

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH IN ELECTRONICS AND COMMUNICATION ENGINEERING
EFFECTIVE FROM ACADEMIC YEAR 20122-23 ADMITTED BATCH

R22 COURSE STRUCTURE AND SYLLABUS

I YEAR I – SEMESTER

Course Code	Course Title	L	T	P	Credits
Professional Core - I	Digital System Design with FPGAs	3	0	0	3
Professional Core - II	Wireless Communications and Networks	3	0	0	3
Professional Elective - I	1. Pattern Recognition and Machine Learning 2. VLSI Technology and Design 3. Design of Fault Tolerant Systems	3	0	0	3
Professional Elective - II	1. Embedded Real Time Operating Systems 2. Optical Communications and Networks 3. Wireless MIMO Communications	3	0	0	3
Lab - I	Digital System Design with FPGAs Lab	0	0	4	2
Lab - II	Wireless Communications and Networks Lab	0	0	4	2
	Research Methodology & IPR	2	0	0	2
Audit - I	Audit Course - I	2	0	0	0
	Total	16	0	8	18

I YEAR II – SEMESTER

Course Code	Course Title	L	T	P	Credits
Professional Core - III	Advanced Digital Signal Processing	3	0	0	3
Professional Core - IV	Advanced Communications and Networks	3	0	0	3
Professional Elective - III	1. SoC Design 2. Coding Theory and Techniques 3. IOT Architectures and System Design	3	0	0	3
Professional Elective - IV	1. Cognitive Radio 2. Embedded System Design 3. Voice and Data Networks	3	0	0	3
Lab - III	Advanced Digital Signal Processing Lab	0	0	4	2
Lab - IV	Advanced Communications and Networks Lab	0	0	4	2
	Mini Project with Seminar	0	0	4	2
Audit - II	Audit Course- II	2	0	0	0
	Total	14	0	12	18

II YEAR I - SEMESTER

Course Code	Course Title	L	T	P	Credits
Professional Elective - V	1. Embedded Networks 2. Ad-hoc & Wireless Sensor Networks 3. 5G and Beyond Communications	3	0	0	3
Open Elective	Open Elective	3	0	0	3
Dissertation	Dissertation Work Review – II	0	0	12	6
	Total Credits	6	0	12	12

II YEAR II - SEMESTER

Course Code	Course Title	L	T	P	Credits
Dissertation	Dissertation Work Review - III	0	0	12	06
Dissertation	Dissertation Viva-Voce	0	0	28	14
	Total	0	0	40	20

Open Electives:

1. Business Analytics
2. Industrial Safety
3. Operations Research
4. Cost Management of Engineering Projects
5. Composite Materials

Audit Course I & II:

1. English for Research Paper Writing
2. Disaster Management
3. Sanskrit for Technical Knowledge
4. Value Education
5. Constitution of India
6. Pedagogy Studies
7. Stress Management by Yoga
8. Personality Development Through Life Enlightenment Skills

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH.- I YEAR- I SEMESTER
ELECTRONICS AND COMMUNICATION ENGINEERING
DIGITAL SYSTEM DESIGN WITH FPGAs (PC – I)

Pre-Requisite: Switching Theory and Logic Design

Course Objectives:

1. To provide extended knowledge of digital logic circuits in the form of state model approach.
2. To provide an overview of system design approach using programmable logic devices.
3. To provide and understand of fault models and test methods.
4. To get exposed to the various architectural features of CPLDS and FPGAs.
5. To learn the methods and techniques of CPLD & FPGA design with EDA tools.
6. To expose software tools used for design process with the help of case studies.

Course Outcomes:

1. To exposes the design approaches using FPGAs.
2. To provide in depth understanding of Fault models.
3. To understands test pattern generation techniques for fault detection.
4. To design fault diagnosis in sequential circuits.
5. To provide understanding in the design of flow using case studies.

UNIT - I

Programmable Logic Devices: The concept of programmable Logic Devices, SPLDs, PAL devices, PLA devices, GAL devices, CPLD-Architecture, FPGAs-FPGA technology, architecture, virtex CLB and slice, FPGA Programming Technologies, Xilinx XC2000, XC3000, XC4000 Architectures, Actel ACT1, ACT2 and ACT3 Architectures. [TEXTBOOK-1]

UNIT - II

Analysis and derivation of clocked sequential circuits with state graphs and tables: A sequential parity checker, Analysis by signal tracing and timing charts-state tables and graphs-general models for sequential circuits, Design of a sequence detector, More Complex design problems, Guidelines for construction of state graphs, serial data conversion, Alphanumeric state graph notation. Need and Design strategies for multi-clock sequential circuits. [TEXTBOOK-2]

UNIT - III

Sequential circuit Design: Design procedure for sequential circuits-design example, Code converter, Design of Iterative circuits, Design of a comparator, Controller (FSM) – Metastability, Synchronization, FSM Issues, Pipelining resources sharing, Sequential circuit design using FPGAs, Simulation and testing of Sequential circuits, Overview of computer Aided Design. [TEXTBOOK-2]

UNIT - IV

Fault Modeling and Test Pattern Generation: Logic Fault Model, Fault detection & redundancy, Fault equivalence and fault location, Fault dominance, Single stuck at fault model, multiple Stuck at Fault models, Bridging Fault model.

Fault diagnosis of combinational circuits by conventional methods, path sensitization techniques, Boolean difference method, KOHAVI algorithm, Test algorithms-D algorithm, Random testing, transition count testing, signature analysis and test bridging faults. [TEXTBOOK-3 & Ref.1]

UNIT - V

Fault Diagnosis in sequential circuits: Circuit Test Approach, Transition check Approach, State identification and fault detection experiment, Machine identification, Design of fault detection experiment. [Ref.3]

TEXT BOOKS

1. Digital Electronics and design with VHDL- Volnei A. Pedroni, Elsevier publications.
2. Fundamentals of Logic Design-Charles H.Roth, Jr. -5th Ed., Cengage Learning.
3. Digital Circuits and Logic Design-Samuel C. LEE, PHI, 2008.

REFERENCE BOOKS

1. Logic Design Theory-N.N. Biswas, PHI.
2. Digital System Design using programmable logic devices- Parag K. Lala, BS publications.
3. Switching and Finite Automata Theory - Zvi Kohavi & Niraj K. Jha, 3rd Edition, Cambridge, 2010.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH. - I YEAR- I SEMESTER
ELECTRONICS AND COMMUNICATION ENGINEERING
WIRELESS COMMUNICATIONS AND NETWORKS (PC – II)

Course Objectives: The objectives of this course are to make the student

1. To study the Channel planning for Wireless Systems
2. To study the Mobile Radio Propagation
3. To study the Equalization and Diversity
4. To study the Wireless Networks

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

1. Understand Cellular communication concepts
2. Study the mobile radio propagation
3. Study the wireless network different type of MAC protocols

UNIT -I

The Cellular Concept-System Design Fundamentals: Introduction, Frequency Reuse, Channel Assignment Strategies, Handoff Strategies- Prioritizing Handoffs, Practical Handoff Considerations, Interference and system capacity – Co channel Interference and system capacity, Channel planning for Wireless Systems, Adjacent Channel interference, Power Control for Reducing interference, Trunking and Grade of Service, Improving Coverage & Capacity in Cellular Systems- Cell Splitting, Sectoring.

UNIT –II

Mobile Radio Propagation: Large-Scale Path Loss: Introduction to Radio Wave Propagation, Free Space Propagation Model, Relating Power to Electric Field, The Three Basic Propagation Mechanisms, Reflection-Reflection from Dielectrics, Brewster Angle, Reflection from perfect conductors, Ground Reflection (Two-Ray) Model, Diffraction-Fresnel Zone Geometry, Knife-edge Diffraction Model, Multiple knife-edge Diffraction, Scattering, Outdoor Propagation Models- Longley-Ryce Model, Okumura Model, Hata Model, PCS Extension to Hata Model, Walfisch and Bertoni Model, Wideband PCS Microcell Model, Indoor Propagation Models-Partition losses (Same Floor), Partition losses between Floors, Log-distance path loss model, Ericsson Multiple Breakpoint Model, Attenuation Factor Model, Signal penetration into buildings, Ray Tracing and Site Specific Modeling.

UNIT –III

Mobile Radio Propagation: Small –Scale Fading and Multipath: Small Scale Multipath propagation-Factors influencing small scale fading, Doppler shift, Impulse Response Model of a multipath channel-Relationship between Bandwidth and Received power, Small-Scale Multipath Measurements-Direct RF Pulse System, Spread Spectrum Sliding Correlator Channel Sounding, Frequency Domain Channels Sounding, Parameters of Mobile Multipath Channels-Time Dispersion Parameters, Coherence Bandwidth, Doppler Spread and Coherence Time, Types of Small-Scale Fading-Fading effects Due to Multipath Time Delay Spread, Flat fading, Frequency selective fading, Fading effects Due to Doppler Spread-Fast fading, slow fading, Statistical Models for multipath Fading Channels-Clarke's model for flat fading, spectral shape due to Doppler spread in Clarke's model, Simulation of Clarke and Gans Fading Model, Level crossing and fading statistics, Two-ray Rayleigh Fading Model.

