the bit error performance

TEXT/REFERENCE BOOKS:

1. Haykin S., "Communications Systems", John Wiley and Sons, 2001.
2. Proakis J. G. and Salehi M., "Communication Systems Engineering", Pearson Education,2002.
3. Taub H. and Schilling D.L., "Principles of Communication Systems", Tata McGraw Hill,2001.
4. Wozencraft J. M. and Jacobs I. M., ``Principles of Communication Engineering",John Wiley, 1965.
5. Barry J. R., Lee E. A. and Messerschmitt D. G., ``Digital Communication", Kluwer Academic Publishers, 2004.
6. Proakis J.G., ``Digital Communications", 4th Edition, McGraw Hill, 2000.

LIST OF EXPERIMENTS (Expandable):

All EXPERIMENTS (wherever applicable) should be performed through the following steps.

Step 1: Circuit should be designed/drafted on paper.

Step 2: The designed/drafted circuit should be tested on the bread board.

Step 4: The bread board circuit should be fabricated on PCB by one batch using PCB machine.

1) Analysis of AM Modulation and Demodulation Techniques (Transmitter and Receiver), Calculation of Parameters
2) Analysis of FM Modulation and Demodulation (Transmitter and Receiver) and Calculation of Parameters
3) To Construct and Verify Pre-emphasis and De-emphasis and Plot the Waveforms.
4) Study of Super-heterodyne Receiver and Characteristics of Radio Receiver.
5) To Construct Frequency Multiplier Circuit and to Observe the Waveform
6) Study of AVC and AFC.
7) Study of PLL chip (566) and its use in various systems.

SEMESTER: IV

CATEGORY: CORE

SUBJECT CODE: ET42

SUBJECT NAME: ANALOG CIRCUITS

Time: 60 HRS

COURSE OBJECTIVES

1. To prepare students to perform the analysis of any Analog electronics circuit.
2. To empower students to understand the design and working of BJT / FET amplifiers, oscillators and Operational Amplifier.

UNIT I (12 Hrs)

Feedback Amplifier and Oscillators: Concept of feedback and their types, Amplifier with negative feedback and its advantages. Feedback Topologies.

UNIT II (12 Hrs)

Oscillators: Concept of Positive feedback, Classification of Oscillators, Barkhausen criterion, Types of oscillators: RC oscillator, RC Phase Shift, Wien Bridge Oscillators. LC Oscillator: Hartley, Colpitt's, Clapp and Crystal oscillator.

UNIT III (12 Hrs)

Introduction to integrated circuits: Advantages and characteristic parameters of IC's, basic building components, data sheets

Operational Amplifier: Differential amplifier and analysis, Configurations- Dual input balanced output differential amplifier, Dual input Unbalanced output differential amplifier, Single input balanced output differential amplifier, Single input Unbalanced output differential amplifier Introduction of op-amp, Block diagram, characteristics and equivalent circuits of an ideal opamp, Power supply configurations for OP-AMP.

UNIT IV (12 Hrs)

Characteristics of op-amp: Ideal and Practical, Input offset voltage, offset current, Input bias current, Output offset voltage, thermal drift, Effect of variation in power supply voltage, common-mode rejection ratio (CMRR), Slew rate and its Effect, PSRR and gain bandwidth product, frequency limitations and compensations, transient response, analysis of TL082 datasheet. OP-AMP applications: Inverting and non-inverting amplifier configurations, Summing amplifier, Integrators and differentiators, Instrumentation amplifier, Differential input and differential output amplifier, Voltage-series feedback amplifier, Voltage-shunt feedback amplifier, Log/ Antilog amplifier, Triangular/rectangular wave generator, phase-shift oscillators, Wein bridge oscillator, analog multiplier-MPY634, VCO, Comparator, Zero Crossing Detector.

UNIT V (12 Hrs)

OP-AMP AS FILTERS: Characteristics of filters, Classification of filters, Magnitude and frequency response, Butterworth 1st and 2nd order Low pass, High pass and band pass filters, Chebyshev filter characteristics, Band reject filters, Notch filter; all pass filters, self-tuned filters, AGC, AVC using op-AMP.

TIMER: IC-555 Timer concept, Block pin configuration of timer. Monostable, Bistable and Astable Multivibrator using timer 555-IC, Schmitt Trigger, Voltage limiters, Clipper and clampers circuits, Absolute value output circuit, Peak detector, Sample and hold Circuit, Precision rectifiers, Voltage-to-current converter, Current-to-voltage converter. Voltage Regulator: simple OP-AMP Voltage regulator, Fixed and Adjustable Voltage Regulators, Dual Power supply, Basic Switching Regulator and characteristics of standard regulator ICs such as linear regulator, switching regulator and low-drop out regulator. Study of LM317, TPS40200 and TPS7250

COURSE OUTCOMES:

At the end of this course students will demonstrate the ability to

1. Understand the characteristics of diodes and transistors
2. Design and analyze various rectifier and amplifier circuits
3. Design sinusoidal and non-sinusoidal oscillators

4. Understand the functioning of OP-AMP and design OP-AMP based circuits

5. Design ADC and DAC

TEXT BOOKS:

1. RamakantA.Gaikward,"OP- Amp and linear Integrated circuits" Third edition 2006, Pearson.

2. B. Visvesvara Rao Linear Integrated Circuits Pearson.

3. http://www.nptelvideos.in/2012/11/analog-ics.html

4. http://nptel.ac.in/courses/117108107/

REFERENCE:

1. David A. Bell: Operational Amplifiers & Linear ICs, Oxford University Press, 2nd edition, 2010.

2. D. Roy Choudhury: Linear Integrated Circuits New Age Publication.

3. B. Somanathan Nair: Linear Integrated Circuits analysis design and application Wiley India Pvt. Ltd.

4. Maheshwary and Anand: Analog Electronics, PHI.

5. S.Salivahanan,V S KanchanaBhaaskaran: Linear Integrated Circuits",second edition, McGraw Hill.

6. Gray Hurst Lewis Meyer Analysis and design of analog Integrated Circuits fifth edition Wiley India.

7. RobertF.Coughlin, Frederick,F.Driscoll: Operational Amplifiers and Linear Integrated Circuits, sixth edition, Pearson.

8. Millman and Halkias: Integrated electronics, TMH.

9. Boylestad and Nashelsky: Electronic Devices and Circuit Theory, Pearson Education.

10. Sedra and Smith: Microelectronics, Oxford Press.

LIST OF EXPERIMENTS:

Apparatus Required –Dual Channel Cathode Ray Oscilloscope (0-20 MHz), Function Generator (10MHz and above), Dual Power Supply, LM741, TL082, MPY634,TPS7250, Probes, digital multimeter.

1. To measure and compare the op-amp characteristics: offset voltages, bias currents, CMRR, Slew Rate of OPAMP LM741 and TL082.

2. To determine voltage gain and frequency response of inverting and non-inverting amplifiers using TL082.

3. To design an instrumentation amplifier and determine its voltage gain using TL082.

4. To design op-amp integrator (low pass filter) and determine its frequency response.

5. To design op-amp differentiator (high pass filter) and determine its frequency response.

6. Design 2nd order Butterworth filter using universal active filter topology with LM741

7. To design Astable, Monostable and Bistablemultivibrator using 555 and analyse its characteristics.

8. Automatic Gain Control (AGC) Automatic Volume Control (AVC)using multiplier MPY634

9. To design a PLL using opampwith MPY634 anddetermine the free running frequency, the capture range and the lock in range of PLL

10. Design and test a Low Dropout regulator using op-amps for a given voltage regulation characteristic and compare the characteristics with TPS7250 IC

SEMESTER: IV

CATEGORY: CORE

SUBJECT CODE: ET43

SUBJECT NAME: ELECTRONICS & INSTRUMENTATION

Time: 60 HRS

COURSE OBJECTIVES:-

Students will get knowledge of construction and working principal and applications of analog and digital instruments Measure electrical parameter like R, L, C using electrical bridges. To provide students with a strong mathematical foundation to acquire the professional competence knowledge and skills.

UNIT-I (12 Hrs)

Measurement and Error: Accuracy and Precision, Sensitivity, Linearity, Resolution, Hysterisis, Loading Effect. Measurements of Current, Voltage, Power and Impedance: DC and AC Ammeter, DC Voltmeter Chopper type and solid-state, AC voltmeter using Rectifier, Average, RMS, Peak Responding voltmeters, Multi-meter, Power meter, Bolometer and Calorimeter.

UNITII (12 Hrs)

Cathode Ray Oscilloscope (CRO): Different parts of CRO, Block diagram, Electrostatic focusing, Electrostatic deflection, Post deflection acceleration, Screen for CRTs, Graticules, Vertical and Horizontal deflection system, Time base circuit, Oscilloscope Probes, Applications of CRO, Special purpose CROs Multi input, Dual trace, Dual beam, Sampling, Storage (Analog and Digital), Oscilloscope.

UNIT-III (12 Hrs)

AC Bridges: Maxwell's bridge (Inductance and Inductance-Capacitance), Hay's bridge, Schering bridge (High voltage and Relative permittivity), Wein bridge, Wagner earth detector, Impedance measurement by Q-meter. Non-Electrical Quantities (Transducer): Classification of Transducers, Strain gauge, Displacement Transducer- Linear Variable Differential Transformer (LVDT) and Rotary Variable Differential Transformer (RVDT), Temperature Transducer- Resistance

Temperature Detector (RTD), Thermistor, Thermocouple, Piezo-electric transducer, Optical Transducer- Photo emissive, Photo conductive, Photo voltaic, Photo-diode, Photo Transistor, Nuclear Radiation Detector.

UNIT-IV (12 Hrs)

Signal generator & Display: Signal and Function Generators, Sweep Frequency Generator, Pulse and Square Wave Generator, Beat Frequency Oscillator, Digital display system and indicators, Classification of Displays, Display devices, Light Emitting diodes(LED), Liquid Crystal Display(LCD).

UNIT-V (12 Hrs)

Digital Measurement and Instruments: Advantages of Digital Instrument over Analog Instrument, Digital-to-analog conversion (DAC) - Variable resistive type, R-2R ladder Type, Binary ladder, weighted converter using Op-amp and transistor, Practical DAC. Analog-to-digital Conversion (ADC) -Ramp Technique, Dual Slope Integrating Type, Integrating Type (voltage to frequency), Successive Approximations, digital voltmeters and multi-meters, Resolution and sensitivity of digital meter, PLC structure, principle of operation, response time and application.

COURSE OUTCOMES:

Applied Electronics & Instrumentation Engineering is an advanced branch of engineering which deals with the application of existing or known scientific knowledge in electronics, instrumentation, measurements and control for any process, practical calibration of instruments, automation of processes etc

REFERENCE:

1. H. S. Kalsi: Electronics Instrumentation, TMH.
2. K. Sawhney: Instrumentation and Measurements, Dhanpat Rai and Co.
3. Helfric and Cooper: Modern Electronic Instrumentation and Measurement Techniques; Pearson.

IST OF EXPERIMENTS:

All EXPERIMENTS (wherever applicable) should be performed through the following steps.

Step 1: Circuit should be designed/drafted on paper.

Step 2: The designed/drafted circuit should be simulated using Simulation Software

Step 3: The designed/drafted circuit should be tested on the bread board and compare the results with the simulated results.

Step 4: The bread board circuit should be fabricated on PCB by one batch using PCB machine.

1. Study of CRO and Function Generator.
2. Displacement measurement by LVDT.
3. Force measurement by strain gauge.
4. Measurement of Capacitor, Self-induction using Q-meter.
5. Temperature measurement by thermistor, RTD and thermocouple.
6. Optical Transducer- Photo conductive, Photo voltaic, Photo-diode, Photo-Transistor
7. Design of digital to analog converter.
8. PLC operation and applications (for example: relay, timer, level, traffic light etc.)

SEMESTER: IV

CATEGORY: CORE

SUBJECT CODE: ET 44

SUBJECT NAME: COMMUNICATION NETWORKS AND TRANSMISSION LINES

Times: 60HRS

COURSE OBJECTIVES

1. To learn the concepts of network analysis in electrical and electronics engineering.
2. To learn transmission lines and networks.
3. To learn active and passive filter circuits

UNIT I (12Hrs)

Characteristic Parameters of symmetrical and asymmetrical two port networks and their design

Image impedance, iterative impedance, characteristic impedance, propagation coefficient, image transfer coefficient , iterative transfer coefficient, Lattice and Bridged T networks, reactive matching networks, matching techniques, insertion loss, symmetrical and asymmetrical attenuators and their design.

UNIT II (12Hrs)

Passive LC Filters

Analysis and design of Low pass, high pass, band pass and band elimination filters, m-derived filters, composite filters, Filter specifications, Butterworth approximation, Chebyshev approximation, elliptic function approximation, frequency transformation.

UNIT III (12Hrs)

Positive real function

LC, RL, RC, and RLC network synthesis, Foster and Cauer network, minimum positive real function, Brune's method, Bott-Duffin method, Synthesis-Coefficient.

UNIT IV (12Hrs)

Transmission line fundamentals

Lumped parameter equivalent, voltage and current on a transmission line, infinite line, characteristic impedance and propagation constant, waveform distortion, attenuation and phase equalizers, distortion-less line, loading, liner reflection on a line, reflection coefficient, input and transfer impedances, open circuit and short circuit line, reflection factors, reflection loss, insertion loss, T and π equivalents of a line, location of line fault, construction and design of two wire line and coaxial cable.

UNIT V (12Hrs)

Line at radio frequencies Parameters of line and coaxial cable at radio frequencies, dissipation-less line, voltage and current on a dissipation-less line, standing waves, standing wave ratio, input impedance of open circuit and short circuit, power and impedance measurement on lines, eighth-wave, quarter-wave and half wave line, circle diagram, Smith chart, solution of problems using Smith chart, single and double stub matching .introduction to microstrip lines and its analysis.

COURSE OUTCOMES:

Transmission lines are used for purposes such as connecting radio transmitters and receivers with their antennas (they are then called feed lines or feeders), distributing cable television signals, trunklines routing calls between telephone switching centres, computer network connections and high speed computer data ..

