JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

I Semester

S. No.	Course Type/Code	Course Name	Teaching Scheme			Credits
			L	T	P	
1	Core 1	Digital System Design	3	0	0	3
2	Core 2	Digital Data Communications	3	0	0	3
3	Prog. Specific Elective	**Elective I** a. Transform Techniques b.VLSI Technology and Design c. Radar Signal Processing	3	0	0	3
4	Prog. Specific Elective	**Elective II** a. Statistical Signal Processing b. Optical Communication Technology c. Network Security & Cryptography	3	0	0	3
5	Lab 1	System Design Using Verilog HDL Laboratory	0	0	4	2
6	Lab2	Data Communications Laboratory	0	0	4	2
7		Research Methodology and IPR	2	0	0	2
8	Aud 1	Audit Course 1	2	0	0	0
		Total Credits	**16**	**0**	**8**	**18**

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DIGITAL SYSTEM DESIGN
(ELECTIVE – I)

OBJECTIVES:

The main objectives of this course are given below:

1. The basic concepts of K-map, tabular method, QM method are revised and higher order minimization techniques like CAMP algorithm and Cubical operations are explained.
2. PLA folding using COMPACT algorithms studied for various cases.
3. ASM charts are revised and design techniques of digital circuit realization are explained.
4. Digital system design is approached using CPLD, FPGA and ASIC.
5. Fault Diagnosis in Combinational Circuits are performed using various techniques like fault detection test, path sensitization method and Boolean difference method, Kohavi algorithm.
6. Fault Diagnosis in sequential circuits is performed using Circuit test approach, Hamming Experiments, synchronizing experiments, distinguishing and adaptive distinguishing experiments on different cases.

UNIT-I: Minimization Procedures and CAMP Algorithm:

Review on minimization of switching functions using tabular methods, k-map, QM algorithm, CAMP-I algorithm, Phase-I: Determination of Adjacencies, DA, CSC, SSMs and EPCs,, CAMP-I algorithm, Phase-II: Passport checking,Determination of SPC, CAMP-II algorithm: Determination of solution cube, Cube based operations, determination of selected cubes are wholly within the given switching function or not, Introduction to cube based algorithms.

UNIT-II:PLA Design, Minimization and Folding Algorithms:

Introduction to PLDs, basic configurations and advantages of PLDs, PLA-Introduction, Block diagram of PLA, size of PLA, PLA design aspects, PLA minimization algorithm(IISc algorithm), PLA folding algorithm(COMPACT algorithm)-Illustration of algorithms with suitable examples.

UNIT -III: Design of Large Scale Digital Systems:

Algorithmic state machinecharts-Introduction, Derivation of SM Charts, Realization of SM Chart, control implementation, control unit design, data processor design, ROM design, PAL design aspects, digital system design approaches using CPLDs, FPGAs and ASICs.

UNIT-IV: Fault Diagnosis in Combinational Circuits:

Faults classes and models, fault diagnosis and testing, fault detection test, test generation, testing process, obtaining a minimal complete test set, circuit under test methods- Path sensitization method, Boolean difference method, properties of Boolean differences, Kohavi algorithm, faults in PLAs, DFT schemes, built in self-test.

UNIT-V: Fault Diagnosis in Sequential Circuits:

Fault detection and location in sequential circuits, circuit test approach, initial state identification, Haming experiments, synchronizing experiments, machine identification, distinguishing experiment, adaptive distinguishing experiments.

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TEXT BOOKS:

1. Logic Design Theory-N. N. Biswas, PHI
2. Switching and Finite Automata Theory-Z. Kohavi , 2nd Edition, 2001, TMH
3. Digital system Design using PLDd-Lala

REFERENCE BOOKS:

1. Fundamentals of Logic Design – Charles H. Roth, 5th Ed., Cengage Learning.
2. Digital Systems Testing and Testable Design – MironAbramovici, Melvin A. Breuer and Arthur D. Friedman- John Wiley & Sons Inc.