UNIT -IV

Equalization and Diversity: Introduction, Fundamentals of Equalization, Training A Generic Adaptive Equalizer, Equalizers in a communication Receiver, Linear Equalizers, Non-linear Equalization-Decision Feedback Equalization (DFE), Maximum Likelihood Sequence Estimation (MLSE) Equalizer, Algorithms for adaptive equalization-Zero Forcing Algorithm, Least Mean Square Algorithm, Recursive least squares algorithm. Diversity Techniques-Derivation of selection Diversity improvement, Derivation

of Maximal Ratio Combining improvement, Practical Space Diversity Consideration-Selection Diversity, Feedback or Scanning Diversity, Maximal Ratio Combining, Equal Gain Combining, Polarization Diversity, Frequency Diversity, Time Diversity, RAKE Receiver.

UNIT -V

Wireless Networks: Introduction to wireless Networks, Advantages and disadvantages of Wireless Local Area Networks, WLAN Topologies, WLAN Standard IEEE 802.11, IEEE 802.11 Medium Access Control, Comparison of IEEE 802.11 a,b,g and n standards, IEEE 802.16 and its enhancements, Wireless PANs, Hiper Lan, WLL.

TEXT BOOKS

1. Wireless Communications, Principles, Practice – Theodore, S. Rappaport, 2nd Ed., 2002, PHI.
2. Wireless Communications-Andrea Goldsmith, 2005 Cambridge University Press.
3. Principles of Wireless Networks – Kaveh PahLaven and P. Krishna Murthy, 2002, PE
4. Mobile Cellular Communication – Gottapu Sasibhushana Rao, Pearson Education, 2012.

REFERENCE BOOKS

1. Wireless Digital Communications – Kamilo Feher, 1999, PHI.
2. Wireless Communication and Networking – William Stallings, 2003, PHI.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH.- I YEAR- I SEMESTER
ELECTRONICS AND COMMUNICATION ENGINEERING
PATTERN RECOGNITION AND MACHINE LEARNING (PE – I)

Pre-requisite: Statistics and Linear Algebra

Course Objectives:

- The student will be able to understand the mathematical formulation of patterns.
- To study the various linear models.
- Understand the basic classifiers.
- Can able to distinguish different models.

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

1. Learn the basics of pattern classes and functionality.
2. Construct the various linear models.
3. Understand the importance kernel methods.
4. Learn the Markov and Mixed models.

UNIT- I

Introduction to Pattern recognition: Mathematical Formulation and Basic Functional Equation, Reduction of Dimensionality, Experiments in Pattern Classification, Backward Procedure for Both Feature Ordering- and Pattern Classification, Suboptimal Sequential Pattern Recognition, Nonparametric Design of Sequential Pattern Classifiers, Analysis of Optimal Performance and a Multiclass Generalization

UNIT- II

Linear Models: Linear Basis Function Models -Maximum likelihood and least squares, Geometry of least squares , Sequential learning, Regularized least squares, Multiple outputs , The Bias-Variance Decomposition, Bayesian Linear Regression -Parameter distribution, Predictive, Equivalent, Bayesian Model Comparison, Probabilistic Generative Models-Continuous inputs, Maximum likelihood solution, Discrete features, Exponential family, Probabilistic Discriminative Models -Fixed basis functions, Logistic regression, Iterative reweighted least squares, Multiclass logistic regression, Probit regression, Canonical link functions

UNIT- III

Kernel Methods: Constructing Kernels, Radial Basis Function Networks - Nadaraya-Watson model, Gaussian Processes -Linear regression revisited, Gaussian processes for regression, Learning the hyper parameters, Automatic relevance determination, Gaussian processes for classification, Laplace approximation, Connection to neural networks, Sparse Kernel Machines- Maximum Margin Classifiers, Overlapping class distributions, Relation to logistic regression, Multiclass SVMs, SVMs for regression, Computational learning theory, Relevance Vector Machines- RVM for regression, Analysis of sparsity, RVM for classification

UNIT- IV

Graphical Models: Bayesian Networks, Example: Polynomial regression, Generative models, Discrete variables, Linear-Gaussian models, Conditional Independence- Three example graphs, D-separation, Markov Random Fields -Conditional independence properties, Factorization properties, Illustration: Image de-noising, Relation to directed graphs, Inference in Graphical Models- Inference on a chain, Trees, Factor graphs, The sum-product algorithm, The max-sum algorithm, Exact inference in general graphs, Loopy belief propagation, Learning the graph structure.

UNIT- V

Mixture Models and EM algorithm: K-means Clustering-Image segmentation and compression, Mixtures of Gaussians-Maximum likelihood, EM for Gaussian mixtures, An Alternative View of EM-Gaussian mixtures revisited, Relation to K-means, Mixtures of Bernoulli distributions, EM for Bayesian linear regression, The EM Algorithm in General, Combining Models- Tree-based Models, Conditional Mixture Models- Mixtures of linear regression models, Mixtures of logistic models, Mixtures of experts.

TEXT BOOKS:

1. Sequential methods in Pattern Recognition and Machine Learning-K.S.Fu, Academic Press, volume no.52.
2. Pattern Recognition and Machine Learning- C. Bishop-Springer, 2006.

REFERENCE BOOKS:

1. Pattern Classification- Richard o. Duda, Peter E. hart, David G. Stork, John Wiley& Sons, 2nd Ed., 2001.
2. The elements of Statistical Learning- Trevor Hastie, Robert Tibshirani, Jerome H. Friedman, Springer, 2nd Ed., 2009.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH.- I YEAR- I SEMESTER
ELECTRONICS AND COMMUNICATION ENGINEERING
VLSI TECHNOLOGY AND DESIGN (PE - I)

Pre-requisite: Switching Theory and Logic Design

Course Objectives:

1. Students from other engineering background to get familiarize with large scale integration technology.
2. To expose fabrication methods, layout and design rules.
3. Learn methods to improve Digital VLSI system's performance.
4. To know about VLSI Design constraints.
5. Visualize CMOS Digital Chip Design.

Course Outcomes: Students will be able to:

1. Review of FET fundamentals for VLSI design.
2. Acquires knowledge about stick diagrams and layouts.
3. Design the subsystems based on VLSI concepts.
4. Do the Floor planning and Routing for VLSI systems.

UNIT - I

Review of Microelectronics and Introduction to MOS Technologies: MOS, CMOS, BiCMOS Technology. Basic Electrical Properties of MOS, CMOS & BiCMOS Circuits: $I_{ds} - V_{ds}$ relationships, Threshold Voltage V_T , G_m , G_{ds} and ω_0 , Pass Transistor, MOS, CMOS & Bi CMOS Inverters, Z_{pu}/Z_{pd} , MOS Transistor circuit model, Latch-up in CMOS circuits.

UNIT - II

Layout Design and Tools: Transistor structures, Wires and Vias, Scalable Design rules, Layout Design tools.

Logic Gates & Layouts: Static Complementary Gates, Switch Logic, Alternative Gate circuits, Low power gates, Resistive and Inductive interconnect delays.

UNIT - III

Combinational Logic Networks: Layouts, Simulation, Network delay, Interconnect design, Power optimization, Switch logic networks, Gate and Network testing.

UNIT - IV

Sequential Systems: Memory cells and Arrays, Clocking disciplines, Design, Power optimization, Design validation and testing.

UNIT - V

Floor Planning: Floor planning methods, Global Interconnect, Floor Plan Design, Off-chip connections.

TEXT BOOKS:

1. Essentials of VLSI Circuits and Systems, K. Eshraghian. D, A. Pucknell, 2005, PHI.
2. Modern VLSI Design – Wayne Wolf, 3rd Ed., 1997, Pearson Education.

REFERENCE BOOKS

1. Introduction to VLSI Systems: A Logic, Circuit and System Perspective – Ming-BO Lin, CRC Press, 2011.
2. Principals of CMOS VLSI Design – N.H.E Weste, K. Eshraghian, 2nd Ed., Addison Wesley.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH. - I YEAR- I SEMESTER
ELECTRONICS AND COMMUNICATION ENGINEERING
DESIGN OF FAULT TOLERANT SYSTEMS (PE - I)

Pre-Requisite: Digital System Design with PLDs

Course Objectives:

1. To acquire the knowledge of fundamental concepts in fault tolerant design.
2. To provide broad understanding of fault diagnosis and tolerant design approach.
3. To illustrate the framework of test pattern generation using semi and full automatic approach.

Course Outcomes: Students will be able to

1. Acquire Design knowledge of requirements of self-check-in circuits and LFSR.
2. Knowledge of design for testability rules and techniques for combinational circuits.
3. Utilize the scan architectures for different digital circuits.
4. Acquire the knowledge of design of built-in-self test.

UNIT - I

Fault Tolerant Design: Basic concepts: Reliability concepts, Failures & faults, Reliability and Failure rate, Relation between reliability and mean time between failure, maintainability and availability, reliability of series, parallel and parallel-series combinational circuits.

Fault Tolerant Design: Basic concepts-static, dynamic, hybrid, triple modular redundant system (TMR), 5MR reconfiguration techniques, Data redundancy, Time redundancy and software Redundancy concepts. [TEXTBOOK-1]

UNIT - II

Self-Checking circuits & Fail safe Design: Self Checking Circuits: Basic concepts of self-checking circuits, Design of Totally self-checking checker, Checkers using m out of n codes, Berger code, Low cost residue code.

Fail Safe Design: Strongly fault secure circuits, fail safe design of sequential circuits using partition theory and Berger code, totally self-checking PLA design. [TEXTBOOK-1]

UNIT - III

Design for Testability: Design for testability for combinational circuits: Basic concepts of Testability, Controllability and observability, The Reed Muller's expansion technique, use of control and syndrome testable designs.

