PRAGATI ENGINEERING COLLEGE:: SURAMPALEM (Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

II Year I Semester Course Structure

Sub Code	Subjects	L	T	P	Credits
16EC3T03	Electronic Devices and Circuits	3	1		3
16EC3T04	Control Systems	3	1		3
16EC3T05	Signals and Systems	3	1		3
16EC3T06	Network Analysis and Synthesis	3	1		3
16EC3T07	Switching Theory and Logic Design	3	1		3
16BH3T14	Managerial Economics & Financial Analysis	3	1		3
16EC3L01	Electronic Devices and Circuits Lab			3	2
16EE3L02	Networks & Electrical Technology Lab			3	2
Total credits					**22**

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM (Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

II YEAR – I SEMESTER **L T P C**
3 1 0 3

ELECTRONIC DEVICES AND CIRCUITS(16EC3T03)

Objective:

1. To learn the basics of semiconductor physics. Review of Semi Conductor Physics.
2. To study the construction details, operation and characteristics of various Semiconductor diodes
3. To understand the operation and analysis of rectifiers with and without filters.
4. To study the characteristics of bipolar junction transistors in differentconfigurations and characteristics of different types of FET.
5. To understand the biasing, stabilization and compensation techniques. To analyze transistor amplifiers using h-parameters.
6. To understand the concepts of transistor low frequency hybrid model and analysis of CE, CB and CC amplifiers.

Outcomes :

1. Students are able to apply the basic concepts od semi conductor physics.
2. Students are able to explain the operation and characteristics of PN junction diode and special diodes.
3. Ability to understand operation and design aspects of rectifiers and regulators.
4. Students are able to understand the characteristics of various transistor configurations
5. Students become familiar with different biasing, stabilization and compensation techniques used in transistor circuits
6. Students are able to understand the CB, CE and CC amplifiers with exact and approximate analysis.

UNIT-I

Semi Conductor Physics : Insulators, Semi conductors and Metals classification using energy band diagrams, mobility and conductivity, electrons and holes in intrinsic semi conductors, extrinsic semi conductors, drift and diffusion, charge densities in semiconductors, Hall effect, continuity equation, law of junction, Fermi Dirac function, Fermi level in intrinsic and extrinsic Semiconductors.

UNIT-II

Junction Diode Characteristics : Open circuited PN junction, Biased PN junction, current components of PN junction Diode, Diode Equation, V - I Characteristics, temperature dependence on V-I characteristics, Diode resistance, Diode capacitance, energy band diagram of PN junction Diode.

Special Semiconductor Devices: Zener Diode, Breakdown mechanisms, LED, LCD, LDR, Photo diode, Photo transistor, Varactor diode, Tunnel Diode, DIAC, TRIAC, SCR, UJT Construction, operation and static and load characteristics.

UNIT-III

Unregulated Power Supplies: Introduction**,** half wave rectifier, full wave rectifier, bridge rectifier circuit diagrams operation, input and output waveforms, derivations of $I_{dc,}$ $I_{RMS,}$ efficiency, ripple factor, TUF, voltage regulation, Design of Zener voltage regulator.

Filters: Series Inductor filter, Shunt Capacitor filter, L- section filter, Π- section filter, Multiple L-section Filter, derivation for ripple factor in each case.

UNIT-IV

Bipolar Junction Transistor & Field Effect Transistor Characteristics:

BJT: Introduction, transistor current components, transistor equation, transistor configurations, transistor as an amplifier, characteristics of transistor in Common Base, Common Emitter and Common Collector configurations, Ebers - Moll model of a transistor, punch through / reach through, Photo transistor, typical transistor junction voltage values.

FET: Introduction,JFET types, construction, operation, characteristics, parameters, MOSFET - types, construction, operation, characteristics, comparison between JFET and MOSFET.

UNIT-V

Biasing Techniques and Thermal Stabilization : Need for biasing, operating point, load line analysis, BJT biasing methods, bias stability, fixed bias, collector to base bias, self bias, Stabilization against variations in V_{BE}, I_C and β, Stability factors, (S, S', S''), Bias compensation Techniques, Thermal runaway, Thermal stability. FET Biasing methods and stabilization.

UNIT-VI

Small Signal Low Frequency Transistor Amplifier Models:

BJT: Two port network, Transistor hybrid model, determination of h-parameters, conversion of h-parameters, generalized analysis of transistor amplifier model using h-parameters, Analysis of CB, CE and CC amplifiers using exact and approximate analysis, Comparison of transistor amplifiers.

FET: Generalized analysis of small signal model, Analysis of CG, CS and CD amplifiers, comparison of FET amplifiers.

TEXT BOOKS:

1. Electronic Devices and Circuits- J. Millman, C. Halkias, Tata McGraw Hill, Second Edition.
2. Electronic Devices and Circuits- K. Satya Prasad, VGS publication 2006.
3. Electronic Devices and Circuits – A.P.Godse, U.A.Bakshi Technical Publications, First Edition.

REFERENCES:

1. Electronic Devices and Circuits – BVRao, KBR Murty, K Raja Rajeswari, PCR Pantulu, Pearson, 2nd edition.
2. Electronic Devices and Circuits-Salivahanan, Kumar, Vallavaraj, TataMc-Graw Hill, Second Edition.
3. Electronic Devices and Circuit Theory – RL Boylestad and LouisNashelsky, Pearson Publications, 10th Edition.
4. Electronic Devices and Circuits – B P Singh, RekhaSingh,PearsonPublications,Second Edition.
5. Electronic Devices and Circuits-David ABell, Oxford University Press, Fifth Edition.

WEB LINKS:

1. http://nptel.ac.in/courses/117103063
2. www.satishkashayap.com/2013/03/video-lectures-on-electron-devices-by.html
3. http://www.smartzworld.com/notes/electronic-devices-and-circuits-edc/

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM (Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

II YEAR – I SEMESTER **L T P C**

3 1 0 3

CONTROL SYSTEMS (16EC3T04)

OBJECTIVES

1. The student willlearn the fundamental concepts of Control systems andmathematical modelling of the system.
2. Learn the difference between open loop control system and closed loop control system
3. Learn the representation of various control systems transfer functions in the form of block diagrams and signal flow graphs and obtain a simplified transfer function
4. Understand the difference between transient response and steady state response
5. Study the time domain specifications and frequency domain specifications
6. Study the concepts of time response and frequency response of thesystem.
7. understand the stability of control systems from the s domain analysis and frequency response plot obtained

OUTCOMES

1. After the completion of this course the student will be able to represent the mathematical model of a system and transfer function of mechanical & electrical systems.
2. Determine the response of different order systems for various step inputs.
3. Design controller to decrease the steady state errors
4. Analyze the stability of the system.
5. Know the controllability and observability of control systems using state space techniques

UNIT I

Concepts of Control Systems: Introduction, Open Loop and closed loop control systems and their differences, Different examples of control systems, Classificationof control systems, Feedback Characteristics,Effects of feedback.Types of feedback control systems, Linear time invariant, time variant systems and non linear control systems.

Mathematical Models: Differential equations, Impulse Response and transfer functions, Translational and Rotational mechanical systems

UNIT II

Transfer Function Representation: Transfer Functions of DC & AC Servo motors, Synchrotransmitter and Receiver, Block diagram representation of electrical systems, Block diagram representation by Signal flow graph,Block diagram reduction using Mason's gainformula.

UNIT III

Time Response Analysis: Standard test signals, Time response of first order systems, CharacteristicEquation of Feedback control systems, Transient response of second ordersystems, Time domain specifications, Steady state response, Steady stateerrors and error constants, Effects of proportional derivative (PD) and proportional integral (PI) systems.

UNIT IV

Stability Analysis in S-Domain: The concept of stability, Routh's stability criterion, qualitative stability andconditional stability, limitations of Routh's stability.

Root Locus Technique: The root locus concept, construction of root loci, effects of adding poles andzeros to closed loop system.

UNIT V

Frequency Response Analysis: Introduction, Frequency domain specifications, Bode diagrams, Determinationof Frequency domain specifications and transfer function from the Bode diagram, Phase margin and Gain margin, Stability analysis from Bode plots.

Stability Analysis in Frequency Domain: Polar plots, Nyquist plots, Stability analysis, closed loop frequency response.

UNIT VI

Classical Control Design Techniques: Compensation techniques, Lag, Lead, Lead-Lag Controllers design infrequency domain, PID Controllers. State space analysis of continuoussystems concepts of state, state variables and state model, derivation of statemodels from block diagrams, Diagonalization, Solving the Time invariantstate equations, State transition matrix and it's properties, concepts ofcontrollability and observability.

TEXT BOOKS:

1. Automatic Control Systems– B C Kuo, 8th edition, John wiley and son's,2003.
2. Control Systems Engineering – I J Nagrath and M Gopal, 2nd edition, NewAge International (P) Limited Publishers,1982.

REFERENCE BOOKS:

1. Modern Control Engineering – Katsuhiko Ogata,3rd edition, Prentice Hall ofIndia Pvt. Ltd., 1998.
2. Control Systems – N K Sinha,3rd edition, New Age International (P) LimitedPublishers, 1998.
3. Control Systems – A Nagoor Kani, 2nd edition, RBA Publications.

Web links:

1. **nptel.ac.in/course/108101037/#**
2. http://ocw.mit.edu/resources/res-6-010
3. www.learnersto.com/free-engineering-video-lectures-1to330

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM

(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

II YEAR – I SEMESTER **L T P C**
3 1 0 3

SIGNALS AND SYSTEMS (16EC3T05)

PREREQUISITES: Courses on Engineering Mathematics and Mathematical Methods**.**
Objective:

1. Analysis of signals and systems
2. Representation of signals using Fourier series and Fourier transform and their properties
3. Time - Domain and Frequency Domain aspects of signals and systems
4. Concept of convolution and correlation;
5. Laplace transform of signals;
6. Z-Transform of sequences and their properties.

Outcomes : On successful completion of the course, students will be able to: Demonstrate fundamental knowledge in

1. Trigonometric and exponential Fourier series representation of periodic signals
2. Fourier transform of signals,Sampling Process
3. Linear systems and their properties. Various Filtes and their characteristics
4. Convolution and correlation of functions
5. Laplace transforms, ROC for Laplace Transform
6. Z-Transform of discrete sequences and ROC for Z –Transform

UNIT-I

Signal Analysis & Fourier Series: Analogy between vectors and signals, Orthogonal signal space, Signal approximation using orthogonal functions, Mean square error, Closed or complete set of orthogonal functions, Orthogonality in complex functions.

Elementary signals: Unit Impulse, Unit Step Functions, Exponential and Sinusoidal Signals. Classification of Continuous Time and Discrete Time Signals, Basic operations on signals, Classification of Continuous Time and DiscreteTime Systems, Basic System Properties, Linear Time-Invariant Systems, DiscreteTime LTI Systems.

Fourier Series: Representation of Fourier series, Continuous time periodic signals, properties of Fourier series, Dirichlet's conditions, Trigonometric Fourier series and Exponential Fourier series, Complex Fourier spectrum,Fourier series representation of periodic signals using symmetry,Relation between Trignometric Fourier series and Complex Fourier series .

UNIT-II

Fourier Transforms and Sampling: Deriving Fourier transform from Fourier series, Fourier transform of impulse, step, ramp, Signum, exponential signals, aperiodic and periodic signals. Properties of Fourier transform, Introduction to Hilbert Transform.

Sampling: Representation of a Continuous time signal by its samples, Sampling theorem, reconstruction of a signal from its samples, different sampling techniques, Effect of under sampling: aliasing.

UNIT III

Signal Transmission through Linear Systems: Linear system, impulse response, Response of a linear system, Linear Time Invariant (LTI) system, Linear Time Variant (LTV) system, Transfer function of a LTI system, Filter characteristics of linear systems, Distortionless transmission through a system, Signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Poly-Wiener criterion for physical realization, relationship between bandwidth and rise time.

UNIT-IV

Convolution & Correlation of Signals: Concept of convolution in time domain and frequency domain, Graphical representation of convolution,Convolution property of Fourier transform. Cross correlation and auto correlation of functions, properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between auto correlation function and energy/power spectral density function. Relation between convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering, Problem Solving.

UNIT-V

Laplace Transforms: Laplace transform of impulse, step, ramp, Signum, exponential signals, aperiodic and periodic signals. Region of Convergence for Laplace transforms, Inverse Laplace transform, relation between Fourier and Laplacetransform, Properties of the Laplace transform, Laplace transform and ROC for various classes of signals, Problem Solving.

UNIT-VI

Z-Transforms: Z-transform of discreteimpulse, step, ramp, Signum, exponential signals. Region of Convergence for the Z-transform, The Inverse Z-transform, relation between Fourier and Z-transform, Properties of the Z-transform, Z-transform and ROC for various classes of signals.

TEXT BOOKS :

1. Signals, Systems & Communications – B P Lathi, 2nd edition, BS Publications,2003.
2. Signals and Systems – A V Oppenheim, AS Willsky and S H Nawab, 2nd edition, PHI,1997.
3. Signals and Systems – Narayan Iyer and K SatyaPrasad,1st edition, Cenage Publications,2011.

REFERENCES :

1. Signals & Systems - Simon Haykin and Van Veen,2nd edition,Wiley Publications, 1999.
2. Signals & Systems - A Anand Kumar, 2nd edition, PHI, 2011.
3. Signals & Systems - K R Rajeswari and B V Rao,2nd edition, PHI, 2014.
4. Fundamentals of Signals and Systems - Michel J Robert, MGH International Edition, 2008.

WEB LINKS:

1. www.nptelvideos.in/2012/12/signals-and-systems.html
2. Freevideolectures.com
3. www.satishkashyap.com

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM (Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

II YEAR – I SEMESTER **L T P C**
3 1 0 3

SWITCHING THEORY AND LOGIC DESIGN(16EC3T07)

Course Objectives:

1. To solve a typical number base conversion and analyze new error coding techniques.
2. Theorems and functions of Boolean algebra and behavior of logic gates.
3. To optimize logic gates for digital circuits using various techniques.
4. Boolean function simplification using Karnaugh maps and Quine-McCluskey methods.
5. To understand concepts of combinational circuits.
6. To develop advanced sequential circuits.

Course Outcomes:

1. Classify different number systems and apply to generate various codes.
2. Use the concept of Boolean algebra in minimization of switching functions
3. Design different types of combinational logic circuits.
4. Apply knowledge of flip-flops in designing of Registers and counters
5. The operation and design methodology for synchronous sequential circuits and algorithmic state machines.
6. Produce innovative designs by modifying the traditional design techniques.

UNIT I

Review of Number Systems: Representation of numbers of different radix, conversion of numbers from one radix to another radix, r-1's complement and r's complement of unsigned numbers subtraction, problem solving. Signed binary numbers - different forms, problem solving.
4-bit codes: weighted and non-weighted codes such as BCD, EXCESS-3, alphanumeric codes, 9's complement, 2 4 2 1, 5 4 -2 -1,

Logic Operations, Error Detection and Correction Codes: Basic logic operations - NOT, OR,AND,Boolean theorems, Complement and dual of logical expressions, NAND and NOR Gates, EX-OR, EX-NOR Gates, standard SOP and POS, Minimization of logic functions using theorems, Generation of self dual functions. Gray code, error detection and error correction code - parity checking - even parity,odd parity, Hamming code, multi level AND-NOR Realizations. Two level NAND-NAND and NOR-NOR realizations. Degenerative forms and Regenerative forms, multi level realizations.

UNIT II

Minimization of Switching Functions: Minimization of switching functions usingK-Map up to 6-variables, Tabular minimization up to 5-variables, minimal SOP and POS Realization. Designing of code convertors using K-map etc.

UNIT III

Combinational Logic Circuits-I: Design of Half adder, full adder, half subtractor, full subtractor, applications of full adders, 4-bit binary adder, 4-bit binary subtractor, adder-subtractor circuit, BCD adder circuit, Excess-3 adder circuit, look-a-head adder circuit.

Combinational Logic Circuits-II: Design of decoder, Demultiplexer, higher order demultiplexing, encoder, multiplexer, higher order multiplexer, realization of Boolean functions using decoders and multiplexers, priority encoder, different code converters using full adders,4-bit comparator.

UNIT IV

Programmable Logic Devices(PLDs): PROM,PLA,PAL,Programming tables of PROM, PLA and PAL, realization of switching functions using PROM, PLA and PAL, comparison of PROM,PLA, and PAL.

UNIT V

Sequential Circuits-I: Classification of sequential circuits (synchronous and asynchronous): basic flip-flops, truth tables and excitation tables (RS latch usingNAND and NOR gates), RS flip-flop, JK flip-flop, T flip-flop, D flip-flop with reset and clear terminals, functional tables, level mode, negative edge trigging & master – slave flip-flops. Race condition, race around condition, setup time, hold time & propagation delay time of various flip-flops, Conversion of one flip-flop toother flip-flop. Calculationof clock frequency for Counters & Registers, State diagram of counters, Design of modulo counters - up/down counters, ripple counters, synchronous counters, Johnson counters, ring counters. Design of registers -buffer, control buffer, shift, bi-directional shift, universal shift registers.

UNIT VI

Sequential Circuits-II: Capabilities and limitations of Finite state machines, procedures & number of steps involved in analysis of clocked sequential circuits.

Design Procedures: Reduction of state tables by inspection, using partition method, equivalent classes for state assignment. Realization of circuits using various flip-flops.Meelay to Moore conversion and vice-versa.

TEXTBOOKS:

1. Switching theory and logic design - Hill and Peterson, Mc-Graw Hill edition.
2. Switching theory and logic design by - Kohavi.

Reference Books:

1. Switching Theory and Logic Design by A. Ananda Kumar
2. Digital design by Mano 2nd edition PHI.
3. Micro electronics by Millman MH edition.
4. Fundamentals of Logic Design by Charles H.RothJr, Jaico Publishers.

Web Links:

1. https://www.youtube.com/watch?v=CeD2L6KbtVM
2. Lecture series on Digital Circuits & Systems by Prof.S.Srinivasan, Department of Electrical Engineering, IIT Madras.For more details on NPTEL visit http://nptel.iitm.ac.in
3. https://www.youtube.com/watch?v=K73N9ES_8nI
4. https://www.youtube.com/watch?v=62WxkICo2Bc

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM (Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

II YEAR – I SEMESTER **L T P C**
3 1 0 3

NETWROK ANALYSIS & SYNTHESIS (16EC3T06)

Course Objectives:

1. One can solve the problem using algebraic equations in Laplace form instead of using integration & differentiations.
2. One can understand the difference between conductively coupled & mutual coupled currents and can find out the input impedance using equivalent conductively coupled circuits.
3. By doing series & Parallel resonance circuits one can know about tuned circuits.
4. One can gain thorough knowledge on different circuit parameters & later they can be used for system design.
5. Steady state analysis of AC circuits will give clear concept about different values like RMS, form factor, Peak factor, etc. hence one can able to find out steady state branch currents, branch voltages & powers.
6. By doing passive synthesis one can design their own circuit by knowing response and excitation.

Course Outcomes:

1. Able to design complicated circuits with complex quantities by using Laplace transforms.
2. Can design transformers with the help of mutually coupled circuits.
3. In communications systems we can design series / Parallel tuned circuits.
4. For system design we can make use of h-Parameters and can find out output quantities like current gain, voltage gain, etc.
5. Can be able to analyze commercial available power & can detect the false also
6. One can able to design different circuits using mixed canonic forms by knowing excitation and response.

UNIT I

Laplace Transforms: Introduction to Laplace transforms, Basic theorems for Laplace transforms, Laplace transforms of shifted unit step, ramp and impulse functions. Examples of finding responseusing Laplace transforms.

Wave form synthesis, initial & final value theorems, convolution integral.

UNIT II

Resonance: Definition of Q-factor, series resonance introduction, band width of series resonance circuits, anti resonance circuits, condition for maximum impedance, Bandwidth of anti resonance circuit, resonance present in both branches, anti resonance at all frequencies.

Coupled circuits: Mutual Inductance – introduction, definitions of self inductance, mutual inductance, relation between self & mutual inductance, coefficient of coupling, analysis of coupled circuits, dot rule for coupled circuits, conductively coupled equivalent circuits, problem solving using dot method.

UNIT III

Two port networks: Introduction to two-port networks, open circuit impedance parameters , short circuit admittance parameters, hybrid parameters, ABCD parameters, relation between different parameters, cascading of two-port networks, parallel connection of two-port networks, series connection of two-port networks, problem solving including dependent sources, condition of symmetry and reciprocity.

UNIT IV

Network functions: Poles,Zeros, Impedance and transform circuits – resistance, inductance, capacitance, series & parallel combination of elements, determination of input impedance, problem solving with initial conditions, network functions for one-port, two-port networks, ladder network, pole & zeros of network functions, necessary conditions for driving point functions, necessary conditions for transfer functions, problem solving to determine current transfer ratio, input impedance, output impedance, etc…

UNIT V

AC Steady State Analysis: Characteristics of periodic functions, average value, RMS value, form factor, peak factor, representation of sine functions in trigonometric & phasor notations, impedance concept of R,L,C elements, steady state response of RLC circuits for sinusoidal excitation using impedance concept by applying mesh & nodal analysis.

UNIT VI

Introduction to Network Synthesis: Properties of driving point LC, RC, RL, impedance and admittance functions.Driving Point synthesis of LC, RC and RL functions – foster 1, foster 2, Couer 1, Couer 2 forms.

Text Books:

1. Network analysis – M E Van Valkenburg, 3rd edition, Reprint, Pearson Publications, 2002.
2. Engineering Circuit Analysis – W H Hayt & J E Kemmerly,1st edition, McGrawHill Publications,1971.
3. Introduction to Modern Network Synthesis – M E Van Valkenburg, 2nd edition,John Willey & Sons, 1962.

Reference Books:

1. Network Analysis - NCJagan, C Lakshmi Narayana, 2nd edition, BS publications, 2009.
2. Engineering Network Analysis & Filter Design - PremRChadha,1st edition, Umesh Publications, 1999.
3. Electric Circuits – Joseph AEdminister, 1st edition, Schaum's outline series, 1965.

Web Links:

1. http://nptelacin/courses/108102042/
2. http://freevideolecturescom/Course/2336/Circuit-Theory/6
3. http://freevideolecturescom/Course/2350/Networks-Signals-and-Systems/14

http://npteliitgernetin/courses/Elec_Engg/IIT%20Delhi/Circuit%20Theory%20(Video)htm

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM
(Autonomous)
ELECTRONICS AND COMMUNICATION ENGINEERING

II YEAR – I SEMESTER

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS
PROPOSED SYLLABUS

Unit – I

(*The Learning objective of this Unit is to understand the concept and nature of Managerial Economic s and its relationship with other disciplines, Concept of Demand and Demand forecasting)

Introduction to Managerial Economics and demand Analysis:

Definition of Managerial Economics and Scope-Managerial Economics and its relation with other subjects-Basic Economic Tools used in Managerial Economics-Concepts of Demand-Types-Determents-Law of Demand its Exception-Elasticity of Demand-Types andMeasurement- Law of Supply -Demand forecasting and it's Methods.

(**The Learner is equipped with the knowledge of estimating the Demand for a product and the relationship between Price and Demand)

Unit – II

(*The Learning object=tive of this Unit is to understand the concept of Production function,Input Output relationship, different Cost Concepts and Concept of Cost-Volume-Profit Analysis)

Production and Cost Analyses:

Production function-Isoquants and Isocosts-Law of Variable proportions- Laws of Returns to Scale-Cobb-Douglas Production function-Economies of Scale-Cost Concepts- Fixed vs Variable Costs-Out of Pocket Costs vs Imputed Costs-Cost Volume Profit analysis-Determination of Break-Even Point (Simple Problems)

(**One should understand the Cost Concepts for decision making and to estimate the least cost combinationof inputs).

Unit – III

(*The Learning Objective of this Unit is t understand the Nature of Competition,Characteristics of Pricing in the different market structure and significance of various pricing methods)

Introduction to Markets, Theories of the Firm & Pricing Policies:

Market Structures: Perfect Competition, Monopoly and Monopolistic and Oligopoly – Features – Price,Output Determination – Managerial Theories of firm: Marris and Williamson's models – Methods of Pricing:Limit Pricing, Market Skimming Pricing, Internet Pricing: Flat Rate Pricing, Usage sensitive, Transactionbased pricing, Priority Pricing.