REFERENCE:

1. Ryder: Networks and Transmission Lines, PHI Learning.
2. Valkenberg: Introduction to Modern Network synthesis, Wiley India.
3. Suresh: Electric Circuits and Networks, Pearson Education.
4. Raju: Electromagnetic field theory and Transmission Lines, Pearson Education.
5. Ganesan: Transmission Lines and Waveguides, TMH.
6. Rao: Electromagnetic Waves and Transmission Lines, PHI learning.

SEMESTER: IV

CATEGORY: ECHS

SUBJECT CODE: BE 41

SUBJECT NAME: ENGINEERING ECONOMICS AND ACCOUNTING

Time: 60HRS

COURSE OBJECTIVES

Engineering economics poses numerous benefits because it allows those in industry to make strategic decisions for their companies. While macroeconomic and financial competencies are key for business operations, engineering economics further provides a mechanism for decision-making.

UNIT I(12Hrs)

INTRODUCTION Managerial Economics – Relationship with other disciplines – Firms: Types, objectives and goals – Managerial decisions – Decision analysis.

UNIT II (12Hrs)

DEMAND & SUPPLY ANALYSIS: Demand – Types of demand – Determinants of demand – Demand function – Demand elasticity – Demand forecasting – Supply – Determinants of supply – Supply function – Supply elasticity.

UNIT III (12Hrs)

PRODUCTION AND COST ANALYSIS: Production function – Returns to scale – Production optimization – Least cost input – Isoquants – Managerial uses of production function.Cost Concepts – Cost function – Types of Cost – Determinants of cost – Short run and Long run cost curves – Cost Output Decision – Estimation of Cost.

UNIT IV (12Hrs)

PRICING Determinants of Price – Pricing under different objectives and different market structures – Price discrimination – Pricing methods in practice – role of Government in pricing control.

UNIT V (12Hrs)

FINANCIAL ACCOUNTING (ELEMENTARY TREATMENT) Balance sheet and related concepts – Profit & Loss Statement and related concepts – Financial Ratio Analysis – Cash flow analysis – Funds flow analysis – Comparative financial statements – Analysis & Interpretation of financial statements. Investments – Risks and return evaluation of investment decision – Average rate of return – Payback Period – Net Present Value – Internal rate of return.

COURSE OUTCOMES:

Course outcome requirements for accredited programs. Engineering economics studies various financial and economic problems pervasive to engineers .

TEXT BOOKS:

1. Mc Guigan, Moyer and Harris, 'Managerial Economics; Applications, Strategy and Tactics', Thomson South Western, 10th Edition, 2005.

2. Prasanna Chandra. 'Fundamentals of Financial Management', Tata Mcgraw Hill Publishing Ltd., 4th edition, 2005.

REFERENCE:

1. Samuelson. Paul A and Nordhaus W.D., 'Economics', Tata Mcgraw Hill Publishing Company Limited, New Delhi, 2004.

2. Paresh Shah, 'Basic Financial Accounting for Management', Oxford University Press, New Delhi, 2007.

SEMESTER: IV

CATEGORY: LC

SUBJECT CODE: BE 42

SUBJECT NAME: SOFTWARE LAB- II

(MATLAB/SCILAB/DOT NET)

Time:60 HRS

COURSE OBJECTIVES

Familiarization of the syntax, semantics, data-types and library functions of numerical computing languages such as MATLAB and/or SCILAB, and application of such languages for implementation/simulation and visualization of basic mathematical functions relevant to electronics applications.

Study of simulation software (any one Scilab/ MatLab etc.). Introduction to Scilab / Matab, Study of Scilab / Matlab programming environment, Modeling, Design and development of Programs. Overview and Study of the key features and applications of the software. Application of the software in the Communications and Communication Systems.

1. Programs Related to Control System response plots, determining transient PID controller on control system, Bode plot, Nyquist plot and Root Locus plot, state space analysis.
2. Programs Related to Communication Systems (Generation, addition of noise and Detection), AM, FM, PM, PAM, PCM, PSK, FSK etc.
3. Programs related to Data Communications line encoding techniques.

Course Outcome

Understand the main features of the MATLAB/SCILAB program development environment to enable their usage in the higher learning. Implement simple mathematical functions/equations in numerical computing environment such as MATLAB/SCILAB

REFERENCE:

1. Rudra Pratap: Getting Started with MATLAB, Oxford
2. http://www.scilab.in

3. http://ekalavya.it.iitb.ac.in/contents.do?topic=Scilab

4. Vinu V. Das: Programming in Scilab, New Age Publisher.

5. Chapman Stephen J.: MATLAB Programming for Engineers, Thomson Cengage

6. Proakis: Contemporary Communication System Using MATLAB; Thomson Cengage.

7.Kuo: Automatic Control Systems, PHI Learning.

8.Singh and Chaudhari: Matlab Programming, PHI Learning

SEMESTER: IV

CATEGORY: MC

SUBJECT CODE: BE 43

SUBJECT NAME: ENVIRONMENTAL SCIENCES

60HRS

COURSE OBJECTIVES

The aim of E.V.S.(environmental studies) is to develop a world population that is aware of and concerned about the environment and its associated problems and which has the knowledge ,Skills, attitudes ,motivations and commitment to work individually and collectively towards solutions of current problems and prevention

UNITI (4Hrs)

The Multidisciplinary nature of environmental studies Definition, scope and importance, Need for public awareness.

UNIT II (8Hrs)

Natural Resources Renewable and non renewable resources: a) Natural resources and associated problems Forest resources: Use and over-exploitation, deforestation, case studies, Timber extraction, mining, dams and their effects on forests and tribal people. Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dam's benefits and problems.

Mineral Resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. Food Resources: World food problems, changes caused by agriculture and over grazing, effects of modern agriculture, fertilizers- pesticides problems, water logging, salinity, case studies.

Energy Resources: Growing energy needs, renewable and nonrenewable energy sources, And use of alternate energy sources, case studies Land Resources: Land as a resource, land degradation, man induces landslides, soil erosion, and desertification. b) Role of individual in conservation of natural resources. c) Equitable use of resources for sustainable life styles.

UNIT III (8Hrs)

Eco Systems Concept of an eco system Structure and function of an eco system. Producers, consumers, decomposers. Energy flow in the eco systems. Ecological succession. Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following eco systems: Forest ecosystem Grass land ecosystem Desert ecosystem. Aquatic eco systems (ponds, streams, lakes, rivers, oceans, estuaries)

UNIT IV(8Hrs)

Biodiversity and it's Conservation Introduction-Definition: genetics, species and ecosystem diversity Biogeographically classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values Biodiversity at global, national and local level.• India as a mega diversity nation. Hot-spots of biodiversity. Threats to biodiversity: habitats loss, poaching of wild life, man wildlife conflicts. Endangered and endemic spaces of India. Conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

UNIT V(8Hrs)

Environmental Pollution Definition Causes, effects and control measures of: a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution e. Noise pollution f. Thermal pollution g. Nuclear hazards Solid waste Management: Causes, effects and control measures of urban and industrial wastes Role of an individual in prevention of pollution Pollution case studies Disaster management: Floods, earth quake, cyclone and land slides

UNIT VI (8Hrs)

Social issues and the Environment Form unsustainable to sustainable development Urban problems related to energy Water conservation, rain water harvesting, water shed management Resettlement and rehabilitation of people; its problems and concerns, case studies Environmental ethics: issues and possible solutions Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. Wasteland reclamation Consumerism and waste products Environment protection Act Air (prevention and control of

pollution) Act Water (prevention and control of pollution) Act Wildlife protection act Forest conservation act Issues involved in enforcement of environmental legislations Public awareness

UNIT VII (8 Hrs)

Human population and the environment Population growth and variation among nations Population explosion- family welfare program Environment and human health Human rights Value education HIV / AIDS Women and child welfare Role of information technology in environment and human health Case studies

UNIT VIII (10Hrs)

Field work Visit to a local area to document environment assets river / forest / grassland / hill / mountain. Visit to a local polluted site-urban/rural/industrial/agricultural. Study of common plants, insects, birds. Study of simple ecosystems-pond, river, hills lopes, etc (field work equal to 5 lecture works)

COURSE OUTCOMES:

An Environmental Studies major will be able to recognize the physical, chemical, and biological components of the earth's systems and show how they function. An Environmental Studies major will be able to apply lessons from various courses through field experiences.

Recommended Books:

1. Textbook of Environmental studies, Erach Bharucha, UGC
2. Fundamental concepts in Environmental Studies, D D Mishra, S Chand & Co Ltd

SEMESTER: IV

CATEGORY: - PDFS

SUBJECT CODE: -BE-44

SUBJECT NAME: -PROFESSIONAL DEVELOPMENT FINISHING SCHOOL

LEVEL-II

TOTAL - 36 HOURS

OBJECTIVE

The students are to be groomed with respect to personality development. Further improvement in English, Aptitude and reasoning ability is desirable.

UNIT-I (18 –HOURS)

Conversational English:

Grammar mainly Prepositions (550 small sentences of daily use related to day to day life

UNIT-II (18 –HOURS)

Aptitude / Reasoning:

Quantitative Aptitude and Logical Reasoning – Level II

Problem solving on,

Partnerships, Profit Loss and Discounts, Time and Distance.

Logical sequence of Figures, Cubes, Blood Relations, Data Sufficiency, Arrangement Problems.

OUTCOME

Further improvement in English, Aptitude and reasoning ability is achieved.

SEMESTER: V

CATEGORY: CORE

SUBJECT CODE: ET- 51

SUBJECT NAME: ELECTROMAGNETIC WAVES

Time: 60Hrs

COURSE OBJECTIVES

To acquire the knowledge of Electromagnetic field theory that allows the student to have a solid theoretical foundation to be able in the future to design emission, propagation and reception of electro- magnetic wave systems. To identify, formulate and solve fields and electromagnetic waves propagation problems in a multidisciplinary frame individually or as a member of a group

UNIT I (12Hrs)

Review of vector calculus: orthogonal coordinate systems, gradient, divergence and curl. Laplacian operator for scalar and vectors. Vector integral and differential identities and theorems. Phasor representation of harmonic variation of scalar and vectors Static electric fields, Columb's law, electric flux density and electric field intensity, permittivity, dielectric constant, field of distributed charges in free space, potential function, Laplace's and Poisson's equations, electric dipole, stored electric energy density. Boundary conditions at abrupt discontinuities between two media including conducting boundaries, surface charge distribution capacitance between two isolated conductors

UNIT II (12Hrs)

Solution of Laplace's equations in systems of dielectric and conducting boundaries, uniqueness theorem, two dimensional boundary condition problems, solution by symmetry, conformal transformation of functions, image theory etc. fields in parallel wire, parallel plane and coaxial systems. Static currents and magnetic fields- flow of charge in conductive media, lossy conductive medium, current density, specific conductivity, mobility, explanation of Ohm's law employing mobility. Magnetic effects of current flow, Biot-Savart's law in vector form magnetic field intensity, magnetic flux, and permeability, closed loop currents, Ampere's circuital law in integral and differential vector form, magnetic vector potential and related equations. Problems

related to straight wire toroidal and cylindrical solenoids, inductance. Boundary conditions on magnetic field, equivalent surface currents for abrupt discontinuity of magnetic field.

UNIT III (12Hrs)

Time varying fields – Faraday's law in integral and differential forms, displacement current concept, Maxwell's equations in differential and integral forms, wave equations in source free region electric and magnetic stored energy density, continuity equation, Poynting vector theorem. Time harmonic fields, r.m.s. phasor representation of field vectors, Maxwell's equations for TH field, average energy density, complex Poynting vector, duality concept. Helmholtz wave equation, general solution in free space in various coordinates, plane polarized wave in free space, properties of plane waves, wave front, power flow, stored energy density. W.E.F. July 2017 Academic Session 2017-18

UNIT IV (12Hrs)

Circular and elliptic polarization, resolution in terms of linear polarized waves and vice- versa. Plane waves in lossy medium, low loss dielectric, good conducting and ionized media, complex permittivity, loss tangent, skin depth, transmission line analogy, boundary conditions at perfect conductor surface, surface current density Interference of two plane waves traveling at oblique directions.

UNIT V (12Hrs)

Reflection and refraction of plane waves at dielectric media and conducting Surfaces, Brewster's angle, total internal reflection, resultant fields and power flow in both media. Frequency dispersive propagation, phase velocity and group velocity. Magnetic vector potential for sources in free space, retarded potential, radiation principles, boundary condition at infinity

COURSE OUTCOMES:

At the end of this course students will demonstrate the ability to

1. Understand characteristics and wave propagation on high frequency transmission lines
2. Carryout impedance transformation on TL

3. Use sections of transmission line sections for realizing circuit elements
4. Characterize uniform plane wave
5. Calculate reflection and transmission of waves at media interface
6. Analyze wave propagation on metallic waveguides in modal form
7. Understand principle of radiation and radiation characteristics of an antenna

REFERENCE:

1. Mathew N.O Sadiku: Elements of Electromagnetic, Oxford University Press
2. William H. Hayt: Engineering Electromagnetic, TMH.
3. John D. Kraus: Electromagnetics, Mc. Graw Hill.
4. Jordan Balmian: Electromagnetic wave and Radiating System, PHI.
5. David K. Cheng: Electromagnetic Fields and Wave, Addison Wesley.
6. Ramo, Whinnerry and VanDuzzer " Fields and waves in communication electronics ", Wiley 1984
7. Harrington RF, "Electromagnetic fields" Mc Graw Hill

LIST OF EXPERIMENTS:

1. Study of Cathode Ray Oscilloscope.
2. Study of displacement measurement by LVDT.
3. Force measurement by strain gauge.
4. Measurement of Capacitor using Q-meter.
5. Measurement of Self-induction using Q-meter.
6. Temperature measurement by thermistor.
7. Study of optical Transducers: Photo-diode, Photo-Transistor.
8. Design of digital to analog converter, R-2R ladder Type and analysis of its characteristics.
9. To measurement of the unknown Inductance by using Maxwell's bridge method.
10. To measurement of the unknown capacitance by using Schering bridge method.
11. To measurement of the unknown Frequency by using Wein's bridge method.
12. To measurement of the unknown Inductance by using Hay's bridge method.
13. To calculate Frequency and amplitude using CRO & Function Generator.

14. To calculate Frequency using Lissajious Pattern.
15. To study RVDT.
16. Study of Function Generator.
17. Temperature measurement by thermocouple.
18. Temperature measurement by RTD.
19. Study of optical Transducers: Photo conductive, Photo voltaic.
20. To study digital Multimeter.