Design for testability by means of scan: Making circuits Testable, Testability Insertion, Full scan DFT technique- Full scan insertion, flip-flop Structures, Full scan design and Test, Scan Architectures-full scan design, Shadow register DFT, Partial scan methods, multiple scan design, other scan designs. [TEXTBOOK-2]

UNIT - IV

Logic Built-in-self-test: BIST Basics-Memory-based BIST, BIST effectiveness, BIST types, Designing a BIST, Test Pattern Generation-Engaging TPGs, exhaustive counters, ring counters, twisted ring counter, Linear feedback shift register, Output Response Analysis-Engaging ORA's, One's counter, transition counter, parity checking, Serial LFSRs, Parallel Signature analysis, BIST architectures-BIST related terminologies, A centralized and separate Board-level BIST architecture, Built-in evaluation and self test (BEST), Random Test socket (RTS), LSSD On-chip self test, Self -testing using MISR and SRSG, Concurrent BIST, BILBO, Enhancing coverage, RT level BIST design-CUT design, simulation and synthesis, RTS BIST insertion, Configuring the RTS BIST, incorporating configurations in BIST, Design of STUMPS, RTS and STUMPS results. [TEXTBOOK-2]

UNIT - V

Standard IEEE Test Access Methods: Boundary Scan Basics, Boundary scan architecture- Test access port, Boundary scan registers, TAP controller, the decoder unit, select and other units, Boundary scan Test Instructions-Mandatory instructions, Board level scan chain structure-One serial scan chain, multiple-scan chain with one control test port, multiple-scan chains with one TDI, TDO but multiple TMS, Multiple-scan chain, multiple access port, RT Level boundary scan-inserting boundary scan test hardware for CUT, Two module test case, virtual boundary scan tester, Boundary Scan Description language. [TEXTBOOK-2]

TEXT BOOKS:

1. Parag K. Lala, "Fault Tolerant & Fault Testable Hardware Design", 1984, PHI
2. Zainalabedin Navabi, "Digital System Test and Testable Design using HDL models and Architectures", Springer International Edition.

REFERENCE BOOKS:

1. Miron Abramovici, Melvin A. Breuer and Arthur D. Friedman, "Digital Systems Testing and Testable Design", Jaico Books
2. Bushnell & Vishwani D. Agarwal, "Essentials of Electronic Testing", Springer.
3. Alfred L. Crouch, "Design for Test for Digital IC's and Embedded Core Systems", 2008, Pearson Education.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH.- I YEAR- I SEMESTER
ELECTRONICS AND COMMUNICATION ENGINEERING
EMBEDDED REAL TIME OPERATING SYSTEMS (PE – II)

Prerequisite: Computer Organization and Operating System

Course Objectives: The objectives of this course are:

1. To provide broad understanding of the requirements of Real Time Operating Systems.
2. To make the student understand, applications of these Real Time features using case studies.

Course Outcomes: After completion of the course students will:

1. Be able to explain real-time concepts such as preemptive multitasking, task priorities, priority inversions, mutual exclusion, context switching, and synchronization, interrupt latency and response time, and semaphores.
2. Able describe how a real-time operating system kernel is implemented.
3. Explain how the real-time operating system implements time management.
4. Be able to work with real time operating systems like RT Linux, Vx Works, MicroC /OS-II, Tiny OS

UNIT – I

Introduction: Introduction to UNIX/LINUX, Overview of Commands, File I/O, (open, create, close, lseek, read, write), Process Control (fork, vfork, exit, wait, waitpid, exec).

UNIT – II

Real Time Operating Systems: Brief History of OS, Defining RTOS, The Scheduler, Objects, Services, Characteristics of RTOS, Defining a Task, asks States and Scheduling, Task Operations, Structure, Synchronization, Communication and Concurrency.

Defining Semaphores, Operations and Use, Defining Message Queue, States, Content, Storage, Operations and Use

UNIT – III

Objects, Services and I/O: Pipes, Event Registers, Signals, Other Building Blocks, Component Configuration, Basic I/O Concepts, I/O Subsystem

UNIT – IV

Exceptions, Interrupts and Timers: Exceptions, Interrupts, Applications, Processing of Exceptions and Spurious Interrupts, Real Time Clocks, Programmable Timers, Timer Interrupt Service Routines (ISR), Soft Timers, Operations.

UNIT – V

Case Studies of RTOS: RT Linux, MicroC/OS-II, Vx Works, Embedded Linux, and Tiny OS.

TEXT BOOK:

1. Real Time Concepts for Embedded Systems – Qing Li, Elsevier, 2011

REFERENCE BOOKS:

1. Embedded Systems- Architecture, Programming and Design by Rajkamal, 2007, TMH.
2. Advanced UNIX Programming, Richard Stevens
3. Embedded Linux: Hardware, Software and Interfacing – Dr. Craig Hollabaugh

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH.- I YEAR- I SEMESTER
ELECTRONICS AND COMMUNICATION ENGINEERING
OPTICAL COMMUNICATIONS AND NETWORKS (PE – II)

Course Objectives:

1. To know the basic geometric structures of Optical fibres, Light laws, Soliton pulses, modes of operation and losses in fibres.
2. To know the physical principles of optical sources, optical detectors and WDM.
3. To understand and design the analog and digital optical links, the noise effects and error control techniques.
4. To understand the working of various optical components and optical networks.

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

1. Analyze and design the optical links for different applications.
2. Know the working of WDM systems and various optical components for different applications.
3. Choose the optical networks for various applications.

UNIT - I

Optical Fibers: Structures, waveguiding and Fabrication: Nature of Light, Basic optical laws and definitions, Single mode fibers, Graded index fiber structure, Attenuation, Signal Dispersion in fibers.

Optical Sources- LEDs, Laser Diodes, Line Coding.

UNIT - II

Photo detectors: Photo detector Noise, Detector Response Time, Avalanche Multiplication Noise.

Optical Receiver Operation: Fundamental receiver operation, Digital receiver performance, Eye diagrams.

WDM Concepts and Components: Passive optical Couplers, Isolators and Circulators

UNIT - III

Digital Links: Point to point links, power penalties, error control, Coherent detection, Differential Quadrature Phase Shift Keying.

Analog Links: Carrier to noise ration, Multichannel Transmission Techniques, RF over Fiber, Radio over fiber links, Microwave Photonics.

UNIT - IV

Optical Networks: Network Concepts, Network Topologies, SONET/SDH, High speed lightwave links, Optical add/ Drop Multiplexing, Optical Switching, WDM Network, Passive Optical Networks, IP Over DWDM, Optical Ethernet, Mitigation of Transmission Impairments

UNIT - V

Performance Measurement and Monitoring: Measurement standards, Basic Test Equipment, Optical power measurement, Optical fiber characterization, Eye diagram tests, optical time domain reflectometer, optical performance monitoring, optical fiber system performance measurements.

TEXT BOOKS:

1. Gerd Keiser, "Optical Fiber Communications", 5th Edition, Mc Graw Hill.
2. Rajeev Ramaswamy and Kumar N Sivarajan, "Optical Networks: A Practical Perspective", 2nd Ed., 2004, Elsevier Morgan Kaufmann Publishers (An imprint of Elsevier).

REFERENCE BOOKS:

1. John. M. Senior, "Optical Fiber Communications: Principles and Practice", 2nd Ed, 2000, PE.

2. Harold Kolimbris, "Fiber Optic Communication", 2nd Ed, 2004, PEI
3. Uyles Black, "Optical Networks: Third Generation Transport Systems", 2nd Ed, 2009, PEI
4. Govind Agarwal, "Optical Fiber Communications", 2nd Ed, 2004, TMH.
5. S. C. Gupta, "Optical Fiber Communications and its Applications", 2004, PHI

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH.- I YEAR- I SEMESTER
ELECTRONICS AND COMMUNICATION ENGINEERING
WIRELESS MIMO COMMUNICATIONS (PE – II)

Course Objectives:

1. To know the diversity techniques and causes of fading
2. To understand the Concepts of MIMO channels and their advantages
3. To design a Space Time codes and Trellis code construction
4. To understand the importance of concatenation in codes

Course Outcomes: Students will be able to:

1. Calculate the Capacity of MIMO channels and understand the role of it in wireless communications
2. Design space-time block codes and Trellis codes
3. Concatenate the codes for MIMO Channels

UNIT - I

Fading Channels and Diversity Techniques: Wireless channels – Error/Outage probability over fading channels – Diversity techniques – Channel coding as a means of time diversity – Multiple antennas in wireless communications.

UNIT - II

Capacity and Information Rates of MIMO Channels: Capacity and Information rates of noisy, AWGN and fading channels – Capacity of MIMO channels – Capacity of non-coherent MIMO channels – Constrained signaling for MIMO communications.

UNIT - III

Space-Time Block and Trellis Codes: Transmit diversity with two antennas: The Alamouti scheme – Orthogonal and Quasi-orthogonal space-time block codes – Linear dispersion codes – Generic space-time trellis codes – Basic space-time code design principles – Representation of space-time trellis codes for PSK constellation – Performance analysis for space-time trellis codes – Comparison of space-time block and trellis codes.

UNIT - IV

Concatenated Codes and Iterative Decoding: Development of concatenated codes – Concatenated codes for AWGN and MIMO channels – Turbo coded modulation for MIMO channels – Concatenated space-time block coding.

UNIT - V

Space-Time Coding for Frequency Selective Fading Channels: MIMO frequency-selective channels – Capacity and Information rates of MIMO FS fading channels – Space-time coding and Channel detection for MIMO FS channels – MIMO OFDM systems.