(** One has to understand the nature of different markets and Price Output determination under variousmarket conditions)

Unit – IV

(*The Learning objective of this Unit is to know the different forms of Businessorganization and their Merits and Demerits both public & private Enterprises and the concepts ofBusiness Cycles)

Types of Business Organization and Business Cycles:

Features and Evaluation of Sole Trader – Partnership – Joint Stock Company – State/Public Enterprises andtheir forms – Business Cycles – Meaning and Features – Phases of Business Cycle.
(**One should be equipped with the knowledge of different Business Units)

Unit – V

(*The Learning objective of this Unit is to understand the different Accounting Systemspreparation of Financial Statements)

Introduction to Accounting:

Introduction to Double Entry Systems-Journal-Ledger- Trail Balance - Preparation of Financial Statements - Analysis and Interpretation of Financial Statements-Ratio Analysis – liquidity ratios, profitability ratios, solvency ratios, turnover ratios
– Preparation of the Funds flow Statement (Simple Problems)
(**The Learner is able to prepare Financial Statements)

Unit – VI

(*The Learning objective of this Unit is to understand the concept of Capital, Capitalization, Capital Budgeting and to know the techniques used to evaluate Capital Budgeting proposals by using different methods **and uses of different tools for performance evaluation**

Capital and Capital Budgeting: Capital Budgeting: Meaning of Capital-Capitalization-Sources of Finance (with special reference to Shares and Debentures)-Meaning of Capital Budgeting-Need for Capital Budgeting-Techniques of Capital Budgeting-Traditional and Modern Methods.
(**The Learner is able to understand the usage of various Ratios for financial Analysis and evaluates various investment project proposals with the help of capital budgeting techniques for decision making)

Note: *Learning Objective
** Learning Assessment

TEXT BOOKS

1. Dr. N. Appa Rao, Dr. P. Vijay Kumar: 'Managerial Economics and Financial Analysis', Cengage Publications, New Delhi – 2011
2. Dr. A. R. Aryasri – Managerial Economics and Financial Analysis, TMH 2011
3. Prof. J.V.Prabhakara rao, Prof. P. Venkatarao. 'Managerial Economics and Financial Analysis', Ravindra
Publication.

REFERENCES:

1. V. Maheswari: Managerial Economics, Sultan Chand.
2. Suma Damodaran: Managerial Economics, Oxford 2011.
3. Dr. B. Kuberudu and Dr. T. V. Ramana: Managerial Economics & Financial Analysis, Himalaya Publishing House 2011.
4. Vanitha Agarwal: Managerial Economics, Pearson Publications 2011.
5. Sanjay Dhameja: Financial Accounting for Managers, Pearson.
6. Maheswari: Financial Accounting, Vikas Publications.
7. S. A. Siddiqui & A. S. Siddiqui: Managerial Economics and Financial Analysis, New Age International
Publishers, 2012

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM
(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

II YEAR – I SEMESTER

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ELECTRONIC DEVICES AND CIRCUITS LAB (16EC3L01)

PART A: Electronic Workshop Practice

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Coils, Gang Condensers, Relays, Bread Boards.
2. Identification, Specifications and Testing of active devices, Diodes, BJTs, JFETs, LEDs, LCDs, SCR, UJT.
3. Soldering Practice- Simple circuits using active and passive components.
4. Study and operation of Ammeters, Voltmeters, Transformers, Analog and Digital Multimeter, Function Generator, Regulated Power Supply and CRO.

PART B: List of Experiments

(For Laboratory Examination-Minimum of Ten Experiments)

1. P-N Junction Diode Characteristics

Part A: Forward bias)

Part B:Reverse bias

2. Zener Diode Characteristics

Part A: V-I Characteristics

Part B: Zener Diode as Voltage Regulator

3. BJT Characteristics(CE Configuration)

Part A: Input Characteristics

Part B: Output Characteristics

4. FET Characteristics(CS Configuration)

Part A: Drain Characteristics

Part B: Transfer Characteristics

5. SCR Characteristics

6. UJT Characteristics

7. Rectifiers (without and with c-filter)

    Part A: Half-wave Rectifier

    Part B: Full-wave Rectifier

8. CRO Operation and its Measurements

9. BJT-CE Amplifier

10. Emitter Follower-CC Amplifier

11. FET-CS Amplifier

PART C: Equipment required for Laboratory

1. Boxes

2. Ammeters (Analog or Digital)

3. Voltmeters (Analog or Digital)

4. Active & Passive Electronic Components

5. Regulated Power supplies

6. Analog/Digital Storage Oscilloscopes

7. Analog/Digital Function Generators

8. Digital Multimeters

9. Decade Résistance Boxes/Rheostats

10. Decade Capacitance

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM
(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

II YEAR – ISEMESTER

L	T	P	C
0	0	3	2

NETWORKS & ELECTRICAL TECHNOLOGY LAB (16EE3L02)

PART – A

Any five experiments are to be conducted from each part

1. Series and Parallel Resonance – Timing, Resonant frequency, Bandwidthand Q-factor determination for RLC network.
2. Time response of first order RC/RL network for periodic non-sinusoidalinputs – time constant and steady state error determination.
3. Determination of Two port network parameters – Z-Y Parameters, chain matrix andanalytical verification.
4. Verification of Superposition and Reciprocity theorems.
5. Verification of maximum power transfer theorem. Verification on DC,verification on AC with Resistive and Reactive loads.
6. Experimental determination of Thevenin's and Norton's equivalentcircuits and verification by direct test.

PART – B

1. Magnetization characteristics of D.C. Shunt generator. Determination ofcritical field resistance.
2. Swinburne's Test on DC shunt machine (Predetermination of efficiencyof a given DC Shunt machine working as motor and generator).
3. Brake test on DC shunt motor. Determination of performancecharacteristics.
4. OC & SC tests on Single-phase transformer (Predetermination ofefficiency and regulation at given power factors and determination ofequivalent circuit).
5. Brake test on 3-phase Induction motor (performance characteristics).
6. Regulation of alternator by synchronous impedance method

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM
(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

II Year II Semester Course Structure

Sub Code	Subjects	L	T	P	Credits
16EC4T09	Electronic Circuit Analysis	3	1		3
16EC4T10	Random Variables and Stochastic Process	3	1		3
16EC4T11	Electromagnetic Waves and Transmission Lines	3	1		3
16EC4T12	Analog Communications	3	1		3
16EC4T13	Pulse and Digital Circuits	3	1		3
16CS4T12	Data Structures	3	1		3
16EC4L02	Electronic Circuit Analysis Lab			3	2
16EC4L03	Analog Communications Lab			3	2
Total credits					**22**

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM (Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

II YEAR – II SEMESTER **L T P C**
3 1 0 3

ELECTRONIC CIRCUIT ANALYSIS (16EC4T09)

Course objectives:

1. Analyze a single stage amplifiers at high frequencies using transistors and FETs
2. Analyze multistage amplifiers using transistors and FETs
3. Design feedback amplifiers for different applications
4. Design sinusoidal Oscillators for a specified frequency
5. Design power amplifier for different applications
6. Apply tuned amplifiers for communication systems

Course outcomes:

1. Students get Explores Variation of hybrid- π parameters with voltage, current and temperature, Frequency response of single stage CB,CC and JFET amplifiers and its gains at low and high frequency.
2. Students gain an idea of high input Resistance and its importance
3. Students gain an idea of Feedback Amplifiers.
4. Students gain an idea of Oscillators.
5. Students get Explores to the concepts of Power and Tuned Amplifiers.
6. Single tuned transformed coupled amplifier, stability of tuned amplifiers Single tuned transformed coupled amplifier, stability of tuned amplifiers

UNIT I

Small Signal High Frequency Transistor Amplifier Models:

BJT: Transistor at High Frequencies, Hybrid Common Emitter transistor model, Hybrid π conductance, Hybrid π capacitances, Validity of hybrid π model, determination of High frequency parameters in terms of low frequency parameters, CE short circuit gain, Current gain with resistive load, Cut-off frequencies, frequency response and gain bandwidth product.

FET: Analysis of Common Source amplifier and Common Drain Amplifier circuits at high frequencies.

UNIT II

Multistage Amplifier: Classification of amplifiers, methods of coupling, cascaded transistor amplifier and its analysis, two stage RC coupled amplifier analysis, High input Resistance Transistor, amplifier circuit and their analysis, Darlington pair amplifier, cascode amplifier, Miller's and dual of Miller's theorem, Boot strap emitter follower, analysis of multi stage amplifiers using FET, Differential amplifier using BJT.

UNIT III

Feedback Amplifier: Feedback Principle and concept, types of feedback, feedback topologies,classification of feedbackamplifiers, characteristics of negative feedback amplifier, generalized analysis of feedback amplifier, performance comparison of feedback amplifiers, method of analysis of feedback amplifiers.

Unit IV

Oscillators: Oscillator principle, conditions for oscillations, types of oscillators – RCphase shift, Wein bridge,generalized analysis of LC Oscillators, Hartley and Colpitt's oscillators using BJT and FET, Crystal oscillators, Frequency and amplitude stability of oscillators.

UNIT V

Power Amplifiers: Classification of amplifiers, Class A power amplifiers and their analysis, Harmonic Distortions, Class B push pull amplifiers and their analysis, complementary symmetry push pull amplifier, Class AB power amplifier, Class-C power amplifiers, Thermal stability and use of Heat sinks, advanced power amplifiers, distortion in amplifiers.

Unit VI

Tuned Amplifiers: Introduction, Q- factor, Small Signal tuned amplifier, Capacitance Coupled Single tuned amplifier, Double tuned amplifiers, effect of cascading single tuned, double tuned amplifiers on band width, stagger tuned amplifiers, stability of tuned amplifiers, wideband amplifiers.

Text Books:

1. Integrated Electronics – J Millman and C C Halkias, Tata McGraw-Hill, 1972.
2. Electronic Devices and Circuit Theory – Robert L Boylestad and Louis Nashelsky, 10th edition Pearson Publications.
3. Electronic Circuit Analysis – Salivahanan, N Suresh Kumar, A Vallavaraj, 1stEdition, McGraw Hill, 2012.

REFERENCES:

1. Microelectronic Circuits – Sedra A S and K C Smith, 6th edition, Oxford University Press.
2. Electronic Circuit Analysis and Design – Donald A Neaman, McGraw Hill.
3. Electronic Circuits-I – Ravish R Singh,1st Edition 2012, Pearson Publications.
4. Electronic Circuit Principles and Application – R D SSamuel, BSujatha, Elesevier Publications.

WEB LINKS:

1. nptel.ac.in/courses/117101106
2. http://www.jntubook.com/electronics-circuit-analysis-textnbook-free-download/
3. www.freebookcentre.net/electronic-circuit-analysis

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM
(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

II YEAR – II SEMESTER **L T P C**
3 1 0 3

RANDOMVARIABLES AND STOCHASTIC PROCESSES(16EC4T10)

Prerequisite: Engineering Mathematics: Differentiation, Integration, Set Theory, Trigonometry, Matrices.

Course description: This course to provides a strong background in probability theory, complete knowledge in statistical methods and random processes, with adequate number of solved problems. The concepts offer clear and concise coverage of the theories of probability, random variables, and random signals,random processes, the response of linear networks to random waveforms and noise, random signals.

Objective of the course: The need of knowledge of random process is encountered in every practical communication system. The main objective of this subject is the tool for analyzing the information bearing signal which contains a random interference component, noise. The mathematical discipline that deals with the statistical characterization of random signals is Probability theory.

Course Objectives :

1. the basic concepts of probability,theorems along with mathematical solvation
2. type of operations that can be performed with random variables
3. Two random variables,characterization of joint density and distribution functions
4. Introduction of time axis to the Random Variable
5. Frequency domain representation of RV
6. Responses are studied in terms of convolution, mean, squared values

Course Outcomes :

1. The basic concepts of probability and related theorems,will be able to solve problems
2. calculation of average value,variancevalue,skew and properties associated
3. calculation of average value,variance value,skew and properties associated for two random variables
4. Measurements of Random Variable in consideration with time
5. Frequency domain representation of RV
6. Noise effects and modeling of noise sources

UNIT I

Probability: Probability introduced through Sets and Relative Frequency - Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Mathematical Model of Experiments, Probability as a Relative Frequency, Joint Probability, Conditional Probability, Total Probability, Baye's Theorem and Independent Events.

The Random Variable: Definition of a Random Variable, Conditions for a function to be a Random Variable, Discrete, Continuous and Mixed Random Variable. Distribution and Density functions of Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh and theirproperties.conditional distribution, conditional density functions and theirproperties.

UNIT II

Operation on One Random Variable – Expectations: Introduction, Expected Value of a Random Variable, Function of a Random Variable, Moments about the Origin, Central Moments, Variance

and Skew, Chebychev's Inequality, Characteristic Function, Moment Generating Function, Transformations of a Random Variable – Monotonic, Non-monotonic Transformations for a Continuous Random Variable.

UNIT III

Multiple Random Variables: Vector Random Variables, Joint Distribution Function and its Properties, Marginal Distribution Functions, Conditional Distribution and Density –Statistical Independence, Sum of Two Random Variables, Sum of Several Random Variables, Central Limit Theorem, Equal and Unequal Distributions.

Operations on Multiple Random Variables: Expected Value of a function of Random Variables - Joint Moments about the origin, Joint Central Moments, Joint Characteristic Functions, Joint Gaussian Random Variables - Two Random Variables, N-Random Variables and their Properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

UNIT IV

Random Processes – Temporal Characteristics: The Random Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, concept of Stationarity and Statistical Independence. First-Order, Second- Order, Wide-Sense(N-Order) and Strict-SenseStationary Processes, Time Averages and Ergodicity, Mean-Ergodic Processes, Autocorrelation, Cross-Correlation functions and their Properties. Covariance, Gaussian and Poisson Random Processes.

UNIT V

Random Processes – Spectral Characteristics: Power Spectrum and its properties, relationship between Power Spectrum and Autocorrelation Function, Power Density Spectrum and its Properties, Relationship between power spectrum and crosscorrelation function.

UNIT VI

Linear Systems with Random Inputs : Random Signal response of Linear Systems - system response, convolution, mean and mean-squared value of system response, autocorrelation function of response, cross-correlation functions of input and output, spectral characteristics of system response - power density spectrum, power density spectrums of input and output, band pass, band-limited and narrowband processes, properties, modeling of noise sources - resistive (thermal), arbitrary.Effective noise temperature, average noise figures, average noise figure of cascaded networks.

TEXT BOOKS :

1. Probability, Random Variables & Random Signal Principles - Peyton Z Peebles, 4th Edition, TMH,2001.
2. Probability, Random Variables and Stochastic Processes – Athanasios Papoulis and S. UnnikrishnaPillai, 4th Edition,PHI, 2002.
3. Probability Theory and Stochastic Process- YMallikarjunaReddy, 4thEdition, University Press.
4. Probability,Stastistics and Random Processes – K.Murugesan and P.Gurusamy

REFERENCES :

1. Probability Theory and Stochastic Process – B Prabhakara Rao, Oxford University Press.
2. Probability and Random Processes with Application to Signal Processing – Henry Stark and John W. Woods, 3rdEdition, Pearson Education.
3. Probability Methods of Signal and System Analysis - George R.Cooper, Clave D. MC Gillem,3rdEdition, Oxford, 1999.
4. Statistical Theory of Communication - S.P. Eugene Xavier, New Age Publications, 2003.

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM
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ELECTRONICS AND COMMUNICATION ENGINEERING

II YEAR – II SEMESTER **L T P C**

3 1 0 3

EM WAVES AND TRANSMISSION LINES (16EC4T11)

Prerequisites:

Electromagnetic Fields

1. Differential Calculus
2. Integral Calculus
3. Matrices and Determinants

Electromagnetic theory is a prerequisite for a wide spectrum of studies in the field of Electrical Sciences and Physics. Electromagnetic theory can be thought of as generalization of circuit theory. There are certain situations that can be handled exclusively in terms of field theory. In electromagnetic theory, the quantities involved can be categorized as source quantities and field quantities. Source of electromagnetic field is electric charges: either at rest or in motion. However an electromagnetic field may cause a redistribution of charges that in turn change the field and hence the separation of cause and effect is not always visible

Objectives:

1. To introduce the student to the theory and concepts of static electric and magnetic fields.
2. To study the Maxwell's Equations in Different Final Form and boundary conditions: Dielectric-Dielectric and Dielectric-Conductor Interfaces.
3. To study the electromagnetic waves Conducting and Perfect Dielectric Media, Wave Propagation.
4. To study the propagation, reflection, and transmission of plane waves, Poynting Vector and Poynting Theorem.
5. To study the Transmission Line Equations, Loading, Distortion in transmission lines.
6. To study the λ/4, λ /2, λ/8 Lines and their Impedance Transformations, to study waveguides,

Outcomes:

A student who successfully fulfills the course requirements will have:

1. An in depth analysis of the solutions and physical Interpretation of Maxwell's equations in the static electric and magnetic fields.
2. An in depth analysis of the field components and Conditions at a Boundary Surface.
3. An ability to write the constitutive relations and solve the wave equation in both isotropic and anisotropic media.
4. An ability to design devices using the reflective and transmissive properties dielectrics and conductors.
5. An in depth analysis of transmission lines and their parameters. And to study the low loss and lossless transmission line characteristics.
6. An ability to study the use of Smith Chart and its applications. An ability to study different transmission lines, understand the propagation of electromagnetic waves in waveguides.

UNIT I

Electrostatics: Coulomb's Law, Electric Field Intensity Electric Flux Density, Gauss Law and Applications, Electric Potential, Maxwell's Two Equations for Electrostatic Fields, Energy Density, Illustrative Problems. Convection and Conduction Currents, Dielectric Constant, Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations; Capacitance – Parallel Plate, Coaxial, Spherical Capacitors, Illustrative Problems.

Magneto Statics : Biot-Savart Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magnetostatic Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere's Force Law, Inductances and Magnetic Energy. Illustrative Problems.

UNIT II

Maxwell's Equations (Time Varying Fields): Faraday's Law and Transformer emf, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Final Forms and Word Statements. Conditions at a Boundary Surface - Dielectric-Dielectric and Dielectric-Conductor Interfaces. Illustrative Problems.

UNIT III

EM Wave Characteristics - I: Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definition, All Relations Between E & H. Sinusoidal Variations. Wave Propagation in Lossless and Conducting Media.Conductors & Dielectrics – Characterization, Wave Propagation in Good Conductors and Good Dielectrics.Polarization.Illustrative Problems.

UNIT IV

EM Wave Characteristics – II: Reflection and Refraction of Plane Waves – Normal and Oblique Incidences, for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection,Surface Impedance. Poynting Vector and Poynting Theorem – Applications, Power Loss in a Plane Conductor.Illustrative Problems.

UNIT V

Transmission Lines - I: Types, Parameters, Transmission Line Equations, Primary & Secondary Constants, Expressions for Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line Concepts, Losslessness/Low Loss Characterization, Distortion – Condition for Distortionlessness and Minimum Attenuation, Loading - Types of Loading. Illustrative Problems.

UNIT VI

Transmission Lines – II: Input Impedance Relations, SC and OC Lines, Reflection Coefficient, VSWR. UHF Lines as Circuit Elements; λ/4, λ /2, λ/8 Lines – Impedance Transformations. Smith Chart – Configuration and Applications, Single and Double Stub Matching.Illustrative Problems.

Wave Guides: Introduction to wave guides, types of wave guides, field equations of rectangular and circular waveguides- modes (TE, TM, TEM) (Qualitative analysis only)

Text Books :

1. Elements of Electromagnetic – Matthew N O Sadiku, 3rd ed.,Oxford University Press, 2001.
2. Electromagnetic Waves and Radiating Systems – EC Jordan and KGBalmain, 2nd Edition, PHI, 2000.
3. Electromagnetic Waves and Transmission Line—Y MallikarjunaReddy , Universities Press,2015.

REFERENCES :

Electromagnetic Fields and Wave Theory –GSN Raju, Pearson Education, 2006.

1. Engineering Electromagnetics – Nathan Ida, 2nd ed., Springer (India) Pvt. Ltd., New Delhi, 2005.
2. Engineering Electromagnetics – William H Hayt Jr and John A Buck, 7th ed.,TMH, 2006.
4. Transmission Lines and Networks – UmeshSinha, SatyaPrakashan (Tech. India Publications), New Delhi, 2001.
5. Electromagnetics - John DKraus, McGraw Hill Book Co., 1973.

WEB LINKS:

1. www.onlinecoursesnptel.ac.in
2. http://www.nptelvideos.in/2012/12/transmissions-lines-and-em-waves-html
3. http://freevideo lectures.com/course/2340/electromagnet-fields
4. http://cas.web.cerm.ch/cas/

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM
(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

II YEAR – II SEMESTER

L	T	P	C
3	1	0	3

ANALOG COMMUNICATION(16EC4T12)

Course Objectives:

The students are able

1. To know the basics of Analog Communication
2. To extend the modulation techniques for better communication.
3. To know the concepts of Frequency Modulation
4. To study various effects of noise on Communication Systems.
5. To study the transmitting & receiving phenomenon by using different receivers & transmitters types,
6. To study about different Pulse Modulation techniques.

Course Outcomes:

1. After studying this unit student is capable of understanding amplitude modulation followed by DSB SC Modulation
2. Student will undergo through the minimal power consumed modulation technique (i.e., SSB Modulation)
3. The student is capable of applying Frequency Modulation in real time applications like FM Radio etc.
4. Student will undergo through various types of Noise removing method by the using filters.
5. Student will understand various range of applications of Radio transmitters & Receivers.
6. After studying this unit student is capable of understanding Pulse Modulation which acts as prerequisite to Pulse Code Modulation.

UNITI

Amplitude Modulation: Introduction to communication system, Need for modulation, Frequency Division Multiplexing, Amplitude Modulation, Definition, Time domain and frequency domain description, single tone modulation, power relations in AM waves, Generation of AM waves, square law Modulator, Switching modulator, Detection of AM Waves - Square law detector, Envelop detector, Double side band suppressed carrier modulators, time domain and frequency domain description, Generation of DSB-SC Modulated waves, COSTAS Loop.

UNIT II

SSB Modulation: Frequency domain description, Frequency discrimination method for generation of AM SSB Modulated Wave, Time domain description, Phase discrimination method for generating AM SSB Modulated waves. Demodulation of SSB Waves, Vestigial side band modulation - Frequency description, Generation of VSB Modulated wave, Time domain description, Envelop detection of a VSB Wave pulse Carrier, Comparison of AM Techniques, Applications of different AM Systems.

UNIT III

Angle Modulation: Basic concepts, Frequency Modulation - Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave, Narrow band and Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave - Generation of FM Waves, Direct FM, Detection of FM Waves - Balanced Frequency discriminator, Zero crossing detector, Phase locked loop, Comparison of FM and AM.

UNIT IV

Noise:Noise in Analog Communication system, Types of Noise - Resistive (Thermal) Noise Source, Shot noise, Extraterrestrial Noise, Arbitrary Noise sources, White Noise, flicker noise Noise in DSB &SSB system, Noise in AM system, Noise in Angle Modulation system, Threshold effect in Angle Modulation system Pre-emphasis and de-emphasis.

UNIT V

Radio Transmitters: Classification of Transmitters, AM Transmitters - high level and low level AM transmitters,SSB Transmitters, Effect of feedback on performance of AM Transmitter, FM Transmitter – Variable reactance type and phase modulated FM Transmitter, frequency stability in FM Transmitter.

Receivers: Radio Receiver, Receiver Types - Tuned radio frequency receiver, Super-heterodyne receiver, RF section and Characteristics - Frequency changing and tracking, Intermediate frequency, AGC, FM Receiver, Comparison with AM Receiver, Amplitude limiting.