SEMESTER: V

CATEGORY: CORE

SUBJECT CODE: ET 52

SUBJECT NAME: PROBABILITY THEORY AND STOCHASTIC PROCESSES

Time: 60HRS

COURSE OBJECTIVES

Objective of the course is to provide the students with knowledge about the random variable, random process and how to model the random processes in the communication system such as receiver performance, interference, thermal noise, and multipath phenomenon.

UNIT I (15Hrs)

Sets and set operations; Probability space; Conditional probability and Bayes theorem;Combinatorial probability and sampling models.

UNIT II (15Hrs)

Discrete random variables, probability mass function, probability distribution function,example random variables and distributions; Continuous random variables, probability density function,probability distribution function, example distributions. Joint distributions, functions of one and two random variables, moments of randomvariables;Conditional distribution, densities and moments; Characteristic functions of a random variable;Markov, Chebyshev and Chernoff bounds;

UNIT III (15Hrs)

Random sequences and modes of convergence (everywhere, almost everywhere,probability, distribution and mean square); Limit theorems; Strong and weak laws of large numbers, central limit theorem.

UNIT IV (15Hrs)

Random process. Stationary processes. Mean and covariance functions. Ergodicity.Transmission of random process through LTI. Power spectral density.

COURSE OUTCOMES:

At the end of this course students will demonstrate the ability to

1. Understand representation of random signals
2. Investigate characteristics of random processes
3. Make use of theorems related to random signals
4. To understand propagation of random signals in LTI systems.

TEXT/REFERENCE BOOKS:

1. H. Stark and J. Woods, ``Probability and Random Processes with Applications to Signal Processing," Third Edition, Pearson Education
2. A.Papoulis and S. Unnikrishnan Pillai, ``Probability, Random Variables and Stochastic Processes," Fourth Edition, McGraw Hill.
3. K. L. Chung, Introduction to Probability Theory with Stochastic Processes, Springer International
4. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability, UBS Publishers,
5. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Stochastic Processes, UBS Publishers
6. S. Ross, Introduction to Stochastic Models, Harcourt Asia, Academic Press.

SEMESTER: V

CATEGORY: CORE

SUBJECT CODE: ET 53

SUBJECT NAME: MICROCONTROLLERS

Time: 60Hrs

COURSE OBJECTIVES

The Purpose of the course is to provide students with the Knowledge of Microprocessors and Microcontroller. To solve real world problems in an efficient manner, this course also emphasis on architecture, Programming and system design used in various day to day gadgets.

UNIT I (12Hrs)

Introduction to 8085 Microprocessor

Von Newman model, various subsystems, CPU, Memory, I/O, System Bus, CPU and Memory registers, Program Counter, Accumulator, Instruction register, Micro operations, Instruction Fetch, decode and execution, data movement and manipulation, Instruction formats and addressing modes of basic computer. 8085 microprocessor organization.

UNIT II (12Hrs)

8086 and its Assembly Language programming

Instruction formats, addressing modes, instruction set, assembly language programming, ALP tools- editor, assembler, linker, locator, debugger, emulator. BIU and EU, register organization, pin diagram, memory organization, clock generator 8284, buffers and latches, 8288 bus controller, maximum and minimum modes.

8086 based multiprocessor systems

Interconnection topologies, coprocessors 8087 NDP, I/O processors 8089 IOP, bus arbitration and control, lightly and tightly coupled systems.

UNIT III (12Hrs)

Peripheral devices and their interfacing

Memory interfacing, Programmable input/output ports 8255, Programmable interval timer 8253, keyboard/display controller 8279, CRT controller 8275, Programmable communication interface 8251 USART.

UNIT IV (12Hrs)

Interrupts of 8086

Interrupts and interrupt service routine, interrupt cycle, maskable and non-maskable interrupts, interrupt programming. Programmable interrupt controller 8259.

DMA in 8086

Basic DMA operation, modes of DMA transfer, DMA controller 8257.

UNIT V (12Hrs)

8051 Microcontroller

Features, architecture, Pin Diagram, memory organization, external memory interfacing, instruction syntax, data types, subroutines, addressing Modes, instruction set, ALP of 8051. Applications of 8051.

COURSE OUTCOMES:

At the end of this course students will demonstrate the ability to

1. Do assembly language programming
2. Do interfacing design of peripherals like, I/O, A/D, D/A, timer etc.
3. Develop systems using different microcontrollers
4. Understand RSIC processors and design ARM microcontroller based systems

REFERENCE:

1. Ray and Bhurchandi: Advanced microprocessors and peripherals, TMH.
2. Brey: The Intel Microprocessors, Architecture, Programming and Interfacing, Pearson Education.
3. Senthil Kumar: Microprocessors and interfacing, Oxford University press.
4. Bahadure: Microprocessors 8086 and Pentium family, PHI Learning.

5. Udayashankara and Mallikarjunaswamy: 8051 Microcontroller, TMH.

6. Mazidi and Mazidi: The 8051 Microcontroller and Embedded Systems, Pearson Education

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

LIST OF EXPERIMENTS:

1. Assembly Language Programs of Microprocessor 8085 and 8086.
2. Assembly Language Programs of Microcontroller 8051.
3. Assembly Language Programs for Interfacing Chips.
4 .To write an ALP to perform addition of two 16-bit signed and unsigned numbers.
5. To write an ALP to perform substraction of two 16-bit signed and unsigned numbers.
6. To write an ALP to perform multiplication of two 16-bit signed and unsigned numbers.
7. To write an ALP to perform division of two 16-bit signed and unsigned numbers.
8. To write an ALP to perform addition of two ASCII bytes.
9. To write an ALP to perform substraction of two ASCII bytes
10.To write an ALP to perform multiplication of two ASCII bytes.
11.To write an ALP to perform the Logical AND operation.
12.To write an ALP to perform the Logical OR operation.
13.To write an ALP to perform the Logical XOR operation

SEMESTER: V

CATEGORY: CORE

SUBJECT CODE: ET 54

SUBJECT NAME: DIGITAL SIGNAL PROCESSING

Time: 60Hrs

COURSE OBJECTIVES:

The primary objective of this course is to provide a thorough understanding and working knowledge of design, implementation and analysis DSP systems.

UNIT – I (12Hrs)

The Discrete Fourier Transform: Discrete Fourier series, Discrete Fourier Transform (DFT), properties of DFT, linear convolution using the DFT, two dimensional DFT

UNIT – II (12Hrs)

Flow Graph and Matrix Representation of Digital Filters: :Signal flow graph representation of digital network, matrix representation, basic network structures for IIR and FIR systems, Telligen's theorem for digital filters and its applications.

UNIT – III (12Hrs)

Digital filter Design Techniques: Design of IIR and FIR digital filters, computer aided design of IIR and FIR filters, comparison of IIR and FIR digital filters.

UNIT-IV (12Hrs)

Computation of the Discrete Fourier Transform: Goertzel algorithm, FT algorithms decimation in time and frequency, FFFT algorithm for N a composite number, Chirp Z transform(CZT).

UNIT-V (12Hrs)

Discrete Random Signals: Discrete time random process ,averages spectrum representations of Infinite energy signals, response of linear system to random signals.

Power Spectrum Estimation: Basic principles of spectrum estimation, estimates of the auto Covariance, power spectrum, cross covariance and cross spectrum.

COURSE OUTCOMES:

At the end of this course students will demonstrate the ability to

1. Represent signals mathematically in continuous and discrete time and frequency domain
2. Get the response of an LSI system to different signals
3. Design of different types of digital filters for various applications

REFERENCE:-

1. A.V.Oppenheim and R. W. Schafer," Digital Signal Processing", Prentice Hall, 1975
2. L.R.Rabiner and B. Gold," Theory and Application of Digital Signal Processing", Prentice Hall1989.

LIST OF EXPERIMENTS

1. Generation, analysis and plots of discrete-time signals.
2. Implementation of operations on sequences (addition, multiplication, scaling, shifting, folding
3. Implementation of Linear time-invariant (LTI) systems and testing them for stability and causality
4. Computation and plot of DTFT of sequences, verification of properties of DTFT.
5. Computation and plots of z-transforms, verification of properties of z-transforms.
6. Computation and plot of DFT of sequences, verification of properties of DFT.
7. Computation and plots of linear/circular convolution of two sequences.
8. Computation of radix-2 FFT- Decimation in time and Decimation in frequency
9. Implementation of IIR and FIR filter structures (direct, cascade, parallel etc).
10. Implementation of various window design techniques (Rectangular, Bartlett, Hann, Hamming etc).

SEMESTER: V

CATEGORY: ETEL

SUBJECT CODE: ET 55(A)

SUBJECT NAME: CMOS Design

Time: 60Hrs

COURSE OBJECTIVES:

To learn basic CMOS Circuits. To learn CMOS process technology. To learn techniques of chip design using programmable devices. To learn the concepts of designing VLSI Subsystems.

UNIT I (12Hrs)

Single-Stage Amplifier: Basic Concepts, Common Source Stage, Source Follower, Common-Gate Stage, Cascode Stage. Frequency Response of Amplifiers: General Consideration, Common-Source Stage, Source Followers, Common-Gate Stage, Cascode Stage, Differential Pair.

UNIT II (12Hrs)

Differential Amplifier: Single-Ended and Differential Operation, Basic Differential Pair, Common-Mode Response, Differential Pair with MOS Loads, Gilbert Cell. Feedback Amplifier: General Consideration, Feedback Topologies, Effect of Loading, Effect of Feedback on Noise. Switched-Capacitor Circuits: General Consideration, Sampling Switches, Switched-Capacitor Amplifier, Switched-Capacitor Integrator, Switched-Capacitor Common-Mode Feedback.

UNIT III (12Hrs)

Oscillator: General Consideration, Ring Oscillator, Voltage Controlled Oscillator, Mathematical Model of VCOs. Phase-Locked Loops: Simple PLL, Charge-Pump PLLs, Nonideal Effects in PLLs, Delayed-Locked Loops.

UNIT IV(12Hrs)

Sequential Circuit Design: Introduction, Sequencing Static Circuit, Circuit Design of Latches and Flip-Flops, Static Sequencing Element Methodology. Array Subsystem: Introduction,

SRAM, DRAM, Read-Only Memory, Serial Access Memories, Content-Addressable Memory, Programmable Logic Arrays.

UNIT V (12Hrs)

Datapath Subsystems: Introduction, Addition/Subtraction, One/Zero Detector, Comparators, Counters, Boolean Logic Operation, Coding, Shifters, Multiplication, Division, Parallel-Prefix Computations.

COURSE OUTCOMES:

At the end of the course the students will be able to

1. Design different CMOS circuits using various logic families along with their circuit layout.
2. Use tools for VLSI IC design.

REFERENCE: 1. B. Razavi: Design of Analog CMOS Integrated Circuits, TMH Publication.
2. Weste, Harris and Banerjee: CMOS VLSI Design, Pearson Education
3. J. M. Rabaey, Digital Integrated Circuits, PHI Learning.
4. R. Jacob Baker: CMOS-Circuit Design, Layout and Simulation, Wiley.
5. A. A. Raj and T. Latha: VLSI Design, PHI Learning.

SEMESTER: V

CATEGORY: ETEL

SUBJECT CODE: ET 55 (B)

SUBJECT NAME: WAVELETS

Time: 60Hrs

COURSE OBJECTIVES:

To expose the students to the basics of wavelet theory and to illustrate the use of wavelet processing for data compression and noise suppression.

Introduction to time frequency analysis; the how, what and why about wavelets, Short-time Fourier transform, Wigner-Ville transform.;Continuous time wavelet transform, Discrete wavelet transform, tiling of the time-frequency plane and wave packet analysis, Construction of wavelets. Multi resolution analysis. Introduction to frames and biorthogonal wavelets, Multirate signal processing and filter bank theory, Application of wavelet theory to signal denoising, image and video compression, multi-tone digital communication, transient detection.

COURSE OUTCOMES:

At the end of the course, students will demonstrate the ability to:

1. Understand time-frequency nature of the signals.
2. Apply the concept of wavelets to practical problems.
3. Mathematically analyze the systems or process the signals using appropriate wavelet functions.

TEXT/REFERENCE BOOKS:

1. Y.T. Chan, Wavelet Basics, Kluwer Publishers, Boston, 1993.
2. I. Daubechies, Ten Lectures on Wavelets, Society for Industrial and Applied Mathematics, Philadelphia, PA, 1992.
3. C. K. Chui, An Introduction to Wavelets, Academic Press Inc., New York, 1992.
4. Gerald Kaiser, A Friendly Guide to Wavelets, Birkhauser, New York, 1995.
5. P. P. Vaidyanathan, Multirate Systems and Filter Banks, Prentice Hall, New Jersey, 1993.

6. A.N. Akansu and R.A. Haddad, Multiresolution signal Decomposition: Transforms, Subbands and Wavelets, Academic Press, Oranld, Florida, 1992.

7. B.Boashash, Time-Frequency signal analysis, In S.Haykin, (editor), Advanced Spectral Analysis, pages 418--517. Prentice Hall, New Jersey, 1991.

SEMESTER: V

CATEGORY: ETEL

SUBJECT CODE: ET 55(C)

SUBJECT NAME: NANO ELECTRONICS

Time: 60Hrs

COURSE OBJECTIVES:

The major objectives are to provide students with knowledge and understanding of nano-electronics as an important interdisciplinary subject.

UNIT-I (12Hrs)

Introduction The 'Top down' and 'Bottom up' approach, Why Nanoelectronics?, Nanotechnology potential. Band structure and density of states at Nanoscale: energy bands, density of states at low dimensional structure. Electrical transport in Nanostructure: Electrical conduction in metals, insulator/ionic crystals and semiconductors. Conduction mechanism in bulk, thin film and low dimensional system. Introductory quantum mechanics for Nanoscience: size effect in smaller systems, quantum behavior of nanometric world.

UNIT-II (12Hrs)

Tunnel junction and application of tunneling: Tunneling through a potential barrier, potential energy profiles of material interfaces, applications of tunneling. Quantum wells, wires and dots: Semiconductor hetrostructure and quantum wells, quantum dots and nanoparticles.

UNIT-III (12Hrs)

Single electron transistor: Coulomb Blockade, single electron transistor, other SET and FET structures.

