JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
ANANTHAPURAMU (A.P.)
COURSE STRUCTURE AND SYLLABUS
(For Affiliated Engineering Colleges w.e.f. 2017-18 Admitted Batch)
M.Tech-ECE-Digital Systems and Computer Electronics (DSCE)

M.Tech I Semester

S.No	Subject Code	Subject	L	T	P	C
1.	17D06101	Structural Digital System Design	4	-	-	4
2.	17D06102	Advanced Computer Networks	4	-	-	4
3.	17D06103	Advanced Computer Architecture	4	-	-	4
4.	17D06104	Advanced Microprocessors and Microcontrollers	4	-		4
5.	17D06105 17D06106 17D06107	**Elective-I** a. Advanced Operating Systems b. Distributed Embedded Computing c. Pattern Recognition and Computer Vision	3	-	-	3
6.	17D06108 17D06109 17D06110	**Elective-II** a. Advanced Digital Signal Processing b. Test and Testability c. Fuzzy Systems and Neural Networks	3	-	-	3
7.	17D06111	Structural Digital System Design Lab	-	-	3	2
8.	17D06112	Computer Networks Lab	-	-	3	2
		Total	**22**	**-**	**06**	**26**

M.Tech II Semester

S.No	Subject Code	Subject	L	T	P	C
1.	17D06201	Embedded System Design	4	-	-	4
2.	17D06202	CPLD & FPGA Architectures and Applications	4	-	-	4
3.	17D06203	Linux Programming and OOPs	4	-	-	4
4.	17D06204	Sensors and Actuators	4	-		4
5.	17D06205 17D06206 17D06207	**Elective-III** a. Internet Protocols b. MEMS& Its Applications c. System on Chip Design	3	-	-	3
6.	17D06208 17D06209 17D06210	**Elective-IV** a. Network Security and Cryptography b. Digital Image and Video Processing c. Low Power VLSI Design	3	-	-	3
7.	17D06211	Linux Programming and OOPs Lab	-	-	3	2
8.	17D06212	CPLD & FPGA Lab	-	-	3	2
		Total	**22**	**-**	**06**	**26**

M.Tech. II YEAR   (III Semester)

S. No	Course Code	Subject	L	T	P	C
1.	17D20301 17D20302 17D20303	Elective – V (Open Elective) 1. Research Methodology 2. Human Values & Professional Ethics 3. Intellectual Property Rights	4	---	---	4
2.	17D06301	ELECTIVE – VI (MOOCs)	--	---	---	--
3.	17D06302	Comprehensive Viva Voce	--	---	---	2
4.	17D06303	Seminar	--	---	---	2
5.	17D06304	Teaching Assignment	--	---	---	2
6.	17D06305	Project Work Phase I	--	---	---	4
		Total	4			14

M.Tech. II YEAR   (IV Semester)

S. No	Course Code	Subject	L	T	P	C
1.	17D06401	Project Work Phase II	--	---	---	12
		Total				**12**

Project Viva Voce Grades:

A: Satisfactory

B: Not Satisfactory

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M.Tech I year I Semester (DSCE)	L	T	P	C
	4	0	0	4

(17D06101) STRUCTURED DIGITAL SYSTEM DESIGN

Course Objective:
- To study about structural functionality of different Digital blocks (Both combinational and Sequential)
- To provide an exposure to ASM charts, their notations and their realizations.
- To provide an exposure to VHDL and different styles of modeling using VHDL.
- To introduce concept of micro programming and study issues related to micro programming

Course Outcome:
After Completion of this course students will be able to
- Understand structural functionality of different digital blocks
- Represent and Realize their designs in ASM charts
- Represent their designs in different modelling styles by using VHDL
- Understand concept of Micro program and issues related to micro programming

UNIT-1
BUILDING BLOCKS FOR DIGITAL DESIGN: Multiplexer, Demultiplexer, Decoder, Encoder, Comparator, Adder, ALU, Carry-look-ahead adder.
BUILDING BLOCKS WITH MEMORY: Clocked building blocks, register building blocks, RAM, ROM, PLA, PAL, Timing devices.

UNIT -II
DESIGN METHODS: Elements of design style, top-down design, separation of controller and architecture, refining architecture, and control algorithm, Algorithmic State Machines, ASM chart notations.

UNIT-III
REALISING ASMS - Traditional synthesis from ASM chart, multiplexer controller method, one-shot method, ROM based method.
ASYNCHRONOUS INPUTS AND RACES - Asynchronous ASMs, Design for testability, test vectors, fault analysis tools.