OUTCOMES:

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

1. Understand the basic concepts of a Karnaugh Map ("K-map") for a 2-, 3-, 4-, or 5-variable logic function and to identify the prime implicates, essential prime implicates, and nonessential prime implicates of a function depicted on a K-map.
2. Perform the minimization of a Boolean function using tabular method, QM algorithm and CAMP algorithm and determine the Adjacencies, DA, CSC, SSMs, EPCs and SPCs.
3. Perform the minimization of PLA using IISc algorithm and folding using COMPACT algorithm.
4. Can design a digital circuit by steps involving ASM chart.
6. Understand the digital system design approaches using CPLDs, FPGAs and ASICs.
7. Rectify a single fault and multiple faults in combinational circuits using Path sensitization method, Boolean difference method and Kohavi algorithm.
8. Perform fault diagnosis in sequential circuits.

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DIGITAL DATA COMMUNICATIONS

Course objectives

The main objectives of this subject are:

1. Different modulation techniques to improve the bandwidth and their properties.
2. Networking and different protocol systems.
3. Error estimation and correction, asynchronous and synchronous protocols.
4. Multiplexing techniques, different networking connections and interfacing devices.
5. Multiple access techniques and analysis.

UNIT -I:

Digital Modulation Schemes:

BPSK, QPSK, 8PSK, 16PSK, 8QAM, 16QAM, DPSK – Methods, Band Width Efficiency, Carrier Recovery, Clock Recovery.

UNIT -II:

Basic Concepts of Data Communications, Interfaces and Modems:

Data Communication Networks, Protocols and Standards, UART, USB, Line Configuration, Topology, Transmission Modes, Digital Data Transmission, DTE-DCE interface, Categories of Networks – TCP/IP Protocol suite and Comparison with OSI model.

UNIT -III:

Error Correction: Types of Errors, Vertical Redundancy Check (VRC), LRC, CRC, Checksum, Error Correction using Hamming code

Data Link Control: Line Discipline, Flow Control, Error Control

Data Link Protocols: Asynchronous Protocols, Synchronous Protocols, Character Oriented Protocols, Bit-Oriented Protocol, Link Access Procedures.

UNIT -IV:

Multiplexing: Frequency Division Multiplexing (FDM), Time Division Multiplexing (TDM), Multiplexing Application, DSL.

Local Area Networks: Ethernet, Other Ether Networks, Token Bus, Token Ring, FDDI.

Metropolitan Area Networks: IEEE 802.6, SMDS

Switching: Circuit Switching, Packet Switching, Message Switching.

Networking and Interfacing Devices: Repeaters, Bridges, Routers, Gateway, Other Devices.

UNIT -V:

Multiple Access Techniques: Frequency- Division Multiple Access (FDMA), Time - Division Multiple Access (TDMA), Code - Division Multiple Access (CDMA), OFDM and OFDMA. Random Access, Aloha- Carrier Sense Multiple Access (CSMA)- Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA), Controlled Access- Reservation- Polling- Token Passing, Channelization.

TEXT BOOKS:

1. Data Communication and Computer Networking - B. A.Forouzan, 2nd Ed., 2003, TMH.
2. Advanced Electronic Communication Systems - W. Tomasi, 5th Ed., 2008, PEI.

REFERENCE BOOKS:

1. Data Communications and Computer Networks - Prakash C. Gupta, 2006, PHI.
2. Data and Computer Communications - William Stallings, 8th Ed., 2007, PHI.
3. Data Communication and Tele Processing Systems -T. Housely, 2nd Ed, 2008, BSP.
4. Data Communications and Computer Networks- Brijendra Singh, 2nd Ed., 2005, PHI.

Course outcomes:

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

1. Model digital communication system using appropriate mathematical techniques (error probability, constellation diagrams, pharos diagrams).
2. Understanding the basic concepts of how digital data is transferred across computer networks.
3. Independently understand basic computer network technology.
4. Understand and explain Data Communications System and its components.
5. Identify the different types of network topologies and protocols.
6. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
7. Identify the different types of network devices and their functions within a network
8. Understand and building the skills of sub netting and routing mechanisms.
9. Familiarity with the basic protocols of computer networks, and how they can be used
10. To assist in network design and implementation.