UNIT-IV (12Hrs)

Ballastic and spin transport: Classical and semi-classical transport, ballistic transport, carbon nanotubes and nanowires, transport of spin and spintronics. The era of new Nanostructures of

carbon: Buck minsterfullerence, Nanodiomond, BN Nanotubes, Molecular Machine, Nanobiometrics.

UNIT V (12Hrs)

Fabrication technology: Top-down vs bottom-up technology. Lithographic process: Lithography, Nanolithography, split gate technology, self assembly, limitation of lithographic process. Non-lithographic techniques: Plasma arc discharge, sputtering, evaporation, chemical vapour deposition, pulsed laser deposition, molecular beam epitaxy, sol-gel technique, electrodeposition and other process.

COURSE OUTCOMES:

At the end of the course, students will demonstrate the ability to:

1. Understand various aspects of nano-technology and the processes involved in making nano components and material.
2. Leverage advantages of the nano-materials and appropriate use in solving practical problems.
3. Understand various aspects of nano-technology and theprocesses involved in making nano components and material.
4. Leverage advantages of the nano-materials and appropriate use in solving practical problems.

REFERENCE:

1. G. W. Hanson: Fundamentals of Nanoelectronics, Pearson Education.
2. K. K. Chattopadhyay and A. N. Banerjee: Introduction to Nanoscience and Nanotechnology, PHI Learning.
3. Vlaadiniz U. Mitin: Introduction to Nanoelectronics, Cambridge University Press.
4. M. Dragman and D. Dragman: Nanoelectronics- Principles and devices, Artech House.
5. Karl Goser: Nanoelectronics and Nanosystems, Springer.
6. Daniel Minoli: Nanotechnology application to telecommunication and networking, Wiley Interscience.
7. John H. Davis: Physics of low dimension semiconductor, Cambridge Press. 8. Carl C. Cosh: Nanostructure materials processing property and applications, Noyes Publications.

SEMESTER: V

CATEGORY: LC

SUBJECT CODE: ET 56

SUBJECT NAME: INDUSTRIAL TRAINING

Time: 60Hrs

COURSE OBJECTIVES:

The main objective of Industrial Training is to expose the students to actual working environment and enhance their knowledge and skill from what they have learned in the college. Another purpose of this program is to instill the good qualities of integrity, responsibility and self confidence.

Duration: 2 weeks after the VI semester in the summer break. Assessment in VII semester.

SCHEME OF EXAMINATION

For the assessment of industrial training undertaken by the students, following components are considered with respective weightage.

A) Term work In Industry Marks allotted

1. Attendance and General Discipline	25
2. Daily diary Maintenance	25
3. Initiative and Participative attitude during training	25
4. Assessment of training by Industrial Supervisor/s	25
Total	100

(B) Practical/Oral Examination (Viva-voce In Institution Marks allotted

1. Training Report	20
2. Seminar and cross questioning (defense)	30
Total	50

Marks of various components in industry should be awarded to the student, in consultation with the Training and Placement Officer (TPO)/ Faculty of the institute, who must establish contact with the supervisor/ authorities of the organization where, students have taken training, to award the marks for term work. During training, students will prepare a first draft of the training report in consultation with the section Incharge. After training they will prepare final draft with the help of the TPO/ faculty of the institute. Then, they will present a seminar on their training and will face viva-voce on training in the institute

COURSE OUTCOMES

Ability to communicate efficiently. Knack to be a multi-skilled engineer with good technical knowledge, management, leadership and entrepreneurship skills. Ability to identify, formulate and model problems and find engineering solution based on a systems approach.

SEMESTER: V

CATEGORY: MC

SUBJECT CODE: BE52

SUBJECT NAME: ESSENCE OF INDIAN KNOWLEDGE TRADITION

Time: 60Hrs

COURSE OBJECTIVES:-

The course on Essence of Indian Knowledge Tradition will focus on Indian philosophical, linguistic and artistic traditions, along with yoga and Indian perspective of modern scientific worldview, reported the Hindustan Times. The curriculum has been reworked to meet the "industry demands"

Basic structure of Indian Knowledge System: Modern Science and Indian Knowledge System– Yoga and Holistic Health care– Case studies–

COURSE OUTCOMES:

Students can extrapolate and interpolate. Students will keep a lab notebook that documents their experience in each lab procedure. Develop skills to impart practical knowledge in real time solution and learn to design new instruments with practical knowledge.

REFERENCE:

1. V. Sivaramakrishnan (Ed.), Cultural Heritage of India-course material, Bharatiya Vidya Bhavan, Mumbai. 5th Edition, 2014

2. Swami Jitatmanand, Modern Physics and Vedant, Bharatiya Vidya Bhavan Swami Jitatmanand, Holistic Science and Vedant, Bharatiya Vidya Bhavan

3. Fritzof Capra, Tao of Physics The Wave of life VN Jha (Eng. Trans.), Tarkasangraha of Annam Bhatta, International Chinmay Foundation, Velliarnad, Arnakulam

4. Yoga Sutra of Patanjali, Ramakrishna Mission, Kolkata GN Jha (Eng. Trans.), Ed. RN Jha, Yoga-darshanam with Vyasa Bhashya, Vidyanidhi Prakashan, Delhi 2016

5. RN Jha, Science of Consciousness Psychotherapyand Yoga Practices, Vidyanidhi Prakashan, Delhi 2016

6. P B Sharma (English translation), Shodashang Hridayan

SEMESTER: V

CATEGORY: - PDFS

SUBJECT CODE: -BE-53

SUBJECT NAME: -PROFESSIONAL DEVELOPMENT FINISHING SCHOOL

LEVEL-III

TOTAL - 36 HOURS

OBJECTIVE

The students are to be groomed with respect to personality development. Further improvement in English, Aptitude and reasoning ability is desirable.

UNIT-I(12 HOURS)

Conversational English: Grammar mainly Active and Passive Voice, 250 sentences of daily use irrespective of any specific tenses**.**

UNIT-II(12 HOURS)

Conversational English:

100 sentences of daily use related to professional and formal environment Report Writing with necessary punctuations and with editor's eye, Thematic Apperception, Expression of Feelings 2-minutes Talk by the students, Smart Etiquettes and Tidiness.

UNIT-III(12 HOURS)

Aptitude/Reasoning

Quantitative Aptitude and Logical Reasoning – Level III

Problem solving on, Average, Time work, percentage, Probability, Permutation and Combination. Question- Statements, Theme Detection, Statement Assumptions, Statement Argument**.**

OUTCOME

Further improvement in reading, writing and vocal English is achieved. Aptitude and reasoning aspect shows improvement.

SEMESTER: VI

CATEGORY: CORE

SUBJECT CODE: ET 61

SUBJECT NAME: CONTROL SYSTEMS

Time: 60Hrs

COURSE OBJECTIVES

To teach the fundamental concepts of Control systems and mathematical modelling of the system. To teach the concept of time response and frequency response of the system. To teach the basics of stability analysis of the system.

UNIT-I (12Hrs)

Control system

Terminology and classification of control system, examples of control system, mathematical modeling of mechanical and electrical systems, differential equations, block diagram representation and reduction, signal flow graph techniques.

Feedback characteristics of control systems Feedback and non-feedback systems, reduction of parameter variations by use of feedback, control over system dynamics and effects of disturbances by the use of feedback, linearization effect of feedback, regenerative feedback.

UNIT-II(12Hrs)

Time response analysis

Standard test signals, time response of 1st order system, time response of 2nd order system, steady-state errors and error constants, effects of additions of poles and zeros to open loop and closed loop system.

Time domain stability analysis

Concept of stability of linear systems, effects of location of poles on stability, necessary conditions for stability, Routh-Hurwitz stability criteria, relative stability analysis, Root Locus concept, guidelines for sketching Root-Locus.

UNIT-III(12Hrs)

Frequency response analysis

Correlation between time and frequency response, Polar plots, Bode Plots, all-pass and minimum-phase systems, log-magnitude versus Phase-Plots.

Frequency domain stability analysis

Nyquist stability criterion, assessment of relative stability using Nyquist Criterion (phase margin, gain margin and stability), closed-loop frequency response.

UNIT-IV(12Hrs)

Approaches to system design Design problem, types of compensation, design of phase-lag, phase lead and phase lead-lag compensators in time and frequency domain, proportional, derivative, integral and PID compensation.

Digital control systems

System with digital controller, difference equations, the z-transform, pulse transfer function, inverse z transform, the s and z domain relationship.

UNIT-V(12Hrs)

Concept of state, state variables and state model,

State space representation of systems, block diagram for state equation, transfer function decomposition, solution of state equation, transfer matrix, relationship between state equation and transfer function, controllability and observability.

COURSE OUTCOMES:

At the end of this course students will demonstrate the ability to

1. Characterize a system and find its study state behavior
2. Investigate stability of a system using different tests
3. Design various controllers
4. Solve liner, non-liner and optimal control problems

REFERENCE:

1) Nagrath and Gopal: Control System Engineering, New Age International Publishers.
2) Kuo: Automatic Control Systems, PHI Learning.
3) Varmah: Control Systems, TMH.
4) Distefano (Schaum series): Control Systems, TMH
5) Manke: Linear Control System, Khanna Publishers.
6) Stefani, Shahian: Design of feedback control systems, Oxford University Press.
7) Ogata: Modern Control Engineering, PHI Learning.

LIST OF EXPERIMENTS

1. Using MATLAB for Control Systems

(a) Introduction to MATLAB.

(b) Polynomials in MATAB

(c)Scripts, Functions & Flow Control in MATLAB**.**

2. Mathematical Modeling of Physical Systems

(a)Mass-Spring System Model.

(b)Speed Cruise Control example:

(c)Mass-Spring System .

3. Performance of First order and second order system.

4. Linear Time-invariant Systems and Representation

(a)Mass-Spring System Mode

(b)Linear Time-Invariant Systems in MATLAB

SEMESTER: VI

CATEGORY: CORE

SUBJECT CODE: ET 62

SUBJECT NAME: VLSI CIRCUITS AND SYSTEMS

COURSE OBJECTIVES **Time: 60HRS**

1. To bring both Circuits and System views on design together.
2. It offers a profound understanding of the design of complex digital VLSI circuits, computer aided simulation and synthesis tool for hardware design.

UNIT I (12Hrs)

Introduction

Introduction to CMOS VLSI circuit, VLSI design flow, Design strategies ,Hierarachy, regularity, modularity, locality, MOS Transistor as a Switches, CMOS Logic, Combinational circuit, latches and register, Introduction of CAD Tool , Design entry, synthesis, functional simulation.

UNIT II (12Hrs)

Specification of sequential systems

Characterizing equation & definition of synchronous sequential machines. Realization of state diagram and state table from verbal description, Mealy and Moore model machines state table and transition diagram. Minimization of the state table of completely and incompletely specified sequential machines.

UNIT III (12Hrs)

Asynchronous Sequential Machine

Introduction to asynchronous sequential machine, Fundamental mode and Pulse mode asynchronous sequential machine, Secondary state assignments in asynchronous sequential machine, races and hazards.

UNIT IV (12Hrs)

State Machine

Algorithmic state machine and fundamental concept of hardware/ firmware algorithms. Controllers and data system designing.

UNIT V (12Hrs)

Fault Detection in combinational circuit

Types of faults, Fault detection using Boolean Difference and path sensitization method.

Concept of PROM, PLA, PAL, CPLD and FPGA, PALASM software applications.

COURSE OUTCOMES:

Be able to create models of moderately sized CMOS circuits that realize specified digital functions. And Be able to apply CMOS technology-specific layout rules in the placement and routing of transistors and interconnect, and to verify the functionality, timing, power, and parasitic effects.

REFERENCE:

1. Neil Weste: Principle of CMOS VLSI Design, TMH.
2. Kohavi: Switching & Finite Automata Theory, TMH.
3. Lee: Digital Circuits and Logic Design, PHI Learning..
4. Roth Jr.: Fundamentals of Logic Design, Jaico Publishing House.
5. Parag K. Lala: Fault Tolerant and Fault Testable Hardware Design, BS Publication. Grading System w.e.f. 2012-13.
6. Samir palnitkar: Verilog HDL- A Guide to Digital Design and Synthesis, Pearson Education.
7. Bhasker: A Verilog HDL Primer –synthesis, Pearson Education.

LIST OF EXPERIMENTS

1. Design and simulation of Logic gates: NAND, NOR, XOR, XNOR using Verilog/ VHDL
2. Design and simulation of half adder, full adder, subtractor, latches using Verilog/ VHDL
3. Design and simulation of multiplexers- 2:1, 4:1, 8:1 using Verilog/ VHDL
4. Design and simulation of comparators, decoders- 2:4, 3:8, 4:16 using Verilog/ VHDL

5. Design and simulation of bit ripple carry full adder using Verilog/ VHDL.
6. Design and simulation of bit Ripple carry counter using Verilog/ VHDL.
7. Design and simulation of parity generator using Verilog/ VHDL.
8. Design and simulation of up/down counters using Verilog/ VHDL.
9. Study of PLA and PAL
10. Design and simulation of half and full subtractor using Verilog/ VHDL.

SEMESTER: VI

CATEGORY: CORE

SUBJECT CODE: ET 63

SUBJECT NAME: INDUSTRIAL ELECTRONICS

Time:60 HRS

COURSE OBJECTIVES:

Power electronics studies the application of semiconductor devices to the conversion and control of electrical energy. To enable the students to simulate and test the rectifier on different load like resistive, inductive and capacitive.

UNIT I [12Hrs]

Power, Semiconductor Devices

Classification of Power semiconductor devices, characteristics, construction, application and theory of operation of power diode, power transistor, Thyristors. Device specifications and ratings, working of Diac, Triac, IGBT, GTO and other power semiconductor devices. Turn-on / Turn-off methods and their circuits.

UNIT II [12Hrs]

Rectifiers

Review of uncontrolled rectification an its limitations, controlled rectifiers, half wave, Full wave configurations, multiphase rectification system, use of flywheel diode in controlled rectifier configurations.

UNIT III[12Hrs]

Inverters and Choppers

Classification of inverters, Transistor inverters, Thyristor inverters, Voltage and Current Communicated inverters, PWM inverters, Principle of Chopper, Chopper classification and types of regulators.

UNIT IV[12Hrs]

A. C. Voltage Controllers and Cyclo-converters

Classification and operation of AC voltage and Cyclo-converters, their circuit analysis for different type of load.