UNIT-IV
MICROPROGRAMED DESIGN: Classical Microprogramming with Modem Technology; Enhancing the Control Unit; The 2910 Microprogram Sequencer; Choosing a Microprogram Memory; A Development System for Microprogramming; Designing a Microprogrammed Minicomputer

UNIT-V
MODELLING WITH VHDL: CAD tools, simulators, schematic entry, synthesis from VHDL.
DESIGN CASE STUDIES: Single pulse, system clock, serial to parallel data conversion, traffic light controller.

TEXT BOOKS:
1. Franklin P. Prosser and David E. Winkel, "The Art of Digital Design", Prentice Hall.
2. Roth, "Digital System Design using VHDL", Mc. Graw Hill, 2000

REFERENCE BOOKS:
1. William Fletcher, An Engineering Approach to Digital Design, 1st Edition, Prentice-Hall India, 1997.
2. William J Dally and John W Poulton, Digital Systems Engineering, Cambridge University Press, 2008.
3. Jayaram Bhasker, A VHDL Primer, 3rd edition, Prentice-Hall India, 2009.
4. VHDL for Programmable Logic – Kevin Skahill, Cypress Semiconductors

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M.Tech I year I Semester (DSCE)	L	T	P	C
	4	0	0	4

(17D06102) ADVANCED COMPUTER NETWORKS

Course Objectives:
- This course aims to provide background on relevant computer networks and protocols; Data Link Layer, LAN and Network routing; Transport Layer and internet protocols.
- To provide a broad coverage of some new advanced topics in the field of computer networks (Wireless and Optical Networks; VPN networks; MANETS and wireless Sensor Networks).

Course Outcomes:
On successful completion of this course the students will be able to:
- Understand the main abstract concepts related to the layered communication architecture
- Gain knowledge on principles of computers, network topologies, routing mechanisms.
- Analyze and implement some of the most advanced routing and congestion control algorithms.
- Understand basics and principles of new generation of computer networks (VPN, wireless networks, mobile networksetc).

UNIT I

Review Computer Networks and the Internet: What is the Internet, The Network edge, The Network core, Access Networks and Physical media, ISPs and Internet Backbones, Delay and Loss in Packet-Switched Networks, History of Computer Networking and the Internet - **Foundation of Networking Protocols:** 5-layer TCP/IP Model, 7-layer OSI Model, Internet Protocols and Addressing, Equal-Sized Packets Model: ATM -Networking Devices: Multiplexers, Modems and Internet Access Devices, Switching and Routing Devices, Router Structure.

UNIT II

The Link Layer and Local Area Networks: Link Layer: Introduction and Services, Error-Detection and Error-Correction techniques,- Multiple Access Protocols, Link Layer Addressing, Ethernet, Interconnections: Hubs and Switches, PPP: The Point-lo-Point Protocol, Link Visualization - **Routing and Internetworking:** Network-Layer Routing, Least-Cost-Path algorithms, Non-Least-Cost-Path algorithms, Intradomain Routing Protocols, Interdomain Routing Protocols, Congestion Control at Network Layer

UNIT III

Logical Addressing: IPv4 Addresses, IPv6 Addresses - Internet Protocol: Internetworking, IPv4, IPv6, Transition from IPv4 to IPv6 - Multicasting Techniques and Protocols: Basic Definitions and Techniques, Intradomain Multicast Protocols, Interdomain Multicast Protocols, Node-Level Multicast algorithms - **Transport and End-to-End Protocols:** Transport Layer, Transmission Control Protocol (TCP), User Datagram Protocol (UDP), Mobile Transport Protocols, TCP Congestion Control - Application Layer: Principles of Network Applications, The Web and HTTP, File Transfer: FTP, Electronic Mail in the Internet, Domain Name System (DNS), P2P File Sharing, Socket Programming with TCP and UDP, Building a Simple Web Server

UNIT IV

Wireless Networks and Mobile IP: Infrastructure of Wireless Networks, Wireless LAN Technologies. IEK1: S02.11 Wireless Standard, Cellular Networks, Mobile IP, Wireless Mesh Networks (WMNs) - **Optical Networks and WDM Systems:** Overview of Optical Networks, Basic Optical Networking Devices, Large-Scale Optical Switches, Optical Routers, Wavelength Allocation in Networks, Case Study: An All-Optical Switch

UNIT V

VPNs, Tunneling and Overlay Networks: Virtual Private Networks (VPNs), Multiprotocol Label Switching (MPLS), Overlay Networks-VoIP and Multimedia Networking: Overview of IP Telephony, VoIP Signaling Protocols, Real-Time Media Transport Protocols, Distributed Multimedia Networking, Stream Control Transmission Protocol - **Mobile A-Hoc Networks:** Overview of Wireless Ad-Hoc Networks, Routing in Ad-Hoc Networks, Routing Protocols for Ad-Hoc Networks - **Wireless Sensor Networks:** Sensor Networks and Protocol Structures, Communication Energy Model, Clustering Protocols, Routing Protocols