TEXT BOOKS

1. Tolga M. Duman and Ali Ghrayeb, "Coding for MIMO Communication systems", John Wiley & Sons, West Sussex, England, 2007.
2. A. B. Gershman and N.D. Sidiropoulos, "Space-time processing for MIMO Communications", Wiley, Hoboken, NJ, USA, 2005.

REFERENCE BOOKS

1. E.G. Larsson and P. Stoica, "Space-time block coding for Wireless communications", Cambridge University Press, 2003.
2. M. Janakiraman, "Space-time codes and MIMO systems", Artech House, 2004.
3. H. Jafarkhani, "Space-time coding: Theory & Practice", Cambridge University Press, 2005.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH.- I YEAR- I SEMESTER
ELECTRONICS AND COMMUNICATION ENGINEERING
DIGITAL SYSTEM DESIGN WITH FPGAs LAB (Lab – I)

Part - I:

Programming can be done using any compiler. Download the programs on FPGA/CPLD boards and performance testing may be done using pattern generator (32 channels) and logic analyzer apart from verification by simulation with any of the front end tools.

1. HDL code to realize all the logic gates
2. Design and Simulation of Full Adder, Serial Binary Adder, Multi Precision Adder, Carry Look Ahead Adder.
3. Design of Combinational circuit using Decoders.
4. Design of Combinational circuit using encoder (without and with parity).
5. Design of Combinational circuit using multiplexer.
6. Design of 4 bit binary to gray converter using MUX or Decoders.
7. Design of Multiplexer/ Demultiplexer, comparator in all 3 styles.
8. Modelling of an Edge triggered and Level triggered FFs : D, SR, JK
9. Design of 4-bit binary, BCD counters (synchronous/ asynchronous reset) or any sequence counter
10. Design of a N- bit Register of Serial- in Serial –out, Serial in parallel out, Parallel in Serial out and Parallel in Parallel Out using different FFs.
11. Design of Sequence Detector (Finite State Machine- Mealy and Moore Machines).
12. Design of 4- Bit Multiplier, Divider.
13. Design of ALU to Perform – ADD, SUB, AND-OR, 1's and 2's Compliment,
14. Implementing the above designs on FPGA kits.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH.- I YEAR- I SEMESTER
ELECTRONICS AND COMMUNICATION ENGINEERING
WIRELESS COMMUNICATIONS AND NETWORKS LAB (Lab – II)

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

1. Implement the advanced digital modulation techniques.
2. Design Convolutional encoder and decoder for error control coding techniques.
3. Calculate path loss for Free space, Okumura and Hata models for outdoor propagation.
4. Comprehend Cellular concepts of GSM and CDMA networks.
5. Simulate RAKE receiver for CDMA with MATLAB.

List of Experiments:

1. FSK Modulation and Demodulation technique.
2. QPSK Modulation and Demodulation technique.
3. DQPSK Modulation and Demodulation technique
4. 8-QAM Modulation and Demodulation technique.
5. Implementation of Convolutional Encoder and Decoder.
6. Simulation of the following Outdoor Path loss propagation models using MATLAB.
 - a. Free Space Propagation model
 - b. Okumura model
 - b. Hata model
7. Simulation of Adaptive Linear Equalizer using MAT LAB software.
8. Measurement of call blocking probability for GSM &CDMA networks using Netsim software.
9. Study of GSM handset for various signalling and fault insertion techniques (Major GSM handset sections: clock, SIM card, charging, LCD module, Keyboard, User interface).
10. Study of transmitter and receiver section in mobile handset and measure frequency
11. band signal and GMSK modulating signal.
12. Simulation of RAKE Receiver for CDMA communication using MAT LAB software.
13. Simulate and test various types of PN codes, chip rate, spreading factor and processing gain on performance of DSSS in CDMA.
14. Simulate and test the 3G Network system features using GSM AT Commands. (Features of 3G Communication system: Transmission of voice, video calls, SMS, MMS, TCP/IP, HTTP, GPS)
15. Modelling of communication system using Simulink.

Note: Experiments 1 to 5 need to be simulated using MATLAB and tested on hardware.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH.- I YEAR- I SEMESTER
ELECTRONICS AND COMMUNICATION ENGINEERING
RESEARCH METHODOLOGY AND IPR

Course Objectives:

- To understand the research problem
- To know the literature studies, plagiarism and ethics
- To get the knowledge about technical writing
- To analyze the nature of intellectual property rights and new developments
- To know the patent rights

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

- Understand research problem formulation.
- Analyze research related information
- Follow research ethics
- Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
- 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.
- 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, and in turn brings about, economic growth and social benefits.

UNIT- I:

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- II:

Effective literature studies approaches, analysis, Plagiarism, Research ethics

UNIT- III:

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- IV:

Nature of Intellectual Property: Patents, Designs, Trade 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- V:

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

TEXT BOOKS:

1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students"
2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"

REFERENCE BOOKS:

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

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH.- I YEAR- II SEMESTER
ELECTRONICS AND COMMUNICATION ENGINEERING
ADVANCED DIGITAL SIGNAL PROCESSING (PC – III)

Course Objectives:

1. To understand theory of different filters and algorithms
2. To understand theory of multirate DSP, solve numerical problems and write algorithms
3. To understand theory of prediction and solution of normal equations
4. To know applications of DSP at block level.

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

1. Design a different types of filters such as Adaptive filter, poly phase filters, ARMA lattice-ladder filters, Wiener filters etc.,
2. Design a decimator and integrator including multi-stages
3. Estimate spectrum by using different methods

UNIT - I

Overview of DSP, Characterization in time and frequency, FFT Algorithms, Digital filter design and structures: Basic FIR/IIR filter design & structures, design techniques of linear phase FIR filters, IIR filters by impulse invariance, bilinear transformation, FIR/IIR Cascaded lattice structures, parallel realization of IIR.

UNIT- II

Multi rate DSP, Decimators and Interpolators, Sampling rate conversion, multistage decimator & interpolator, poly phase filters, QMF, digital filter banks, Applications in subband coding.

UNIT- III

Linear prediction & optimum linear filters, stationary random process, forward-backward linear prediction filters, solution of normal equations, AR Lattice and ARMA Lattice-Ladder Filters, Wiener Filters for Filtering and Prediction.

UNIT- IV

Adaptive Filters, Applications, Gradient Adaptive Lattice, Minimum mean square criterion, LMS algorithm, Recursive Least Square algorithm

UNIT- V

Estimation of Spectra from Finite-Duration Observations of Signals. Nonparametric Methods for Power Spectrum Estimation, Parametric Methods for Power Spectrum Estimation, Minimum-Variance Spectral Estimation, Eigen analysis Algorithms for Spectrum Estimation.

TEXT BOOKS:

1. J. G. Proakis and D.G. Manolakis, "Digital signal processing: Principles, Algorithm and Applications", 4th Edition, Prentice Hall, 2007.
2. N. J. Fliege, "Multirate Digital Signal Processing: Multirate Systems -Filter Banks – Wavelets", 1st Edition, John Wiley and Sons Ltd, 1999.

REFERENCE BOOKS:

1. Bruce W. Suter, "Multirate and Wavelet Signal Processing", 1st Edition, Academic Press, 1997.
2. M. H. Hayes, "Statistical Digital Signal Processing and Modeling", John Wiley & Sons Inc., 2002.
3. S. Haykin, "Adaptive Filter Theory", 4th Edition, Prentice Hall, 2001.
4. D. G. Manolakis, V. K. Ingle and S. M. Kogon, "Statistical and Adaptive Signal Processing", McGraw Hill, 2000

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH.- I YEAR- II SEMESTER
ELECTRONICS AND COMMUNICATION ENGINEERING
ADVANCED COMMUNICATIONS AND NETWORKS (PC – IV)

Course Objectives:

1. To understand of some fundamental techniques used to model and analyze communication networks.
2. To gain knowledge in communications and networks
3. To understand the principles of OFDM and MIMO communication system.

Course Outcomes: Students will be able to:

1. Develop a model and analyze communication networks
2. Demonstrate OFDM and MIMO Communication System
3. Critically analyze the function, properties and application of emerging communication systems and networks
4. Know the different IEEE LAN standards.

UNIT - I

Spread Spectrum Communications: Spreading sequences- Properties of Spreading Sequences, Pseudo- noise sequence, Gold sequences, Kasami sequences, Walsh Sequences, Orthogonal Variable Spreading Factor Sequences, Barker Sequence, Complementary Codes

Direct sequence spread spectrum: DS-CDMA Model, Conventional receiver, Rake Receiver, Synchronization in CDMA, Power Control, Soft handoff, Multiuser detection – Optimum multiuser detector, Linear multiuser detection.

UNIT - II

Orthogonal Frequency Division Multiplexing: Basic Principles of Orthogonality, Single vs Multicarrier Systems, OFDM Block Diagram and Its Explanation, OFDM Signal Mathematical Representation, Selection parameter for Modulation, Pulse shaping in OFDM Signal and Spectral Efficiency, Window in OFDM Signal and Spectrum, Synchronization in OFDM, Pilot Insert in OFDM Transmission and Channel Estimation, Amplitude Limitations in OFDM, FFT Point Selection Constraints in OFDM, CDMA vs OFDM, Hybrid OFDM.