UNIT V[12Hrs]

Industrial Applications

Solid-state switching circuits, Relays, Electronic Timer, battery charger, Sawtooth generator, applications in Industrial process control, Motor drive applications, Electronic regulators, etc., Induction heating, Dielectric Heating, Resistance welding and welding cycle.

COURSE OUTCOMES:

At the end of this course students will demonstrate the ability to

1. Build and test circuits using power devices such as SCR
2. Analyze and design controlled rectifier, DC to DC converters, DC to AC inverters,
3. Learn how to analyze these inverters and some basic applications.
4. Design SMPS.

LIST OF EXPERIMENTS

1 To draw the V-1 characteristics of Thyristor.

2 To draw the V-1 characteristics of Triac.

3 To draw the V-1 characteristics of Diac

4 Study of light dimmer using Triac find out the firing angle and draw the wave forms across load and Triac.

5 Study the operation of an SCR automatic speed control circuit .

6 To draw the V-1 characteristics of IGBT.

7 Study of light dimmer using Diac, find out the firing angle and draw the wave forms across load.

8 Study SCR automatic speed control circuit and see the waveforms on CRO.

9 Study Cyclo-converters.

10 Study PWM inverters.

SEMESTER: VI

CATEGORY: ETEL

SUBJECT CODE: ET 64(A)

SUBJECT NAME: EMBEDDED SYSTEM

Time: 60HRS

COURSE OBJECTIVES:

To provide experience to integrate hardware and software for microcontroller applications systems. To acquire knowledge about microcontrollers embedded processors and their applications. Foster ability to understand the internal architecture and interfacing of different peripheral devices with Microcontrollers.

UNIT-I[12Hrs]

8 Bit Micro controllers: Introduction to MCS-51 family, Peripheral of MCS-51 family, PIC Micro Controller –CPU architecture, registers, instruction sets addressing modes, loop timing, On chip Peripherals of PIC, Motorola MC68H11 Family Architecture Registers, Addressing modes, Interrupts features of interrupts- Interrupt vector and Priority, timing generation and measurements, Input capture, Out capture.

UNIT-II[12Hrs]

16 Bit Micro controller: Introduction to MCS-96 family, Peripherals of MCS-96 family, 80196-architecture, CPU operation, memory organization, I/O port, Operand addressing, instruction set, Interrupts, On chip Peripherals-PWM, Timers, HIS/HSO, Serial Port, External memory interfacing.

UNIT-III[12Hrs]

32 bit Micro controller: Intel 80960-architecture, memory address space, Salient features of ARM processor family-ARM7 /ARM9/ ARM9E/ ARM10/ ARM11/ Secure Core /Strong ARM, XScale technology, ARM9200 Architecture,Pinouts, Peripheral Identifier, System Interrupts, External Interrupts, Product memory mapping, External memory mapping, Internal memory

mapping, On chip Peripherals-Memory controllers, external Bus Interface(EBI), Advanced interrupt controller(AIC), USART, Timer counter.

UNIT-IV[12Hrs]

Software development and tools: Embedded system evolution trends. Round- Robin, Roundrobin with Interrupts, function- One- Scheduling Architecture, Algorithms. Introduction to assembler- compiler- cross compilers and Integrated Development Environment (IDE) Object Oriented Interfacing, Recursion, Debugging strategies, Simulators.

UNIT-V[12Hrs]

Real Time Operating Systems: Task and Task States, tasks and data, semaphores and shared Data Operating system Services- Message queues- Timer Function- Events- Memory Management, Interrupt Routines in an RTOS environment, basic design Using RTOS.

COURSE OUTCOMES:

At the end of the course, students will demonstrate the ability to:

1. Suggest design approach using advanced controllers to real-life situations.

REFERENCE:-

1. David E Simon, " An embedded software Primer" Pearson education Asia.
2. John B Peat man " Design with Micro controller" Pearson education Asia.
3. Jonartthan W. Valvano Brooks/cole " Embedded Micro Computer Systems. Real time interfacing", Thomson learning.

SEMESTER: VI

CATEGORY: ETEL

SUBJECT CODE: ET 64(B)

SUBJECT NAME: BIO-MEDICAL ELECTRONICS

Time: 60HRS

COURSE OBJECTIVES:

The objective of this course is to introduce student to basic biomedical engineering technology and introduce different biological signals, their acquisition, measurements and related constraints.

Brief introduction to human physiology. Biomedical transducers: displacement,velocity, force, acceleration, flow, temperature, potential, dissolved ions and gases. Bio-electrodes and bio-potential amplifiers for ECG, EMG, EEG, etc. Measurement of blood temperature, pressure and flow. Impedanceplethysmography. Ultrasonic, Xray and nuclear imaging.Prostheses and aids: pacemakers, defibrillators, heart-lung machine, artificialkidney, aids for the handicapped. Safety aspects.

COURSE OUTCOMES:

At the end of the course, students will demonstrate the ability to:

1. Understand the application of the electronic systems in biological and medical applications.
2.Understand the practical limitations on the electronic components while handling biosubstances.
3. Understand and analyze the biological processes like other electronic processes.

TEXT/REFERENCE BOOKS:

1. W.F. Ganong, Review of Medical Physiology, 8th Asian Ed, Medical Publishers, 1977.
2. J.G. Websster, ed., Medical Instrumentation, Houghton Mifflin, 1978.
3. A.M. Cook and J.G. Webster, eds., Therapeutic Medical Devices, Prentice-Hall, 1982.

SEMESTER: VI

CATEGORY: ETEL

SUBJECT CODE: ET 64(C)

SUBJECT NAME: MIXED SIGNAL DESIGN

Time: 60HRS

COURSE OBJECTIVES:

Students will: Apply principles of hierarchical mixed signal CMOS VLSI, from the transistor up to the system level, to the understanding of CMOS circuits and systems that are suitable for CMOS fabrication. Design simulated EXPERIMENTS using Cadence to verify the integrity of a CMOS circuit.

Analog and discrete-time signal processing, introduction to sampling theory; Analog continuous-time filters: passive and active filters; Basics of analog discrete-time filters and Z-transform. Switched-capacitor filters- Non idealities in switched-capacitor filters; Switched-capacitor filter architectures; Switched-capacitor filter applications. Basics of data converters; Successive approximation ADCs, Dual slope ADCs, Flash ADCs, Pipeline ADCs, Hybrid ADC structures, High-resolution ADCs, DACs. Mixed-signal layout, Interconnects and data transmission; Voltage-mode signaling and data transmission; Current-mode signaling and data transmission. Introduction to frequency synthesizers and synchronization; Basics of PLL, Analog PLLs; Digital PLLs; DLLs.

COURSE OUTCOMES:

At the end of the course, students will demonstrate the ability to:

1. Understand the practical situations where mixed signal analysis is required.
2. Analyze and handle the inter-conversions

TEXT/REFERENCE BOOKS:

1. R. Jacob Baker, CMOS mixed-signal circuit design, Wiley India, IEEE press, reprint 2008.
2. Behzad Razavi , Design of analog CMOS integrated circuits, McGraw-Hill, 2003.
3. R. Jacob Baker, CMOS circuit design, layout and simulation, Revised second edition, IEEE

press, 2008.

4. Rudy V. dePlassche, CMOS Integrated ADCs and DACs, Springer, Indian edition, 2005.

5. Arthur B. Williams, Electronic Filter Design Handbook, McGraw-Hill, 1981.

6. R. Schauman, Design of analog filters by, Prentice-Hall 1990 (or newer additions).

7. M. Burns et al., An introduction to mixed-signal IC test and measurement by, Oxford university press, first Indian edition, 2008.

SEMESTER: VI

CATEGORY: OE-2

SUBJECT CODE: ET 65 (A)

SUBJECT NAME: NANO MATERIAL AND TECHNOLOGY

Time: 60HRS

COURSE OBJECTIVES:

This is course deals with fundamental behavior of Nano Materials and competing nano - technologies for various applications

UNIT 1 (12 HRS)

Introduction of nanomaterials and nanotechnologies, Features of nanostructures, Background of nanostructures, Techniques of synthesis of nanomaterials, Tools of the nanoscience, Applications of nanomaterials and technologies. Bonding and structure of the nanomaterials, Predicting the Type of Bonding in a Substance crystal structure, Metallic nanoparticles, Surfaces of Materials, Nanoparticle Size and Properties, Mechanical, electrical, properties of materials, theories relevant to mechanical properties, techniques to study mechanical properties of nanomaterials

UNIT 2 (12 HRS)

Applications of one and higher dimension nano-materials. Application of Nanomaterial: Ferroelectric materials, coating, molecular electronics and nanoelectronics, biological and environmental, membrane based application, polymer based application.

UNIT 3(12 HRS)

Overview of Nano-lithography technologies and overview of pattern transfer, Nanoimprint lithography and soft lithography, micro electro-mechanical system (MEMS) Definition - MEMS materials. Laws of scaling. The multi disciplinary nature of MEMS. Survey of materials central to micro engineering. Applications of MEMS in various industries and nano-phonics.

UNIT 4 (12 HRS)

Basic Concept of Carbon Nanotube, the structure of Carbon Nanotubes, properties of carbon nanotubes, Mechanical Properties, Thermal Stability, Electronic Properties, Optical Properties, Elastic Properties, Vibrational Properties, Intrinsic Properties of individual Carbon Nano Tube,

APPLICATION OF CARBON NANOTUBES, Carbon Nanotubes in Electronics, Carbon Nanotubes in Energy Applications, Carbon Nanotubes For Mechanical Applications, Carbon Nanotube Sensors, Carbon Nanotubes in Field Emission and Lighting Applications, Carbon Nanotubes for Biological Applications.

UNIT 5 (12 HRS)

Synthesis process of metal nanoparticles: Wet Chemical Synthesis Routes, Phase Transfer Method, Stabilization Mechanisms, Electrochemical Method, Interdisciplinary arena of nanotechnology.

COURSE OUTCOMES

At the end of this course student will demonstrate the ability to:

1. To understand the basic science behind the design and fabrication of nano scale systems.
2. To understand and formulate new engineering solutions for current problems and competing technologies for future applications.
3. To be able make inter disciplinary projects applicable to wide areas by clearing and fixing the boundaries in system development.
4. To gather detailed knowledge of the operation of fabrication and characterization devices to achieve precisely designed systems.

REFERENCE:

1. Nanoscale Materials in Chemistry edited by Kenneth J. Klabunde and Ryan M. Richards, 2ndedn, John Wiley and Sons, 2009.
2. Nanocrystalline Materials by A I Gusev and A ARempel, Cambridge International Science Publishing, 1st Indian edition by Viva Books Pvt. Ltd. 2008.
3. Springer Handbook of Nanotechnology by Bharat Bhushan, Springer, 3rdedn, 2010.
4. Carbon Nanotubes: Synthesis, Characterization and Applications by Kamal K. Kar, Research Publishing Services; 1stedn, 2011, ISBN-13: 978-9810863975.

SEMESTER: VI

CATEGORY: OE-2

SUBJECT CODE: ET 65 (B)

SUBJECT NAME: DIGITAL IMAGE PROCESSING

Time: 60HRS

COURSE OBJECTIVES:

Students should be able to

(i) understand and analyze image processing problems

(ii) Design algorithms to solve image processing problems and meet design specifications

UNIT-I (12 Hrs)

Digital Image Processing (DIP) Introduction, examples of fields that use DIP, fundamental steps in DIP, components of an image processing system. Digital Image Fundamentals: elements of visual perception, image sensing and acquisition, image sampling and quantization, basic relationships between pixels.

UNIT-II (12 Hrs)

Image Transforms Two-dimensional (2D) impulse and its shifting properties, 2D continuous Fourier Transform pair, 2D sampling and sampling theorem, 2D Discrete Fourier Transform (DFT), properties of 2D DFT. Other transforms and their properties: Cosine transform, Sine transform, Walsh transform, Hadamard transform, Haar transform, Slant transform, KL transform.

UNIT-III (12 Hrs)

Image Enhancement Spatial domain methods: basic intensity transformation functions, fundamentals of spatial filtering, smoothing spatial filters (linear and non-linear), sharpening spatial filters (unsharp masking and high boost filters), combined spatial enhancement method. Frequency domain methods: basics of filtering in frequency domain, image smoothing filters (Butterworth and Gaussian low pass filters), image sharpening filters (Butterworth and Gaussian high pass filters), selective filtering.

UNIT-IV (12 Hrs)

Image Restoration, Image degradation/restoration, noise models, restoration by spatial filtering, noise reduction by frequency domain filtering, linear position invariant degradations, estimation of degradation function, inverse filtering, Wiener filtering, image reconstruction from projection.

UNIT-V (12 Hrs)

Image Compression, Fundamentals of data compression: basic compression methods: Huffman coding, Golomb coding, LZW coding, Run-Length coding, Symbol based coding. Digital image watermarking, representation and description- minimum perimeter polygons algorithm (MPP).

COURSE OUTCOMES:

At the end of the course, students will demonstrate the ability to:

1. Mathematically represent the various types of images and analyze them.
2. Process these images for the enhancement of certain properties or for optimized use of the resources.
3. Develop algorithms for image compression and coding.

REFERENCE:

1. Gonzalez and Woods: Digital Image Processing, Pearson Education.
2. Anil Jain: Fundamentals of Digital Image Processing, PHI Learning.
3. Annadurai: Fundamentals of Digital Image Processing, Pearson Education.
4. Sonka, Hlavac and Boyle: Digital Image Processing and Computer Vision, Cengage Learning.
5. Chanda and Majumder: Digital Image Processing and Analysis, PHI Learning.
6. Jayaraman, Esakkirajan and Veerakumar: Digital Image Processing, TMH.
7. William K. Pratt, Digital Image Processing, Wiley India.

SEMESTER: VI

CATEGORY: OE-2

SUBJECT CODE: ET65(C)

SUBJECT NAME: NEURAL NETWORKS

Time: 60HRS

COURSE OBJECTIVES:

The objective of this course is to provide students with a sound and comprehensive understanding of artificial neural networks and machine learning, including subjects of the McCulloch-Pitts Model, activation functions, feed-forward and feed-back network structures, approximation of nonlinear functions, supervised.

UNIT-I(12 Hrs)

Neural Network (NN) Introduction, benefits of neural network, models of a neuron, neural network as directed graph, network architectures, artificial intelligence and neural network. Learning processes: error correction learning, memory based learning, Hebbian learning, competitive learning, Boltzman learning, learning tasks, adaptation, statistical nature of learning process, statistical learning theory.