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TRANSFORM TECHNIQUES
(ELECTIVE – I)

UNIT -I:
Fourier Analysis:

Fourier series, Examples, Fourier Transform, Properties of Fourier Transform, Examples of Fourier transform, sampling theorem, Partial sum and Gibbs phenomenon, Fourier analysis of Discrete time Signals, Discrete Fourier Transform.
Time – Frequency Analysis: Window function, Short Time Fourier Transform, Discrete Short Time Fourier Transform, Continuous wavelet transform, Discrete wavelet transform, wavelet series, Interpretations of the Time-Frequency plot.

UNIT -II:
Transforms:
Walsh, Hadamard, Haar and Slant Transforms, DCT, DST, KLT, Singular value Decomposition – definition, properties and applications

UNIT -III:
Continuous Wavelet Transform (CWT):
Short comings of STFT, Need for wavelets, Wavelet Basis- Concept of Scale and its relation with frequency, Continuous time wavelet Transform Equation- Series Expansion using Wavelets- CWT- Tiling of time scale plane for CWT. Important Wavelets: Haar, Mexican Hat, Meyer, Shannon, Daubechies.

UNIT -IV:
Multi Rate Analysis and DWT:
Need for Scaling function – Multi Resolution Analysis, Two-Channel Filter Banks, Perfect Reconstruction Condition, Relationship between Filter Banks and Wavelet Basis, DWT, Structure of DWT Filter Banks, Daubechies Wavelet Function, Applications of DWT.

UNIT -V:
Wavelet Packets and Lifting: Wavelet Packet Transform, Wavelet packet algorithms, Thresholding- Hard thresholding, Soft thresholding, Multidimensional Wavelets, Bi-orthogonal basis- B-Splines, Lifting Scheme of Wavelet Generation, Multi Wavelets

TEXT BOOKS:

1. A Wavelet Tour of Signal Processing theory and applications -RaghuveerM.Rao and Ajit S. Bopardikar, Pearson Edu, Asia, New Delhi, 2003.
2. K.P.Soman and K.I Ramachandran, " Insight into Wavelets – from theory to practice" PHI, Second edition,2008

REFERENCE BOOKS:

1. Fundamentals of Wavelets- Theory, Algorithms and Applications -Jaideva C Goswami, Andrew K Chan, John Wiley & Sons, Inc, Singapore, 1999.
2. JaidevaC.Goswami and Andrew K.Chan, " Fundamentals of Wavelets" Wiley publishers, 2006
3. A Wavelet Tour of Signal Processing-Stephen G. Mallat, Academic Press, 2 Ed
4. Digital Image Processing – S.Jayaraman, S.Esakkirajan, T.Veera Kumar – TMH,2009

Course Outcomes: On completion of this course student will be able to:

1. The student will learn basics of two-dimensional transforms.
2. Understand the definition, properties and applications of various two-dimensional transform.
3. Understand the basic concepts of wavelet transform.
4. Understand the special topics such as wavelet packets, Bi-orthogonal wavelets e.t.c.

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VLSI TECHNOLOGY AND DESIGN
(ELECTIVE – I)

UNIT-I:

VLSI Technology: Fundamentals and applications, IC production process, semiconductor processes, design rules and process parameters, layout techniques and process parameters.

VLSI Design: Electronic design automation concept, ASIC and FPGA design flows, SOC designs, design technologies: combinational design techniques, sequential design techniques, state machine logic design techniques and design issues.

UNIT-II:

CMOS VLSI Design: MOSTechnology and fabrication process of pMOS, nMOS, CMOS and BiCMOS technologies**,** comparison of different processes.

Building Blocks of a VLSI circuit: Computer architecture, memory architectures, communication interfaces, mixed signal interfaces.

VLSI Design Issues: Design process, design for testability, technology options, power calculations, package selection, clock mechanisms, mixed signal design.

UNIT-III:

Basic electrical properties of MOS and BiCMOS circuits, MOS and BiCMOS circuit design processes, Basic circuit concepts, scaling of MOS circuits-qualitatitive and quantitative analysis with proper illustrations and necessary derivations of expressions.

UNIT-IV:

Subsystem Design and Layout: Some architectural issues, switch logic, gate logic, examples of structured design (combinational logic), some clocked sequential circuits, other system considerations.