UNIT - III

MIMO Systems: Introduction, Space Diversity and System Based on Space Diversity, Smart Antenna system and MIMO, MIMO Based System Architecture, MIMO Exploits Multipath, Space – Time Processing, Antenna Consideration for MIMO, MIMO Channel Modelling, MIMO Channel Measurement, MIMO Channel Capacity, Cyclic Delay Diversity (CDD), Space Time Coding, Advantages and Applications of MIMO in Present Context, MIMO Applications in 3G Wireless System and Beyond, MIMO-OFDM

UNIT - IV

Wireless LANs/IEEE 802.11x: Introduction to IEEE802.11x Technologies, Evolution of wireless LANs, IEEE 802.11 Design Issues, IEEE 802.11 Services, IEEE 802.11 MAC Layer operations, IEEE 802.11 Layer1, IEEE 802.11 a/b/g Higher Rate Standards, Wireless LAN Security, Computing Wireless Technologies, Typical WLAN Hardware

UNIT - V

Wireless PANs/IEEE 802.15x: Introduction to IEEE 802.15x Technologies: Wireless PAN Applications and Architecture, IEEE 802.15.1 Physical Layer Details, Bluetooth Link Controllers Basics, Bluetooth

Link Controllers Operational States, IEEE 802.15.1 Protocols and Host Control Interface. Evaluation of IEEE 802.15 Standards

Broad Band Wireless MANs/IEEE 802.16x: Introduction to WMAN/IEEE 802.16x Technology, IEEE 802.16 Wireless MANs, IEEE 802.16 MAC Layer Details, IEEE 802.16 Physical Layer Details, IEEE 802.16 Physical Layer Details for 2-11 GHz, IEEE 802.16 Common System Operations.

TEXT BOOKS:

1. Gary J. Mullett, "Introduction to Wireless Telecommunications Systems and Networks", CENGAGE
2. Upena Dalal, "Wireless Communication", Oxford University Press, 2009

REFERENCE BOOKS:

1. Ke-Lin Du & M N S Swamy, "Wireless Communication System", Cambridge University Press, 2010
2. Gottapu Sasibhusan Rao, "Mobile Cellular Communication", PEARSON

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH.- I YEAR- II SEMESTER
ELECTRONICS AND COMMUNICATION ENGINEERING
SOC DESIGN (PE – III)

Course Objectives:

1. To learn ASIC design concepts and strategies
2. To know the NISC applications and advantages
3. To familiar with simulation and synthesis process

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

1. Identify and formulate a given problem in the framework of SoC based design approaches
2. Design SoC based system for engineering applications
3. Realize impact of SoC on electronic design philosophy and Macro-electronics thereby incline towards entrepreneurship & skill development.

UNIT- I

ASIC: Overview of ASIC types, design strategies, CISC, RISC and NISC approaches for SOC architectural issues and its impact on SoC design methodologies, Application Specific Instruction Processor (ASIP) concepts.

UNIT- II

NISC: NISC Control Words methodology, NISC Applications and Advantages, Architecture Description Languages (ADL) for design and verification of Application Specific Instruction- set Processors (ASIP), No-Instruction-Set-computer (NISC)- design flow, modeling NISC architectures and systems, use of Generic Netlist Representation - A formal language for specification, compilation and synthesis of embedded processors.

UNIT- III

Simulation: Different simulation modes, behavioural, functional, static timing, gate level, switch level, transistor/circuit simulation, design of verification vectors, Low power FPGA, Reconfigurable systems, SoC related modeling of data path design and control logic, Minimization of interconnects impact, clock tree design issues.

UNIT- IV

Low power SoC design / Digital system Design synergy, Low power system perspective- power gating, clock gating, adaptive voltage scaling (AVS), Static voltage scaling, Dynamic clock frequency and voltage scaling (DCFS), building block optimization, building block memory, power down techniques, power consumption verification.

UNIT- V

Synthesis: Role and Concept of graph theory and its relevance to synthesizable constructs, Walks, trails paths, connectivity, components, mapping/visualization, nodal and admittance graph. Technology independent and technology dependent approaches for synthesis, optimization constraints, Synthesis report analysis Single core and Multi core systems, dark silicon issues, HDL coding techniques for minimization of power consumption, Fault tolerant designs

TEXT BOOKS:

1. Hubert Kaeslin, "Digital Integrated Circuit Design: From VLSI Architectures to CMOS Fabrication", Cambridge University Press, 2008.
2. B. Al Hashimi, "System on chip-Next generation electronics", The IET, 2006

REFERENCE BOOKS:

1. Rochit Rajsuman, "System-on- a-chip: Design and test", Advantest America R&D Center, 2000
2. P Mishra and N Dutt, "Processor Description Languages", Morgan Kaufmann, 2008
3. Michael J. Flynn and Wayne Luk, "Computer System Design: System-on-Chip". Wiley, 2011

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH.- I YEAR- II SEMESTER
ELECTRONICS AND COMMUNICATION ENGINEERING
CODING THEORY AND TECHNIQUES (PE – III)

Prerequisite: Digital Communications

Course Objectives

1. To acquire the knowledge in measurement of information and errors.
2. To study the generation of various code methods.
3. To study the various application of codes.

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

1. Calculate entropy of information and errors.
2. Design Linear Block Codes and Cyclic codes.
3. Construct tree and trellis diagrams for convolution codes
4. Design the Turbo codes and Space time codes and also their applications

UNIT - I

Coding for Reliable Digital Transmission and storage: Mathematical model of Information, A Logarithmic Measure of Information, Average and Mutual Information and Entropy, Types of Errors, Error Control Strategies.

Linear Block Codes Introduction to Linear Block Codes, Syndrome and Error Detection, Minimum Distance of a Block code, Error-Detecting and Error-correcting Capabilities of a Block code, Standard array and Syndrome Decoding, Probability of an undetected error for Linear Codes over a BSC, Hamming Codes. Applications of Block codes for Error control in data storage system

UNIT - II

Cyclic Codes Description, Generator and Parity-check Matrices, Encoding, Syndrome Computation and Error Detection, Decoding, Cyclic Hamming Codes, Shortened cyclic codes, Error-trapping decoding for cyclic codes, Majority logic decoding for cyclic codes.

UNIT - III

Convolutional Codes Encoding of Convolutional Codes, Structural and Distance Properties, maximum likelihood decoding, Sequential decoding, Majority- logic decoding of Convolution codes. Application of Viterbi Decoding and Sequential Decoding, Applications of Convolutional codes in ARQ system.

UNIT - IV

Turbo Codes LDPC Codes- Codes based on sparse graphs, Decoding for binary erasure channel, Log-likelihood algebra, Brief propagation, Product codes, Iterative decoding of product codes, Concatenated convolutional codes- Parallel concatenation, The UMTS Turbo code, Serial concatenation, Parallel concatenation, Turbo decoding

UNIT - V

Space-Time Codes Introduction, Digital modulation schemes, Diversity, Orthogonal space- Time Block codes, Alamouti's schemes, Extension to more than Two Transmit Antennas, Simulation Results, Spatial Multiplexing: General Concept, Iterative APP Preprocessing and Per-layer Decoding, Linear Multilayer Detection, Original BLAST Detection, QL Decomposition and Interface Cancellation, Performance of Multi – Layer Detection Schemes, Unified Description by Linear Dispersion Codes.

TEXT BOOKS:

1. Error Control Coding- Fundamentals and Applications –Shu Lin, Daniel J. Costello, Jr, Prentice Hall, Inc.
2. Error Correcting Coding Theory-Man Young Rhee, McGraw-Hill, 1989.

REFERENCE BOOKS:

1. Digital Communications-Fundamental and Application - Bernard Sklar, PE.
2. Digital Communications- John G. Proakis, 5th ed. TMH, 2008.
3. Error Correction Coding – Mathematical Methods and Algorithms – Todd K. Moon, Wiley India, 2006.
4. Information Theory, Coding and Cryptography – Ranjan Bose, 2nd Edition, TMH, 2009

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH.- I YEAR- II SEMESTER
ELECTRONICS AND COMMUNICATION ENGINEERING
IOT ARCHITECTURES AND SYSTEM DESIGN (PE – III)

Course Objectives

1. To Know the definition and basic concepts of IoT
2. Learn the interfacing the IoT and M2M
3. To understand the Architecture of IoT

Course Outcomes: Students will be able to

1. Integrate the sensors and actuator depending on the applications
2. Interface the IoT and M2M with value chains
3. Write Python programming for Arduino, Raspberry Pi devices
4. Design IoT based systems such as Agricultural IoT, Vehicular IoT etc.,

UNIT- I

IoT introduction: Introduction and definition of IoT, Evolution of IoT, IoT growth, Application areas of IoT, Characteristics of IoT, IoT stack, Enabling technologies, IoT levels, IoT sensing and actuation, Sensing types, Actuator types.

UNIT – II

IoT and M2M: M2M to IoT – A Basic Perspective– Introduction, Differences and similarities between M2M and IoT, SDN and NFV for IoT. M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies.

UNIT – III

IoT Hands-on: Introduction to Arduino Programming, Integration of Sensors and Actuators with Arduino. Introduction to Python programming, Introduction to Raspberry Pi, Interfacing Raspberry Pi with basic peripherals, Implementation of IoT with Raspberry Pi.

UNIT - IV

IoT Architecture: IoT Architecture components, Comparing IoT architectures, A simplified IoT architecture, The core IoT functional stack, IoT data management and compute stack

UNIT – V

IoT System design: Challenges associated with IoT, Emerging pillars of IoT, Agricultural IoT, Vehicular IoT, Healthcare IoT, Smart cities, Transportation and logistics.