UNIT-II(12 Hrs)

Perceptrons Single layer perceptrons: adaptive filtering problem, unconstrained optimization technique, linear least squares filter, least mean square algorithm (LMS), perceptron convergence theorem Multi layer perceptron: architecture, back propagation algorithm, generalization, approximations of functions, network pruning techniques.

UNIT-III(12 Hrs)

Radial Basis Function (RBF) Networks Cover's theorem on the separability of patterns, interpolation problem, supervised learning as an Ill-posed hyper surface reconstruction problem, regularization theory, regularization network, generalized radial basis function networks (RBF), estimation of the regularization parameter, approximation properties of RBF networks,

comparison of RBF networks and multilayer perceptrons, Kernel regression and its relation tom RBF networks, learning strategies.

UNIT-IV(12 Hrs)

Information- Theoretic Models, Entropy, maximum entropy principle, mutual information, Kullback-Leibler divergence, mutual information as an objective function to be optimized, maximum mutual information principle, infomax and redundancy reduction, spatially coherent and incoherent features, independent components analysis, maximum likelihood estimation, maximum entropy method.

UNIT V (12 Hrs)

Dynamically Driven Recurrent Networks introduction, recurrent network architectures, state space model, non-linear autogressive with exogenous inputs model, computational power of recurrent networks, learning algorithms, back propagation through time, real time recurrent learning, Kalman filter, decoupled Kalman filter, vanishing gradients in recurrent networks, system identification, model reference adaptive control.

COURSE OUTCOMES:

Design single and multi-layer feed-forward neural networks; develop and train radial-basis function networks; program linear and nonlinear models for data mining; analyse the performance of neural networks.

REFERENCE:

1. Haykin: Neural Networks- A Comprehensive Foundation, PHI Learning.
2. Sivanandam, Sumathi and Deepa: Introduction to Neural Networks using Matlab, TMH.
3. Freeman and Skapura: Fundamentals of Neural Networks- algorithms, applications and Programming techniques, Pearson Education.
4. Hagan, Demuth and Beale: Neural Network Design, Cengage Learning.
5. Anderson: An introduction ro Neural Networks, PHI Learning.
6. Satish Kumar: Neural Networks, TMH.

SEMESTER: VI

CATEGORY: PROJECT

SUBJECT CODE: ET 66

SUBJECT NAME: MINI PROJECTS/ELECTRONIC DESIGN WORKSHOP

Time: 60HRS

COURSE OBJECTIVES:

Design and analyze of electronic circuits, Evaluate frequency response to understand behavior of Electronics circuits. Digital System Design Students will try to learn: To understand concepts of sequential circuits and to analyze sequential systems in terms of state machines.

The student should select a topic (from the subjects he/she has studied so far or any topic related to real life problem). He should do the literature survey, analyze the problem and propose some solution for the same. He should prepare a detailed (typed) report regarding the topic and should present the same with the help of power point presentation at the end of the semester. The analysis of the problem may be done with the help of some software or any hardware (which may be made by the student).

Course Outcomes:

The ability to function in team and multidisciplinary setting. The ability to identify, formulate and solve complex engineering problems. The understanding of professional and ethical responsibility. The ability to communicate effectively.

SEMESTER: VI

CATEGORY: - PDFS

SUBJECT CODE: -BE- 61

SUBJECT NAME: -PROFESSIONAL DEVELOPMENT FINISHING SCHOOL

(LEVEL-IV)

TOTAL - 36 HOURS

OBJECTIVE

The students are to be groomed with respect to personality development. Emphasis to be made in reading, writing and vocal English, quantitative aptitude and logical reasoning to be stressed.

UNIT-I(18 HOURS)

Final Finishing: Final Preparation of CV. Final Compilation of Database of Students with Necessary Mapping, Mock Interviews, Group Discussions.

UNIT-II (18 HOURS)

Aptitude / Reasoning: Quantitative Aptitude and Logical Reasoning- Level IV

Problem solving on Ratio and Proportions, Solutions and Mixtures, Sets, Simple Interest and Compound Interest, Simple and Quadratic Equations.

OUTCOME

Attainment of confidence the students to be able to face interviews, group discussion and presentation ability. Knowledge on basic mathematical ability attained. Hence forth a student become competent to face the challenges of the world after attainments of knowledge at college level

SEMESTER: VII

CATEGORY: ETEL

SUBJECT CODE: ET71 (A)

SUBJECT NAME: - MICROWAVE THEORY AND TECHNIQUES

Time: 60HRS

COURSE OBJECTIVES:

Microwave Engineering introduces the student to RF/microwave analysis methods and design techniques. Scattering parameters are defined and used to characterize devices and system behavior. Passive and active devices commonly utilized in microwave subsystems are analyzed and studied.

UNIT I (10 Hrs)

Introduction to Microwaves- History of Microwaves, Microwave Frequency bands; Applications of Microwaves: Civil and Military, Medical, EMI/ EMC. Mathematical Model of Microwave Transmission-Concept of Mode, Features of TEM, TE and TM Modes, Losses associated with microwave transmission, Concept of Impedance in Microwave transmission.

UNIT II (10 Hrs)

Analysis of RF and Microwave Transmission Lines- Coaxial line, Rectangular waveguide, Circular waveguide, Strip line, Micro strip line.

Microwave Network Analysis- Equivalent voltages and currents for non-TEM lines, Network parameters for microwave circuits, Scattering Parameters.

UNIT III (10 Hrs)

Passive and Active Microwave Devices- Microwave passive components: Directional Coupler, Power Divider, Magic Tee, Attenuator, Resonator. Microwave active components: Diodes, Transistors,

UNIT IV (10 Hrs)

Oscillators, Mixers. Microwave Semiconductor Devices: Gunn Diodes, IMPATT diodes, Schottky Barrier diodes, PIN diodes. Microwave Tubes: Klystron, TWT, Magnetron.

Microwave Design Principles-Impedance transformation, Impedance Matching, Microwave Filter Design, RF and Microwave Amplifier Design, Microwave Power Amplifier Design, Low Noise Amplifier Design, Microwave Mixer Design, Microwave Oscillator Design.

Microwave Antennas- Antenna parameters, Antenna for ground based systems, Antennas for airborne and satellite borne systems, Planar Antennas.

UNIT V (10 Hrs)

Microwave Measurements- Power, Frequency and impedance measurement atmicrowave frequency, Network Analyzer and measurement of scattering parameters, Spectrum Analyzer and measurement of spectrum of a microwave signal, Noise at microwave frequency and measurement of noise figure. Measurement of Microwave antenna parameters.

UNIT VI (10 Hrs)

Microwave Systems- Radar, Terrestrial and Satellite Communication, Radio Aidsto Navigation, RFID, GPS. Modern Trends in Microwaves Engineering- Effect of Microwaves on human body, Medical and Civil applications of microwaves, Electromagnetic interference and Electromagnetic Compatibility (EMI& EMC), Monolithic Microwave ICs, RFMEMS for microwave components, Microwave Imaging.

COURSE OUTCOMES:

At the end of the course, students will demonstrate the ability to:

1. Understand various microwave system components their properties.
2. Appreciate that during analysis/ synthesis of microwave systems, the different mathematical Treatment is required compared to general circuit analysis.
3. Design microwave systems for different practical application.

TEXT/REFERENCE BOOKS:

1. R.E. Collins, Microwave Circuits, McGraw Hill

2. K.C. Gupta and I.J. Bahl, Microwave Circuits, Artech house.

LIST OF EXPERIMENTS

1. To study the characteristics of the reflex klystron tube and to determine its electronic tuning range.

2. To determine the frequency and wavelength in a rectangular waveguide working on TE10 mode.

3. To determine the standing wave ratio and reflection coefficient in a rectangular waveguide.

4. To measure and plot the V-I characteristic of Gunn diode.

5. To determine the Square wave modulation through PIN diode.

6. To Study the Function of Magic Tee by measuring the following parameters

(a). Measurement the VSWR at different ports

(b). Measurement isolation and coupling coefficient.

7. To Study the function of isolator/circulator by measuring the following parameter

(a). Input VSWR measurement of isolator/ circulator

(b). Measurement of insertion loss and isolation.

8. To Study the function of Attenuator (Fixed and Variable type) by measuring the following parameters.

(a) Input VSWR measurement.

(b) Measurement of insertion loss and attenuation.

9. To study the function of multihole directional coupler (MHD coupler) by measuring the following parameters:

(a).To measure main line and auxiliary line VSWR.

(b).To measure the coupling factor insertion loss an directivity of the coupler.

SEMESTER: VII

CATEGORY: ETEL

SUBJECT CODE: ET 71 (B)

SUBJECT NAME: PROGRAMMING LANGUAGES FOR EMBEDDED SOFTWARE

Time: 60HRS

COURSE OBJECTIVES:

Students will try to learn:

1. The concepts and architecture of embedded systems
2. Basic of microcontroller 8051.
3. The concepts of microcontroller interface.
4. The concepts of ARM architecture
5. The concepts of real-time operating system
6. Different design platforms used for an embedded systems application

UNIT 1 (10HRS)

Embedded 'C' Programming

- Bitwise operations, Dynamic memory allocation, OS services
- Linked stack and queue, Sparse matrices, Binary tree
- Interrupt handling in C, Code optimization issues
- Writing LCD drives, LED drivers, Drivers for serial port communication
- Embedded Software Development Cycle and Methods (Waterfall, Agile)

UNIT 2: (10HRS)

Object Oriented Programming

Introduction to procedural, modular, object-oriented and generic programming techniques, Limitations of procedural programming, objects, classes, data members, methods, data encapsulation, data abstraction and information hiding, inheritance, polymorphism

UNIT 3: (10HRS)

CPP Programming: 'cin', 'cout', formatting and I/O manipulators, new and delete operators,

Defining a class, data members and methods, 'this' pointer, constructors, destructors, friend function, dynamic memory allocation

UNIT 4: (10HRS)

Overloading and Inheritance: Need of operator overloading, overloading the assignment, overloading using friends, type conversions, single inheritance, base and derived classes, friend classes, types of inheritance, hybrid inheritance, multiple inheritance, virtual base class, polymorphism, virtual functions.

UNIT 5: (10HRS)

Templates: Function template and class template, member function templates and template arguments,Exception Handling: syntax for exception handling code: try-catch- throw, Multiple Exceptions.

UNIT 6: (10HRS)

Scripting Languages Overview of Scripting Languages – PERL, CGI, VB Script, Java Script. PERL: Operators, Statements Pattern Matching etc. Data Structures, Modules, Objects, Tied Variables, Inter process Communication Threads, Compilation & Line Interfacing.

COURSE OUTCOMES

Students will able to:

1. Explain the embedded system concepts and architecture of embedded systems
2. Describe the architecture of 8051 microcontroller and write embedded program for 8051 microcontroller.
3. Design the interfacing for 8051 microcontroller.
4. Understand the concepts of ARM architecture.

REFERENCE:

1. Michael J. Pont , "Embedded C", Pearson Education, 2nd Edition, 2008
2. Randal L. Schwartz, "Learning Perl", O'Reilly Publications, 6th Edition 2011

3. A. Michael Berman, “Data structures via C++”, Oxford University Press, 2002
4. Robert Sedgewick, “Algorithms in C++”, Addison Wesley Publishing Company, 1999
5. Abraham Silberschatz, Peter B, Greg Gagne, “Operating System Concepts”, John Willey & Sons, 2005

LIST OF EXPERIMENTS

1. Design and develop a reprogrammable embedded computer using 8051 microcontrollers and to show the following aspects. a. Programming b. Execution c. Debugging

2. Configure timer control registers of 8051 and develop a program to generate given time delay.

3. To demonstrate use of general purpose port i.e. Input/ output port of two controllers for data transfer between them.

4. Port I / O: Use one of the four ports of 8051 for O/P interfaced to eight LED‟s. Simulate binary counters (8 bit) on LED‟s

5. To interface 8 LEDs at Input-output port and create different patterns.

6. To demonstrate timer working in timer mode and blink LED without using any loop delay routine.

7. To demonstrate interfacing of seven-segment LED display and generate counting from 0 to 99 with fixed time delay.

8. Interface stepper motor with 8051 and write a program to move the motor through a given angle in clock wise or counter clock wise direction

9. Generate traffic signal.

10. Implement temperature control.

SEMESTER: VII

CATEGORY: ETEL

SUBJECT CODE: ET 71 (C)

SUBJECT NAME: MEMORY TECHNOLOGIES

Time: 60 HRS

COURSE OBJECTIVES

This is course deals with fundamental designing concepts of various memory technologies, techniques and architectures and algorithms for modeling and testing the designed RAMs

UNIT 1: (10 HRS)

Random Access Memory Technologies: Static Random Access Memories (SRAMs), SRAM Cell Structures, MOS SRAM Architecture, MOS SRAM Cell and Peripheral Circuit, Bipolar SRAM, Advanced SRAM Architectures, Application Specific SRAMs.

UNIT 2: (10 HRS)

DRAMs, MOS DRAM Cell, BiCMOS DRAM, Error Failures in DRAM, Advanced DRAM Design and Architecture, Application Specific DRAMs. SRAM and DRAM Memory controllers.

UNIT 3: (10 HRS)

Non-Volatile Memories: Masked ROMs, PROMs, Bipolar & CMOS PROM, EEPROMs, Floating Gate PROM Cell, OTP EPROM, EEPROMs, Non-volatile SRAM, Flash Memories.

UNIT 4: (10 HRS)

Semiconductor Memory Reliability and Radiation Effects: General Reliability Issues, RAM Failure Modes and Mechanism, Nonvolatile Memory, Radiation Effects, SEP, Radiation HardeningTechniques. Process and Design Issues, Radiation Hardened Memory Characteristics, Radiation Hardness Assurance and Testing.

UNIT 5 : (10 HRS)

Advanced Memory Technologies and High-density Memory Packing Technologies: Ferroelectric Random Access Memories (FRAMs), Gallium Arsenide (GaAs) FRAMs, Analog Memories, Magneto Resistive Random Access Memories (MRAMs), Experimental Memory Devices.