Subsystem Design Processes: Some general considerations and an illustration of design processes, design of an ALU subsystem.

UNIT-V:

Floor Planning: Introduction**,** Floor planning methods, off-chip connections.

Architecture Design: Introduction, Register-Transfer design, high-level synthesis, architectures for low power, architecture testing.

Chip Design: Introduction and design methodologies.

TEXT BOOKS:

1. Essentials of VLSI Circuits and Systems, K. Eshraghian, Douglas A. Pucknell, SholehEshraghian, 2005, PHI Publications.
2. Modern VLSI Design-Wayne Wolf, 3rd Ed., 1997, Pearson Education.
3. VLSI Design-Dr.K.V.K.K.Prasad, KattulaShyamala, Kogent Learning Solutions Inc., 2012.

REFERENCE BOOKS:

1. VLSI Design Technologies for Analog and Digital Circuits, Randall L.Geiger, Phillip E.Allen, Noel R.Strader, TMH Publications, 2010.
2. Introduction to VLSI Systems: A Logic, Circuit and System Perspective- Ming-BO Lin, CRC Press, 2011.
3. Principals of CMOS VLSI Design-N.H.E Weste, K. Eshraghian, 2nd Edition, Addison Wesley.

Course Outcomes

1. Review of FET fundamentals for VLSI design.
2. To acquires knowledge about stick diagrams and layouts.
3. Enable to design the subsystems based on VLSI concepts.

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RADAR SIGNAL PROCESSING
(ELECTIVE -I)

Core Objectives:
The main objectives of this subject are:

1. Derivation of Radar range and Design of matched filter for different noises.
2. Signal detection techniques at receiver.
3. Optimum Radar Waveforms for Detection of signals in Clutter and various Families.
4. The characteristics of a Linear pulse and digital compression to Radar signals.
5. The principles of different phase coding techniques and analysis.

UNIT -I:

Introduction:

Radar Block Diagram, Bistatic Radar, Monostatic Radar, Radar Equation, Information Available from Radar Echo. Review of Radar Range Performance– General Radar Range Equation, Radar Detection with Noise Jamming, Beacon and Repeater Equations, MTI and Pulse Doppler Radar.

Matched Filter Receiver – Impulse Response, Frequency Response Characteristic and its Derivation, Matched Filter and Correlation Function, Correlation Detection and Cross-Correlation Receiver, Efficiency of Non-Matched Filters, Matched Filter for Non-White Noise.

UNIT -II:

Detection of Radar Signals in Noise:

Detection Criteria – Neyman-Pearson Observer, Likelihood-Ratio Receiver, Inverse Probability Receiver, Sequential Observer, Detectors–Envelope Detector, Logarithmic Detector, I/Q Detector. Automatic Detection-CFAR Receiver, Cell Averaging CFAR Receiver, CFAR Loss, CFAR Uses in Radar. Radar Signal Management–Schematics, Component Parts, Resources and Constraints.

UNIT -III:

Waveform Selection [3, 2]:

Radar Ambiguity Function and Ambiguity Diagram – Principles and Properties; Specific Cases – Ideal Case, Single Pulse of Sine Wave, Periodic Pulse Train, Single Linear FM Pulse, Noise Like Waveforms, Waveform Design Requirements, Optimum Waveforms for Detection in Clutter, Family of Radar Waveforms.

UNIT -IV:

Pulse Compression in Radar Signals:

Introduction, Significance, Types, Linear FM Pulse Compression – Block Diagram, Characteristics, Reduction of Time Side lobes, Stretch Techniques, Generation and Decoding of FM Waveforms – Block Schematic and Characteristics of Passive System, Digital Compression, SAW Pulse Compression.

UNIT V:

Phase Coding Techniques:

Principles, Binary Phase Coding, Barker Codes, Maximal Length Sequences (MLS/LRS/PN), Block Diagram of a Phase Coded CW Radar.

Poly Phase Codes : Frank Codes, Costas Codes, Non-Linear FM Pulse Compression, Doppler Tolerant PC Waveforms – Short Pulse, Linear Period Modulation (LPM/HFM), Sidelobe Reduction for Phase Coded PC Signals.