UNIT VI

Pulse Modulation: Time Division Multiplexing,Types of Pulse modulation, PAM (Single polarity, double polarity) PWM -generation and demodulation of PWM, PPM - generation and demodulation of PPM, comparison between TDM and FDM.

TEXT BOOKS:

1. Principles of Communication Systems - Simon Haykin. 2nd Edition, John Wiley 2007.
2. Analog communication systems - Dr.sanjsy Sharma, 6th Edition S K kataria and sons 2016.

REFERENCE BOOKS:

1. Principles of Communication Systems – H Taub & D Schilling, Gautam Sahe, 3rd Edition, TMH, 2007.
2. Electronics & Communication System - George Kennedy and Bernard Davis, 4th Edition TMH 2009.
3. Analog Communications - KN Hari Bhat & Ganesh Rao, 2nd Edition, Pearson Publications, 2008.
4. Communication Systems 2nd Edition – R P Singh, S P Sapre, TMH, 2007.
5. Communication Systems – B P Lathi, B S Publication, 2006.

WEB LINKS :

1. http://onlinecourses.nptel.ac.in/noc17_ee06/course
2. http://www.smartzworld.com/downloads/download.ac-complete-notes-jntu
3. http://www.jantuworldupdates.org/analog-communication-system-ac
4. Freevideolectures.com/course/2314/communication-engineering/8

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM
(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

II YEAR – II SEMESTER **L T P C**
3 1 0 3

PULSE DIGITAL CIRCUITS (16EC4T13)

COURSE OBJECTIVES

The Students during the course will understand

1. The response of low pass & high pass circuits for different inputs.
2. Design & analyze of different clippers & clampers circuit using diode & transistors.
3. The switching characteristics of diode & transistor.
4. Realization of various logic gates using DTL, TTL & ECL logic families.
5. The analysis and design of different multi-vibrators & their applications.
6. Various time base generator (Miller, Bootstrap time base generator)&The principals of synchronization & frequency division.

COURSE OUTCOMES

After undergoing the course the students will be able to

1. Design RC Circuits for altering Non-sinusoidal signal
2. Design various types of clippers & clampers using diodes.
3. Apply the basic concepts of design different logic gates using different logic families.
4. Design different multivibrators like bi-stable, monostable, and Astable multi's.
5. Design of memory elements and free running oscillators
6. Design different voltages time base generators.

UNIT I

Linear Wave Shaping: High pass, Low pass RC circuits and their response for sinusoidal, step, pulse, square and ramp inputs. RC network as differentiator and integrator, attenuators and their applications in CRO probe, RL and RLC circuits and their response for step input, Ringing circuit.

UNIT II

Non Linear Wave Shaping: Diode clippers, Transistor clippers, clipping at two independent levels, Transfer characteristics of clippers, Emitter coupled clipper, Comparators, applications of voltage comparators, clamping operation, clamping circuits using diode with different inputs, Clamping circuit theorem, practical clamping circuits, effect of diode characteristics on clamping voltage, Transfer characteristics of clampers.

UNIT III

Switching Characteristics of Devices: Diode as a switch, piece wise linear diode characteristics, Transistor as a switch, Break down voltage consideration of transistor, saturation parameters of Transistor and their variation with temperature, Design of transistors witch, transistor-switching times.

Digital Logic Gate Circuits: Realization of Logic Gates using DTL,TTL, ECLand CMOS logic circuits, Comparison of logic families.

UNIT IV

Multivibrators: Analysis & Design of Fixed Bias, Self Bias Bi-stable Multi vibrator, Emitter Coupled Bi-stable, Multi Vibrator (Schmitt trigger), Analysis and Design of Collector Coupled Mono-stable &Astable Multi-vibrators, Commutating capacitors, Triggering Methods, Application of Mono-stable Multivibrator as a Voltage to Time Converter, Application of AstableMultivibrator as a Voltage to Frequency Converter.

UNIT V

Voltage Time Base Generators: General features of a time base signal, methods of generating time base wave form, Miller and Bootstrap time base generators– basic principles, Transistor miller time base generator, Transistor Boot strap time base generator .

UNITVI

Synchronization and Frequency Division & Sampling Gates:Principles of Synchronization, Frequency division in sweep circuit, Astable relaxation circuits, Monostable relaxation circuits, Synchronization of a sweep circuit with symmetrical signals. Basic operating principles of sampling gates, Unidirectional and Bidirectional sampling gates, Reduction of pedestal in gate circuits, Applications of sampling gates.

TEXT BOOKS:

1. Pulse, Digital and Switching Waveforms by J Millman, H Taub and M S Prakash Rao, Mc-Graw Hill, 2007.
2. Pulse and Digital Circuits by AAnand Kumar, 2nd Edition, PHI, 2012.

REFERENCE BOOKS:

1. Solid state pulse circuits by David A Bell,4th edition, PHI, 2002.
2. Pulse, Digital Circuits and Computer fundamentals by R Venkataramana, Dhanpat Rai publications, 2010.

WEB LINKS:

1. https://www.smartzworld.com/notes/pdc
2. https://www.jntubook.com/pdc-textbook-free-download
3. Surkur.blogspot.in/pdc.html
4. https://www.facebook.com/IEINDIA/posts
5. nptel.ac.in/course/117106086/1
6. www.nptelvideos.in/2012/12/digital-circuits-and-systems.html

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM

(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

II YEAR – II SEMESTER

L	T	P	C
0	0	3	2

ELECTRONIC CIRCUIT ANALYSIS LAB (16EC4L02)

LIST OF EXPERIMENTS

A) DESIGN AND SIMULATION IN SIMULATION LAB USING MULTISIM:

1. Voltage Series Feedback Amplifier.
2. Current Shunt Feedback Amplifier.
3. RC Phase Shift Oscillator.
4. Colpitt's Oscillators.
5. Two Stage RC Coupled Amplifier.
6. Darlington Pair Amplifier.
7. Bootstrapped Emitter Follower
8. Class ASeries-Fed Power Amplifier.
9. Class B Complimentary Symmetry Amplifier.
10. Single Tuned Voltage Amplifier

B) TESTING IN THE HARDWARE LABORATORY:

1. Voltage Series Feedback Amplifier.
2. Current Shunt Feedback Amplifier.
3. RC Phase Shift Oscillator.
4. Colpitt's Oscillators.
5. Two Stage RC Coupled Amplifier.
6. Darlington Pair Amplifier.
7. Bootstrapped Emitter Follower
8. ClassASeries-Fed Power Amplifier.
9. Class B Complimentary Symmetry Amplifier.
10. Single Tuned Voltage Amplifier

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM (Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

II YEAR – II SEMESTER

L	T	P	C
0	0	3	2

ANALOG COMMUNICATIONS LAB (16EC4L03)

List of Experiments (Any Twelve experiments to be done)

a. Hardware, b.MATLAB Simulink, c. MATLAB Communication tool box

1. Amplitude Modulation & De-modulation
2. Amplitude modulation Double Side Band Suppressed Carrier - Modulation & De-modulation
3. Diode Detector
4. Pre-emphasis & De-emphasis
5. Frequency Modulation & De-modulation
6. Automatic Gain Control Circuits
7. Sampling Theorem
8. Pulse Amplitude Modulation & De-modulation
9. Pulse Width Modulation. & Demodulation
10. Pulse Position Modulation. & Demodulation

Equipments& Software required:

Software :

1. Amplitude Modulation & De-modulation
2. Amplitude modulation Double Side Band Suppressed Carrier - Modulation & De-modulation
3. Frequency Modulation & De-modulation
4. Verification Of Sampling Theorem
5. Pulse Width and Pulse Position Modulation. & Demodulation
6. Pulse Amplitude Modulation & De-modulation

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM

(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

III Year I Semester Course Structure

Sub Code	Subjects	L	T	P	Credits
16CS5T14	Computer Architecture and Organization	3	1		3
16EC5T14	Linear I C Applications	3	1		3
16EC5T15	Digital I C Applications	3	1		3
16EC5T16	Digital Communications	3	1		3
16EC5T17	Antennas and Propagation	3	1		3
16EC5L04	Pulse and Digital Circuits and I C Applications Lab			3	2
16EC5L05	Digital Communications Lab			3	2
16EC5L06	Digital I C Applications Lab			3	2
16BH5T17	Professional Ethics and Human Values		3		--
16EC5M01	MOOCs		3		
Total credits					**21**

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM

(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

III Year – I Semester **L T P C**
4 1 0 3

COMPUTER ARCHITECTURE AND ORGANIZATION
(16CS5T14)

Learning Objectives:

1. To impart an understanding of the internal organization and operations of a computer functional units.
2. To familiarize with the single and multiprocessor design architectures.

Course Outcomes:

At the end of this course student will be able to-

1. Examine functional units, bus structure and analyzing the data representations. (Analyze)
2. Evaluation of micro operations of ALU. (Evaluate)
3. Design of CPU and micro programmed control units.(Create)
4. Applying algorithms to perform arithmetic operations on fixed point and floating point. (Apply)
5. Assess memory hierarchy for accessing data by CPU. (Evaluate)
6. Analyze the I/O interfaces and multiprocessors architectures. (Analyze)

UNIT - I

Basic Structure of Computers: Computer Types, Functional unit, Basic Operational concepts, Bus structures. Data Representation: Data types, complements, fixed point representation. floating – pointrepresentation. Other binary codes-BCD-8421, 2421, excess-3, gray and excess-3 gray, error detection codes.

UNIT - II

Register Transfer Language and Micro-operations: Register transfer language. register transfer bus and memory transfers, arithmetic micro operations, logic micro operations, shift micro operations, arithmetic logic shift unit.

Basic Computer Organization and Design: Instruction codes, Computer Register Computer instructions, Instruction cycle, Memory – Reference Instructions. Input – Output and Interrupt.

UNIT - III

Central Processing Unit: General register organization, stack organization, instruction formats, addressing modes, data transfer and manipulation, program control, reduced instruction set computer.
Micro Programmed Control: Control memory, address sequencing, micro program example.

UNIT - IV

Computer Arithmetic: Addition and subtraction, multiplication algorithms, division algorithms, floating – point arithmetic operations.

UNIT - V

The Memory System: Memory hierarchy, main memory, auxiliary memory, associative memory, cache memory, virtual memory.

Pipelining Arithmetic and Instruction Pipeline, Basics of vector processing and Array Processors.

UNIT-VI

Input-Output Organization: Peripheral devices, input-output interface, asynchronous data transfer, modes of transfer, priority interrupts, direct memory access.

Multi Processors: Introduction, characteristics of multiprocessors, interconnection structures, inter processor arbitration.

Text Books

1. Computer System Architecture, M.Morris Mano, 3/e, Pearson/PHI, 1993
2. Computer Organization, Carl Hamacher, ZvonksVranesic, SafeaZaky, 5/e, McGraw Hill, 2011.

References

1. Computer Organization and Architecture – William Stallings, 6/e, Pearson/PHI, 2012
2. Structured Computer Organization – Andrew S. Tanenbaum, 4/e, PHI/Pearson, 2012
3. Fundamentals or Computer Organization and Design, - SivaraamaDandamudi Springer Int. Edition, 2014.
4. Computer Architecture a quantitative approach, John L. Hennessy and David A. Patterson, 5/e, Elsevier, 2011

URLs

1. http://nptel.iitm.ac.in/video.php?subjectId=106106092
2. https://www.tutorialspoint.com/videos/computer_organization/index.htm
3. https://www.reference.com/technology/computer-organization-36c3a064b20f9b33
4. https://www.youtube.com/watch?v=CDO28Esqmcg&list=PLhwVAYxlh5dvB1MkZrcRZy6x_a2yORNAu

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM

(Autonomous)
ELECTRONICS AND COMMUNICATION ENGINEERING

III YEAR – I SEMESTER

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LINEAR IC APPLICATIONS (16EC5T14)

Course objectives

The student will

1. Study differential amplifier analysis for different modes of operation for DC and AC Analysis.
2. Study and measurement of DC and AC characteristics of OP-AMP.
3. Study the linear and non-linear applications of operational amplifier.
4. Study the oscillators, active filters and analog multipliers.
5. Study IC 555 timer, PLL and VCO with their applications.
6. Study and understand different types of ADCs and DACs.

UNIT-I

ANALYSIS OF DIFFERENTIAL AMPLIFIER: Differential amplifiers analysis using BJT, emitter coupled differential amplifiers –DC analysis with R_E, differential amplifier using constant current source and determination of constant current, AC analysis of Differential amplifiers(dual input balanced output, single input balanced output, dual input unbalanced output, single input unbalanced output) –determination of R_i, R_o,A_d using r-parameters, Cascaded Differential Amplifier, current mirror circuit ,current repeater (basic and improved versions),level shifter circuit with constant current source- problem solving.

UNIT-II

CHARACTERISTICS OF OP-AMP: Characteristics of ideal op-amp, Power supplies, block diagram of op-amp, significance of each terminals, DC and AC characteristics.

Op-Amp parameters and Measurement: Input and Output Offset voltages and currents, slew rates, CMRR, PSRR, thermal drift -Problem Solving.

UNIT-III

LINEAR AND NON-LINEAR APPLICATIONS OF OP- AMPS: Ideal Inverting and Non-inverting amplifiers, summing amplifier, subtractor, basic Integrator and differentiator - Design and Problem Solving, Non ideal equivalent circuit of op-amp with inverting mode and non-inverting mode and determination of R_i, R_o, A_d, practical Integrator and differentiator, practical improved versions Instrumentation amplifier, Log and Anti log Amplifiers, V to I, I to V converters, comparator (inverting and non-inverting types) , zero crossing detector, Schmitt trigger, Square wave generator, function generators, monostable multivibrator, Precision rectifiers, peak detector- Design and Problem Solving.

UNIT-IV

OSCILLATORS, ACTIVE FILTERS, ANALOG MULTIPLIERS:RC phase shift oscillator, wien bridge oscillator, Butter worth filters- 1st order, 2nd order -LPF, HPF filters, 1st order - Band pass, Band reject and All pass filters, analog multiplier circuits- basic multiplier and its characteristics, applications of multiplier- voltage divider, squaring circuit ,square root circuit, doubler circuit, r.m.s detector, rectifier.

UNIT-V

TIMERS AND PHASE LOCKED LOOPS: Introduction to 555 timer, functional diagram, Monostable operations and applications- frequency divider, linear ramp generator, PWM, Astable operation and applications- FSK generator, PPM , Schmitt Trigger.

PLL - introduction, block schematic, principles and description of individual blocks, 565 PLL, Applications of PLL – frequency multiplication, frequency translation, voltage controlled oscillator 566 functional block diagram.

UNIT-VI

DIGITAL TO ANALOG AND ANALOG TO DIGITAL CONVERTERS: Introduction, basic DAC techniques- weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and IC 1408 DAC. Different types of ADCs – parallel Comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC.

Text books

1. Linear Integrated Circuits – D. Roy Chowdhury, New Age International (p) Ltd, 2nd Edition,2003.
2. Op-Amps and Linear ICs - Ramakanth A. Gayakwad, PHI,1987.

References

1. Operational Amplifiers and Linear Integrated Circuits–R.F.Coughlin and Fredrick Driscoll, PHI, 6th Edition.
2. Operational Amplifiers – C.G. Clayton, Butterworth and Company Publishers Ltd./ Elsevier, 1971.
3. OP-AMPS and linear integrated circuits –Sanjay Sharma, S.K.Kataria and Sons , 2nd Edition 2012.

Web Link

http://nptel.ac.in/courses/1171070

Course Outcomes :

After completion of this course the student will be able to

1. Design differential amplifier for the given specifications.
2. Analyze operational amplifier DC and AC characteristics.
3. Design of linear and non linear applications of op-amp for the given specifications.
4. Design of oscillators and active filters for desired bandwidth and gain.
5. Apply the concepts of 555 timer, PLL and VCO for communication applications.
6. Analyze A/D and D/A converters for signal processing applications.

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM

(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

III YEAR – I SEMESTER

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DIGITAL IC APPLICATIONS (16EC5T15)

Course objectives:

The student will

1. Study the concepts of hardware description language for various levels of Abstraction.
2. Study various simulation techniques for synthesis process.
3. Understand the concepts of electrical behavior of CMOS and Bipolar logic both in static and dynamic conditions.
4. Understand Coding and design of various combinational circuits using hardware description language.
5. Design and develop Counters using Flip-flops and VHDL.
6. Study Modeling of Registers and Memories using VHDL.

UNIT-I

DIGITAL DESIGN USING HDL: Design flow, program structure, History of VHDL, VHDL requirements, Levels of Abstraction, Elements of VHDL, Concurrent and Sequential Statements, Packages, Libraries and Bindings, Objects and Classes, Subprograms, Comparison of VHDL and Verilog HDL.

UNIT-II

VHDL MODELLING: Simulation, Logic Synthesis, Inside a logic Synthesizer, Constraints, Technology Libraries, VHDL and Logic Synthesis, Functional Gate-Level verification, Place and Route, Post Layout Timing Simulation, Static Timing, Major Netlist formats for design representation, VHDL Synthesis-Programming Approach.

UNIT-III

DIGITAL LOGIC FAMILIES AND INTERFACING: Introduction to logic families, CMOS logic, CMOS steady state and dynamic electrical behavior, CMOS logic families, Bipolar logic, transistor-transistor logic, TTL families, CMOS/TTL interfacing, low voltage CMOS logic and interfacing, Emitter coupled logic.

UNIT-IV

COMBINATIONAL LOGIC DESIGN: Adders And Subtractors, Ripple Adder, Look Ahead Carry Generator, Binary Parallel Adder, Binary Adder-Subtractor, ALU, Decoders, Encoders, Three State Devices, Multiplexers and De-Multiplexers, Code Converters, Parity Circuits, Comparators, Multipliers, Barrel Shifter, Simple Floating-Point Encoder, Cascading Comparators, Dual Priority Encoder, Design considerations with relevant Digital IC's, Modeling of circuits by using VHDL.

UNIT-V:

SEQUENTIAL LOGIC DESIGN: SSI Latches and Flip-Flops, Counters- ripple counter, synchronous counter Design of Counters using Digital ICs, Ring Counter, Johnson Counter, modeling of counters by using VHDL.

UNIT-VI

REGISTERS AND MEMORIES: MSI Registers, Shift Registers, Modes of Operation of Shift Registers, Universal Shift Registers, MSI Shift Registers, Design considerations with relevant Digital ICs, modeling of circuits by using VHDL.

ROM: Internal structure, 2D-Decoding, Commercial ROM types, timing and applications.

Static RAM: Internal structure, SRAM timing, standard, synchronous SRAMS.

Dynamic RAM: Internal structure, timing, synchronous DRAMs.

Text books

1. Digital Design Principles and Practices – John F.Wakerly, PHI/ Pearson Education Asia, 3rd Edition, 2005.
2. Fundamentals of Digital logic design with VHDL- Stephen Brown and Zvonko Vranesic, Tata McGraw Hill, 2nd edition.

References

1. VHDL Primer – J. Bhasker, Pearson Education/ PHI, 3rd Edition.
2. Designing with TTL Integrated Circuits- Robert L. / John R. Morris and Miller, Tata McGraw Hill, 1971.

Web links

1. http://www.nptelvideos.in/2012/12/digital-systems-design

Course Outcomes :

On successful completion of the course, students will be able to

1. Model logic circuits using hardware description language for digital applications.
2. Synthesize digital logic circuits using various simulation techniques.
3. Implement Basic Logic circuits using CMOS, TTL,ECL and their interfacing.
4. Design combinational logic circuits using VHDL.
5. Design Counters using various types of Flip-Flops .
6. Analyze Memories with timing diagrams using hardware description language.

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM

(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

III YEAR – I SEMESTER

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DIGITAL COMMUNICATIONS (16EC5T16)

Course objectives:

The student will

1. Understand the pulse digital modulation systems such as PCM, DPCM and DM.
2. Categorize various digital modulation techniques.
3. Explain the concept of transmission process, error calculation and concepts of matched filters.
4. Estimate the values of entropy and channel characteristics in source coding techniques.
5. Formulate the errors present in Block codes, cyclic codes.
6. Interpret and estimate the errors present in convolution codes.

UNIT-I

DIGITAL MODULATION: Elements of digital communication systems, advantages of digital communication systems, Elements of PCM: Sampling, Quantization and Coding, Quantization error, Companding in PCM systems, Differential PCM systems (DPCM), Delta modulation, its draw backs, adaptive delta modulation, comparison of PCM and DM systems, noise in PCM and DM systems.

UNIT-II

DIGITAL MODULATION TECHNIQUES: Introduction, Modulation and Demodulation of ASK, FSK, PSK, DPSK, DEPSK, QPSK, M-ary PSK, ASK, FSK, similarity of BFSK and BPSK.

UNIT-III

DATA TRANSMISSION : Base band signal receiver, probability of error, the optimum filter, matched filter, probability of error using matched filter, coherent reception, non-coherent detection of FSK, calculation of error probability of ASK, BPSK, BFSK,QPSK.

UNIT-IV

INFORMATION THEORY: Discrete messages, concept of amount of information and its properties, Average information (Entropy) and its properties, Information rate, Mutual information and its properties.

SOURCE CODING: Introduction, Advantages, Shannon's theorem, Shanon-Fano coding, Huffman coding, efficiency calculations, channel capacity of discrete and analog channels, capacity of a Gaussian channel, bandwidth –S/N trade off.

UNIT-V

LINEAR BLOCK CODES: Introduction, Matrix description of Linear Block codes, Error detection and error correction capabilities of Linear block codes, Hamming codes, Binary cyclic codes, Algebraic structure, encoding, syndrome calculation, BCH codes.

UNIT-VI

CONVOLUTION CODES: Introduction, encoding of convolution codes, time domain approach, transform domain approach. Graphical approach: state, tree and trellis diagram decoding using Viterbi algorithm.

Text books

1. Digital and Analog Communication Systems - Sam Shanmugam, John Wiley, 2005.
2. Digital communications - Simon Haykin, John Wiley, 2005.

References

1. Principles of Communication Systems – H. Taub and D. Schilling, TMH, 2003.
2. Principles of digital communications- P.Chakrabarti,Dhanpat rai publication ,1991.
3. Digital Communications – John Proakis, TMH, 1983.

Web links

1. http://www.nptelvideos.in/2012/12/digital-communication.html

Course Outcomes:

On successful completion of the course, students will be able to

1. Distinguish the performance of pulse digital modulation techniques.
2. Interpret digital modulation techniques like ASK, FSK, PSK etc.
3. Evaluate the performance of digital modulation techniques for coherent and non coherent detection.
4. Apply the basic concepts of Information theory in source coding techniques.
5. Analyze block codes and cyclic codes for the reliable transmission of digital information over the channel.
6. Implement convolution codes for digital communication applications.

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM

(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

III YEAR – I SEMESTER

L	T	P	C
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ANTENNAS AND PROPAGATION (16EC5T17)

Course objectives:

The student will

1. Learn the basic fundamentals of antennas.
2. Analyze the current distribution and EM field radiated by monopole, dipole and loop antennas.
3. Classify different types of antenna arrays and determine radiation patterns.
4. Study the constructional features of microstrip and helical antennas.
5. Study the characteristics of VHF, UHF and Microwave antennas.
6. Study the concepts of radio wave propagation in the atmosphere.

UNIT-I

ANTENNA FUNDAMENTALS: Introduction, Radiation Mechanism – single wire, 2 wire, dipoles, Current Distribution on a thin wire antenna. Antenna Parameters - Radiation Patterns, Patterns in Principal Planes, Main Lobe and Side Lobes, Beam widths, Polarization, Beam Area, Radiation Intensity, Beam Efficiency, Directivity, Gain and Resolution, Antenna Apertures, Aperture Efficiency, Effective Height, Antenna Theorems – Applicability and Proofs for equivalence of directional characteristics, illustrated Problems.

UNIT-II

THIN LINEAR WIRE ANTENNAS: Retarded Potentials, Radiation from Electric Dipole, Quarter wave Monopole and Half wave Dipole – Current Distributions, Evaluation of Field Components, Power Radiated, Radiation Resistance, Beam widths, Directivity, Effective Area and Effective Height. Natural current distributions, fields and patterns of Thin Linear Center-fed Antennas of different lengths, Radiation Resistance at a point which is not current maximum.