UNIT 6: (10 HRS)

Memory Hybrids (2D & 3D), Memory Stacks, Memory Testing and Reliability Issues, Memory Cards, High Density Memory Packaging

COURSE OUTCOMES

At the end of this course student will demonstrate the ability to:

1. Understand different memory technologies
2. Understand theory for designing of different memory architectures and issues related
3. Understand theory for the testing of designed memories and explore different algorithm level fault modelling

REFERENCE:

1. Ashok K Sharma, “Advanced Semiconductor Memories: Architectures, Designs and Applications”, Wiley Interscience
2. Kiyoo Itoh, “VLSI memory chip design”, Springer International Edition
3. Ashok K Sharma,” Semiconductor Memories: Technology, Testing and Reliability , PHI

LIST OF EXPERIMENTS

1. Study of Random access memory for combinational logic.
2. Examine the use of Random Access Memory (RAM) and Read Only Memory (ROM), as a means of realizing combinational logic circuits.
3. Study structure and the working mechanisms of memory elements.

SEMESTER: VII

CATEGORY: ETEL

SUBJECT CODE: ET 72 (A)

SUBJECT NAME: VLSI TECHNOLOGY

Time: 60HRS

COURSE OBJECTIVES

To learn about basics of wafer fabrication and clean room construction and maintenance this is very important in VLSI Technology. They can able to know about different type of Oxidation process, Basic Patterning, Doping and Deposition.

UNIT 1: (12 HRS)

Overview of Semiconductor Processing: Electronic grade silicon preparation, Crystal growth, Czochralski process, wafer-preparation, slicing, Marking, polishing, evaluation. Basic wafer fabrication operations, wafer sort, clean room construction and maintenance.

UNIT 2: (12 HRS)

Oxidation: Objectives, Silicon dioxide layer uses, Thermal oxidation mechanism and methods, Kinetics of oxidation, Deal Grove model, Oxidation processes, post oxidation evaluation.

UNIT 3: (12 HRS)

Basic Patterning: Overview of Photo-making process, Ten step process, Basic photo resist chemistry, comparison of positive and negative photo resists, X-ray lithography, Electron beam exposure system.

UNIT 4: (12 HRS)

Doping: Definition of a junction, Formation of doped region and junction by diffusion, diffusion process steps, deposition, drive-in-oxidation, Ion implantation- concept and system, implant damage, Comparison of diffusion and ion-implantation techniques.

UNIT 5: (12 HRS)

Deposition: Chemical Vapor Deposition (CVD), CVD Process steps, CVD System types, Low-Pressure CVD (LPCVD), Plasma-enhanced CVD (PECVD), Vapor Phase Epitaxy (VPE), Molecular Beam Epitaxy (MBE), Metal organic CVD (MOCVD), SOS (Silicon on Sapphire) and SOI (silicon on Insulator). Brief Introduction to Metallization.

COURSE OUTCOMES:-

Completion of this course will enable the students to: Describe of semiconductor materials, basics of wafer fabrication and clean room construction and maintenance. They can able to know about different type of Oxidation process, Basic Patterning, Doping and Deposition.

REFERENCE:

1. S.M. Sze, VLSI Technology, McGraw-Hill, 2nd Ed.
2. S. K. Gandhi, VLSI Fabrication Principles, Wiley
3. W. R. Runyan, Silicon Semiconductor Technology, McGraw-Hill

SEMESTER: VII

CATEGORY: ETEL

SUBJECT CODE: ET 72 (B)

SUBJECT NAME: HIGH SPEED ELECTRONICS

Time: 60HRS

COURSE OBJECTIVES:

Through the subject, students will grasp the fundamental properties and models of high-speed signals and interconnects, acquire high-speed digital design skills with a focus on the modelling, analysis, design and application of high speed transistors, logic gates and modern logic families.

Transmission line theory (basics) crosstalk and nonideal effects; signal integrity: impact of packages, vias, traces, connectors; non-ideal return current paths, high frequency powerdelivery, methodologies for design of high speed buses; radiated emissions and minimizing system noise;

Noise Analysis: Sources, Noise Figure, Gain compression, Harmonic distortion, Intermodulation,Cross-modulation, Dynamic range

Devices: Passive and active, Lumped passive devices (models), Active (models,low vs highfrequency) RF Amplifier Design, Stability, Low Noise Amplifiers, Broadband Amplifiers (and Distributed) Power Amplifiers, Class A, B, AB and C, D E Integrated circuit realizations, Cross-over distortion Efficiency RF power output stages

Mixers –Upconversion Downconversion, Conversion gain and spurious response.Oscillators Principles.PLL Transceiver architectures

Printed Circuit BoardAnatomy, CAD tools for PCB design, Standard fabrication, Microvia Boards.

Board Assembly: Surface Mount Technology, Through Hole Technology, Process Control and Design challenges**.**

COURSE OUTCOMES:

At the end of the course, students will demonstrate the ability to:

1. Understand significance and the areas of application of high-speed electronics circuits.

2. Understand the properties of various components used in high speed electronics

3. Design High-speed electronic system using appropriate components.

TEXT/REFERENCE BOOKS:

1. Stephen H. Hall, Garrett W. Hall, James A. McCall "High-Speed Digital System Design: A Handbook of Interconnect Theory and Design Practices", August 2000, Wiley-IEEE Press

2. Thomas H. Lee, "The Design of CMOS Radio-Frequency Integrated Circuits", CambridgeUniversity Press, 2004, ISBN 0521835399.

3. Behzad Razavi, "RF Microelectronics", Prentice-Hall 1998, ISBN 0-13-887571-5.

4. Guillermo Gonzalez, "Microwave Transistor Amplifiers", 2nd Edition, Prentice Hall.

5. Kai Chang, "RF and Microwave Wireless systems", Wiley.

6. R.G. Kaduskar and V.B.Baru, Electronic Product design, Wiley India, 2011

SEMESTER: VII

CATEGORY: ETEL

SUBJECT CODE: ET 72 (C)

SUBJECT NAME: SUBJECT NAME: COMPUTER NETWORK

Time: 60HRS

COURSE OBJECTIVES:

The COURSE OBJECTIVES include learning about computer network organization and implementation, obtaining a theoretical understanding of data communication and computer networks, and gaining practical experience in installation, monitoring, and troubleshooting of current LAN systems.

UNIT I (12 Hrs)

Computer Networks Introduction, applications, types of networks, network software, reference models- OSI model, TCP/IP model, comparison of OSI and TCP/IP models, example networks. The Physical layer Design Issues, review of data communication concepts (configuration, topology, transmission mode, media guided and unguided, types of switching etc).

UNIT II (12 Hrs)

The Data Link layer Design issues, error detection and correction, data link protocols- stop and wait and sliding window ARQ, utilization of ARQ techniques, example of data link protocol- HDLC. The Medium Access Control Layer Static and dynamic channel allocation, multiple access protocols- Pure and slotted ALOHA, CSMA, Collision free protocols, limited contention protocols, CSMA/CD (ETHERNET), fast Ethernet, Gigabit Ethernet.

UNIT III (12 Hrs)

Wireless Protocols The 802.11, the 802.16, Bluetooth, RFID, Data link layer switching- uses of repeaters, hubs, bridges, switches, routers and gateways. The Network Layer Design Issues, Virtual Circuit and datagram networks, routing algorithms- adaptive and non-adaptive algorithms, congestion control algorithms, quality of service, internetworking, Network layer in the Internet- IPv4 protocol, IP addresses, IPv6 protocol, Internet control protocols, Mobile IP.

UNIT IV(12 Hrs)

The Transport Layer Design issues and services, Transport protocols, congestion control, UDP and TCP protocols, performance issues.

UNIT V (12 Hrs)

The Application Layer The Domain Name System, E-mail, World Wide Web, streaming audio and video, content delivery.

COURSE OUTCOMES:

At the end of this course students will demonstrate the ability to:

1. Understand the concepts of networking thoroughly.
2. Design a network for a particular application.
3. Analyze the performance of the network.

REFERENCE:

1. Tanenbaum: Computer Networks, Pearson Education.
2. Bertsekas and Gallager: Data Networks, PHI Learning.
3. Black: Computer Networks, PHI Learning.
4. Forouzan: Computer Networks, TMH.
5. Stallings: Computer Networking and Internet Protocol, Pearson Education.
6. Keiser: Local Area Network, TMH.
7. Forouzan: Data Communication and Networking, TMH.
8. Gupta: Data Communications and Computer Networks, PHI Learning.

SEMESTER: VII

CATEGORY: ETEL

SUBJECT CODE: ET 73 (A)

SUBJECT NAME: ANTENNA AND WAVE PROPOGATION

Time: 60HRS

COURSE OBJECTIVES:

This course's objective is to introduce the student to antennas, covering their principles of radiation, their basic parameters, (radiation resistance, radiation pattern, polarization, reciprocity, effective radiated power), their general types, and those commonly used in wireless systems.

UNIT I (12 Hrs)

Radiation

Potential function and the Electromagnetic field, potential functions for Sinusoidal Oscillations, retarded potential, the Alternating current element (or oscillating Electric Dipole), Power radiated by a current element, Application to short antennas, Assumed current distribution, Radiation from a Quarter wave monopole or Half wave dipole, sine and cosine integral, Electromagnetic field close to an antenna, Solution of the potential equations, Far-field Approximation.

UNIT II (12 Hrs)

Antenna Fundamentals

Introduction, network theorems, directional properties of dipole antennas, travelling –wave antennas and effect of feed on standing-wave antennas, two –element array, horizontal patterns in broad-cast arrays, linear arrays, multiplication of patterns ,effect of earth on vertical patterns, Binomial array, antenna gain, effective area.

UNIT III (12 Hrs)

Types of antennas

Babinet's principles and complementary antenna, horn antenna, parabolic reflector antenna, slot antenna, log periodic antenna, loop antenna, helical antenna, biconical antenna, folded dipole

antenna, Yagi-Uda antenna, lens antenna, turnstile antenna. Long wire antenna: resonant and travelling wave antennas for different wave lengths, V-antenna, rhombic antenna, beverage antenna, microstrip antenna.

UNIT IV (12 Hrs)

Antenna array synthesis

Introduction, retarded potentials, array structures, weighting functions, linear array analysis, different forms of linear arrays, Schelknoff UNIT circle, linear array synthesis, sum and difference patterns, Dolph- Chebychev synthesis of sum pattern, Taylor synthesis of sum patterns, Bayliss synthesis of difference patterns, planar arrays, arrays with rectangular boundary.

UNIT V (12 Hrs)

Propagation of radio waves

Fundamentals of electromagnetic waves, effects of the environment, modes of propagation. Ground wave propagation- Introduction, plane earth reflection, space wave and surface wave, transition between surface and space wave, tilt of wave front due to ground losses.

Space wave propagation- Introduction, field strength relation, effects of imperfect earth, curvature of earth and interference zone, shadowing effect of hills and buildings, absorption by atmospheric phenomena, variation of field strength with height, super refraction, scattering, troposphere propagation, fading, path loss calculations.

Sky wave propagation- Introduction, structural details of the ionosphere, wave propagation mechanism, refraction and reflection of sky waves by ionosphere, ray path, critical frequency, MUF, LUF, OF, virtual height, skip distance, relation between MUF and skip distance.

COURSE OUTCOMES:

At the end of the course, students will demonstrate the ability to:

1. Understand the properties and various types of antennas.
2. Analyze the properties of different types of antennas and their design.
3. Operate antenna design software tools and come up with the design of the antenna of required specifications.

REFERENCE:

1. Jordan and Balmain: Electromagnetic Waves and Radiating System, PHI Learning.

2. Krauss: Antennas and wave propagation, TMH.

3. Balanis: Antenna Theory Analysis and Design, Wiley India Pvt. Ltd.

4. Harish and Sachidananda: Antennas and wave propagation, Oxford University Press.

5. Raju: Antennas and Wave Propagation, Pearson Education.

6. Kennedy: Electronic Communication Systems, TMH.

LIST OF EXPERIMENTS:

1. To Plot the Radiation Pattern of an Omni Directional Antenna.

2. To Plot the Radiation Pattern of a Directional Antenna.

3. To Plot the Radiation Pattern of a Parabolic Reflector Antenna.

4. To Plot the Radiation Pattern of a Log Periodic Antenna.

5. To Plot the Radiation Pattern of a Patch Antenna.

6. To Plot the Radiation Pattern of a Dipole/ Folded Dipole Antenna. Grading System w.e.f. 2012-13

7. To Plot the Radiation Pattern of a Yagi (3-EL/4EL) Antenna.

8. To Plot the Radiation Pattern of a Monopole/ WHIP/ Collinear Antenna.

9. To Plot the Radiation Pattern of a Broad site Antenna.

10. To Plot the Radiation Pattern of a Square Loop Antenna.

SEMESTER: VII

CATEGORY: ETEL

SUBJECT CODE: ET 73 (B)

SUBJECT NAME: INTRODUCTION TO MEMS

Time: 60HRS

COURSE OBJECTIVES:

Students will be introduced to technology for developments of micro electromechanical systems.Students are taught Principal of Microsystems. Students are exposed to Micro system Fabrication Process and Manufacturing.

Introduction and Historical Background, Scaling Effects. Micro/ Nano Sensors, Actuators andm Systems overview: Case studies. Review of Basic MEMS. fabrication modules: Oxidation, Deposition Techniques, Lithography (LIGA), and Etching. Micromachining: Surface Micromachining, sacrificial layer processes, Stiction; Bulk Micromachining, Isotropic Etching and Anisotropic Etching, Wafer Bonding. Mechanics of solids in MEMS/NEMS: Stresses, Strain, Hookes's law, Poisson effect, Linear Thermal Expansion, Bending; Energy methods, Overview of Finite Element Method, Modeling of Coupled Electromechanical Systems.

COURSE OUTCOMES:

At the end of the course the students will be able to

1. Appreciate the underlying working principles of MEMS and NEMS devices.
2. Design and model MEM devices.

Text/Reference Book:

1. G. K. Ananthasuresh, K. J. Vinoy, S. Gopalkrishnan K. N. Bhat, V. K. Aatre, Micro and Smart Systems, Wiley India, 2012.

2. S. E.Lyshevski, Nano-and Micro-Electromechanical systems: Fundamentals of Nano-and Microengineering (Vol. 8). CRC press, (2005).

3. S. D. Senturia, Microsystem Design, Kluwer Academic Publishers, 2001.

4. M. Madou, Fundamentals of Microfabrication, CRC Press, 1997.

5.G. Kovacs, Micromachined Transducers Sourcebook, McGraw-Hill, Boston, 1998.