TEXT BOOKS

1. Sudip Misra, Anandarup Mukherjee, Arijit Roy “Introduction to IOT”, Cambridge University Press.
1. David Hanes, Gonzalo salgueiro, Patrick Grossetete, Rob barton, Jerome henry “IoT Fundamentals Networking technologies, protocols, and use cases for IoT”, Cisco Press

REFERENCE BOOKS

1. Cuno pfister, “Getting started with the internet of things”, O Reilly Media, 2011
2. Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”, 1st Edition, Apress Publications.
3. “Internet of Things concepts and applications”, Wiley
4. Arshdeep Bahga, Vijay Madiseti “Internet of Things A Hands-on approach”, Universities Press
5. Shriram K Vasudevan, RMD Sundaram, Abhishek S Nagarajan, “Internet of things” John Wiley and Sons.
6. Massimo Banzi, Michael Shiloh Make: Getting Started with the Arduino, Shroff Publisher/Maker Media Publishers.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH.- I YEAR- II SEMESTER
ELECTRONICS AND COMMUNICATION ENGINEERING
COGNITIVE RADIO (PE – IV)

Course Objectives:

1. To understand the concepts of Cognitive Radio
2. To know the knowledge of Spectrum sensing
3. To manage the resources of spread spectrum communication system

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

1. Design a cognitive radio networks with understanding of spectrum sensing.
2. Develop the cognitive radio, as well as techniques for spectrum holes detection that cognitive radio takes advantages in order to exploit it.
3. Use efficiently TVWS for radio communications based on two spectrum sharing business models/policies.
4. Manage the radio-resources as well as a number of optimization techniques for better spectrum exploitation.

UNIT- I

Introduction to Cognitive Radios: Digital dividend, cognitive radio (CR) architecture, functions of cognitive radio, dynamic spectrum access (DSA), components of cognitive radio, spectrum sensing, spectrum analysis and decision, potential applications of cognitive radio.

UNIT- II

Spectrum Sensing: Spectrum sensing, detection of spectrum holes (TVWS), collaborative sensing, geo-location database and spectrum sharing business models (spectrum of commons, real time secondary spectrum market).

UNIT- III

Optimization Techniques of Dynamic Spectrum Allocation: Linear programming, convex programming, non-linear programming, integer programming, dynamic programming, stochastic programming.

UNIT- IV

Dynamic Spectrum Access and Management: Spectrum broker, cognitive radio architectures, centralized dynamic spectrum access, distributed dynamic spectrum access, learning algorithms and protocols.

UNIT- V

Spectrum Trading: Introduction to spectrum trading, classification to spectrum trading, radio resource pricing, brief discussion on economics theories in DSA (utility, auction theory), and classification of auctions (single auctions, double auctions, concurrent, sequential). Research Challenges in Cognitive Radio: Network layer and transport layer issues, cross layer design for cognitive radio networks.

TEXT BOOKS

1. Ekram Hossain, Dusit Niyato, Zhu Han - Dynamic Spectrum Access and Management in Cognitive Radio Networks, Cambridge University Press, 2009.
2. Kwang-Cheng Chen, Ramjee Prasad - Cognitive radio networks, John Wiley & Sons Ltd., 2009.

REFERENCE BOOKS

1. Bruce Fette, - Cognitive radio technology, Elsevier, 2nd Ed., 2009.

2. Huseyin Arslan – Cognitive Radio, Software Defined Radio, and Adaptive Wireless Systems, Springer, 2007.
3. Francisco Rodrigo Porto Cavalcanti, Soren Andersson - Optimizing Wireless Communication Systems, Springer, 2009.
4. Linda Doyle - Essentials of Cognitive Radio, Cambridge University Press, 2009.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH.- I YEAR- II SEMESTER
ELECTRONICS AND COMMUNICATION ENGINEERING
EMBEDDED SYSTEMS DESIGN (PE – IV)

Prerequisite: Microprocessor and Microcontrollers

Course Objectives:

1. To differentiate between a General purpose and an Embedded System.
2. To provide knowledge on the building blocks of Embedded System.
3. To understand the requirement of Embedded firmware and its role in API.

Course Outcomes:

1. Expected to differentiate the design requirements between General Purpose and Embedded Systems.
2. Expected to acquire the knowledge of firmware design principles.
3. Expected to understand the role of Real Time Operating System in Embedded Design.
4. To acquire the knowledge and experience of task level Communication in any Embedded System.

UNIT - I

Introduction to Embedded Systems: Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems.

UNIT - II

Typical Embedded System: Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS), Memory: ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: Onboard and External Communication Interfaces.

UNIT - III

Embedded Firmware: Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages.

UNIT - IV

RTOS Based Embedded System Design: Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling.

UNIT - V

Task Communication: Shared Memory, Message Passing, Remote Procedure Call and Sockets, Task Synchronization: Task Communication/Synchronization Issues, Task Synchronization Techniques, Device Drivers, How to Choose an RTOS.

TEXT BOOKS:

1. Introduction to Embedded Systems - Shibu K.V, Mc Graw Hill.

REFERENCE BOOKS:

1. Embedded Systems - Raj Kamal, TMH.
2. Embedded System Design - Frank Vahid, Tony Givargis, John Wiley.
3. Embedded Systems – Lyla, Pearson, 2013
4. An Embedded Software Primer - David E. Simon, Pearson Education.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH.- I YEAR- II SEMESTER
ELECTRONICS AND COMMUNICATION ENGINEERING
VOICE AND DATA NETWORKS (PE – IV)

Course Objectives:

1. To understand the different Network Design issues
2. To learn the designing of Data Networks
3. To understand the Queuing models and examine some LAN examples.
4. To understand the concepts of Intra networking

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

1. Trade offs the different Protocols, algorithms
2. Design Routing, transport, DNS, Intra Networks
3. Familiar with Network extensions and next generation architectures.
4. Design the Queuing models of Networks

UNIT- I

Network Design Issues, Network Performance Issues, Network Terminology, centralized and distributed approaches for networks design, Issues in design of voice and data networks.

UNIT - II

Layered and Layer less Communication, Cross layer design of Networks, Voice Networks (wired and wireless) and Switching, Circuit Switching and Packet Switching, Statistical Multiplexing.

UNIT- III

Data Networks and their Design, Link layer design- Link adaptation, Link Layer Protocols, Retransmission. Mechanisms (ARQ), Hybrid ARQ (HARQ), Go Back N, Selective Repeat protocols and their analysis.

UNIT- IV

Queuing Models of Networks, Traffic Models, Little's Theorem, Markov chains, M/M/1 and other Markov systems, Multiple Access Protocols, Aloha System, Carrier Sensing, Examples of Local area networks,

UNIT- V

Inter-networking, Bridging, Global Internet, IP protocol and addressing, Sub netting, Classless Inter domain Routing (CIDR), IP address lookup, Routing in Internet. End to End Protocols, TCP and UDP. Congestion Control, Additive Increase/Multiplicative Decrease, Slow Start, Fast Retransmit/ Fast Recovery: Congestion avoidance, RED TCP Throughput Analysis, Quality of Service in Packet Networks. Network Calculus, Packet Scheduling Algorithms.

TEXT BOOKS

1. D. Bertsekas and R. Gallager, "Data Networks", 2nd Edition, Prentice Hall, 1992.
2. L. Peterson and B. S. Davie, "Computer Networks: A Systems Approach", 5th Edition, Morgan Kaufman, 2011.

REFERENCE BOOKS

1. Kumar, D. Manjunath and J. Kuri, "Communication Networking: An analytical approach", 1st Edition, Morgan Kaufman, 2004.
2. Walrand, "Communications Network: A First Course", 2nd Edition, McGraw Hill, 2002.
3. Leonard Kleinrock, "Queueing Systems, Volume I: Theory", 1st Edition, John Wiley and Sons, 1975.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH.- I YEAR- II SEMESTER
ELECTRONICS AND COMMUNICATION ENGINEERING
ADVANCED DIGITAL SIGNAL PROCESSING LAB (LAB – III)

Note: Minimum of 10 Experiments have to be conducted.

List of Experiments:

1. Basic Operations on Signals, Generation of Various Signals and finding its FFT.
2. Program to verify Decimation and Interpolation of a given Sequences.
3. Program to Convert CD data into DVD data
4. Generation of Dual Tone Multiple Frequency (DTMF) Signals
5. Plot the Periodogram of a Noisy Signal and estimate PSD using Periodogram and Modified Periodogram methods
6. Estimation of Power Spectrum using Bartlett and Welch methods
7. Verification of Autocorrelation Theorem
8. Parametric methods (Yule-Walker and Burg) of Power Spectrum Estimation
9. Estimation of data series using Nth order Forward Predictor and comparing to the Original Signal
10. Design of LPC filter using Levinson-Durbin Algorithm
11. Computation of Reflection Coefficients using Schur Algorithm
12. To study Finite Length Effects using Simulink
13. ECG signal compression
14. Design and Simulation of Notch Filter to remove 60 Hz Hum/any unwanted frequency component of given Signal (Speech/ECG)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH. - I YEAR- II SEMESTER
ELECTRONICS AND COMMUNICATION ENGINEERING
ADVANCED COMMUNICATIONS AND NETWORKS LAB (LAB – IV)

Note: Below experiments are to be performed using MATLAB

List of Experiments:

1. Implementation of Matched Filters.
2. Optimum receiver for the AWGN channel.
3. Design FIR (LP/HP/BP) filter using Window method.
4. Measurement of effect of Inter Symbol Interference.
5. Generation of constant envelope PSK signal wave form for different values of M.
6. Simulation of PSK system with M=4
7. Simulation of DPSK system with M=4
8. Design of FSK system
9. Simulation of correlation type demodulation for FSK signal
10. BPSK Modulation and Demodulation techniques
11. QPSK Modulation and Demodulation techniques
12. DQPSK Modulation and Demodulation techniques
13. 8-QAM Modulation and Demodulation techniques
14. DQAM Modulation and Demodulation techniques
15. Verification of Decimation and Interpolation of a given signal
16. Power spectrum estimation using AR models

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH. - II YEAR- I SEMESTER
ELECTRONICS AND COMMUNICATION ENGINEERING
EMBEDDED NETWORKS (PE – V)

Prerequisite: Computer Networks.