Loop Antennas: Small Loops - Field Components, Comparison of far fields of small loop and short dipole, concept of short magnetic dipole, D and R_r relations for small loops.

UNIT III

ANTENNA ARRAYS : 2 element arrays – different cases, Principle of Pattern Multiplication, N element Uniform Linear Arrays – Broadside, End-fire Arrays, EFA with Increased Directivity, Derivation of their characteristics and comparison, arrays with Parasitic Elements, Yagi-Uda, Folded Dipoles and their characteristics.

UNIT-IV

NON-RESONANT RADIATORS : Introduction, Travelling wave radiators basic concepts, Long wire antennas – field strength calculations and patterns, Micro strip Antennas-Introduction, Features, Advantages and Limitations. Rectangular Patch Antennas –Geometry and Parameters, Impact of different parameters on characteristics.

Broadband Antennas: Helical Antennas – Significance, Geometry, basic properties, Design considerations for monofilar helical antennas in Axial Mode and Normal Modes (Qualitative Treatment).

UNIT-V

VHF,UHF AND MICROWAVE ANTENNAS: Reflector Antennas - Flat Sheet and Corner Reflectors, Paraboloidal Reflectors – Geometry, characteristics, types of feeds, F/D Ratio, Spill Over, Back Lobes, Aperture Blocking, Off-set Feeds, Cassegrain Feeds.

Horn Antennas – Types, Optimum Horns, Design Characteristics of Pyramidal Horns; Lens Antennas – Geometry, Features, Dielectric Lenses and Zoning, Applications.

UNIT-VI

WAVE PROPAGATION: Concepts of Propagation – frequency ranges and types of propagations. Ground Wave Propagation–Characteristics, Parameters, Wave Tilt, Flat and Spherical Earth Considerations. Sky Wave Propagation – Formation of Ionospheric Layers and their Characteristics, Mechanism of Reflection and Refraction, Critical Frequency, MUF and Skip Distance – Calculations for flat and spherical earth cases, Optimum Frequency, LUHF, Virtual Height, Ionospheric Abnormalities, Ionospheric Absorption.Fundamental Equation for Free-Space Propagation, Basic Transmission Loss Calculations.

Space Wave Propagation – Mechanism, LOS and Radio Horizon. Tropospheric Wave Propagation – Radius of Curvature of path, Effective Earth's Radius, Effect of Earth's Curvature, Field Strength Calculations, Tropospheric Scattering.

Text books

1. Antennas for All Applications – John D.Kraus and Ronald J.Marhefka, TMH, 3rd Edition, 2003.
2. Electromagnetic Waves and Radiating Systems – E.C.Jordan and K.G.Balmain,PHI, 2nd Edition, 2000.

References

1. Antenna Theory - C.A. Balanis, John Wiley and Sons, 2nd Edition, 2001.
2. Antennas and Wave Propagation – K.D.Prasad, Satya Prakashan, Tech India Publications, New Delhi,2001.
3. Transmission and Propagation – E.V.D. Glazier and H.R.L.Lamont, The Services Text Book of Radio, vol. 5, Standard Publishers Distributors, Delhi.

Course Outcomes:

On successful completion of the course, students will be able to

1. Identify basic antenna parameters in designing of antennas.
2. Evaluate current distribution and radiation pattern of wire antennas.
3. Design antenna array based on principle of pattern multiplication to obtain radiation pattern.
4. Design of Helical antenna for satellite and Mobile communications.
5. Design parabolic, Lens and Horn antennas for microwave applications.
6. Infer the characteristics of radio wave propagation in the atmosphere.

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM

(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

III YEAR – I SEMESTER

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PULSE AND DIGITAL CIRCUITS AND IC APPLICATIONS LAB (16EC5L04)

List of Experiments to be conducted :

PULSE AND DIGITAL CIRCUITS:

1. Linear wave shaping (RC Integrator and RC differentiator).
2. Non Linear wave shaping –Clippers.
3. Non Linear wave shaping –Clampers.
4. Schmitt Trigger.
5. Multivibrators.
6. Boot strap circuits.

IC APLICATION:

1. Study of ICs – IC 741, IC 555, IC 565, IC 566, IC 1496 – functioning, Parameters and Specifications.
2. OP AMP Applications – Adder, Subtracted, Comparator Circuits.
3. Design of Integrator and Differentiator Circuits using IC 741.
4. Design of Active Filters – LPF, HPF (first order) , BPF, Band Reject (Wideband) and Notch Filters
5. IC 741 Oscillator Circuits – Phase Shift and Wien Bridge Oscillators.
6. Comparison of Astable Operation with IC 555 Timer and IC 741.

Equipment required for Laboratories:

1. RPS:(0 –30) V
2. CRO:(0 –20) MHz
3. Function Generators :(0 –3) MHz
4. Components
5. Multi Meters
6. Components:- IC741, IC555, IC565, IC1496, IC723, 7805, 7809, 7912 and other essential components.
7. Analog IC Tester

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM

(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

III YEAR – I SEMESTER

L	T	P	C
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DIGITAL COMMUNICATIONS LAB (16EC5L05)

List of Experiments to be conducted :

PART-A:

1. Verification of Time division multiplexing and demultiplexing.
2. Pulse code modulation and demodulation.
3. Differential pulse code modulation and demodulation.
4. Delta modulation and demodulation.
5. Frequency shift keying.
6. Phase shift keying .
7. Differential phase shift keying.
8. Verification of Companding techniques using A-law and μ-law.
9. Source Encoder and Decoder
10. Linear Block Code-Encoder and Decoder
11. Binary Cyclic Code - Encoder and Decoder
12. Convolution Code - Encoder and Decoder

PART B:

Experiments using MATLAB

1. Simulation of PCM,DPCM
2. Simulation of DM ,ADM
3. Simulation of ASK,FSK
4. Simulation of PSK, M-ary PSK

Equipment required for Laboratories:

1. RPS - 0 – 30 V
2. CRO - 0 – 20 M Hz.
3. Function Generators - 0 – 1 M Hz
4. RF Generators - 0 – 1000 M Hz./0 – 100 M Hz.
5. Multimeters
6. Lab Experimental kits for Digital Communication
7. Components
8. Radio Receiver/TV Receiver Demo kits or Trainees.

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM

(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

III YEAR – I SEMESTER

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DIGITAL IC APPLICATIONS LAB (16EC5L06)

Note: The students are required to design and draw the internal logical structure of the following Digital Integrated Circuits and to develop VHDL/Verilog HDL Source code, perform simulation using relevant simulator and analyze the obtained simulation results using necessary synthesizer. All the experiments are required to verify and implement the logical operations on the latest FPGA Hardware in the Laboratory.

List of Experiments to be conducted :

1. Realization of Logic Gates
2. Design of Full Adder using 3 modeling systems
3. 3 to 8 Decoder -74138
4. 8 to 3 Encoder (with and without parity)
5. 8 x 1 Multiplexer-74151 and 2x 4 De-multiplexer-74155
6. 4- Bit comparator-7485
7. D Flip-Flop-7474
8. Decade counter -7490
9. Shift registers-7495
10. 8-bit serial in-parallel out and parallel in-serial out
11. Fast In and Fast Out (FIFO)
12. MAC (Multiplier and Accumulator)
13. ALU Design.

Equipment/Software required:

1. Xilinx Vivado software / Equivalent Industry Standard Software
2. Xilinx Hardware / Equivalent hardware.
3. Personal computer system with necessary software to run the programs and Implement.

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM

(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

III YEAR – I SEMESTER

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PROFESSIONAL ETHICS AND HUMAN VALUES (16BH5T17)

Unit I

Professional Ethics and Human values: Ethics -History of Ethics-Types of Ethics, Professional Ethics and its forms -Significance-Personal ethics vs Professional Ethics, Morals, Values — Integrity — Work Place Ethics and Business Ethics—Ethics in HRM, Finance, Marketing Management — Civic Virtue —Respect for others — Living Peacefully — Caring — Sharing — Honesty —Courage — Value time —Co-operation — Commitment Empathy — Self-confidence — Spirituality- Character.

Unit II

Engineering Ethics: Engineering Ethics-Meaning & Purpose of Engineering Ethics-Consensus and Controversy —Profession, Professional and Professionalism —Key Characteristics of Engineering Professionals Professional Roles to be played by an Engineer-Self Interest, Customs and Religion- Ethical Theories-Meaning & Uses of Ethical Theories-Types of Inquiry -Theories of moral Development-Kohlberg's Theory — Gilligan's Argument —Heinz's Dilemma.

Unit III

Engineering as Social Experimentation: Comparison with Standard Experiments —Knowledge gained — Conscientiousness — Relevant Information — Learning from the Past — Engineers as Managers, Consultants, and Leaders — Accountability — Role of Codes — Codes and Experimental Nature of Engineering- Ethical issues involved in Clinical Trials.

Unit IV

Engineers' Responsibility for Safety and Risk: Concept of Safety-Types of Safety, Risk-Types of Risks, Voluntary v/s Involuntary Risk- Short term v/s Long term Consequences- Expected Probability- Reversible Effects- Threshold Levels for Risk-Delayed v/s Immediate Risk- Safety and the Engineer — Designing for Safety — Risk-Benefit Analysis-Accidents.

Unit V

Engineers Responsibilities and Rights: Collegiality-Techniques for Achieving Collegiality —Loyalty -Two Senses of Loyalty-obligations of Loyalty-Misguided Loyalty — professionalism and Loyalty- Professional Rights —Professional Responsibilities — confidential and proprietary information-Conflict of Interest-solving conflict problems - Ethical egoism-Collective bargaining-ConfidentialityAcceptance of

Bribes/Gifts when is a Gift and a Bribe-examples of Gifts v/s Bribes-problem solving-interests in other companies-Occupational Crimes-industrial espionage-price fixing-endangering lives- Whistle Blowing-types of whistle blowing-when should it be attempted-preventing whistle blowing.

Unit VI

Global Issues: Globalization-Problems of globalization- Cross-culture Issues-Environmental Ethics-Computer Ethics-computers as the instrument of Unethical behavior-computers as the object of Unethical Acts-autonomous computers-computer codes of Ethics-Weapons Development-Ethics and Research-Analyzing Ethical Problems in Research-Food and Drug Adulteration.

Relevant case studies shall be dealt where ever necessary.

Reference Books:

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

"Engineering Ethics" by Harris, Pritchard and Rabins, CENGAGE Learning, India Edition, 2009.

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM

(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

III Year II Semester Course Structure

Sub Code	Subjects	L	T	P	Credits
16BH6T15	Management Science	3	1		3
16BH6T16	IPR and Patents		2		--
16EC6T19	Digital Signal Processing	3	1		3
16EC6T20	Micro Processors and Micro Controllers	3	1		3
16EC6T21	VLSI Design	3	1		3
16CS6E06 16CS6E07 16ME6E01 16EE6E03 16EC6E02 16EE6E04	**OPEN ELECTIVE** 1. OOPs through Java 2. Data Mining 3. Robotics 4. Power Electronics And Industrial Applications 5. Bio-Medical Instrumentation 6.MEMS	3	1		3
16EC6L08	Micro Processors and Micro Controllers Lab			3	2
16EC6L09	VLSI Lab			3	2
16EC6P01	Mini Project			3	2
Total credits					**21**

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM

(Autonomous)
ELECTRONICS AND COMMUNICATION ENGINEERING

III YEAR – II SEMESTER	**L**	**T**	**P**	**C**
	3	**1**	**0**	**3**

MANAGEMENT SCIENCE (16BH6T15)

Unit I

Introduction to Management: Concept —nature and importance of Management — Functions of Management — Evaluation of Management thought- Theories of Motivation — Decision making Process-Designing organization structure- Principles of organization - Types of organization structure.

Unit II

Operations Management: Production Management-functions— Work study- Statistical Quality Control- Control charts (P-chart, R-chart, and C-chart). Simple problems- Material Management: Need for Inventory control- EOQ, ABC analysis (simple problems) and Types of ABC analysis (HML, SDE, VED, and FSN analysis).

Unit III

Functional Management: Concept of HRM, HRD and PMIR- Functions of HR Manager- Job Evaluation and Merit Rating, Balanced Score Card — Team Dynamics/Working in Teams - Marketing Management- Functions of Marketing —Marketing strategies based on Product Life Cycle.

Unit IV

Project Management: (PERT/CPM): Development of Network Difference between PERT and CPM Identifying Critical Path- Probability- Project Crashing (Simple Problems).

Unit V

Entrepreneurship Management & Strategic Management: Entrepreneurship-features- Financial Institutions facilitating entrepreneurship — Startup culture. Strategic Management: Vision, Mission, Goals, Strategy — Elements of Corporate Planning Process — Environmental Scanning — SWOT analysis Steps in Strategy Formulation and Implementation, Generic Strategy Alternatives.

Unit VI

Introduction to Contemporary Management Practices: Basic concepts of MIS, Just In Time (AT) system, Total Quality Management (TOM), Lean Six Sigma, People Capability Maturity Model, Supply Chain Management, Evolution of Enterprise Systems, Business Process Outsourcing (BPO), Business Process Re-Engineering.

Text Books

1. Dr. P. Vijaya Kumar & Dr. N. Appa Rao, 'Management Science' Cengage, Delhi, 2012.
2. Dr. A. R. Aryasri, Management Science' TMH 2011.

REFERENCES

1. Koontz & Weihrich: 'Essentials of Management' TMH 2011
2. Seth & Rastogi: Global Management Systems, Cengage Learning, Delhi, 2011.
3. Robbins: Organizational Behaviors, Pearson Publications, 2011
4. Kanishka Bedi: Production & Operational Management, Oxford Publications, 2011
5. Manjunath: Management Science, Pearson Publications, 2013.
6. Biswajit Patnaik: Human Resource Management, PHI, 2011.
7. Hitt and Vijaya Kumar: Strategic Management, Cengage Learning.
8. Dr. PG. Ramanujam, BVR Naidu, PV Rama Sastry : Management Science Himalaya Publishing House, 2013.
9. Management Shapers, Universities Press.
10. Philip Kotler & Armstrong: Principles of Marketing, Pearson publications.
11. Principles of management and administration, D. Chandra Bose, Prentice Hall of India Pvt. Ltd. New Delhi.
12. Patterns of Entrepreneurship Management, jack M.kaplan

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM

(Autonomous)
ELECTRONICS AND COMMUNICATION ENGINEERING

III YEAR – II SEMESTER

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INTELLECTUAL PROPERTY RIGHTS AND PATENTS (16BH6T16)

Unit I :

Introduction to Intellectual Property Law — Evolutionary past — Intellectual Property Law Basics - Types of Intellectual Property - Innovations and Inventions of Trade related Intellectual Property Rights — Agencies Responsible for Intellectual Property Registration —WTO-WIPO- Regulatory — Over use or Misuse of Intellectual Property Rights - Compliance and Liability Issues.

Unit II:

Introduction to Copyrights — Principles of Copyright — Subject Matters of Copyright — Rights Afforded by Copyright Law —Copyright Ownership — Transfer and Duration — Right to Prepare Derivative Works —Rights of Distribution — Rights of performers — Copyright Formalities and Registration — Limitations — Infringement of Copyright — International Copyright Law- Semiconductor Chip Protection Act.

Unit III:

Introduction to Patent Law — Rights and Limitations — Rights under Patent Law —Patent Requirements — Product Patent and Process Patent- Ownership and Transfer — Patent Application Process and Granting of Patent — Patent Infringement and Litigation — International Patent Law — Double Patenting — Patent Searching —New developments in Patent Law

Unit IV:

Introduction to Trade Mark — Trade Mark Registration Process — Post registration procedures — Trade Mark maintenance — Transfer of rights — Inter parties Proceedings — Infringement — Dilution of Ownership of Trade Mark — Likelihood of confusion — Trade Mark claims — Trade Marks Litigation — International Trade Mark Law.

Unit V:

Introduction to Trade Secrets — Maintaining Trade Secret — Physical Security —Employee Access Limitation — Employee Confidentiality Agreement — Trade Secret Law — Unfair Competition — Trade Secret Litigation- Service Level Agreements Breach of Contract — Applying State Law.

Unit VI:

Introduction to Cyber Law — Information Technology Act - Cyber Crime and E-commerce —Security -Data Security — Confidentiality — Data Privacy in India Vs Rest of the World.

Relevant Cases Shall be dealt where ever necessary.

REFERENCE BOOKS:

1. Deborah E.Bouchoux: "Intellectual Property". Cengage learning, New Delhi.
2. Intellectual Property Rights (Patents & Cyber Law), Dr. A. Srinivas. Oxford University Press, New Delhi.
3. Kompal Bansal & Parishit Bansal "Fundamentals of IPR for Engineers", BS Publications (Press).
4. Cyber Law. Texts & Cases, South-Western's Special Topics Collections.
5. Prabhuddha Ganguli: 'Intellectual Property Rights" Tata Mc-Graw — Hill, New Delhi
6. Richard Stim: "Intellectual Property", Cengage Learning, New Delhi.
7. R. Radha Krishnan, S. Balasubramanian: "Intellectual Property Rights", Excel Books. New Delhi.

M.Ashok Kumar and Mohd.lqbal Ali: "Intellectual Property Right" Serials Pub.

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(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

III YEAR – II SEMESTER

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DIGITAL SIGNAL PROCESSING (16EC6T19)

Course objectives:

The student will

1. Study the representation of discrete time signals, systems and their solutions using Z transforms.
2. Learn the concepts of DFS, DFT and FFT .
3. Study and design of infinite impulse response (IIR) digital filters.
4. Study the concepts and design of finite impulse response (FIR) digital filters.
5. Study various Digital Signal Processors and Architectures.
6. Learn about multirate signal processing

UNIT-I

INTRODUCTION: Introduction to Digital Signal Processing: Discrete time signals and sequences, linear shift invariant systems, stability, and causality. Linear constant coefficient difference equations. Frequency domain representation of discrete time signals and systems.

Review of Z-transforms: Applications of Z – transforms, solution of difference equations.

UNIT-II

DISCRETE FOURIER SERIES AND FOURIER TRANSFORMS: Properties of discrete Fourier series, DFS representation of periodic sequences, Discrete Fourier transforms: Properties of DFT, linear convolution of sequences using DFT, Computation of DFT.

Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency FFT Algorithms, Inverse FFT, Problem solving.

UNIT-III

REALIZATION OF DIGITAL FILTERS: Digital filters Basic structures of IIR systems, Transposed forms.

IIR DIGITAL FILTERS: Analog filter approximations – Butter worth and Chebyshev, Design of IIR Digital filters from analog filters, Analog-Digital transformations, Problem solving .

UNIT-IV

FIR DIGITAL FILTERS : Basic structures of FIR systems, System function, Characteristics of FIR Digital Filters, frequency response. Design of FIR Digital Filters using Window Techniques, Frequency Sampling technique, Comparison of IIR and FIR filters.

UNIT-V

DSP PROCESSORS: Introduction to programmable DSPs- Multiplier and Multiplier Accumulator (MAC), Modified Bus Structures and Memory Access scheme, Multiple access memory ,multiport memory, VLSI architecture, Pipelining, Special addressing modes, On-Chip Peripherals.

Architecture of TMS 320C5X- Introduction, Bus Structure, Central Arithmetic Logic Unit, Auxiliary Register, Index Register, Block Move Address Register, Parallel Logic Unit, Memory mapped registers, program controller, Some flags in the status registers, On- chip registers, On-chip peripherals.

UNIT-VI

MULTIRATE DIGITAL SIGNAL PROCESSING: Decimation, interpolation, sampling rate conversion, Implementation of sampling rate conversion, sub band coding of speech signal.

Text books

1. Digital Signal Processing, Principles, Algorithms, and Applications --John G. Proakis,Dimitris G.Manolakis, 4th edition, PHI, 2013.
2. Digital Signal Processors, Architecture, Programming and Applications – B.Venkataramani, M.Bhaskar, TATA McGraw Hill, 2002.
3. Digital signal Processing --A Anand Kumar, eastrn economy edition, PHI, 2013.

References

1. Discrete Time Signal Processing – A.V.Oppenheim and R.W. Schaffer,4th edition ,PHI,2007.
2. Digital Signal Processing-- Tarunkumar Rawat, 1st edition, Oxford, 2015.

Web links

1. www.nptelvideos.in/2012/12/digital signal processing.html

Course Outcomes:

On successful completion of the course, students will be able to

1. Comprehend the representation of discrete time signals and systems.
2. Show discrete time signals in frequency domain using DFS, DFT and FFT.
3. Design of IIR filters with digitization techniques for the given specifications.
4. Implement of FIR filters with windowing techniques for the given specifications.
5. Know the architectures of DSP processors for signal processing applications.
6. Interpret sampling rate conversion like decimation and interpolation.

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM

(Autonomous)
ELECTRONICS AND COMMUNICATION ENGINEERING

III YEAR – II SEMESTER

L	T	P	C
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MICRO PROCESSORS AND MICRO CONTROLLERS (16EC6T20)

Course objectives:
The student will

1. Study architecture and memory organization of 8086.
2. Learn Programming concepts of 8086.
3. Study the interfacing of 8086 with Peripheral devices (I/O devices).
4. Study the features and operating modes in advanced microprocessors (80386).
5. Learn the programming concepts of 8051 microcontroller.
6. Study architecture and features of PIC Microcontroller.

UNIT-I
8086 ARCHITECTURE : Main features, pin diagram/description, 8086 microprocessor family, 8086 internal architecture, bus interfacing unit, execution unit, interrupts and interrupt responses, 8086 system timing, minimum mode and maximum mode configurations.

UNIT-II
8086 PROGRAMMING: Program development steps, instructions, addressing modes, assembler directives, writing simple programs with an assembler, assembly language program development tools.

UNIT-III
8086 INTERFACING: Semiconductor memories interfacing (RAM,ROM), Intel 8255 programmable peripheral interface, alphanumeric displays (LED,7-segment display, multiplexed 7-segment display), Intel 8257 DMA controller, Intel 8259 programmable interrupt controller, software and hardware interrupt applications, Programmable communication interface 8251-USART,stepper motor,A/D and D/A converters

UNIT-IV
ADVANCED MICROPROCESSORS(80386): Salient features of 80386, Architecture of 80386, register organization of 80386, addressing modes, real mode, protected mode, segmentation and paging, Virtual 8086 mode and enhanced mode, instruction set of 80386, architectural differences between 80386 and 80486 microprocessors.

UNIT-V
Intel 8051 MICROCONTROLLER: Architecture, pin descriptions, input/output ports and circuits, memory organization, counters/timers, serial data input/output, interrupts. Assembly language programming: Instructions, addressing modes, simple programs. Interfacing: keyboard, displays (LED, 7-segment display unit).

UNIT-VI

PIC MICROCONTROLLER: Introduction, characteristics of PIC microcontroller, PIC microcontroller families, memory organization, parallel and serial input and output, timers, Interrupts, PIC 16F877 architecture, instruction set of the PIC 16F877.

ARM-Introduction to ARM Processors and applications in Embedded systems

Text Books

1. Microprocessors and Interfacing – Programming and Hard ware -Douglas V Hall, SSSP Rao, 3rd Edition, Tata McGraw Hill Education Private Limited.
2. The 8051 Microcontroller and Embedded Systems Using Assembly and C - Kenneth J.Ayala, Dhananjay V.Gadre,Cengage Learninbg , India Edition.

References

1. The Intel Microprocessors-Architecture, Programming, and Interfacing - Barry B.Brey, 8th Edition,Pearson, -2012.
2. Microprocessors and Microcontrollers-Architecture, Programming and System Design-Krishna Kant, Second Edition , PHI Learning Private Limited,2014.
3. Microprocessors and Microcontrollers- N.Senthil Kumar, M.Saravanan and S.Jeevananthan, Seventh Impression, Oxford University Press, 2013

Web link

1. https://www.nptel.ac.in/ downloads/ 106108100/
2. *enhanceedu.iiit.ac.in/wiki/images/ARM_architecture.pdf*

Course Outcomes:

After completion of the course the student will be able to

1. Analyze the concepts of architecture and key features of 8086.
2. Develop Assembly Language Programs using 8086.
3. Design Interfacing for I/O devices like Stepper motor, LED displays with 8086.
4. Understand the functional features of advanced microprocessors (80386).
5. Interface I/O devices like Keyboard, display units with 8051.
6. Implement the concepts of PIC microcontroller in embedded real time project applications.