6. M.H. Bao, Micromechanical Transducers: Pressure sensors, accelerometers, and Gyroscopes, Elsevier, New York, 2000.

LIST OF EXPERIMENTS

1. Study of Micro/ Nano Sensors and Actuators andm Systems.
2. Study of Basic MEMS fabrication modules Oxidation, Deposition Techniques,
3. Study of Lithography (LIGA),
4. Study of Surface Micromachining
5. Study of Hookes's law.
6. Study of Poisson effect
7. Linear Thermal Expansion.

SEMESTER: VII

CATEGORY: ETEL

SUBJECT CODE: ET73 (C)

SUBJECT NAME: ADAPTIVE SIGNAL PROCESSING

Time: 60HRS

COURSE OBJECTIVES:-

To introduce some practical aspects of signal processing, and in particular adaptive systems. Current applications for adaptive systems are in the fields of communications, radar, sonar, seismology, navigation systems and biomedical engineering. This course will present the basic principles of adaptation, will cover various adaptive signal processing algorithms (e.g., the LMS algorithm) and many applications, such as adaptive noise cancellation, interference canceling, system identification, etc.

General concept of adaptive filtering and estimation, applications and motivation, Review of probability, random variables and stationary random processes, Correlation structures, properties of correlation matrices.

Optimal FIR (Wiener) filter, Method of steepest descent, extension to complex valued The LMS algorithm (real, complex), convergence analysis, weight error correlation matrix, excess mean square error and mis-adjustment Variants of the LMS algorithm: the sign LMS family, normalized LMSalgorithm, block LMS and FFT based realization, frequency domain adaptive filters, Sub-band adaptive filtering. Signal space concepts - introduction to finite dimensional vector space theory, subspace, basis, dimension, linear operators, rank and nullity, inner product space, orthogonality, Gram- Schmidt orthogonalization, concepts of orthogonal projection, orthogonal decomposition of vector spaces.

Vector space of random variables, correlation as inner product, forward and backward projections, Stochastic lattice filters, recursive updating of forward and backward prediction errors, relationship with AR modeling, joint process estimator, gradient adaptive lattice.

Introduction to recursive least squares (RLS), vector space formulation of RL Sestimation, pseudo inverse of a matrix, time updating of inner products, development of RLS lattice filters,

RLS transversal adaptive filters. Advanced topics: affine projection and subspace based adaptive filters, partial update algorithms, QR decomposition and systolic array.

COURSE OUTCOMES:

At the end of the course, students will demonstrate the ability to:

1. Understand the non-linear control and the need and significance of changing the control parameters w.r.t. real-time situation.
2. Mathematically represent the 'adaptability requirement'.

TEXT/REFERENCE BOOKS:

1. S. Haykin, Adaptive filter theory, Prentice Hall, 1986.
2. C.Widrow and S.D. Stearns, Adaptive signal processing, Prentice Hall, 1984.

COURSE OUTCOMES:

At the end of the course, students will demonstrate the ability to:

1. Understand the non-linear control and the need and significance of changing the control parameters w.r.t. real-time situation.
2. Mathematically represent the 'adaptability requirement'.
3. Understand the mathematical treatment for the modeling and design of the signal processing systems.

LIST OF EXPERIMENTS

1. Generation, analysis and plots of discrete-time signals.
2. Implementation of operations on sequences (addition, multiplication, scaling, shifting, folding
3. Implementation of Linear time-invariant (LTI) systems and testing them for stability and causality
4. Computation and plot of DTFT of sequences, verification of properties of DTFT.
5. Computation and plots of z-transforms, verification of properties of z-transforms.
6. Computation and plot of DFT of sequences, verification of properties of DFT.

SEMESTER: VII

CATEGORY: OE-3

SUBJECT CODE: ET 74(A)

SUBJECT NAME: FIBER OPTICS COMMUNICATION

COURSE OBJECTIVES: **60HR**

To learn the basic elements of optical fiber transmission link, fiber modes .configurations and structures. To understand the different kind of losses, signal distortion, SM fibers. To learn the various optical sources, materials and fiber splicing. To learn the fiber optical receivers and noise performance in photo detector.To learn link budget, WDM, solitons and SONET/SDH network.

UNIT-I

Overview of Optical Fiber Communications (OFC): Motivation, optical spectral bands, key elements of optical fiber systems. Optical fibers: basic optical laws and definitions, optical fiber modes and configurations, mode theory for circular waveguides, single mode fibers, and graded-index fiber structure, fiber materials, photonic crystal fibers, fiber fabrication, fiber optic cables.

UNIT-II

Optical sources: Light emitting diodes (LED): structures, materials, quantum efficiency, LED power, modulation of an LED. Laser diodes: modes, threshold conditions, laser diode rate equations, external quantum efficiency, resonant frequencies, structure and radiation patterns, single mode lasers, modulation of laser diodes. Power launching and coupling: source to fiber power launching, fiber to fiber joints, LED coupling to single mode fibers, fiber splicing, optical fiber connectors.

UNIT-III

Photo detectors: pin photo detector, avalanche photodiodes, photo detector noise, detector response time, avalanche multiplication noise. Signal degradation in optical fibers: Attenuation: UNITs, absorption, scattering losses, bending losses, core and cladding losses. Signal distortion in fibers: overview of distortion origins, modal delay, factors contributing to delay, group delay, material dispersion, waveguide dispersion, polarization-mode dispersion. Characteristics of single mode fibers: refractive index profiles, cutoff wavelength, dispersion calculations, mode field diameter, bending loss calculation. Specialty fibers.

UNIT-IV

Optical receivers: fundamental receiver operation, digital receiver performance, eye diagrams, coherent detection: homodyne and heterodyne, burst mode receiver, analog receivers. Digital links: point to point links, link power budget, rise time budget, power penalties. Analog links: overview of analog links, carrier to noise ratio, multi channel transmission techniques.

UNIT-V

Optical technologies Wavelength division multiplexing (WDM) concepts: operational principles of WDM, passive optical star coupler, isolators, circulators, active optical components: MEMS technology, variable optical attenuators, tunable optical filters, dynamic gain equalizers, polarization controller, chromatic dispersion compensators. Optical amplifiers: basic applications and types of optical amplifiers, Erbium Doped Fiber Amplifiers (EDFA): amplification mechanism, architecture, power conversion efficiency and gain. Amplifier noise, optical SNR, system applications. Performance Measurement and monitoring: measurement standards, basic test equipment, optical power measurements, optical fiber characterization, eye diagram tests, optical time-domain reflectometer, optical performance monitoring..

COURSE OUTCOMESs:

At the end of the course, students will demonstrate the ability to:

1. Understand the principles fiber-optic communication, the components and the bandwidth advantages.
2. Understand the properties of the optical fibers and optical components.and operation of lasers, LEDs, and detectors and 4. Analyze system performance of optical communication systems
5. Design optical networks and understand non-linear effects in optical fibers

REFERENCES:

1. Keiser: Optical Fiber Communications, TMH.
2. Senior: Optical Fiber Communication- Principles and Practices, Pearson Education.
3. Agarwal: Fiber Optic Communication Systems, Wiley India.

SEMESTER: VII

CATEGORY: OE-3

SUBJECT CODE: ET74 (B)

SUBJECT NAME: INTERENT OF THINKS

Times: 60HRS

COURSE OBJECTIVES:

Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design & develop IOT Devices

Introduction to IoT Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Communication models & APIs

IoT & M2M Machine to Machine, Difference between IoT and M2M, Software define Network Network & Communication aspects Wireless medium access issues, MAC protocol survey, Survey routing protocols, Sensor deployment & Node discovery, Data aggregation & dissemination Challenges in IoT Design challenges, Development challenges, Security challenges, Other challenges Domain specific applications of IoT Home automation, Industry applications, Surveillance applications, Other IoT applications.

Developing IoTs Introduction to Python, Introduction to different IoT tools, Developing applications through IoT tools, Developing sensor based application through embedded system platform, Implementing IoT concepts with python.

Course Outcomes :-

Determine the most appropriate IoT Devices and Sensors based on Case Studies. setup the connections between the Devices and Sensors. evaluate the appropriate protocol for communication between IoT. analyse the communication protocols for IoT.

Reference Books:

1. Vijay Madisetti, Arshdeep Bahga, “Internet of Things: A Hands-On Approach”

2. Waltenegus Dargie,Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice

SEMESTER: VII

CATEGORY: OE-3

SUBJECT CODE: ET 74(C)

SUBJECT NAME: SCADA AND SIMULATION

Times: 60HRS

COURSE OBJECTIVES:

The objective of this course is to equip operators/engineers/supervisors/managers with skills which will enable them to implement SCADA system which will have a definite economic and engineering benefit for process operations.

UNIT-I (10 Hrs)

Introduction to SCADA and PLC:

Communication technologies, monitoring and supervisory functions. PLC: Block diagram, programming languages, Ladder of PLC with SCADA.

UNIT – II (10 Hrs)

SCADA system components: Schemes, Remote Terminal UNIT, Intelligent Electronic Devices, Communication Network, SCADA server.

UNIT – III (10 Hrs)

SCADA Architecture-Various

system, single unified standard architecture IEC 61850 SCADA / HMI Systems.

UNIT – IV (10 Hrs)

SCADA Communication-Various industrial communication technologies methods and fiber optics, open standard communication protocols.

UNIT – V (10 Hrs)

Operation and control of interconnected power system

SCADA configuration, Energy management system, system operating states, system security, and state estimation.

UNIT –VI (10 Hrs)

SCADA applications Utility applications, transmission and distribution sector operation, monitoring analysis and improvement. Industries oil gas and water. Case studies, Implementation, simulation exercises.

COURSE OUTCOMES:-

The theory should be taught and practical should be carried out in such a manner that students are able to acquire required learning out comes in cognitive, psychomotor and affective domain to demonstrate following COURSE OUTCOMES:

i. Identify and interpret PI diagram on HMI.
ii. Identify different elements of SCADA.
iii. Interpret the functionality of various elements of SCADA.
iv. Control process parameters of given process using DCS and SCADA

Reference Books:

1. Stuart A Boyer: SCADA supervisory control and data acquisition.
2. Gordan Clark, Deem Reynders, Practical Modem SCADA Protocols.
3. Sunil S. Rao, Switchgear and Protections, Khanna Publication

SEMESTER: VII

CATEGORY: PROJECT

SUBJECT CODE: ET 75

SUBJECT NAME: MAJOR PROJECT –I

Times: 60HRS

COURSE OBJECTIVES

1. To be able to apply some of the techniques/principles you have been taught
2. To carry out budget and time planning for the project.
3. To inculcate electronic hardware implementation skills by learning PCB artwork design using an appropriate EDA tool.
4. To follow correct grounding and shielding practices

The student should select a topic (from the subjects he has studied so far or any topic related to real life problem). He should do the literature survey, analyze the problem and propose some solution for the same. He should prepare a detailed (typed) report regarding the topic and should present the same with the help of power point presentation at the end of the semester. The analysis of the problem may be done with the help of some software or any hardware (which may be made by the student).

COURSE OUTCOMES:-

Students who complete a Major Qualifying Project will: apply fundamental and disciplinary concepts and methods in ways appropriate to their principal areas of study. demonstrate skill and knowledge of current information and technological tools and techniques specific to the professional field of study.

SEMESTER: VII

CATEGORY: HSMC

SUBJECT CODE: BE 76

SUBJECT NAME: OPERATIONS RESEARCH

Times: 60HRS

COURSE OBJECTIVES

Identify and develop operational research models from the verbal description of the real system. Understand the mathematical tools that are needed to solve optimization problems. Use mathematical software to solve the proposed models.

UNIT I (12Hrs)

Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models

UNIT II (12 Hrs)

Formulation of a LPP - Graphical solution revised simplex method - duality theory - dual simplex method - sensitivity analysis - parametric programming

UNIT III (12 Hrs)

Nonlinear programming problem - Kuhn-Tucker conditions min cost flow problem - max flow problem - CPM/PERT Model Curriculum of Engineering & Technology PG Courses [Volume-I]

UNIT IV (12 Hrs)

Scheduling and sequencing - single server and multiple server models - deterministic inventory models - Probabilistic inventory control models - Geometric Programming.

UNIT V (12 Hrs)

Competitive Models,Single and Multi-channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks, Elementary Graph Theory, Game Theory Simulation

COURSE OUTCOMES:-

Formulate and solve problems as networks and graphs.

develop linear programming (LP) models for shortest path, maximum flow, minimal spanning tree, critical path, minimum cost flow, and transshipment problems.

solve the problems using special solution algorithms.

REFERENCE:

1. H.A. Taha, Operations Research, An Introduction, PHI, 2008
2. H.M. Wagner, Principles of Operations Research, PHI, Delhi, 1982.
3. J.C. Pant, Introduction to Optimisation: Operations Research, Jain Brothers, Delhi, 2008
4. Hitler Libermann Operations Research: McGraw Hill Pub. 2009
5. Pannerselvam, Operations Research: Prentice Hall of India 2010
6. Harvey M Wagner, Principles of Operations Research: Prentice Hall of India 2010

SEMESTER: VIII

CATEGORY: PROJECT

SUBJECT CODE: ET 81

SUBJECT NAME: MAJOR PROJECTS - 2/ INTERNSHIP

Times: 60HRS

COURSE OBJECTIVES

1. To be able to apply some of the techniques/principles you have been taught
2. To carry out budget and time planning for the project.
3. To inculcate electronic hardware implementation skills by learning PCB artwork design using an appropriate EDA tool.
4. To follow correct grounding and shielding practices

The student should prepare a working system or some design or understanding of a complex system that he has selected from the previous semesters using system analysis tools and submit the same in the form of a write-up i.e. detail project report. The student should maintain proper documentation of different stages of project such as need analysis, market analysis, concept evaluation, requirement specification, objectives, work plan, analysis, design, implementation and test plan wherever applicable. Each student is required to prepare a project report based on the above points and present the same at the final examination with demonstration of the working system.

COURSE OUTCOMES:-

Students who complete a Major Qualifying Project will: apply fundamental and disciplinary concepts and methods in ways appropriate to their principal areas of study.

Demonstrate skill and knowledge of current information and technological tools and techniques specific to the professional field of study.