Course Objectives:

1. To elaborate on the conceptual frame work of physical layer and topological issues of networking in Embedded Systems.
2. To emphasis on issues related to guided and unguided media with specific reference to Embedded device level connectivity.

Course Outcomes: Students will be:

1. Expected to acquire knowledge on communication protocols of connecting Embedded Systems.
2. Expected to master the design level parameters of USB and CAN bus protocols.
3. Understand the design issues of Ethernet in Embedded networks.
4. Acquire the knowledge of wireless protocols in Embedded domain.

UNIT - I

Embedded Communication Protocols: Embedded Networking: Introduction – Serial/Parallel Communication – Serial communication protocols -RS232 standard – RS485 – Synchronous Serial Protocols -Serial Peripheral Interface (SPI) – Inter Integrated Circuits (I2C) – PC Parallel port programming - ISA/PCI Bus protocols – Firewire.

UNIT - II

USB and CAN Bus: USB bus – Introduction – Speed Identification on the bus – USB States – USB bus communication Packets –Data flow types –Enumeration –Descriptors –PIC 18 Microcontroller USB Interface – C Programs –CAN Bus – Introduction - Frames –Bit stuffing –Types of errors –Nominal Bit Timing – PIC microcontroller CAN Interface –A simple application with CAN.

UNIT - III

Ethernet Basics: Elements of a network – Inside Ethernet – Building a Network: Hardware options – Cables, Connections and network speed – Design choices: Selecting components –Ethernet Controllers –Using the internet in local and internet communications – Inside the Internet protocol.

UNIT - IV

Embedded Ethernet: Exchanging messages using UDP and TCP – Serving web pages with Dynamic Data – Serving web pages that respond to user Input – Email for Embedded Systems – Using FTP – Keeping Devices and Network secure.

UNIT - V

Wireless Embedded Networking: Wireless sensor networks – Introduction – Applications – Network Topology – Localization –Time Synchronization - Energy efficient MAC protocols –SMAC – Energy efficient and robust routing – Data Centric routing.

TEXT BOOKS

1. Embedded Systems Design: A Unified Hardware/Software Introduction - Frank Vahid, Tony Givargis, John & Wiley Publications, 2002
2. Parallel Port Complete: Programming, interfacing and using the PCs parallel printer port - Jan Axelson, Penram Publications, 1996.

REFERENCE BOOKS

1. Advanced PIC microcontroller projects in C: from USB to RTOS with the PIC18F series -Dogan Ibrahim, Elsevier 2008.
2. Embedded Ethernet and Internet Complete - Jan Axelson, Penram publications, 2003.
3. Networking Wireless Sensors - Bhaskar Krishnamachari, Cambridge press 2005.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH.- II YEAR- I SEMESTER
ELECTRONICS AND COMMUNICATION ENGINEERING
AD-HOC AND WIRELESS SENSOR NETWORKS (PE – V)

Prerequisite: Wireless Sensor Networks

Course Objectives: The objectives of this course are to make the student

1. To study the fundamentals of wireless Ad-Hoc Networks.
2. To study the operation and performance of various Adhoc wireless network protocols.
3. To study the architecture and protocols of Wireless sensor networks.

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

1. Design performance-based MAC layer protocols of Adhoc wireless networks.
2. Design performance-based routing protocol of Adhoc wireless network.
3. Design performance-based transport layer protocol of Adhoc wireless networks.
4. Distinguish between protocols used in Adhoc wireless network and wireless sensor networks.

UNIT - I

Wireless LANs and PANS: Introduction, Fundamentals of WLANs, IEEE 802.11 Standards, HIPERLAN Standard, Bluetooth, Home RF.

AD HOC WIRELESS NETWORKS: Introduction, Issues in Ad Hoc Wireless Networks.

UNIT - II

MAC Protocols: Introduction, Issues in Designing a MAC protocol for Ad Hoc Wireless Networks, Design goals of a MAC Protocol for Ad Hoc Wireless Networks, Classifications of MAC Protocols, Contention - Based Protocols, Contention - Based Protocols with reservation Mechanisms, Contention – Based MAC Protocols with Scheduling Mechanisms, MAC Protocols that use Directional Antennas, Other MAC Protocols.

UNIT - III

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.

UNIT - IV

Transport Layer 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 - V

Wireless Sensor Networks: Introduction, Sensor Network Architecture, Data Dissemination, Data Gathering, MAC Protocols for Sensor Networks, Location Discovery, Quality of a Sensor Network, Evolving Standards, Other Issues.

TEXT BOOKS:

1. Ad Hoc Wireless Networks: Architectures and Protocols - C. Siva Ram Murthy and B.S. Manoj, 2004, PHI.
2. Wireless Ad- hoc and Sensor Networks: Protocols, Performance and Control - Jagannathan Sarangapani, CRC Press.

REFERENCE BOOKS:

1. Ad- Hoc Mobile Wireless Networks: Protocols & Systems, C.K. Toh, 1st Ed. Pearson Education.
2. Wireless Sensor Networks - C. S. Raghavendra, Krishna M. Sivalingam, 2004, Springer

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH.- II YEAR- I SEMESTER
ELECTRONICS AND COMMUNICATION ENGINEERING
5G AND BEYOND COMMUNICATIONS

Course Objectives:

1. To understand the principles of MIMO Communications
2. To provide exposure to advanced research topics in the field of Beyond 5G/6G wireless systems
3. To know the various requirements beyond 2020 communications

Course Outcomes: Students will be able to:

1. Design MIMO Communication system
2. Utilize the Mobile Wireless Technology Generations
3. Know the propagation of mm waves
4. Face the challenges of beyond 2020 wireless communication

UNIT - I**Multiple Input Multiple Output (MIMO) Communications:**

Spatial Multiplexing, Spatial Diversity, Beamforming in MIMO systems, Hybrid Precoding, 5G Communication Landscape, Related work on 5G.

UNIT- II**Introduction to Mobile Wireless Technology Generations:**

5G, WISDOM, GIMVC, Requirements of 5G, standardization of WISDOM, Vision of 5G, WISDOM Concept and Challenges, Cellular D2D Communication, D2D Using Physical Layer Network Coding, Using FFR and Using Cognitive Radio.

SMNAT: Introduction, Network Architecture and the Process, Implementation of SMNAT for In-Band-D2D and Interoperability with WISDOM, Description of Network elements of SMNAT and Call Flow for Session Establishment.

UNIT - III**Radio Wave Propagation for Mm Wave:**

Introduction, Large-scale Propagation Channel Effects, Small-Scale Channel Effects, Spatial Characterization of Multipath and Beam Combining, Outdoor Channel Models, Indoor Channel Models.

UNIT- IV**Higher layer Design Considerations for Mm Wave:**

Challenges when Networking Mm Wave Devices, Beam Adaptation Protocols, Relaying for Coverage Extension, Support for Multimedia Transmission, Multiband considerations, Performance of Cellular networks, Mm Wave Standardization: ECMA-387, IEEE 802.11ad.

UNIT - V**BEYOND 2020**

Major Challenges Surrounding Future Cyber Security, Users Awareness, Spectrum Related Security Issues in CRNs. Challenges for 2020 and beyond, Future Mobile Technologies, High Altitude Stratospheric Platform Station Systems, Human Bond Communications, CONASENSE.

TEXT BOOKS

1. Ramjee Prasad, 5G: 2020 and Beyond, River Publishers
2. T. S. Rappaport, R. W. Heath Jr., R. C. Daniels, and J. M. Murdock, Millimeter Wave Wireless Communication, Pearson Education, 2015.

REFERENCE BOOKS

1. M. Manish, G. Devendra, P. Pattanayak, and N. Ha, 5G and Beyond Wireless Systems PHY Layer Perspective, Springer Series in Wireless Technology
2. M. Vaezi, Z. Ding, and H. V. Poor, Multiple Access techniques for 5G Wireless Networks and Beyond, Springer Nature, Switzerland, 2019

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. Tech. (ECE)

ENGLISH FOR RESEARCH PAPER WRITING (Audit Course - I & II)

Prerequisite: None

Course objectives: Students will be able to:

- Understand that how to improve your writing skills and level of readability
- Learn about what to write in each section
- Understand the skills needed when writing a Title Ensure the good quality of paper at very first-time submission

UNIT- I:

Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

UNIT- II:

Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction

UNIT- III:

Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.

UNIT- IV:

key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature,

UNIT- V:

skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions. useful phrases, how to ensure paper is as good as it could possibly be the first- time submission

TEXT BOOKS/ REFERENCES:

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman's book.
4. Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. Tech. (ECE)

DISASTER MANAGEMENT (Audit Course - I & II)

Prerequisite: None

Course Objectives: Students will be able to

- learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.
- critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
- develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
- critically understand the strengths and weaknesses of disaster management approaches,
- planning and programming in different countries, particularly their home country or the countries they work in

UNIT- I

Introduction:

Disaster: Definition, Factors and Significance; Difference Between Hazard and Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude.