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM

(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

III YEAR – II SEMESTER

L	T	P	C
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VLSI DESIGN (16EC6T21)

Course objectives:

The main objectives of this course is:

1. To enable the student to visualize MOS fabrication technologies and to understand electrical properties of MOS, CMOS and Bi CMOS circuits.
2. To train the student to draw integrated circuit layouts and stick diagrams following Lambda based design rules.
3. To gain knowledge in Basic circuit concepts and scaling for advanced VLSI design technology.
4. To learn input and output circuits of a Chip and testing and verification in VLSI design .
5. To understand the types of Architectures, Technologies and Families related to FPGA Design
6. To provide knowledge for the students on the importance to go for Low power VLSI and design applications.

UNIT-I

INTRODUCTION AND BASIC ELECTRICAL PROPERTIES OF MOS CIRCUITS: Introduction to IC technology, Fabrication process: nMOS, pMOS and CMOS. I_{ds} versus V_{ds} Relationships, Aspects of MOS transistor Threshold Voltage, MOS transistor Trans, Output Conductance and Figure of Merit. nMOS Inverter, Pull-up to Pull-down Ratio for nMOS inverter driven by another nMOS inverter, and through one or more pass transistors. Alternative forms of pull-up, The CMOS Inverter, Latch-up in CMOS circuits, Bi-CMOS Inverter, Comparison between CMOS and BiCMOS technology.

UNIT-II

MOS AND BI-CMOS CIRCUIT DESIGN PROCESSES: MOS Layers, Stick Diagrams, Design Rules and Layout, General observations on the Design rules, 2µm Double Metal, Double Poly, CMOS/BiCMOS rules, 1.2µm Double Metal, Double Poly CMOS rules, Layout Diagrams of NAND and NOR gates and CMOS inverter, Symbolic Diagrams Translation to Mask Form.

UNIT-III

BASIC CIRCUIT CONCEPTS: Sheet Resistance, Sheet Resistance concept applied to MOS transistors and Inverters, Area Capacitance of Layers, Standard unit of capacitance, Some area Capacitance Calculations, The Delay Unit, Inverter Delays, Driving large capacitive loads, Propagation Delays, Wiring Capacitances, Choice of layers.

SCALING OF MOS CIRCUITS: Scaling models and scaling factors, Scaling factors for device parameters, Limitations of scaling, Limits due to sub threshold currents, Limits on logic levels and supply voltage due to noise and current density. Switch logic, Gate logic.

UNIT-IV

CHIP INPUT AND OUTPUT CIRCUITS: ESD Protection, Input Circuits, Output Circuits and L(di/dt) Noise, On-Chip clock Generation and Distribution.

DESIGN FOR TESTABILITY: Fault types and Models, Controllability and Observability, Ad Hoc Testable Design Techniques, Scan Based Techniques and Built-In Self Test techniques.

UNIT-V

FPGA DESIGN: FPGA design flow, Basic FPGA architecture, FPGA Technologies, FPGA families-Altera Flex 8000FPGA, Altera Flex 10FPGA, Xilinx XC4000 series FPGA, Xilinx Spartan XL FPGA, Xilinx Spartan II FPGAs, Xilinx Vertex FPGA. Case studies: FPGA Implementation of Half adder and full adder.

SYNTHESIS LEVELS: Logic synthesis, RTL synthesis, High level Synthesis.

UNIT-VI

LOW POWER VLSI DESIGN: Introduction to Deep submicron digital IC design, Low Power CMOS Logic Circuits: Over view of power consumption, Low –power design through voltage scaling, Estimation and optimisation of switching activity, Reduction of switching capacitance. Interconnect Design, Power Grid and Clock Design.

Test books

1. Essentials of VLSI Circuits and Systems - Kamran Eshraghian, Douglas and A. Pucknell and Sholeh Eshraghian, Prentice-Hall of India Private Limited, 2005.
2. CMOS Digital Integrated Circuits Analysis and Design- Sung-Mo Kang, Yusuf Leblebici, Tata Mc Graw Hill Education, 2003.

References

1. Advanced Digital Design with the Verilog HDL- Michael D.Ciletti, Xilinx Design Series, Pearson Education.
2. Analysis and Design of Digital Integrated Circuits in Deep submicron Technology- David Hodges, 3rd edition.

Course Outcomes:

On successful completion of the course, students will be able to

1. Demonstrate a clear understanding of CMOS fabrication flow and impact of electrical properties of MOS circuits in semiconductor industry.
2. Know three sets of design rules with which NMOS and CMOS design may be fabricated.
3. Identify the interactions between process parameters, device structures, circuit performance for system design.
4. Design complex digital systems using VLSI design methodology through testing and verification.
5. Comprehend the types of FPGA's and their programming technologies, programmable logic block architectures and their interconnect.
6. Estimate the power dissipation in VLSI circuits through study of Switching capacitance, interconnect and clock.

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(Autonomous)
ELECTRONICS AND COMMUNICATION ENGINEERING

III Year - II Semester

L	T	P	C
4	1	0	3

OOPS THROUGH JAVA (16CS6E06)
(OPEN ELECTIVE)

Learning objectives:

1. To make the students understand the fundamentals of Java programming and how to use Java to write applications.
2. To train the learners to implement and use OOPs concepts in JAVA

Course Outcomes:

At the end of this course student will be able to-

1. Apply bottom up approach to handle data and code. (Apply)
2. Make use of data encapsulation and abstraction properties. (Apply)
3. Develop programs using the concepts of inheritance and packages. (Apply)
4. Handle exceptions and enhancing the degree of programming using threads. (Create)
5. Create java based applications using I/O and Applets. (Create)
6. Build event based applications for handling AWT components. (Create)

UNIT – I

Introduction to OOP

Introduction, Need of Object Oriented Programming, Principles of Object Oriented Languages, C++ vs Java, Applications of OOP, History of JAVA, Java Virtual Machine, Java Features, Program structures, Installation of JDK1.6 Variables , Primitive Data types, Identifiers- Naming Conventions, Keywords, Literals

UNIT - II

Programming Constructs

Operators- Binary, Unary and ternary, Expressions, Precedence rules and Associative, Primitive Type Conversion and Casting, Flow of control- Conditional, loops.,

Classes and Objects-

Classes, Objects, Creating Objects, Methods, constructors-Constructor overloading, cleaning up unused objects-Garbage collector, Class variable and Methods-Static keyword, this keyword, Arrays, Command line arguments.

UNIT - III

Inheritance:

Types of Inheritance, Deriving classes using extends keyword, Method overloading, super keyword, final keyword, Abstract class

Interfaces, Packages and Enumeration:

Interface-Extending interface, Interface vs. Abstract classes, Packages-Creating packages, using Packages, Access protection, java.lang package.

UNIT – IV

Exceptions & Assertions –

Introduction, Exception handling techniques-try...catch, throw, throws, finally block, user defined exception, Exception Encapsulation and Enrichment, Assertions

Multi-Threading:

java.lang.Thread, the main Thread, Creation of new threads, Thread priority, Multithreading-Using isAlive () and join(), Synchronization, suspending and Resuming threads, Communication between Threads

UNIT – V

Input/output: reading and writing data, java.io package

Applets- Applet class, Applet structure, An Example Applet Program, Applet Life Cycle, paint(),update() and repaint()

UNIT – VI

Event Handling

Introduction, Event Delegation Model, java.awt. event Description, Sources of Events, Event Listeners, Adapter classes, Inner classes

Abstract Window Toolkit

Why AWT?, java.awt package, Components and Containers, Button, Label, Checkbox, Radio buttons, List boxes, Choice boxes, Text field and Text area, container classes, Layouts, Menu, Scroll bar

TEXT BOOKS:

1. The Complete Reference Java, Herbert Schildt, TMH 9th edition, 2014
2. Programming in JAVA, Sachin Malhotra, Saurabh choudhary, Oxford university press india, 2nd edition, 2013.

REFERENCE BOOKS:

1. JAVA Programming, K.Raj kumar. Pearson, 1st edition, 2013
2. Object oriented programming with JAVA, Essentials and Applications, Raj KumarBuyya, Selvi, Chu TMH, 2009
3. Introduction to Java Programming, Y Daniel Liang, Pearson, 7th edition, 2009.
4. Core Java Volume 1.Fundamentals, Cay S.Horstmann, Gray Cornell, Pearson8th edition, 2007.
5. Advanced Programming in Java2: Updated to J2SE6 with Swing, Servlet and RMI, K.Somasundaram, jaico publishing house, 1st edition, 2008.

URLs:

1. https://www.tutorialspoint.com/java/java_object_classes.htm
2. http://beginnersbook.com/2015/07/java-swing-tutorial/
3. http://www.realapplets.com/tutorial/
4. https://www.youtube.com/watch?v=aUlwgdakBug
5. http://beginnersbook.com/2013/04/java-exception-handling/

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(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

III Year – II Semester **L T P C**
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DATA MINING (16CS6E07)
(OPEN ELECTIVE)

Learning Objectives:

1. Understand and implement classical models and algorithms in data mining.
2. Learn how to analyze the data, identify the problems, and choose the relevant models and algorithms to apply.

Course Outcomes:
At the end of this course student will be able to-

1. Analyze real time datasets with basic summary statistics (Analyze)
2. Apply different preprocessing methods, Similarity and Dissimilarity measures for any given raw data.(Apply)
3. Build decision tree and resolve the problem of model overfitting (Create)
4. Compare Apriori and FP Growth association rule mining algorithms (Evaluate)
5. Identify suitable clustering algorithm to interpret the results (Apply)
6. Analyze web data mining techniques (Analyze)

UNIT –I:

Data Mining: Introduction, What is Data Mining?, Motivating challenges, The origins of Data Mining, Data Mining Tasks, Types of Data, Data Quality.

UNIT –II:

Data Preprocessing: Aggregation, Sampling, Dimensionality Reduction, Feature Subset Selection, Feature creation, Discretization and Binarization, Variable Transformation, Measures of Similarity and Dissimilarity.

UNIT –III:

Classification: Basic Concepts, General Approach to solving a classification problem, Decision Tree Induction: Working of Decision Tree, building a decision tree, Algorithm for decision tree induction, Model overfitting, evaluating the performance of classifier.

UNIT –IV:

Association Analysis: Basic Concepts and Algorithms: Problem Definition, Frequent Item Set Generation, Rule Generation, Compact Representation of Frequent Itemsets, FP-Growth algorothm

UNIT –V:

Cluster Analysis: Basic Concepts and Algorithms: What is Cluster Analysis?, K-means, Strengths and Weaknesses, Agglomerative Hierarchical Clustering, Strengths and Weaknesses, The DBSCAN Algorithm, Strengths and Weaknesses.

UNIT –VI:

Web data mining: Introduction, Web terminology and characteristics, Web content mining, Web usage mining, web structure mining, Search Engines: Characteristics, Functionality, Architecture,

Ranking of WebPages.

Text Books :

1. Introduction to Data Mining : Pang-Ning Tan & Michael Steinbach, Vipin Kumar, Pearson, 2nd edition, 2013.
2. Introduction to Data Mining with Case Studies: GK Gupta; Prentice Hall, 2nd edition, 2011.

Reference Books :

1. Data Mining concepts and Techniques, Jiawei Han, Michel Kamber, Elsevier, 3rd edition, 2011.
2. Data Mining Techniques and Applications: An Introduction, Hongbo Du, Cengage Learning.2010
3. Data Mining : Introductory and Advanced topics : Dunham, Pearson.2008
4. Data Warehousing Data Mining & OLAP, Alex Berson, Stephen Smith, TMH. 2008
5. Data Mining Techniques, Arun K Pujari, Universities Press. 2005

URLs

1. https://onlinecourses.nptel.ac.in/noc18_cs14/preview
2. https://www-users.cs.umn.edu/~kumar001/dmbook/index.php
3. http://hanj.cs.illinois.edu/bk3/bk3_slidesindex.htm

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(Autonomous)
ELECTRONICS AND COMMUNICATION ENGINEERING

III Year – II Semester

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ROBOTICS(16ME6E01)
(OPEN ELECTIVE)

Course Objectives:
To make the students aware of:
1. Robot applications, classifications, controlling systems and automation
2. Robot components, their architecture, work envelope and types of drive systems.
3. Homogeneous transformations Manipulator Kinematics of robots.
4. Robotic arm motion by using mathematical approach.
5. Trajectory planning for a manipulator by avoiding obstacles and programming languages, software packages for path description to robots.
6. Functioning of sensors, actuators and robot applications in manufacturing.

UNIT – I
Introduction: Automation and Robotics, CAD/CAM and Robotics – An over view of Robotics – present and future applications – classification by coordinate system and control system.

UNIT – II
Components of the Industrial Robotics: Function line diagram representation of robot arms, common types of arms. Components, Architecture, number of degrees of freedom – Requirements and challenges of end effectors, determination of the end effectors, comparison of Electric, Hydraulic and Pneumatic types of locomotion devices.

UNIT – III
Motion Analysis: Homogeneous transformations as applicable to rotation and translation – problems.
Manipulator Kinematics: Specifications of matrices, D-H notation joint coordinates and world coordinates Forward and inverse kinematics – problems.

UNIT – IV
Differential transformations and manipulators Jacobians–problems.
Dynamics: Lagrange – Euler and Newton – Euler formulations – Problems.

UNIT V
General considerations in path description and generation Trajectory planning and avoidance of obstacles, path planning, Skew motion, joint integrated motion – straight line motion – Robot programming, languages and software packages-description of paths with a robot programming languages.

UNIT VI
Robot actuators and Feedback components:
Actuators: Pneumatic, Hydraulic actuators, electric & stepper motors.
Feedback components: position sensors – potentiometers, resolvers, encoders – Velocity sensors.
Robot Application in Manufacturing: Material Transfer - Material handling, loading and unloading Processing - spot and continuous arc welding & spray painting - Assembly and Inspection.

TEXT BOOKS:

1. Industrial Robotics / Groover M P /Pearson Edu.
2. Robotics and Control / Mittal R K & Nagrath I J / TMH.

REFERENCES:

1. Robotics / Fu K S/ McGraw Hill.
2. Robotic Engineering / Richard D. Klafter, Prentice Hall.
3. Robot Analysis and Intelligence / Asada and Slow time / Wiley Inter-Science.
4. Introduction to Robotics / John J Craig / Pearson Edu.

Course outcomes:

Students will be able to:

1. Classify the coordinate systems and control systems of robot.
2. Explain the architecture of a robot.
3. Analyze kinematics of a serial manipulator.
4. Analyze dynamics of serial manipulator.
5. Develop the trajectory planning algorithms using programming languages.
6. Illustrate the applications of robots in manufacturing, select the actuators and feedback components for a given robot application

Weblinks:

HTTP://WWW.nptel.ac.in/courses/112101099/#

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM

(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

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III Year - II Semester	**3**	**1**	**0**	**3**

POWER ELECTRONICS AND INDUSTRIAL APPLICATIONS (16EE6E03)

(OPEN ELECTIVE)

Preamble:

The usage of power electronics in day to day life has increased in recent years. It is important for student to understand the fundamental principles behind all these converters. This course covers characteristics of semiconductor devices, ac/dc, dc/dc, ac/ac and dc/ac converters. The importance of using pulse width modulated techniques to obtain high quality power supply (dc/ac converter) and its application provided in industries is also discussed in detail in this course.

Course Objectives:

This course enables the students to

1. Study the characteristics of various power semiconductor devices and to design firing circuits for SCR.
2. Understand the operation of single phase half wave and full–wave converters
3. Get Knowledge on the operation of different types of DC-DC converters.
4. Understand the operation of inverters and application of PWM techniques for voltage control.
5. Explore the operation of AC-AC converters.
6. Understand switch mode power supplies and their applications.

UNIT-I: Power Semi-Conductor Devices

Thyristors– Silicon controlled rectifiers (SCR's) – Static characteristics of SCR–Turn on and turn off methods–Dynamic characteristics of SCR. Snubber circuit design - Firing circuits for SCR. Characteristics of power MOSFET and power IGBT

UNIT-II: AC-DC Single-Phase Converters

Single phase half controlled rectifiers (continuous conduction mode) – R load and RL load with and without freewheeling diode – Single Phase fully controlled rectifiers (continuous conduction mode) with R load and RL load, with and without freewheeling diode.

UNIT-III: DC–DC Converters

Buck Converter operation – Time ratio control and current limit control strategies–Voltage and current waveforms– Derivation of output voltage –Boost converter operation –Voltage and current waveforms–Derivation of output voltage. Buck- Boost converter operation.

UNIT-IV: DC–AC Converters

Single phase half bridge and full bridge inverters with R and RL loads – Pulse Width Modulation (PWM) techniques– Quasi square wave and sinusoidal PWM techniques.

UNIT-V: AC – AC Single-Phase Converters

Single phase AC-AC regulator phase angle control and integrated cycle control with R and RL load – For continuous and discontinuous conduction – Principle of operation of Cyclo-Converters.

UNIT-VI : Switch Mode Power Supplies

Introduction to Linear Power Supplies- Overview of Switch Mode Power Supplies (SMPS) – DC to DC converters with electrical isolation – Control of Switch Mode DC Power Supplies –Time ratio control (TRC), Current limit control (CLC) – Power Supply Protection.
Static VAR Control, Power factor correction using Switch mode DC Power Supplies – Selection of drives and control schemes for steel rolling mills, paper mills, lifts, cranes etc.

Text Books:

1. Power Electronics – by P.S.Bhimbra, Khanna Publishers.
2. Power Electronics: Circuits, Devices and Applications – by M. H. Rashid, Prentice Hall of India, 2nd edition, 1998.
3. Power Electronics: Essentials & Applications by L. Umanand, Wiley, Pvt. Limited, India, 2009.

References:

1. Power Electronics: converters, applications & design -by Nedmohan, Tore M. Undeland, Robbins by Wiley India Pvt. Ltd.
2. Elements of Power Electronics–Philip T.Krein.oxford.
3. Power Electronics handbook by Muhammad H.Rashid, Elsevier.
4. Power Converter Circuits -by William Shepherd, Li zhang, CRC Taylor & Francis Group.
5. M.D.Singh, K.B.Khanchandani – Power Electronics. Tata Mcgraw –Hiill Publishing Company Limited.
6. Muhammad.H.Rashid – Power Electronics, Circuits, Devices & Applications Pearson Education.
7. Ashfeq Ahmed – Power Electronics For Technology , Pearson Education.

Course Outcomes:

At the end of the Course, the student should be able to:

CO#	Statement	Cognitive Level
CO1	Analyze the static and dynamic characteristics of SCR's and their family.	Analysis
CO2	Report the operation of single phase half wave and full–wave converters.	Comprehend
CO3	Differentiate the operation of different types of DC-DC converters.	Analysis
CO4	Discuss the Inverter application regarding voltage control with the PWM techniques.	Comprehend
CO5	Propose the operation of AC-AC converters.	Synthesis
CO6	Get view on switch mode power supplies operation and control.	Characterize

Weblinks:

http://nptel.ac.in/courses/108101038/
https://www.electrical4u.com/concept-of-power-electronics/

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(Autonomous)
ELECTRONICS AND COMMUNICATION ENGINEERING

III YEAR – II SEMESTER

L	T	P	C
3	1	0	3

BIO-MEDICAL INSTRUMENTATION (16EC6E02)
(OPEN ELECTIVE)

Course objectives:

The student will

1. Study the physiological relation of human body – environment.
2. Learn and Identify various errors that occur while measuring living system.
3. Study various types of Electrodes and Transducers used in biomedical measurements.
4. Learn Anatomy of Heart and Respiratory system.
5. Study various diagnostic and therapeutic techniques.
6. Study and prevent various Electric hazards of biomedical equipments.

UNIT-I

INTRODUCTION TO BIOMEDICAL INSTRUMENTATION: Age of Biomedical Engineering, Development of Biomedical Instrumentation, Man Instrumentation System, Components of the Man-Instrument System, Physiological System of the Body, Problems Encountered in Measuring a Living System, Sources of Bioelectric Potentials, Muscle, Bioelectric Potentials, Sources of Bioelectric Potentials, Resting and Action Potentials, Propagation of Action Potential, Bioelectric Potentials-ECG, EEG and EMG, Evoked Responses.

UNIT-II

ELECTRODES AND TRANSDUCERS: Introduction, Electrode Theory, Biopotential Electrodes, Examples of Electrodes, Basic Transducer principles, Biochemical Transducers, The Transducer and Transduction principles, Active Transducers, Passive Transducers, Transducers for Biomedical applications, Pulse Sensors, Respiration Sensor, Transducers with Digital Output.

UNIT-III

CARDIOVASCULAR SYSTEM AND MEASUREMENTS: The Heart and Cardiovascular System, Electro Cardiography, Blood Pressure Measurement, Measurement of Blood Flow and Cardiac Output, Measurement of Heart sound, Plethysmography, Angiogram and Angioplasty

MEASUREMENTS IN THE RESPIRATORY SYSTEM: The Physiology of the Respiratory System, Tests and Instrumentation for the Mechanics of Breathing, Respiratory Therapy Equipment.

UNIT-IV

PATIENT CARE AND MONITORING: Elements of Intensive-Care Monitoring, Patient Monitoring Displays, Diagnosis, Calibration and Repair ability of Patient-Monitoring equipment, Other Instrumentation for Monitoring Patients, Organization of the Hospital for Patient-Care Monitoring, Pacemakers, Defibrillators, Radio Frequency applications of Therapeutic use.

THERAPEUTIC AND PROSTHETIC DEVICES: Audiometers and Hearing Aids, Myoelectric Arm, Laparoscope, Ophthalmology Instruments, Anatomy of Vision, Electrophysiological Tests,

Ophthalmoscope, Tonometer for Eye Pressure Measurement, Diathermy, Clinical Laboratory Instruments, Biomaterials, Stimulators.

UNIT-V

DIAGNOSTIC TECHNIQUES AND BIO-TELEMETRY: Principles of Ultrasonic Measurement, Ultrasonic imaging, Ultrasonic Applications of Therapeutic uses, Ultrasonic diagnosis, X-Ray and Radio-Isotope instrumentations, CAT Scan, Emission Computerized Tomography, MRI, Telemedicine Technology.

INTRODUCTION TO TELEMEDICINE, CYBER MEDICINE, APPLICATIONS OF TELEMEDICINE: Introduction to Biotelemetry, Physiological Parameters Adaptable to Biotelemetry, the Components of Biotelemetry System, Implantable Units, Telemetry for ECG Measurements during Exercise, Telemetry for Emergency Patient Monitoring.

UNIT-VI

MONITORS, RECORDERS AND SHOCK HAZARDS: Biopotential Amplifiers, Monitors, Recorders, Shock Hazards and Prevention, Physiological Effects and Electrical Current, Shock Hazards from Electrical Equipment, Methods of Accident Prevention, Isolated Power Distribution System.

Text books

1. Bio-Medical Instrumentation – Leslie Cromwell, Fred J.Weibell, Erich A. Pfeiffer, 2nd edition, PHI, 2011.
2. Introduction to Bio-Medical Equipment Technology - Joseph J. Carr, John M. Brown, 4th edition, Pearson Publications.

References

1. Hand Book of Bio-Medical Instrumentation – R.S.Khandapur, McGrawHill, 2nd edition, 2003.
2. Biomedical Instrumentation – Dr. M. Arumugam, Anuradha Publications, 2006.

Course Outcomes:

On successful completion of the course, students will be able to

1. Acquainted with the function of human body and measure active and resting potentials of cell bodies.
2. Measure the Bioelectric potential using appropriate electrodes and Transducers.
3. Know the mechanism and measurement of ECG for the Cardiac cycle and respiratory system .
4. Monitor the Patient care monitoring system and applications of therapeutic equipment.
5. Know the working principles of diagnostic equipment.
6. Design safety standards in Hospitals by solving critical engineering problems to prevent electrical hazards.