TEXT BOOKS:

1. Radar Handbook - M.I. Skolnik, 2nd Ed., 1991, McGraw Hill.
2. Radar Design Principles : Signal Processing and The Environment - Fred E. Nathanson, 2nd Ed., 1999, PHI.
3. Introduction to Radar Systems - M.I. Skolnik, 3rd Ed., 2001, TMH.

REFERENCE BOOKS:

1. Radar Principles - Peyton Z. Peebles, Jr., 2004, John Wiley.
2. Radar Signal Processing and Adaptive Systems - R. Nitzberg, 1999, Artech House.

Core Outcomes:

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

1. Understand the operation of Radar and characteristics of Matched filter for non-white noise.
2. Understand the various detection criterion and types of detectors that can be used to detect the Radar signals in noise.
4. Understand the waveform design requirements and optimum waveforms for the detection of signals in clutter.
5. Know the significance and types of pulse compression techniques for analog and digital signals.
6. Understand the requirements of phase coding in Radar and various poly phase codes used for phase coding.

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STATISTICAL SIGNAL PROCESSING
(ELECTIVE - II)

UNIT I

Signal models and characterization: Types and properties of statistical models for signals and how they relate to signal processing,Common second-order methods of characterizing signals including autocorrelation,partial correlation, cross-correlation, power spectral density and cross-power spectral density.

UNIT II
Spectral estimation: Nonparametric methods for estimation of power spectral density, autocorreleation, cross-correlation,transfer functions, and coherence form finite signal samples.

UNIT III
Review of signal processing: A review on random processes, Areview on filtering random processes, Examples.

Statistical parameter estimation: Maximum likehood estimation, maximum a posterior stimation, Cramer-Rao bound.

UNIT IV
Eigen structure based frequency estimation: Pisarenko, MUSIC, ESPRIT their application sensor array direction finding.

Spectrum estimation: Moving average (MA), Auto Regressive (AR), Auto Regressive Moving Average (ARMA), Various non-parametric approaches.

UNIT V
Wiener filtering: The finite impulse case, causal and non-causal infinite impulse responses cases, Least mean squares adaptation, recursive least squares adaptation, Kalman filtering.

TEXT BOOKS:

1. Steven M.Kay, fundamentals of statistical signal processing: estimation Theory,Pretice-Hall,1993.

2. Monsoon H. Hayes, Stastical digital signal processing and modeling, USA, Wiley,1996.

REFERENCE BOOKS:

1. DimitrisG.Manolakis, Vinay K. Ingle, and Stephen M. Kogon, Statistical and adaptive signal processing, Artech House, Inc,2005, ISBN 1580536107

Course Outcomes:

1. Analyse signals and develop their statistical models for efficient processing
2. Formulate filtering problems from real life applications and design filtering solutions to estimate a desired signal from a given mixture by minimizing a cost function
3. Design and analyse efficient algorithms for estimation of various parameters of signals with different constraints
4. Develop efficient methods for spectrum and frequency estimation suiting the requirements derived from practical problems

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OPTICAL COMMUNICATION TECHNOLOGY
(ELECTIVE -II)

Course Objectives

1. To expose the students to the basics of signal propagation through optical fibers , fiber impairments
2. students should be familiar with commonly used components and subsystems in optical communication and network systems
3. To know the Optical Modulation and demodulation and Error Detection and Correction codes.
4. Learn about optical amplifier Transmission system model, power penalty-transmitter, power penalty-transmitter, receiver Scope – receiver optical amplifiers, crosstalk, dispersion,
5. Learn about necessity of wavelength division multiplexing (WDM), working principle and techniques of multiplexing,and Overall System Design considerations and optical networks

UNIT –I:

Signal propagation in Optical Fibers:

Geometrical Optics approach and Wave Theory approach, Loss and Bandwidth, Chromatic Dispersion, Non Linear effects- Stimulated Brillouin and Stimulated Raman Scattering, Propagation in a Non-Linear Medium, Self-Phase Modulation and Cross Phase Modulation, Four Wave Mixing, Principle of Solitons.