Disaster Prone Areas in India:

Study of Seismic Zones; Areas Prone to Floods and Droughts, Landslides and Avalanches; Areas Prone to Cyclonic and Coastal Hazards with Special Reference to Tsunami; Post-Disaster Diseases and Epidemics

UNIT- II

Repercussions of Disasters and Hazards:

Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts and Famines, Landslides and Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks and Spills, Outbreaks of Disease and Epidemics, War and Conflicts.

UNIT- III

Disaster Preparedness and Management:

Preparedness: Monitoring of Phenomena Triggering A Disaster or Hazard; Evaluation of Risk: Application of Remote Sensing, Data from Meteorological and Other Agencies, Media Reports: Governmental and Community Preparedness.

UNIT- IV

Risk Assessment Disaster Risk:

Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co-Operation in Risk Assessment and Warning, People's Participation in Risk Assessment. Strategies for Survival.

UNIT- V

Disaster Mitigation:

Meaning, Concept and Strategies of Disaster Mitigation, Emerging Trends In Mitigation. Structural Mitigation and Non-Structural Mitigation, Programs of Disaster Mitigation in India.

TEXT BOOKS/ REFERENCES:

1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies "New Royal book Company.
2. Sahni, Pardeep Et. Al. (Eds.)," Disaster Mitigation Experiences and Reflections", Prentice Hall of India, New Delhi.
3. Goel S. L., Disaster Administration and Management Text and Case Studies", Deep &Deep Publication Pvt. Ltd., New Delhi.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. Tech. (ECE)**

SANSKRIT FOR TECHNICAL KNOWLEDGE (Audit Course - I & II)

Prerequisite: None

Course Objectives:

- To get a working knowledge in illustrious Sanskrit, the scientific language in the world
- Learning of Sanskrit to improve brain functioning
- Learning of Sanskrit to develop the logic in mathematics, science & other subjects enhancing the memory power
- The engineering scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature

Course Outcomes: Students will be able to

- Understanding basic Sanskrit language
- Ancient Sanskrit literature about science & technology can be understood
- Being a logical language will help to develop logic in students

UNIT-I:

Alphabets in Sanskrit,

UNIT-II:

Past/Present/Future Tense, Simple Sentences

UNIT-III:

Order, Introduction of roots,

UNIT-IV:

Technical information about Sanskrit Literature

UNIT-V:

Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics

TEXT BOOKS/ REFERENCES:

1. "Abhyaspustakam" – Dr. Vishwas, Samskrita-Bharti Publication, New Delhi
2. "Teach Yourself Sanskrit" Prathama Deeksha-Vempati Kutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication
3. "India's Glorious Scientific Tradition" Suresh Soni, Ocean books (P) Ltd., New Delhi.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. Tech. (ECE)

VALUE EDUCATION (Audit Course - I & II)

Prerequisite: None

Course Objectives: Students will be able to

- Understand value of education and self- development
- Imbibe good values in students
- Let the should know about the importance of character

Course outcomes: Students will be able to

- Knowledge of self-development
- Learn the importance of Human values
- Developing the overall personality

UNIT-I:

Values and self-development –Social values and individual attitudes. Work ethics, Indian vision of humanism. Moral and non- moral valuation. Standards and principles. Value judgements

UNIT-II:

Importance of cultivation of values. Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness. Honesty, Humanity. Power of faith, National Unity. Patriotism. Love for nature, Discipline

UNIT-III:

Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline, Punctuality, Love and Kindness.

UNIT-IV:

Avoid fault Thinking. Free from anger, Dignity of labour. Universal brotherhood and religious tolerance. True friendship. Happiness Vs suffering, love for truth. Aware of self-destructive habits. Association and Cooperation. Doing best for saving nature

UNIT-V:

Character and Competence –Holy books vs Blind faith. Self-management and Good health. Science of reincarnation, Equality, Nonviolence, Humility, Role of Women. All religions and same message. Mind your Mind, Self-control. Honesty, Studying effectively

TEXT BOOKS/ REFERENCES:

1. Chakroborty, S.K. "Values and Ethics for organizations Theory and practice", Oxford University Press, New Delhi

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. Tech. (ECE)

CONSTITUTION OF INDIA (Audit Course - I & II)

Prerequisite: None

Course Objectives: Students will be able to:

- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
- To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

Course Outcomes: Students will be able to:

- Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
- Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
- Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
- Discuss the passage of the Hindu Code Bill of 1956.

UNIT-I:

History of Making of the Indian Constitution: History Drafting Committee, (Composition & Working),
Philosophy of the Indian Constitution: Preamble, Salient Features.

UNIT-II:

Contours of Constitutional Rights & Duties: Fundamental Rights Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.

UNIT-III:

Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualification, Powers and Functions.

UNIT-IV:

Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Pachayati raj: Introduction, PRI: Zila Pachayat. Elected officials and their roles, CEO Zila Pachayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy.

UNIT-V:

Election Commission: Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

TEXT BOOKS/ REFERENCES:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. Tech. (ECE)

PEDAGOGY STUDIES (Audit Course - I & II)

Prerequisite: None

Course Objectives: Students will be able to:

- Review existing evidence on the review topic to inform programme design and policy making undertaken by the DfID, other agencies and researchers.
- Identify critical evidence gaps to guide the development.

Course Outcomes: Students will be able to understand:

- What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?
- What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?
- How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?

UNIT-I:

Introduction and Methodology: Aims and rationale, Policy background, Conceptual framework and terminology Theories of learning, Curriculum, Teacher education. Conceptual framework, Research questions. Overview of methodology and Searching.

UNIT-II:

Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. Curriculum, Teacher education.

UNIT-III:

Evidence on the effectiveness of pedagogical practices, Methodology for the in-depth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? Theory of change. Strength and nature of the body of evidence for effective pedagogical practices. Pedagogic theory and pedagogical approaches. Teachers' attitudes and beliefs and Pedagogic strategies.

UNIT-IV:

Professional development: alignment with classroom practices and follow-up support, Peer support, Support from the head teacher and the community. Curriculum and assessment, Barriers to learning: limited resources and large class sizes

UNIT-V:

Research gaps and future directions: Research design, Contexts, Pedagogy, Teacher education, Curriculum and assessment, Dissemination and research impact.

TEXT BOOKS/ REFERENCES:

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261.
2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.
3. Akyeamong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.

4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? *International Journal Educational Development*, 33 (3): 272–282.
5. Alexander RJ (2001) *Culture and pedagogy: International comparisons in primary education*. Oxford and Boston: Blackwell.
6. Chavan M (2003) *Read India: A mass scale, rapid, 'learning to read' campaign*.
7. www.pratham.org/images/resource%20working%20paper%202.pdf.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. Tech. (ECE)**

STRESS MANAGEMENT BY YOGA (Audit Course - I & II)

Prerequisite: None

Course Objectives:

- To achieve overall health of body and mind
- To overcome stress

Course Outcomes: Students will be able to:

- Develop healthy mind in a healthy body thus improving social health also
- Improve efficiency

UNIT-I:

Definitions of Eight parts of yog. (Ashtanga)

UNIT-II:

Yam and Niyam.

UNIT-III:

Do`s and Don`t`s in life.

- i) Ahinsa, satya, astheya, bramhacharya and aparigraha
- ii) Shaucha, santosh, tapa, swadhyay, ishwarpranidhan

UNIT-IV:

Asan and Pranayam

UNIT-V:

- i) Various yog poses and their benefits for mind & body
- ii) Regularization of breathing techniques and its effects-Types of pranayam

TEXT BOOKS/ REFERENCES:

1. 'Yogic Asanas for Group Training-Part-I': Janardan Swami Yogabhyasi Mandal, Nagpur
2. "Rajayoga or conquering the Internal Nature" by Swami Vivekananda, Advaita Ashrama (Publication Department), Kolkata

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. Tech. (ECE)

PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS
(Audit Course - I & II)

Prerequisite: None

Course Objectives:

- To learn to achieve the highest goal happily
- To become a person with stable mind, pleasing personality and determination
- To awaken wisdom in students

Course Outcomes: Students will be able to

- Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life
- The person who has studied Geeta will lead the nation and mankind to peace and prosperity
- Study of Neetishatakam will help in developing versatile personality of students

UNIT-I:

Neetisatakam-Holistic development of personality

- Verses- 19,20,21,22 (wisdom)
- Verses- 29,31,32 (pride & heroism)
- Verses- 26,28,63,65 (virtue)

UNIT-II:

Neetisatakam-Holistic development of personality

- Verses- 52,53,59 (don't's)
- Verses- 71,73,75,78 (do's)

UNIT-III:

Approach to day to day work and duties.

- Shrimad Bhagwad Geeta: Chapter 2-Verses 41, 47,48,
- Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23, 35,
- Chapter 18-Verses 45, 46, 48.

UNIT-IV:

Statements of basic knowledge.

- Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62, 68
- Chapter 12 -Verses 13, 14, 15, 16,17, 18
- Personality of Role model. Shrimad Bhagwad Geeta:

UNIT-V:

- Chapter2-Verses 17, Chapter 3-Verses 36,37,42,
- Chapter 4-Verses 18, 38,39
- Chapter18 – Verses 37,38,63

TEXT BOOKS/ REFERENCES:

1. "Srimad Bhagavad Gita" by Swami Swarupananda Advaita Ashram (Publication Department), Kolkata.
2. Bhartrihari's Three Satakam (Niti-sringar-vairagya) by P. Gopinath, Rashtriya Sanskrit Sansthanam, New Delhi.