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM

(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

III Year - II Semester

L	T	P	C
4	**0**	**0**	**3**

MICRO ELECTRO MECHANICAL SYSTEMS (16EE6E04)

(OPEN ELECTIVE)

Preamble:

This course presents the fundamentals of modeling and analysis of MEMS with a specialized focus on electro statically actuated systems. Topics include fundamentals of solid mechanics, electrostatics, and analytical and numerical methods for analyzing multiphysics systems. Students will develop a basic knowledge of MEMS that is of sufficient depth to begin reading the subject literature.

Course Objectives:

This course enables the students to

1. Learn basics of Micro Electro Mechanical Systems (MEMS).
2. Study about various thermal sensors and actuators used in MEMS.
3. Understand the principle and various devices of MEMS,
4. Introduce various magnetic sensors and actuators
5. Learn the principle and various devices of Fluidic systems.
6. Learn the principle and various devices of bio and chemical systems

UNIT-I: Introduction

Definition of MEMS, MEMS history and development, micro machining, lithography principles & methods, structural and sacrificial materials, thin film deposition, impurity doping, etching, surface micro machining, wafer bonding, LIGA.

Mechanical Sensors and Actuators: Principles of sensing and actuation: beam and cantilever, capacitive, piezo electric, strain, pressure, flow, pressure measurement by microphone, MEMS gyroscopes, shear mode piezo actuator, gripping piezo actuator, Inchworm technology.

UNIT-II: Thermal Sensors and Actuators:

Thermal energy basics and heat transfer processes, thermisters, thermo devices, thermo couple, micro machined thermo couple probe, peltier effect heat pumps, thermal flow sensors, micro hot plate gas sensors, MEMS thermo vessels, pyro electricity, shape memory alloys (SMA), U-shaped horizontal and vertical electro thermal actuator, thermally activated MEMS relay, micro spring thermal actuator, data storage cantilever.

UNIT-III: Micro-Opto-Electro Mechanical Systems:

Principle of MOEMS technology, properties of light, light modulators, beam splitter, micro lens, micro mirrors, digital micro mirror device (DMD), light detectors, grating light valve (GLV), optical switch, wave guide and tuning, shear stress measurement.

UNIT-IV: Magnetic Sensors and Actuators

Magnetic materials for MEMS and properties, magnetic sensing and detection, magneto resistive sensor, more on hall effect, magneto diodes, magneto transistor, MEMS magnetic sensor, pressure sensor utilizing MOKE, MAG-MEMS actuators, by directional micro actuator, feedback circuit integrated magnetic actuator, large force reluctance actuator, magnetic probe based storage device.

UNIT-V: Micro Fluidic Systems:

Applications, considerations on micro scale fluid, fluid actuation methods, Dielectrophoresis (DEP), electro wetting, electro thermal flow, thermo capillary effect, electro osmosis flow, Opto electro

wetting (OEW), tuning using micro fluidics, typical micro fluidic channel, microfluid dispenser, micro needle, molecular gate, micro pumps.
Radio Frequency (RF) MEMS: RF – based communication systems, RF MEMS, MEMS inductors, varactors, tuner/filter, resonator, clarification of tuner, filter, resonator, MEMS switches, phase shifter.

UNIT-VI : Chemical and Bio Medical Micro Systems:
Sensing mechanism & principle, membrane-transducer materials, chem.-lab-on-a-chip (CLOC) chemoresistors, chemocapacitors, chemotransistors, electronic nose (E-nose), mass sensitive chemosensors, fluroscence detection, calorimetric spectroscopy

Text Books:
1. MEMS, Nitaigour Premchand Mahalik, TMH Publishing co.
2. Foundation of MEMS, Chang Liu, Prentice Hall Ltd.

References:
1. MEMS and NEMS, Sergey Edwrd Lyshevski, CRC Press, Indian Edition.
2. MEMS and Micro Systems: Design and Manufacture, Tai-Ran Hsu, TMH Publishers.
3. Introductory MEMS, Thomas M Adams, Richard A Layton, Springer International Publishers.

Course Outcomes:
At the end of the Course, the student should be able to:

CO#	Statement	Cognitive Level
CO1	Analyze the basic concepts of MEMS and its applications.	Analysis
CO2	Discuss the thermal sensors and actuator types.	Comprehend
CO3	Acquire the knowledge on **micro-opto-electro mechanical systems.**	Knowledge
CO4	Examine the **magnetic sensors and actuators types.**	Application
CO5	Report the parameters of **micro fluidic systems and radio frequency MEMS.**	Comprehend
CO6	Discuss the **chemical and bio medical micro systems** parameters.	Comprehend

Weblinks:

1. https://www.mems-exchange.org/MEMS/what-is.html
2. http://www.lboro.ac.uk/microsites/mechman/research/ipm-tn/pdf/Technology_review/an-introduction-to-mems.pdf
3. https://www.slideshare.net/navinec1/micro-electromechanical-system-mems
4. https://en.wikipedia.org/wiki/Microelectromechanical_systems.

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM

(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

III YEAR – II SEMESTER

L	T	P	C
0	0	3	2

MICROPROCESSORS AND MICROCONTROLLERS LAB (16EC6L08)

LIST OF EXPERIMENTS

PART- A:

8086 Assembly Language Programming using Assembler Directives

1. Sorting.
2. Multibyte addition/subtraction
3. Sum of squares/cubes of a given n-numbers
4. Addition of n-BCD numbers
5. Factorial of given n-numbers
6. Multiplication and Division operations
7. Stack operations
8. BCD to Seven segment display codes

PART- B:

8086 interfacing

1. Hardware/Software Interrupt Application
2. A/D Interface through Intel 8255
3. D/A Interface through Intel 8255
4. Keyboard and Display Interface through Intel 8279
5. Generation of waveforms using Intel 8253/8254

PART- C:

8051assembly Language Programs

1. Finding number of 1's and number of 0's in a given 8-bit number
2. Addition of even numbers from a given array
3. Ascending / Descending order
4. Average of n-numbers

PART-D:

8051 Interfacing

1. Switches and LEDs
2. 7-Segment display (multiplexed)
3. Stepper Motor Interface
4. Traffic Light Controller

Equipment Required:

1. Regulated Power supplies
2. Analog/Digital Storage Oscilloscopes
3. 8086 Microprocessor kits
4. 8051 microcontroller kits
5. ADC module
6. DAC module
7. Stepper motor module
8. Keyboard module
9. LED, 7-Segemt Units
10. Digital Multimeters
11. ROM/RAM Interface module
12. Bread Board etc.

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM

(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

III YEAR – II SEMESTER

L	T	P	C
0	0	3	2

VLSI Laboratory (16EC6L09)

The students are required to design the schematic diagrams using CMOS logic and to draw the layout diagrams to perform the following experiments using CMOS 130nm Technology with necessary EDA tools(MentorGraphics/Tanner).

List of Experiments based on the course-VLSI Design (16EC6T21):

1. Design and implementation of an inverter.
2. Design and implementation of universal gates.
3. Design and implementation of full adder.
4. Design and implementation of full subtractor.
5. Design and Implementation of Decoder.
6. Design and implementation of RS-latch.
7. Design and implementation of D-latch.
8. Design and implementation asynchronous counter.
9. Design and Implementation of static RAM cell.
10. Design and Implementation of 8 bit DAC using R-2R latter network.
11. Design and Implementation of differential amplifier.
12. Design and Implementation of ring oscillator.

Equipment Required:

1. Mentor Graphics/Tanner software-latest version
2. Personal computer with necessary peripherals

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM

(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

IV Year I Semester Course Structure

Sub Code	Subjects	L	T	P	Credits
16CS7T15	Computer Networks	3	1		3
16EC7T22	Digital Image Processing	3	1		3
16EC7T23	Micro Wave Engineering	3	1		3
16EC7T24	Optical Communications	3	1		3
16EC7D01 16EC7D02 16EC7D03	**Elective I** 1. Digital TV Engineering 2. Radar Engineering 3. System Design through Verilog	3	1		3
16EC7D04 16EC7D05 16EC7D06	**Elective II** 1.Embedded Systems 2. Analog IC Design 3.Network security and Cryptography	3	1		3
16EC7L10	Micro Wave Engineering and Optical Lab			2	2
16EC7L11	Digital Signal Processing Lab			2	2
Total credits					**22**

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM

(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

IV YEAR – I SEMESTER

L	T	P	C
3	1	0	3

Computer Networks (16CS7T15)

Course objectives:

The Student will

1. Understand the basic taxonomy, terminology and architectures of the computer networks.
2. Analyze the services, protocols and features of the various layers of computer networks.
3. Understand the requirements for a given organizational structure and select the most appropriate networking architecture and technologies.

Course Outcomes:

At the end of this course student will be able to -

1. Conceptualize the data communication models using OSI/ISO and TCP/IP protocol architectures. (Evaluate)
2. Analyze protocols implemented in data link layer for error and flow control. (Analyze)
3. Analyze the features and operations of different MAC mechanisms. (Analyze)
4. Build the skills of subnetting and routing mechanisms. (Apply)
5. Choose network protocols by elucidate the way protocols currently in use in the Internet like IPv4, IPv6, ICMP, ARP, RARP, DHCP operate.(Apply)
6. Develop client/server based applications using TCP and UDP protocols.(Apply)

UNIT - I:

Overview of the Internet: Protocol, Layering Scenario, TCP/IP Protocol Suite: The OSI Model, Internet history standards and administration; Comparison of the OSI and TCP/IP reference model.

Physical Layer: Guided transmission media, wireless transmission media.

UNIT - II:

Data Link Layer - design issues, Error Detection and error correction codes, CRC codes, Elementary Data Link Layer Protocols, Flow control -sliding window protocols: stop-and-wait ARQ, Go-back-n ARQ, Selective Repeat ARQ, HDLC

UNIT - III:

Multi Access Protocols - ALOHA, CSMA – CSMA/CD, CSMA/CA, Collision free protocols, data link layer switching & use of bridges, learning bridges, spanning tree bridges, repeaters, hubs, bridges, switches, routers and gateways

UNIT - IV:

Network Layer: Network Layer Design issues, store and forward packet switching connection less and connection-oriented networks-routing algorithms-optimality principle, shortest path, flooding, Distance Vector Routing, Count- to -Infinity Problem, Hierarchical Routing.

UNIT - V:

Internetworking: Tunneling, Internetwork Routing, Packet fragmentation, IPv4, introduction to IPv6 Protocol, IP addresses, ICMP, ARP, RARP, DHCP.

UNIT - VI:

Transport Layer: Services provided to the upper layers elements of transport protocol-addressing connection establishment, connection release, Connection Release, Crash Recovery.

The internet transport protocols – UDP, TCP.

Application Layer- Introduction, providing services, Applications layer paradigms, Client server model, Standard client-server application-HTTP, FTP, electronic mail, TELNET, DNS, SSH

TEXT BOOKS:

1. Data Communications and Networking - Behrouz A.Forouzan, Fifth Edition TMH, 2013.
2. Computer Networks - Andrew S Tanenbaum, Pearson Education, 4th Edition 2003.

REFERENCE BOOKS:

1. An Engineering Approach to Computer Networks - S. Keshav, Pearson Education, 2nd Edition,1997.
2. Understanding communications and Networks, W. A. Shay, Cengage Learning, 3rd Edition,2004.

Web resources

1. http://nptel.ac.in/courses/106105081/1
2. http://epgp.inflibnet.ac.in/view_f.php?category=1736
3. http://media.pearsoncmg.com/ph/streaming/esm/tanenbaum5e_videonotes/tanenbaum_videoNotes.html

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM

(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

IV YEAR – I SEMESTER

L	T	P	C
3	1	0	3

DIGITAL IMAGE PROCESSING (16EC7T22)

Course objectives:

The Student will

1. Learn basic concepts of digital image processing and image transforms.
2. Familiarize with histogram processing, image enhancement, spatial filtering for image smoothing and sharpening.
3. Learn various image noise models and restoration techniques.
4. Understand various image compression methods using coding techniques.
5. Learn fundamentals in image segmentation and various morphological operations.
6. Understand color image fundamentals and color models.

UNIT-I

INTRODUCTION: Introduction to image processing, fundamental steps in digital image processing, components of an image processing system, image sensing and acquisition, image sampling and quantization, some basic relationships between pixels, an introduction to the mathematical tools used in digital image processing.

IMAGE TRANSFORMS: Need for image transforms, Discrete Fourier transform (DFT) of one variable and two variables, some properties of the 2-D Discrete Fourier transform, Importance of Walsh Transform. Hadamard transform, Haar transform, Slant transform, Discrete Cosine transform.

UNIT-II

INTENSITY TRANSFORMATIONS AND SPATIAL FILTERING: Background, some basic intensity transformation functions, histogram processing, fundamentals of spatial filtering, smoothing spatial filters , sharpening spatial filters, combining spatial enhancement methods.

FILTERING IN THE FREQUENCY DOMAIN: Preliminary concepts, the basics of filtering in the frequency domain, image smoothing using frequency domain filters, image sharpening using frequency domain filters, selective filtering.

UNIT-III

IMAGE RESTORATION: A model of the image degradation / restoration process, noise models, restoration in the presence of noise –only spatial filtering, periodic noise reduction by frequency domain filtering, linear, position –invariant degradations, estimating the degradation function, inverse filtering, minimum mean square error (Wiener) filtering, constrained least squares filtering, geometric mean filter.

UNIT-IV

IMAGE COMPRESSION: Fundamentals, Basic compression methods- Huffman coding, arithmetic coding, LZW coding, run-length coding, bit-plane coding, block transform coding, Predictive coding.

WAVELETS: Image pyramids, sub band coding, wavelet transforms in one dimensions and two dimensions, wavelet coding.

UNIT-V

IMAGE SEGMENTATION: Fundamentals, point, line, edge detection, thresholding, region based segmentation.

MORPHOLOGICAL IMAGE PROCESSING: Preliminaries, erosion and dilation, opening and closing, basic morphological algorithms for boundary extraction, thinning, gray-scale morphology, segmentation using morphological watersheds.

UNIT-VI

COLOR IMAGE PROCESSING: color fundamentals, color models, pseudo color image processing, basics of full color image processing, color transformations, smoothing and sharpening. Image segmentation based on color, noise in color images, color image compression.

Text books

1. Digital Image Processing --R. C. Gonzalez and R. E. Woods, 3rd edition, Prentice Hall of India, 2008.
2. Digital Image Processing --S.Sridhar,4th edition, Oxford higher education,2013.

Reference books

1. Fundamentals of Digital Image Processing-- Anil K.Jain, 9th Edition, Prentice Hall of India, Indian Reprint, 2002.
2. Digital Image Processing --Jayaraman, S. Esakkirajan, and T. Veerakumar, 8th Reprint, Tata McGraw-Hill Education, 2012.
3. Digital Image Processing and Analysis-- B.Chanda, D.Dutta Majumder, Prentice Hall of India, 2009.

Web links

http://nptel.ac.in/courses/106105032/

Course Outcomes:

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

1. Know the basic steps in image processing, relation between pixels in spatial and frequency domain for image processing operations.
2. Implement filtering operations for image enhancement, smoothing and sharpening.
3. Interpret filtering operations in image restoration.
4. Analyze image compression methods with coding techniques like Huffman, LZW etc.
5. Extend the concepts of morphological operations in image segmentation.
6. Categorize pseudo and full color image processing techniques.

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM

(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

IV YEAR – I SEMESTER

L	T	P	C
3	1	0	3

MICROWAVE ENGINEERING (16EC7T23)

Course objectives:

The student will study

1. Electromagnetic wave propagation in rectangular wave guide.
2. Different microwave junctions and components.
3. Scattering matrix of different 2-port, 3-port junctions.
4. Classifications of microwave tubes and working principles of klystron tubes.
5. Slow wave structures and M-type tubes.
6. Microwave solid state devices and measurement of microwave parameters.

UNIT-I

MICROWAVE TRANSMISSION LINES: Introduction, Microwave Spectrum and Bands, Applications of Microwaves. Rectangular Waveguides– TE/TM mode analysis, Expressions for Fields, Characteristic Equation and Cut-off Frequencies, Dominant and Degenerate Modes, Sketches of TE and TM mode fields in the cross-section, Mode Characteristics – Phase and Group Velocities, Wavelengths and Impedance Relations; Power Transmission and Power Losses in Rectangular Guide, Impossibility of TEM mode, Cavity Resonators– Introduction, Rectangular and Cylindrical Cavities Related Problems.

UNIT-II

WAVEGUIDE COMPONENTS AND APPLICATIONS: Coupling Mechanisms – Probe, Loop, Aperture types. Waveguide Discontinuities –Waveguide irises, Tuning Screws and Posts, Matched Loads. Waveguide Attenuators – Resistive Card, Rotary Vane types; Waveguide Phase Shifters– Dielectric, Rotary Vane types.

UNIT-III

SCATTERING MATRIX: Significance, Formulation and Properties. S-Matrix Calculations for – 2 port Junction, E-plane and H-plane Tees, Magic Tee, Hybrid Ring; Directional Couplers – 2Hole, Bethe Hole types, Ferrite Components– Faraday Rotation, S-Matrix Calculations for Isolator, Circulator, Related Problems.

UNIT-IV

MICROWAVE TUBES: Limitations and Losses of conventional tubes at microwave frequencies. Microwave tubes – O type and M type classifications. O-type tubes : 2 Cavity Klystrons – Structure, Reentrant Cavities, Velocity Modulation Process and Applegate Diagram, Bunching Process

REFLEX KLYSTRONS : Structure, Applegate Diagram and Principle of working, Oscillating Modes and output Characteristics, Electronic and Mechanical Tuning, Related Problems.

UNIT-V

HELIX TWTS: Significance, Types and Characteristics of Slow Wave Structures; Structure of TWT and Suppression of Oscillations, Nature of the four Propagation Constants.

M-TYPE TUBES: Introduction, Cross-field effects, Magnetrons – Different Types, 8-Cavity Cylindrical Travelling Wave. Magnetron – Hull Cut-off and Hartree Conditions, Modes of Resonance and PI-Mode Operation, Separation of PI-Mode, output characteristics.

UNIT-VI

MICROWAVE SOLID STATE DEVICES: Introduction, Classification, Applications.

TEDs – Introduction, Gunn Diode – Principle, RWH Theory, Characteristics, Basic Modes of Operation, Oscillation Modes. Avalanche Transit Time Devices – Introduction, IMPATT and TRAPATT Diodes – Principle of Operation and Characteristics, PIN diode and its applications.

MICROWAVE MEASUREMENTS: Description of Microwave Bench –Different Blocks and their Features, Precautions, Microwave Power Measurement – Calorimetric Method, Bolometer Method. Measurement of Attenuation, Frequency, VSWR, Cavity Q, Impedance Measurements.

Text books

1. Foundations for Microwave Engineering – R.E. Collin, IEEE Press, John Wiley, 2nd Edition, 2002.
2. Microwave Circuits and Passive Devices – M.L. Sisodia and G.S.Raghuvanshi, Wiley Eastern Ltd., New Age International Publishers Ltd., 1995.

References

1. Microwave Devices and Circuits - Samuel Y.Liao, PHI,2009.
2. Microwave and Radar Engineering-Dr.M. Kulkarni,2nd edition, umesh publications,2008.
3. Microwave Engineering by Annapurna Das and Sisir Das by Mc Graw Hill

Web Link

http://nptel.ac.in/courses/117105130/
https://onlinecourses.nptel.ac.in/noc16_ec09

Course Outcomes:

After completion of this course student will be able to:

1. Determine dominant modes and cut off frequencies of rectangular wave guides.
2. Analyze different microwave junctions and components.
3. Determine the S-matrix for microwave junctions like E-plane, H-plane and Magic Tee etc.
4. Compute power and efficiency of klystron tubes.
5. Apply the knowledge of cross field tubes in microwave applications.
6. Measure microwave parameters like phase, attenuation, impedance, frequency and VSWR.

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM

(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

IV YEAR – I SEMESTER

L	T	P	C
3	1	0	3

OPTICAL COMMUNICATIONS (16EC7T24)

Course objectives:

The student will study

1. The functionality of each of the components that comprise a fiber- optic communication system.
2. The properties of optical fiber that affect the performance of a communication link and types of fiber materials with their properties and the losses occur in fibers.
3. The principles of single and multi-mode optical fibers and their characteristics.
4. The working of optical sources and detectors.
5. The methods of source to fiber power launching.
6. The optical links for optical communication system.

UNIT- I

OVERVIEW OF OPTICAL FIBER COMMUNICATION AND FIBER MATERIALS : Historical development, The general system, advantages of optical fiber communications. Optical fiber wave guides- Introduction, Ray theory transmission, Total Internal Reflection, Acceptance angle, Numerical Aperture, Skew rays, Cylindrical fibers- Modes, V-number, Mode coupling, Step Index fibers, Graded Index fibers, Single mode fibers- Cut off wavelength, Mode Field Diameter, Effective Refractive Index, Related problems, Glass halide, chalcogenide fibers, plastic optic fibers, active glass fibers.

UNIT- II

LOSES AND DISPERSION: Signal distortion in optical fibers-Attenuation, Absorption, Scattering and Bending losses, Core and Cladding losses, Group delay, Types of Dispersion:- Material dispersion, Wave-guide dispersion, Polarization-Mode dispersion, Intermodal dispersion, Pulse broadening in Graded index fiber, CNR, Related problems.

UNIT- III

OPTICAL FIBER COMPONENTS: Connector types, Single mode fiber connectors, Connector return loss, Fiber Splicing- Splicing techniques, Splicing single mode fibers, Fiber alignment and joint loss- Multimode fiber joints, single mode fiber joints.

UNIT -IV

OPTICAL SOURCES: LEDs, Structures, Materials, Quantum efficiency, Power, Modulation, Power bandwidth product. Injection Laser Diodes- Modes, Threshold conditions, External quantum efficiency, Laser diode rate equations, Resonant frequencies, Reliability of LED and ILD.

OPTICAL DETECTORS- Physical principles of PIN and APD, Detector response time, Temperature effect on Avalanche gain, Comparison of Photo detectors, Related problems.

UNIT- V

SOURCE TO FIBER POWER LAUNCHING : Output patterns, Power coupling, Power launching, Equilibrium Numerical Aperture, Optical Amplifiers ,Optical network concepts, Topologies, Laser diode to fiber coupling, Optical receiver operation- Fundamental receiver operation, Digital signal transmission, error sources.

UNIT- VI

OPTICAL SYSTEM DESIGN : Point-to- point links- Component choice and considerations, Link power budget, Rise time budget with examples, Line coding in Optical links, WDM, Necessity, Principles, Measurement of Attenuation and Dispersion, Eye pattern, Analog links.

Text books

1. Optical Fiber Communications – Gerd Keiser, Mc Graw-Hill International edition, 3rd Edition, 2000.
2. Optical Fiber Communications – John M. Senior, PHI, 2nd Edition, 2002.

References

1. Fiber Optic Communications – D.K. Mynbaev , S.C. Gupta and Lowell L. Scheiner, Pearson Education,2005.
2. Text Book on Optical Fiber Communication and its Applications – S.C.Gupta, PHI, 2005.
3. Fiber Optic Communication Systems – Govind P. Agarwal , John Wiley, 3rd Ediition, 2004.

Web links

1. http://www.nptel.ac.in/syllabus/117101054/

Course Outcomes

After completion of this course the student will be able to:

1. Comprehend fiber optic communications and fiber materials.
2. Calculate Power loss based on dispersions and distortions.
3. Analyze the fiber optic connectors and splicers to minimize the losses.
4. Analyze the characteristics of various optical sources and detectors.
5. Design of optical networks with the help of optical topology.
6. Design optical links for analog and digital communication systems .

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM

(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

IV YEAR – I SEMESTER

L	T	P	C
3	1	0	3

DIGITAL TELEVISION ENGINEERING (16EC7D01)

(Elective- I)

Course objective:

The student will

1. Study transmission standards and performance parameters of Digital TV.
2. Study channel coding and modulation techniques of Digital TV .
3. Study Transmitter and RF systems of television engineering.
4. Study transmission line parameters.
5. Acquire knowledge in Transmitting antennas.
6. Study testing and measurement of a Digital TV Transmission.