UNIT –II:

Fiber Optic Components for Communication & Networking:

Couplers, Isolators and Circulators, Multiplexers, Bragg Gratings, Fabry-Perot Filters, Mach Zender Interferometers, Arrayed Waveguide Grating, Tunable Filters, High Channel Count Multiplexer Architectures, Optical Amplifiers, Direct and External Modulation Transmitters, Pump Sources for Amplifiers, Optical Switches and Wavelength Converters.

UNIT –III:

Modulation and Demodulation:

Signal formats for Modulation, Subcarrier Modulation and Multiplexing, Optical Modulations – Duobinary, Single Side Band and Multilevel Schemes, Ideal and Practical receivers for Demodulation, Bit Error Rates, Timing Recovery and Equalization, Reed-Solomon Codes for Error Detection and Correction.

UNIT -IV:

Transmission System Engineering:

System Model, Power Penalty in Transmitter and Receiver, Optical Amplifiers, Crosstalk and Reduction of Crosstalk, Cascaded Filters, Dispersion Limitations and Compensation Techniques.

UNIT –V:

Fiber Non-linearities and System Design Considerations:

Limitation in High Speed and WDM Systems due to Non-linearities in Fibers, Wavelength Stabilization against Temperature Variations, Overall System Design considerations – Fiber Dispersion, Modulation, Non-Linear Effects, Wavelengths, All Optical Networks.

TEXT BOOKS:

1. Optical Networks: A Practical Perspective - Rajiv Ramaswami and Kumar N. Sivarajan, 2nd Ed., 2004, Elsevier Morgan Kaufmann Publishers (An Imprint of Elsevier).
2. Optical Fiber Communications – Gerd Keiser, 3rd Ed., 2000, McGraw Hill.

REFERENCE BOOKS:

1. Optical Fiber Communications: Principles and Practice – John.M.Senior, 2nd Ed., 2000, PE.
2. Fiber Optics Communication – Harold Kolimbris, 2nd Ed., 2004, PEI
3. Optical Networks: Third Generation Transport Systems – Uyless Black, 2nd Ed., 2009, PEI
4. Optical Fiber Communications – GovindAgarwal, 2nd Ed., 2004, TMH.
5. Optical Fiber Communications and Its Applications – S.C.Gupta, 2004, PHI.

Course outcomes

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

1. Able to analyze characteristics of optical fiber and signal propagation through optical fibers
2. Know the commonly used components and subsystems in optical communication and network systems ,Working principle of optical communication components ,amplifiers, filters
3. Able to analyze Transmission system model
4. Understand the importance of wavelength division multiplexing (WDM) and de-multiplexing,

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NETWORK SECURITY AND CRYPTOGRAPHY
(ELECTIVE -II)

UNIT -I:

Introduction:

Attacks, Services and Mechanisms, Security attacks, Security services, A Model for Internetwork security.Classical Techniques:Conventional Encryption model, Steganography, Classical Encryption Techniques.

Modern Techniques:

Simplified DES, Block Cipher Principles, Data Encryption standard, Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles and Modes of operations.

UNIT -II:

Encryption Algorithms:

Triple DES, International Data Encryption algorithm, Blowfish, RC5, CAST-128, RC2, Characteristics of Advanced Symmetric block cifers.**Conventional Encryption:** Placement of Encryption function, Traffic confidentiality, Key distribution, Random Number Generation.

UNIT -III:

Public Key Cryptography: Principles, RSA Algorithm, Key Management, Diffie-Hellman Keyexchange, Elliptic Curve Cryptograpy.**Number Theory:**Prime and Relatively prime numbers, Modular arithmetic, Fermat‟s and Euler‟s theorems, Testing for primality, Euclid‟s Algorithm, the Chinese remainder theorem, Discrete logarithms.

UNIT -IV:

Message Authentication and Hash Functions: Authentication requirements and functions, Message Authentication, Hash functions, Security of Hash functions and MACs.**Hash and Mac Algorithms**
MD File, Message digest Algorithm, Secure Hash Algorithm, RIPEMD-160, HMAC.Digital signatures and Authentication protocols: Digital signatures, Authentication Protocols, Digital signature standards.
Authentication Applications : Kerberos, X.509 directory Authentication service.Electronic Mail Security: Pretty Good Privacy, S/MIME.