UNIT- I

DIGITAL TELEVISION TRANSMISSION STANDARDS: ATSC terrestrial transmission standard, vestigial sideband modulation, DVB-T transmission standard, ISDB-T transmission standard, channel allocations, antenna height and power, MPEG-2.

PERFORMANCE OBJECTIVES FOR DIGITAL TELEVISION: System noise, external noise sources, transmission errors, error vector magnitude, eye pattern, interference, cochannel interference, adjacent channel interference, analog to digital TV, transmitter requirements.

UNIT-II

CHANNEL CODING AND MODULATION FOR DIGITAL TELEVISION: Data synchronization, randomization/scrambling, forward error correction, interleaving, inner code, frame sync insertion, quadrature modulation, 8 VSB, bandwidth, error rate, COFDM, flexibility, bandwidth.

UNIT- III

TRANSMITTERS FOR DIGITAL TELEVISION: Precorrection and equalization, up conversion, precise frequency control, RF amplifiers, solid-state transmitters, RF amplifier modules, power supplies, power combiners, Wilkinson combiner, ring combiner, starpoint combiner, cooling, automatic gain or level control, ac distribution, transmitter control, tube transmitters, tube or solid-state transmitters, performance quality, retrofit of analog transmitters for DTV.

RADIO-FREQUENCY SYSTEMS FOR DIGITAL TELEVISION: Constant-impedance filter, output filters, elliptic function filters, cavities, channel combiners.

UNIT-IV:

TRANSMISSION LINE FOR DIGITAL TELEVISION: Fundamental parameters, efficiency, effect of VSWR, system AERP, rigid coaxial transmission lines, dissipation, attenuation, and power handling, higher order modes, peak power rating, frequency response, standard lengths, corrugated coaxial cables, wind load, waveguide, bandwidth, waveguide attenuation, power rating, frequency response, size trade-offs, waveguide or coax pressurization.

UNIT-V

TRANSMITTING ANTENNAS FOR DIGITAL TELEVISION : Antenna patterns, elevation pattern, mechanical stability, null fill, azimuth pattern, slotted cylinder antennas, gain and directivity, power handling, antenna impedance, bandwidth and frequency response, multiple-channel operation, types of digital television broadcast antennas, antenna mounting.

UNIT-VI

TEST AND MEASUREMENT FOR DIGITAL TELEVISION: Power measurements, average power measurement, calorimetry, power meters, peak power measurement, measurement uncertainty, testing digital television transmitters.

Text books

1. Modern Television Practice – Principles, Technology and Service – R.R. Gulati, New Age International Publication, 2002.
2. Fundamentals of Digital television Transmission- Gerald w. Collins, Wilcy 2001

References

1. Colour Television Theory and Practice – S.P. Bali, TMH, 1994.
2. Television and Video Engineering - A.M. Dhake, 2nd Edition Mc Graw Hill, 1999.
3. Basic Television and Video Systems – B. Grob and C.E. Herndon, McGraw Hill, 1999.

Course Outcomes:

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

1. Compare Digital TV transmission standards and performance parameters for high Quality Transmission.
2. Apply channel coding and modulation techniques to increase the performance of Digital TV .
3. Analyze RF amplifiers, modules and systems for Digital TV.
4. Identify Transmission lines suitable for Digital TV.
5. Know types of antennas suitable for Digital TV for better transmission Quality.
6. Test a Digital TV Transmitter and receiver for better broadcasting .

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM

(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

IV YEAR – I SEMESTER

L	T	P	C
3	1	0	3

RADAR ENGINEERING (16EC7D02)
(Elective- I)

Course Objectives:

The student will study:

1. The Basic Principle of radar and radar range equation.
2. Different types of radars; CW, FM-CW.
3. MTI and pulse Doppler radars performance.
4. Different tracking techniques for radar.
5. The characteristics of a matched filter receiver and its performance.
6. Different types of displays, duplexers and antennas used in radar systems**.**

UNIT–I

BASICS OF RADAR : Introduction, Maximum Unambiguous Range, simple Radar range Equation, Radar Block Diagram and Operation, Radar Frequencies and Applications. Prediction of Range Performance, Minimum Detectable Signal, Receiver Noise, Illustrative Problems.

Radar Equation : Modified Radar Range Equation, SNR, probability of detection, probability of False Alarm, Integration of Radar Pulses, Radar Cross Section of Targets (simple targets - sphere, cone-sphere), Creeping Wave, Transmitter Power, PRF and Range Ambiguities, System Losses (qualitative treatment), Illustrative Problems.

UNIT–II

CW AND FREQUENCY MODULATED RADAR : Doppler Effect, CW Radar – Block Diagram, Isolation between Transmitter and Receiver, Non-zero IF Receiver, Receiver Bandwidth Requirements, Applications of CW radar. Illustrative Problems .

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

UNIT-III

MTI AND PULSE DOPPLER RADAR: Introduction, Principle, MTI Radar with - Power Amplifier Transmitter and Power Oscillator Transmitter, Delay Line Cancellers – Filter Characteristics, Blind Speeds, Double Cancellation, Nth Cancellation Staggered PRFs. Range Gated Doppler Filters. MTI Radar Parameters, Limitations to MTI Performance, MTI versus Pulse Doppler Radar.

UNIT –IV

TRACKING RADAR: Tracking with Radar, Sequential Lobing, Conical Scan, Mono pulse Tracking Radar – Amplitude Comparison Mono pulse (one- and two- coordinates), Phase Comparison Mono pulse, Tracking in Range, Acquisition and Scanning Patterns, Comparison of Trackers.

UNIT –V

DETECTION OF RADAR SIGNALS IN NOISE : Introduction, Matched Filter Receiver – Response Characteristics and Derivation, Correlation detection and Cross-correlation Receiver, Efficiency of Non-matched Filters, Matched Filter with Non-white Noise, Noise Figure and Noise Temperature.

UNIT –VI

RADAR RECEIVERS : Duplexers – Branch type and Balanced type, Circulators as Duplexers, Radar Displays.

PHASED ARRAY RADAR -Introduction to Basic Concepts, Radiation Pattern, Beam Steering and Beam Width changes, Series versus parallel feeds, Applications, Advantages and Limitations. Radomes.

Text books

1. Introduction to Radar Systems -M.I. Skolnik, , 2nd Edition, Mc Graw Hill Book,1981.
2. Understanding of RADAR Systems - Simon Kingsley and Shaun Quegan, , McGraw Hill Book , 1993.

References

1. Radar Engineering and Fundamentals of Navigational Aids -G S N Raju, IK International Publishers, 2008.
2. Microwave and Radar Engineering , G.Sasi Bhushana Rao, , Pearson education, 2013.

Course Outcomes:

On successful completion of the course, students will be able to

1. Familiarize the fundamentals of basic radar.
2. Apply Doppler Effect to detect moving targets.
3. Analyze the MTI radar performance.
4. Analyze the performance of radar tracking methods.
5. Apply the concepts of matched filter and ambiguity functions in detection of radar signals in noise.
6. Design radar receiver based on characteristics of duplexer and antennas.

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM

(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

IV YEAR – I SEMESTER

L	T	P	C
3	1	0	3

SYSTEM DESIGN THROUGH VERILOG (16EC7D03)

(Elective- I)

Course objectives:

Students undergoing this course are expected:

1. To understand the constructs and conventions of the Verilog HDL programming.
2. To understand the structural level of abstraction for modeling digital hardware systems.
3. To Learn functional Bifurcation, various construct models, design using behavioral level.
4. To Understand continuous assignment structures, delays in data flow level and bidirectional gates and time delays with switch primitives.
5. To Understand synthesis of combinational logic and sequential logic circuits.
6. To study advanced features of verilog HDL and apply them to design complex real time digital systems.

UNIT-I

INTRODUCTION TO VERILOG: Verilog as HDL, Levels of design description, concurrency, simulation and synthesis, functional verification, system tasks, programming language interface(PLI), module.

LANGUAGE CONSTRUCTS AND CONVENTIONS: Introduction, keywords, identifiers, whitespace characters, comments, numbers, strings, logic values, data types, scalars and vectors, parameters, memory, operators, system tasks.

UNIT-II

GATE LEVEL MODELLING: Introduction, AND gate primitive, module structure, other gate primitives, illustrative examples, tristate gates, array of instances of primitives, design of Flip flops with gate primitives, delays, strengths and contention resolution, net types, design of basic circuits.

UNIT-III

BEHAVIORAL MODELLING: Introduction, operations and assignments, functional Bifurcation, initial construct, always construct, examples, assignments with delays, wait construct, multiple always blocks, designs at behavioral level, blocking and non blocking assignments, the case statement, simulation flow, if and if else constructs, assign-Deassign construct, repeat construct, FOR loop, the disable construct, While loop, Forever loop, parallel blocks, force-release construct, event.

UNIT-IV

DATAFLOW LEVEL AND SWITCH LEVEL MODELLING: Introduction, continuous assignment structures, delays and continuous assignments, assignment to vectors, basic transistor switches, CMOS switch, Bidirectional gates and time delays with switch primitives, instantiations with strengths and delays, strength contention with trireg nets.

UNIT-V

SYNTHESIS OF COMBINATIONAL AND SEQUENTIAL LOGIC USING VERILOG: Synthesis of combinational logic: Net list of structured primitives, a set of continuous assignment statements and level sensitive cyclic behavior with examples, Synthesis of priority structures, Exploiting logic don't care conditions. Synthesis of sequential logic with latches: Accidental synthesis of latches and Intentional synthesis of latches, Synthesis of sequential logic with flip-flops, Synthesis of explicit state machines.

UNIT-VI

VERILOG MODELS: Static RAM Memory, A simplified 486 Bus Model, Interfacing Memory to a Microprocessor Bus, UART Design and Design of Microcontroller CPU.

Text books

1. Fundamentals of Logic Design with Verilog – Stephen. Brown and Zvonko Vranesic, TMH, 2005.
2. A Verilog Primier – J. Bhasker, BSP, 2003.

References

1. Advanced Digital Design with Verilog HDL – Michael D. Ciletti, PHI, 2005.
2. Design through Verilog HDL – T.R. Padmanabhan and B. Bala Tripura Sundari, WSE, IEEE Press, 2004.

Course Outcomes:

After undergoing the course students will be able to

1. Use VLSI design methodologies to understand and design complex digital systems.
2. Apply pre-defined Primitive gates to Create System Design .
3. create circuits that realize specified Logic functions using behavioral Modelling.
4. Identify logic and technology-specific parameters to control the functionality and timing.
5. Extract a Logic Circuit through Verilog HDL for Combinational and sequential Circuits .
6. Design a significant VLSI project having a set of objective criteria and design constraints.

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM

(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

IV YEAR – I SEMESTER

L	T	P	C
3	1	0	3

EMBEDDED SYSTEMS (16EC7D04)

(Elective- II)

Course objectives:

The student will

1. Study the basic concepts of an embedded system are introduced.
2. Know the various elements of embedded hardware and their design principles are explained.
3. Learn different steps involved in the design and development of firmware for embedded systems is elaborated.
4. Study the Internals of Real-Time operating system and the Fundamental issues in hardware software co-design were presented and explained.
5. Familiarize with the different IDEs for firmware development for different family of processors/controllers and embedded operating systems.
6. Discuss Embedded system implementation and testing tools.

UNIT-I

INTRODUCTION: Embedded system-Definition, history of embedded systems, classification of embedded systems, major application areas of embedded systems, purpose of embedded systems, the typical embedded system-core of the embedded system, Memory, Sensors and Actuators, Communication Interface, Embedded firmware, Characteristics of an embedded system, Quality attributes of embedded systems, Application-specific and Domain-Specific examples of an embedded system, Introduction to IOT Devices.

UNIT-II

EMBEDDED HARDWARE DESIGN: Analog and digital electronic components, I/O types and examples, Serial communication devices, Parallel device ports, Wireless devices, Timer and counting devices, Watchdog timer, Real time clock.

UNIT-III

EMBEDDED FIRMWARE DESIGN AND PROGRAMING CONCEPTS: Embedded Firmware design approaches, Embedded Firmware development languages, ISR concept, Interrupt sources, Interrupt servicing mechanism, Multiple interrupts, DMA, Device driver programming, Concepts of C versus Embedded C and Compiler versus Cross-compiler.

UNIT-IV

REAL TIME OPERATING SYSTEM: Operating system basics, Types of operating systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling, Threads, Processes and Scheduling, Task communication, Task synchronization, Device Drivers.

HARDWARE SOFTWARE CO-DESIGN: Fundamental Issues in Hardware Software Co-Design, Middle ware, Computational models in embedded design, Hardware software Trade-offs, Integration of Hardware and Firmware, ICE.

UNIT-V

EMBEDDED SYSTEM DEVELOPMENT: The integrated development environment, Types of files generated on cross-compilation, Deassembler/Decompiler, Simulators, Emulators and Debugging, Target hardware debugging, Boundary Scan, Embedded Software development process and tools.

UNIT-VI

EMBEDDED SYSTEM IMPLEMENTATION AND TESTING: The main software utility tool, CAD and the hardware, Translation tools-Pre-processors, Interpreters, Compilers and Linkers, Debugging tools, Quality assurance and testing of the design, Testing on host machine, Simulators, Laboratory Tools.

Text Books

1. Embedded Systems Architecture- By Tammy Noergard, Elsevier Publications, 2013.
2. Embedded Systems-By Shibu.K.V-Tata McGraw Hill Education Private Limited, 2013.

References

1. Embedded Systems-Lyla B.Das-Pearson Publications, 2013.
2. An Embedded Software Primer -David E.Simon, Pearson Education Asia, First Indian Reprint 2000.

Course Outcomes:

At the end of this course the student can able to:

1. Understand the basic concepts of an embedded system.
2. Know an embedded system design approach to perform a specific function.
3. Familiarize with embedded firmware design approaches to control the functions of various hardware devices on embedded environment.
4. Identify the unique characteristics of real-time operating systems and evaluate the need for real-time operating system.
5. Understand how to integrate hardware and firmware of an embedded system using real time operating system.
6. Test a Embedded system design using Testing tools for Quality of design.

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM

(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

IV YEAR – I SEMESTER

L	T	P	C
3	1	0	3

ANALOG IC DESIGN (16EC7D05)

(Elective- II)

Course objectives:

The student will:

1. Study the concepts of MOS Devices, Small-Signal and Large-Signal Modeling of MOS Transistor .
2. Learn the MOS elements and Analog Sub-Circuits.
3. Study the CMOS Amplifiers like Differential Amplifiers, Cascode Amplifiers, Output Amplifiers and Operational Amplifiers with design considerations.
4. Distinguish the Analog CMOS Circuits for Analog operations.
5. Construct Comparator circuits improving the Performance of Open-Loop Comparators.
6. Design comparators and PLL's.

UNIT -I

MOS DEVICES AND MODELING: The MOS Transistor, Passive Components- Capacitor and Resistor, Integrated circuit Layout, CMOS Device Modeling – Simple MOS Large-Signal Model, Other Model Parameters, Small-Signal Model for the MOS Transistor, Computer Simulation, Models, Sub-threshold MOS Model.

UNIT -II

ANALOG CMOS SUB-CIRCUITS: MOS Switch, MOS Diode, MOS Active Resistor, Current Sinks and Sources, Current Mirrors-Current mirror with Beta Helper, Degeneration, Cascode current Mirror and Wilson Current Mirror, Current and Voltage References, Band gap Reference.

UNIT -III

CMOS AMPLIFIERS: Inverters, Differential Amplifiers, Cascode Amplifiers, Current Amplifiers, Output Amplifiers, High Gain Amplifiers Architectures.

UNIT -IV

CMOS OPERATIONAL AMPLIFIERS: Design of CMOS Op -Amps, Compensation of Op-Amps, Design of Two-Stage Op-Amps, Power- Supply Rejection Ratio of Two-Stage Op- Amps, Cascade
Op- Amps, Measurement Techniques of OP-Amp.

UNIT -V

COMPARATORS: Characterization of Comparator, Two-Stage, Open-Loop Comparators, Other Open-Loop Comparators, Improving the Performance of Open-Loop Comparators, Discrete- Time Comparators.

UNIT -VI

OSCILLATORS AND PHASE-LOCKED LOOPS: General Considerations, Ring Oscillators, LC Oscillators, Voltage Controlled Oscillators. Simple PLL, Charge Pump PLLs, Non-Ideal Effects in PLLs, Delay Locked Loops, Applications.

Text Books

1. Design of Analog CMOS Integrated Circuits- Behzad Razavi, TMH .
2. CMOS Analog Circuit Design – Philip E. Allen and Douglas R. Holberg, Oxford University Press, International Second Edition/Indian Edition, 2010.

References

1. Analysis and Design of Analog Integrated Circuits- Paul R. Gray, Paul J. Hurst, S. Lewis and R. G. Meyer, Wiley India, 5^{TH} Edition, 2010.
2. Analog Integrated Circuit Design- David A.Johns, Ken Martin, Wiley Student Edition, 2013.

Course Outcomes:

After completion of this course the student will be able to

1. Apply the concepts of MOS Devices and Modelling involved in IC circuits.
2. Summarize the MOS sub circuits used in CMOS analog circuit design.
3. Analyze amplifiers using CMOS technology used in Analog electronics.
4. Design high-performance operational amplifier combining compensation circuits which are widely used in A/D and D/A Converters.
5. Analyze the Comparators in terms of performance to measure and digitize analog signals.
6. Design Oscillators and PLL'S which has extensive applications in communication systems.

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM

(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

IV YEAR – I SEMESTER

L	T	P	C
3	1	0	3

NETWORK SECURITY AND CRYPTOGRAPHY (16EC7D06)

(Elective- II)

Course Objective:

The student will

1. Understand symmetric block ciphers (DES, AES, other contemporary symmetric ciphers), Public-key cryptography (RSA, discrete logarithms).

Course Outcomes:

At the end of this course student will be able to-

1. Analyze the functional units of security model.(Analyze)
2. Evaluate security mechanisms with Symmetric Key cryptography. (Evaluate)
3. Evaluate security mechanisms with Asymmetric Key cryptography. (Evaluate)
4. Analyze Data Integrity, Digital Signature Schemes & Key Management. (Analyze)
5. Analyze network security models for ensuring security at Application layer and Transport layer. (Analyze)
6. Analyze network security model at Network layer (Analyze)

UNIT- I:

Classical Encryption Techniques

Security attacks, services & mechanisms, Network Security Model, Non-Cryptographic Protocol Vulnerabilities, Cryptography basics, Symmetric Cipher Model, Cryptanalysis and brute force attacks, Substitution and transposition techniques.

UNIT- II:

Block Ciphers & Symmetric Key Cryptography

Stream ciphers & Block ciphers, Feistel Cipher, DES, Triple DES, AES.

UNIT- III:

Number Theory & Asymmetric Key Cryptography

Number Theory: Prime and Relatively Prime Numbers, Modular Arithmetic, Fermat's and Euler's Theorems, The Chinese Remainder theorem, Discrete logarithms.

Public Key Cryptography: Principles, public key cryptosystems, RSA Algorithms, Diffie Hellman Key Exchange, Elgamal encryption & decryption, Elliptic Curve Cryptography.

UNIT- IV:

Cryptographic Hash Functions & Digital Signatures

Application of Cryptographic hash Functions, Requirements & Security, Secure Hash Algorithm(SHA-512), Message Authentication Functions, Requirements & Security, HMAC & CMAC. Digital Signatures, NIST Digital Signature Algorithm. Key management & distribution.

UNIT -V:

Network Security-I (Transport Layer Security & Email Security)

Transport Level Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Shell (SSH)
Electronic Mail Security: Pretty Good Privacy (PGP) and S/MIME.

UNIT -VI:

Network Security-II

IP Security: IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.
Intrusion detection: Overview, Approaches for IDS/IPS, Signature based IDS, Host based IDS/IPS.

TEXT BOOKS:

1. Cryptography & Network Security: Principles and Practices, William Stallings, PEA, Sixth edition.2006
2. Introduction to Computer Networks & Cyber Security, Chwan Hwa Wu, J.David Irwin, CRC press.2016

REFERENCE BOOKS:

1. Network Security and Cryptography, Bernard Meneges, Cengage Learning.2012
2. Everyday Cryptography, Keith M.Martin, Oxford,2nd edition,2017
3. Cryptography and Network Security, Behrouz A Forouzan, DebdeepMukhopadhyay, Mc Graw Hill,3rd edition,2008

URLs

1. http://nptel.ac.in/courses/106105031/
2. http://williamstallings.com/Extras/Security-Notes/

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM

(Autonomous)
ELECTRONICS AND COMMUNICATION ENGINEERING

IV YEAR – I SEMESTER

L	T	P	C
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MICROWAVE ENGINEERING AND OPTICAL LAB (16EC7L10)

List of Experiments to be conducted:

Part – A

1. To verify Reflex Klystron Characteristics and to determine the frequency and tuning range of reflex klystron.
2. To verify Gunn Diode Characteristics.
3. To determine crystal index of the detector diode.
4. To draw the calibration curve of the attenuator.
5. To determine the coupling factors and directivity of directional coupler.
6. To measure the power distribution of various wave guide Tee i.e. E plane, H plane.
7. To measure the power distribution of various wave guide Magic Tee
8. VSWR Measurement and load impedance calculations using smith chart.
9. Scattering parameters of Circulator.
10. To measure the radiation pattern of antennas.
11. Characterization of Microstrip components.

Part – B

12. Characterization of LED.
13. Characterization of Laser Diode.
14. Intensity modulation of Laser output through an optical fiber.
15. Measurement of Data rate for Digital Optical link.
16. Measurement of Numerical Aperture of fiber cable.
17. Measurement of losses for Analog Optical link.

Add on experiment: (As a mini project)

18. Design of micro strip antenna.

Equipment required for Laboratories:

1. Regulated Klystron Power Supply
2. VSWR Meter -
3. Micro Ammeter - 0 – 500 μA
4. Multi meter
5. CRO
6. GUNN Power Supply, Pin Modulator
7. Reflex Klystron
8. Crystal Diodes
9. Micro wave components (Attenuation)
10. Frequency Meter
11. Slotted line carriage

12. Probe detector
13. wave guide shorts
14. Pyramidal Horn Antennas
15. Directional Coupler
16. E, H, Magic Tees
17. Circulators, Isolator
18. Matched Loads
19. Fiber Optic Analog Trainer based LED
20. Fiber Optic Analog Trainer based laser
21. Fiber Optic Digital Trainer
22. Fiber cables - (Plastic, Glass)

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM

(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

IV YEAR – I SEMESTER

L	T	P	C
0	0	3	2

DIGITAL SIGNAL PROCESSING LABORATORY (16EC7L10)

LIST OF EXPERIMENTS:

1. To verify linear convolution, circular convolution.
2. To design FIR filter (LP/HP) using windowing technique
    a) Using rectangular window
    b) Using triangular window
3. To Implement IIR filter (LP/HP) on DSP Processors
4. N-point FFT algorithm.
5. MATLAB program to find frequency response of analog LP/HP filters.
6. Perform Basic operations on image (shrinking, zooming and cropping)
7. Implement smoothing and sharpening of image using low pass and high pass filter.
8. Perform image restoration using special filters.
9. Implement edge, line detection using operators.
10. Implement image compression bit plane coding.
11. Perform morphological operations on image.

ADD ON EXPERIMENTS:

1. To verify linear convolution using MATLAB
2. To verify circular convolution using MATLAB

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM

(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

IV Year II Semester Course Structure

Sub Code	Subjects	L	T	P	Credits
16EC8T25	Cellular and Mobile Communications	3	1		3
16EC8T26	Electronic Measurements and Instrumentation	3	1		3
16EC8T27	Satellite Communications	3	1		3
16EC8D07 16EC8D08 16IT8D19 16IT8D20	**Elective III** 1.Wireless sensors and Actuator Networks 2. Digital IC Design 3. Web Technologies 4. Python	3	1		3
16EC8S01	Seminar		3		2
16EC8P02	Project				10
Total credits					**24**

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM

(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

IV YEAR – II SEMESTER

L	T	P	C
3	1	0	3

CELLULAR AND MOBILE COMMUNICATION (16EC8T25)

Course Objective:

The student will Study

1. The cellular systems and its Operation.
2. Various types of interferences and frequency management techniques.
3. The antennas used cell sites.
4. The concept of signal reflectors and cell coverage.
5. The concept of handoff techniques and cell site.
6. The Architecture of GSM and OFDM.

UNIT-I

INTRODUCTION TO CELLULAR MOBILE SYSTEMS: A basic cellular system, performance criteria, uniqueness of mobile radio environment, operation of cellular systems, Hexagonal shaped cells, Consideration of the components of cellular systems, Analog and digital cellular systems, General Description of Cellular Radio System design problem and concept of frequency reuse channels.

UNIT-II

CHANNEL INTERFERENCE AND CHANNEL ASSIGNMENT: Introduction to Co-Channel Interference, Real-Time Co-channel Interference, Co-channel interference reduction factor, Desired C/I from a normal case in a Omni Directional Antenna System, Non Co-Channel Interference-different types.

FREQUENCY MANAGEMENT AND CHANNEL ASSIGNMENT: Frequency Management, Set-up channels and Paging Channels, Channel assignment to the cell sites and mobile units, Channel sharing and borrowing, Sectorization and Overlaid Cells, Non-fixed channel assignment.

UNIT-III

CELL SITE AND MOBILE ANTENNAS: Design of Antenna System, Antenna Parameters and their Effects, Equivalent Circuits of Antennas, Sum and difference patterns and their synthesis, For Coverage use – Omni directional Antennas, For interference reduction use – Directional antennas, Space diversity antennas and Umbrella pattern antennas, Unique Situations of Cell site antennas, Mobile Antennas.

UNIT-IV

CELL COVERAGE FOR SIGNAL AND TRAFFIC: Signal reflections in flat and hilly terrain, Effect of Human made Structures, Phase difference between direct and reflected paths, Constant standard deviation and straight line path loss slope, General formula for mobile radio propagation over water or Flat open area, Near and long distance propagation Antenna height gain, Form of a Point-to-point Model.

UNIT-V

HANDOFFS AND CELL SPLITTING: Types of Handoffs, Initiation of Handoff, Delayed Handoff and Forced Handoffs, Mobile Assigned Handoff, Inter-system Handoff, Cell splitting, micro cells, Vehicle locating methods, Dropped Call Rates and their evaluation.

UNIT-VI

DIGITAL CELLULAR NETWORKS: GSM-Introduction to GSM, GSM Architecture, GSM Channel Types and Frame Structure of GSM.

OFDM: Introduction to OFDM, Multicarrier Modulation and Cyclic Prefix, Channel model and SNR performance. Introduction to Network Technology such as 2G,3G,4G and VoLTE and their advantages.

Text Books

1. Mobile Cellular Telecommunications- William C. Y. Lee , 2nd Edition, Tata McGraw Hill. 2006.
2. Wireless Communication Principles and Practice -Theodore S Rappaport, 2nd Edition, Pearson Education. 2002.

References

1. Wireless and Cellular Communications – William C. Y. Lee , 3rd Edition, Tata McGraw Hill. 2005.
2. Mobile Cellular Communication – G Sasibhushana Rao, Pearson

Course outcomes:

On successful completion of the course, student will be able to

1. Know cellular system components and its performance.
2. Analyze the frequency management and channel assignments to reduce interference.
3. Identify suitable antennas for cell sites.
4. Analyze the problems in cell coverage's in terrains like flat, hill area and on water etc.
5. Apply the concept of handoff to reduce dropped call rates.
6. Understand the architectures of GSM and OFDM used in network technologies like 2G, 3G etc.

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM

(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

IV YEAR – II SEMESTER

L	T	P	C
3	1	0	3

ELECTRONIC MESUREMENTS AND INSTRUMENTATION (16EC8T26)

Course objectives:

The student will study

1. Different types of electronic measuring instruments' working principle, errors, specifications etc.
2. Various types of signal generators, wave analyzers and their working principle.
3. The working principles of different types of CRO's.
4. Working principles of various bridges and the measurement of inductance, capacitance and frequency.
5. Active and passive transducers.
6. Measuring physical parameters using transducers.

UNIT-I

PERFORMANCE CHARACTERISTICS OF INSTRUMENTS: Static characteristics, Accuracy, Resolution, Precision, Expected value, Error, Sensitivity. Errors in Measurement, Dynamic Characteristics-speed of response, Fidelity, Lag and Dynamic error. DC Voltmeters- Multi-range, Range extension/Solid state and differential voltmeters, AC voltmeters- AC Voltmeters Using Rectifiers, True RMS voltmeter multi range, range extension, Thermocouple type RF ammeter, Ohm meters series type, shunt type, Multimeter for Voltage, Current and resistance measurements.

UNIT-II

SIGNAL GENERATORS: Fixed and variable AF oscillators, AF sine and square wave signal generators, Function Generators, Pulse generator, Random noise generator, Sweep generator.

Wave Analyzers: Frequency selective wave analyzer, Harmonic Distortion Analyzers, Spectrum Analyzers, Digital Fourier Analyzers.

UNIT-III

OSCILLOSCOPES: CRT features, Vertical amplifiers, Horizontal deflection system, sweep, trigger pulse, delay line, sync selector circuits, simple CRO, triggered sweep CRO, Dual beam CRO, Dual trace oscilloscope, sampling oscilloscope, storage oscilloscope, digital readout oscilloscope, digital storage oscilloscope, Lissajous method of frequency measurement, standard specifications of CRO, probes for CRO- Active and Passive, attenuator type.

UNIT-IV

AC BRIDGES: Measurement of inductance- Maxwell's bridge, Anderson bridge. Measurement of capacitance -Schearing Bridge. Wheatstone bridge, Wien Bridge. Errors and precautions in using bridges, Q-meter.

UNIT-V

TRANSDUCERS: Active and passive transducers - Resistance, Capacitance, Inductance, Strain gauges, LVDT, Piezo Electric transducers, Resistance Thermometers, Thermocouples, Thermistors, Sensistors.

UNIT-VI

MEASUREMENT OF PHYSICAL PARAMETERS: Strain, Load, Force, Pressure, Velocity, humidity, moisture, speed, proximity and displacement, Data acquisition systems.

Text books

1. Electronic instrumentation - H.S.Kalsi, 2nd Edition, Tata McGraw Hill, 2004.
2. Modern Electronic Instrumentation and Measurement Techniques – A.D. Helfrick and W.D. Cooper, 5th Edition, PHI, 2002.

References

1. Electronic Instrumentation and Measurements - David A. Bell, 2nd Edition PHI, 2003.
2. Electronic Test Instruments, Analog and Digital Measurements - Robert A.Witte, 2nd Edition, Pearson Education., 2004.
3. Electrical Measurements and Measuring Instruments- R.K.Rajput, S.Chand publications, 2008

Web links

1. www.nptel.ac.in/courses/108105064

Course Outcomes:

On successful completion of the course, student will be able to

1. Identify the instrument for specific measurements and also understand, estimate errors in measurements.
2. Acquire the knowledge on signal generators and wave analyzers for communication applications.
3. Understand the operation of different oscilloscopes.
4. Estimate the values of R, L, C and frequency employing suitable bridges.
5. Know the basic principles of transducers for measurement of displacement, velocity, temperature and pressure.
6. Measure the physical parameters and to Identify data acquisition system for a specific application.

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM

(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

IV YEAR – II SEMESTER

L	T	P	C
3	1	0	3

SATELLITE COMMUNICATIONS (16EC8T27)

Course Objectives

The student will study

1. The basic concepts, applications, frequencies used in satellite communications.
2. The various satellite subsystems and its functionality.
3. The concepts of satellite link design and calculation of C/N ratio.
4. The concepts of multiple access and various types of multiple access techniques in satellite systems.
5. The transmitters, receivers, antennas, tracking systems of satellite.
6. The concepts of satellite navigation, architecture and applications of GPS.

UNIT-I

INTRODUCTION : Origin of Satellite Communications, Historical Back-ground, Basic Concepts of Satellite Communications, Frequency allocations for Satellite Services, Applications, Future Trends of Satellite Communications.

ORBITAL MECHANICS AND LAUNCHERS: Orbital Mechanics, Look Angle determination, Orbital perturbations, Orbit determination, launches and launch vehicles, Orbital effects in communication systems performance.

UNIT-II

SATELLITE SUBSYSTEMS: Attitude and orbit control system, telemetry, tracking, Command and monitoring, power systems, communication subsystems, Satellite antenna Equipment reliability and Space qualification.

UNIT-III

SATELLITE LINK DESIGN: Basic transmission theory, system noise temperature and G/T ratio, Design of down links, up link design, Design of satellite links for specified C/N, System design example.

UNIT-IV

MULTIPLE ACCESS: Frequency division multiple access (FDMA) Intermediation, Calculation of C/N, Time division Multiple Access (TDMA) , Frame structure, Examples. Satellite Switched TDMA Onboard processing, DAMA, Code Division Multiple access (CDMA), Spread spectrum transmission and reception, PN Sequence, Direct Sequence and Frequency Hopped Spread Spectrum System.

UNIT-V

EARTH STATION TECHNOLOGY : Introduction, Transmitters, Receivers, Antennas, Tracking systems, Terrestrial interface, Primary power test methods.

Low earth orbit and geo-stationary satellite systems: Orbit consideration, coverage and frequency considerations, Delay and Throughput considerations, System considerations, Operational NGSO constellation Designs.

UNIT-VI

SATELLITE NAVIGATION AND THE GLOBAL POSITIONING SYSTEM: Radio and Satellite Navigation, GPS Position Location principles, GPS Receivers and codes, Satellite signal acquisition, GPS Navigation Message, GPS signal levels, GPS receiver operation, GPS C/A code accuracy, Differential GPS.

Text books

1 Satellite Communications – Timothy Pratt, Charles Bostian and Jeremy Allnutt, WSE, Wiley Publications, 2nd Edition, 2003.

2 Satellite Communications Engineering – Wilbur L. Pritchard, Robert A Nelson and Henri G.Suyderhoud, 2nd Edition, Pearson Publications, 2003.

References

1.Fundamentals of Satellite Communications – K.N. Raja Rao, PHI, 2004

2. Satellite Communications : Design Principles – M. Richharia, BS Publications, 2nd Edition, 2003.

3. Satellite Communication - D.C Agarwal, Khanna Publications, 5th Edition.

Web links

www.nptelvideos.in/2012/12/ Satellite Communications.html

Course Outcomes:

On successful completion of the course, student will be able to

1. Understand the basic principles of satellite systems.
2. Analyze Satellite subsystems.
3. Design the link budget of a satellite for specified C/N ratios.
4. Configure the satellite multiple access techniques.
5. Know the concepts of satellite earth station technologies.
6. Analyze the satellite navigation and GPS.

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM

(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

IV YEAR – II SEMESTER

L	T	P	C
3	1	0	3

WIRELESS SENSORS AND ACTUATOR NETWORKS (16EC8D07)

(Elective III)

Course objectives

The student will study

1. Mobile Ad Hoc Networks, Implementation Issues and available Solutions.
2. Routing Mechanism approaches in network technology.
3. Clustering Mechanisms and different schemes.
4. 802.11 Wireless LAN (Wi-Fi) and Bluetooth Standards.
5. Sensor Networks and Their Characteristics.
6. The security in Ad Hoc wireless networks and applications of WSN.

UNIT-I

OVERVIEW OF WIRELESS SENSOR NETWORKS: Definitions of sensor networks, Advantages of sensor Networks, Unique constraints an challenges, Driving Applications, Enabling Technologies for Wireless Sensor Networks.

ARCHITECTURES: Single-Node Architecture - Hardware Components, Energy Consumption of Sensor nodes, operating systems and Execution Environments Network Architecture -Sensor Network Scenarios, Optimization goals and Figures of Merit, Gateway Concepts.

UNIT-II

NETWORKING TECHNOLOGIES- Physical Layer and Transceiver Design Considerations, Personal area networks (PANs), hidden node and exposed node problem, Topologies of PANs, MANETs, WANETs.

UNIT-III

MAC PROTOCOLS FOR WIRELESS SENSOR NETWORKS: Issues in Designing a MAC protocol for Ad Hoc Wireless Networks, Design goals of a MAC protocol for Ad-hoc network Wireless Networks, Classifications of MAC Protocols, Contention – Based protocols, Contention-Based protocols with reservation Mechanisms, Contention – Based MAC Protocols with Scheduling Mechanisms, MAC protocol that use Directional Antennas, Other MAC Protocols.

UNIT-IV

ROUTING PROTOCOLS: Introduction, Issues in Designing a Routing Protocol for Ad Hoc Wireless networks, Classification of routing Protocols, Table –Driven Routing Protocols, On – Demand Routing protocols, Hybrid Routing protocols, Routing Protocols with Efficient Flooding Mechanisms, Hierarchical Routing protocols, Power-Aware Routing protocols, Proactive Routing.

UNIT-V

TRANSPORT LAYER AND SECURITY PROTOCOLS: Introduction, Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks, Design goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer solutions, TCP over Ad Hoc Wireless Networks, Other Transport Layer Protocol for Ad Hoc Wireless Networks.

UNIT-VI

SECURITY IN WSNs: Security in Ad Hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Key Management, Secure Routing in Ad Hoc Wireless Networks.

SENSOR NETWORK PLATFORMS AND TOOLS: Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node-level software platforms, Node-level Simulators, State-centric programming.

APPLICATIONS of WSN: S Ultra wide band radio communication Wireless fidelity systems Future directions, Home automation, smart metering Applications

Textbooks

1. Protocols And Architectures for Wireless Sensor networks -Holger Karl and Andreas Willig, John Wiley,2005.
2. Ad Hoc Wireless Networks: Architectures and Protocols - C. Siva Ram Murthy and B.S.Manoj, PHI, 2004.
3. Wireless Ad- hoc and Sensor Networks: Protocols, Performance and Control – Jagannathan Sarangapani,CRC Press.

References

1. Wireless Sensor Networks- Technology, Protocols, and, Applications - Kazem Sohraby, Daniel Minoli, and Taieb Znati, , John Wiley,2007.
2. Wireless Sensor Networks- An Information processing Approach-Feng Zhao and Leonidas J. Guibas, , Elsevier,2007.
3. Ad- Hoc Mobile Wireless Networks: Protocols and Systems- C.K. Toh ,1st edition, Pearson education.

Course Outcomes:

After completion of this course the student will be able to

1. Understand the principles and characteristics of wireless sensor networks.
2. Distinguish among networks like PANs, MANETs, WANETs.
3. Analyze the network architecture, MAC protocol and clustering algorithm.
4. Illustrate routing protocols and their implications on data transmission delay, bandwidth consumption.
5. Comprehend the design issues in transport layer protocol.
6. Design wireless sensor network for different applications.

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(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

IV YEAR – II SEMESTER

L	T	P	C
3	1	0	3

DIGITAL IC DESIGN (16EC8D08)

(Elective III)

Course objectives

The student will

1. Study the static and dynamic characteristics of inverter using NMOS and CMOS.
2. Study Logic gates and design Combinational logic circuits (i.e) AOI, OAI etc.
3. Implement Sequential logic Circuits like latches and flip-flops using CMOS transmission gates.
4. Study dynamic logic circuits.
5. Study about interconnect parameters of MOS circuits.
6. Study concept of Semiconductor Memories, Flash Memory and RAM array organization.

UNIT-I

MOS DESIGN: Pseudo NMOS Logic – Inverter, Inverter threshold voltage, Output high voltage, Output Low voltage, Gain at gate threshold voltage, Transient response, Rise time, Fall time, Pseudo NMOS logic gates, Transistor equivalency, CMOS Inverter logic.

UNIT-II

COMBINATIONAL MOS LOGIC CIRCUITS: MOS logic circuits with NMOS loads, Primitive CMOS logic gates – NOR and NAND gate, Complex Logic circuits design – Realizing Boolean expressions using NMOS gates and CMOS gates, AOI and OIA gates, CMOS full adder, CMOS transmission gates, Designing with Transmission gates.

UNIT-III

SEQUENTIAL MOS LOGIC CIRCUITS: Behavior of bistable elements, SR Latch, Clocked latch and flip flop circuits, CMOS D latch and edge triggered flip-flop.

UNIT-IV

DYNAMIC LOGIC CIRCUITS: Basic principle, Voltage Bootstrapping, Synchronous dynamic pass transistor circuits, Dynamic CMOS transmission gate logic, High performance Dynamic CMOS circuits.

UNIT-V

INTERCONNECT: Capacitive Parasitics, Resistive Parasitics, Inductive Parasitics, Advanced Interconnect Techniques.

UNIT-VI

SEMICONDUCTOR MEMORIES: Memory Types, RAM array organization, DRAM – Types, Operation, Leakage currents in DRAM cell and refresh operation, SRAM operation Leakage currents in SRAM cells, Flash Memory NOR flash and NAND flash.

Text Books

1. Digital Integrated Circuits – A Design Perspective- Jan M. Rabaey, Anantha Chandrakasan, Borivoje Nikolic, PHI ,2nd Edition.
2. Digital Integrated Circuit Design – Ken Martin, Oxford University Press, 2011.

References

1. CMOS Digital Integrated Circuits Analysis and Design – Sung-Mo Kang, Yusuf Leblebici, TMH, 3rd Edition, 2011.
2. CMOS VLSI Design – Neil H.E Weste, David harris, Ayan Banerjee, Pearson, 3rd Edition.

Web links

1. http://www.nptelvideos.in/2012/12/digital-vlsi-system-design.html

Course Outcomes:

After completion of this course the student will be able to

1. Acquire the design principles of inverter using NMOS and CMOS.
2. Design Combinational logic Circuits using CMOS transmission gates.
3. Design Sequential logic Circuits like latches and flip-flops using CMOS transmission gates.
4. Design Dynamic CMOS logic Circuits.
5. Know the basic parameters of Interconnect system for design aspects.
6. Acquire the knowledge of Semiconductor Memories and organization RAM array.

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM

(Autonomous)

ELECTRONICS AND COMMUNICATION ENGINEERING

IV YEAR – II SEMESTER

L	T	P	C
3	1	0	3

WEB TECHNOLOGIES (16IT8D19)

(Elective III)

COURSE OBJECTIVES:

1. This course is designed to introduce students with no programming experience to the programming languages and techniques associated with the World Wide Web.
2. The course will introduce web-based media-rich programming tools for creating interactive web pages.

COURSE OUTCOMES:

The Student will

1. Analyze a web page and identify its elements and attributes.
2. Develop client side manipulations in web pages using Java Script.
3. Write simple scripts using AJAX and compare DOM & SAX XML Parsers.
4. Build web applications using PHP.
5. Implement programming through PERL.
6. Create applications by using Ruby.

UNIT-I: HTML, CSS

Basic Syntax, Standard HTML Document Structure, Basic Text Markup, Images, Hypertext Links, Lists, Tables, Forms, HTML5

CSS: Levels of Style Sheets, Style Specification Formats, Selector Forms, the Box Model

UNIT-II:

JavaScript

The Basic of Javascript: Objects, Primitives Operations and Expressions, Screen Output and Keyboard Input, Control Statements, Object Creation and Modification, Arrays, Functions, Constructors, Pattern Matching using Regular Expressions.

UNIT-III:

XML: Document type Definition, XML schemas, Document object model, XSLT, DOM and SAX Approaches,

AJAX A New Approach: Introduction to AJAX, Integrating PHP and AJAX.

WebSerivces: SOAP, WSDL

UNIT-IV:

PHP Programming: Introducing PHP: Creating PHP script, Running PHP script.

Working with variables and constants: Using variables, Using constants, Data types, Operators. Controlling program flow: Conditional statements, Control statements, Arrays, functions. Working with forms and Databases such as MySQL.

UNIT-V:

Introduction to PERL, Operators and if statements, Program design and control structures, Arrays, Hashes and File handling, Regular expressions, Subroutines, Retrieving documents from the web with Perl.

UNIT-VI:

Introduction to Ruby, Variables, types, simple I/O, Control, Arrays, Hashes, Methods, Classes, Iterators, Pattern Matching. Overview of Rails.

TEXT BOOKS:

1. Programming the World Wide Web, Robet W Sebesta, 7ed, Pearson.
2. Web Technologies, Uttam K Roy, Oxford
3. The Web Warrior Guide to Web Programming, Bai, Ekedahl, Farrelll, Gosselin, Zak, Karparhi, Maclntyre, Morrissey, Cengage

REFERENCE BOOKS:

1. Ruby on Rails Up and Running, Lightning fast Web development, Bruce Tate, Curt Hibbs, Oreilly (2006)
2. Programming Perl, 4ed, Tom Christiansen, Jonathan Orwant, Oreilly (2012)
3. Web Technologies, HTML< JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech.
4. 4. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage Learning

WEB LINKS:

1. https://www.w3schools.com/html/html_lists.asp
2. https://www.w3schools.com/xml/
3. www.tutorialspoint.com/ajax/
4. http://www.upriss.org.uk/perl/PerlCourse.html

PRAGATI ENGINEERING COLLEGE:: SURAMPALEM

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ELECTRONICS AND COMMUNICATION ENGINEERING

IV YEAR – II SEMESTER

L	T	P	C
3	1	0	3

PYTHON(16IT8D20)

(Elective III)

COURSE OBJECTIVES:

- To make the students understand the fundamentals of python programming.
- To expose the students to object oriented concepts.
- To make the students to develop applications using python.
- To make students to use python for automation.

COURSE OUTCOMES:

The Student will

1. Understand various data types, operators in Python.
2. Write programs using loop and branch statements to manipulate data in files.
3. Perform string manipulations.
4. Perform list and dictionaries operations in python.
5. Understand the concept of modular programming using functions.
6. Realize the ease of developing complex programs with smaller sized programs.

UNIT I:

Introduction to Python, Installing Python: Basic syntax, interactive shell, editing, saving, and running a script. The concept of data types variables, assignments immutable variables numerical types; arithmetic operators and expressions comments in the program understanding error messages.

UNIT II:

Conditions, Boolean logic, logical operators; ranges: Control statements: If-else, loops (for, while) short-circuit (lazy) evaluation, Strings and text files manipulating files and directories, os and sys modules; text files: reading/writing text and numbers from/to a file creating and reading a formatted file (csv or tab-separated).

UNIT III:

String manipulations: Subscript operator, indexing, slicing a string; strings and number system: converting strings to numbers and vice versa. Binary, octal, hexadecimal numbers, Lists, tuples, and dictionaries.

UNIT IV:

Basic list operators, replacing, inserting, removing an element; searching and sorting lists; dictionary literals, adding and removing keys, accessing and replacing values; traversing dictionaries.

UNIT V:

Design with functions: Hiding redundancy, complexity; arguments and return values; formal vs. Actual arguments, named arguments, Program structure and design, Recursive functions.

UNIT VI:

Classes and OOP: Classes, objects, attributes and methods; defining classes; design with classes, data modeling; persistent storage of objects, inheritance, polymorphism, operator overloading (eq_, _str_, etc) abstract classes; exception handling, try block, Multithreading, Automation using Python.

TEXT BOOK:

1. Think Python, How to Think Like a Computer Scientist, Version 2.0.17, Allen Downey, Green Tea Press.

REFERENCE BOOKS:

1. Python Essential Reference, David M. Beazley , Pearson Education, Inc.
2. Fluent Python, Luciano Ramalho by O'Reilly Media
3. Python Cookbook, David Beazley and Brian K. Jones, O'Reilly Atlas.3e
4. Fundamentals of Python: First Programs, Kenneth Lambert, Course Technology, Cengage Learning, 2012. ISBN-13: 978-1-111-82270-5.

WEB LINKS:

1. Think Python: How to Think Like a Computer Scientist by Allen B. Downey
2. http://www.greenteapress.com/thinkpython/thinkpython.html
3. Dive into Python by Mark Pilgrim-
   http://www.diveintopython.nethttp://staff.washington.edu/jon/python-course/
   https://wiki.python.org/moin/PythonBooks