UNIT –V:

IP Security:

Overview, Architecture, Authentication, Encapsulating Security Payload, Combining security Associations, Key Management. Web Security: Web Security requirements, Secure sockets layer and Transport layer security, Secure Electronic Transaction.

Intruders, Viruses and Worms

Intruders, Viruses and Related threats.

Fire Walls: Fire wall Design Principles, Trusted systems.

TEXT BOOKS:

1. Cryptography and Network Security: Principles and Practice - William Stallings, Pearson Education.
2. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education.

REFERENCE BOOKS:

1. Fundamentals of Network Security by Eric Maiwald (Dreamtech press)
2. Network Security - Private Communication in a Public World by Charlie Kaufman, Radia Perlman and Mike Speciner, Pearson/PHI.
3. Principles of Information Security, Whitman, Thomson.
4. Network Security: The complete reference, Robert Bragg, Mark Rhodes, TMH
5. Introduction to Cryptography, Buchmann, Springer.

Course Outcomes:

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

1. Identify and utilize different forms of cryptographytechniques.
2. Incorporate authentication and security in the networkapplications.
3. Distinguish among different types of threats to the system and handle thesame.

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SYSTEM DESIGN USING VERILOG HDL LABORATORY

List of Experiments:

1) Verilog implementation of 8:1 Mux/Demux, Full Adder, 8-bit Magnitude comparator, Encoder/decoder, Priority encoder, D-FF, 4-bit Shift registers (SISO, SIPO, PISO, bidirectional), 3-bit Synchronous Counters, Binary to Gray converter, Parity generator.
2) Sequence generator/detectors, Synchronous FSM – Mealy and Moore machines.
3) Vending machines - Traffic Light controller, ATM, elevator control.
4) PCI Bus & arbiter and downloading on FPGA.
5) UART/ USART implementation in Verilog.
6) Realization of single port SRAM in Verilog.
7) Verilog implementation of Arithmetic circuits like serial adder/ subtractor, parallel adder/subtractor, serial/parallel multiplier.
8) Discrete Fourier transform/Fast Fourier Transform algorithm in Verilog.

Course Outcomes:

At the end of the laboratory work, students will be able to:

1. Identify, formulate, solve and implement problems in signal processing, communication systems etc using RTL design tools.
2. Use EDA tools like Cadence, Mentor Graphics and Xilinx.

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DATA COMMUNICATIONS LAB

List of Experiments:

1. Study of serial interface RS – 232
2. Study of pc to pc communication using parallel port
3. To establish pc-pc communication using LAN
4. Study of LAN using star topology, bus topology and tree topology
5. Study and configure modem of a computer
6. To configure a hub/switch
7. To study the interconnections of cables for data communication
8. Study of a wireless communication system
9. Set up of time division multiplexing using fiber optics
10. Digital Fiber Optical Transmitter and Receiver

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RESEARCH METHODOLOGY AND IPR

Unit 1: Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem.
Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations
Unit 2: Effective literature studies approaches,
analysis Plagiarism , Research ethics,
Unit 3: Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee
Unit 4: Nature of Intellectual Property: Patents, Designs, Trademarks and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

Unit 5: Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.

Unit 6: New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

References:

1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students‟"
2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"
3. Ranjit Kumar, 2nd Edition , "Research Methodology: A Step by Step Guide for beginners"
4. Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007.
5. Mayall , "Industrial Design", McGraw Hill, 1992.
6. Niebel , "Product Design", McGraw Hill, 1974.
7. Asimov , "Introduction to Design", Prentice Hall, 1962.
8. Robert P. Merges, Peter S. Menell, Mark A. Lemley, " Intellectual Property in New Technological Age", 2016.
9. T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand, 2008

Course Outcomes:
At the end of this course, students will be able to

1. Understand research problem formulation.
2. Analyze research related information
3. Follow research ethics
4. Understand that today‟s world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
5. Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
6. Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, andin turn brings about, economic growth and social benefits.