TEXT BOOKS:
1. Computer Networking: A Top-Down Approach Featuring the Internet, James E Kuro.se, Keith W. Ross, Third Edition, Pearson Education, 2007
2. Computer and Communication Networks, Nader F. Mir, Pearson Education. 2007

REFERENCE BOOKS:
1. Data Communications and Networking, Behrouz A. Forouzan, Fourth Edition, Tata McGraw Hill, 2007
2. Guide to Networking Essentials, Greg Tomsho.EdTittel, David Johnson, Fifth Edition, Thomson
3. An Engineering Approach to Computer Networking ,S.Keshav. Pearson Education.
4. Campus Network Design Fundamentals, Diane Teare. Catherine Paquet, Pearson Education (CISCO Press)
5. Computer Networks, Andrew S. Tanenbaum, Fourth Edition, Prentice Hall.

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M.Tech I year I Semester (DSCE)   L   T   P   C
                                       4   0   0   4

(17D06103) ADVANCED COMPUTER ARCHITECTURE

Course objective:
- To study about various parallel computer models and also to study the program and network properties
- To study the concepts of pipelining and super scalar techniques.
- To study about architectures of multi processors and multi computers

Course *Outcome:*

After completion of the course the students will be able to
- Know about different parallel computer models and their network properties.
- Understand about different concepts related to pipelining and super scalar techniques.
- Get complete knowledge regarding multi processors and multi computers.

UNIT - I

Parallel Computer Models – System attributes to performance, Multiprocessors and Multicomputers, Classifications of Architectures, Multivector and SIMD Computers, Architecture development tracks

UNIT - II

Program and Network Properties- Conditions for parallelism, Program partitioning and Scheduling, Program flow mechanisms, System interconnect architectures, Performance metrics and measures, Parallel Processing Applications

UNIT-III

Processors and Memory Hierarchy- Advanced Processor Technology, Superscalar and Vector processors, Memory hierarchy technology, Virtual Memory, Backplane bus systems, Cache memory organizations, Shared memory organizations

UNIT - IV

Pipelining and Superscalar Techniques Linear Pipeline processors, Nonlinear pipeline processors, Instruction pipeline design, Arithmetic pipeline design, Superscalar and Super Pipeline Design

UNIT- V

Multiprocessors and Multicomputers Multiprocessor System Interconnects, Cache Coherence and Synchronization mechanisms, Three generations of Multicomputers, Message passing mechanisms, Vector Processing principles, Principles of Multithreading

TEXT BOOKS:
1. Hwang kai, "Advanced Computer Architecture", McGraw-Hill, 2001.
2. Patterson, Davidand Hennessy John, Morgn Kaufmann, "Computer Architecture",2001.

REFERENCE BOOKS:

1. William Stallings, Computer Organization and Architecture, 8th Edition, Prentice-Hall India, 2010.
2. David A Patterson and John L. Hennesey, Computer Organization and Design, 4th Edition, Elsevier India, 2011.
3. Andrew S Tanenbaum and James R Goodman, Structured Computer Organization, 5th Edition PrenticeHall India, 2009.

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M.Tech I year I Semester (DSCE)

	L	T	P	C
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(17D06104) ADVANCED MICROPROCESSORS AND MICROCONTROLLERS

OBJECTIVES:
- To expose the students to the fundamentals of microprocessor architecture.
- To introduce the advanced features in microprocessors and microcontrollers.
- To enable the students to understand various microcontroller architectures.

OUTCOME:
The student will be able to work with suitable microprocessor / microcontroller for a specific real world application

UNIT I
MICROPROCESSOR ARCHITECTURE
Instruction Set – Data formats –Addressing modes – Memory hierarchy –register file – Cache – Virtual memory and paging – Segmentation- pipelining –the instruction pipeline – pipeline hazards –instruction level parallelism – reduced instruction set –Computer principles – RISC versus CISC.

UNIT II
HIGH PERFORMANCE CISC ARCHITECTURE – PENTIUM
CPU Architecture- Bus Operations – Pipelining – Brach predication – floating point unit- Operating Modes –Paging – Multitasking – Exception and Interrupts – Instruction set – addressing modes – Programming the Pentium processor.

UNIT III
HIGH PERFORMANCE RISC ARCHITECTURE – ARM
Organization of CPU – Bus architecture –Memory management unit - ARM instruction set- Thumb Instruction set- addressing modes – Programming the ARM processor.

UNIT IV
MOTOROLA 68HC11 MICROCONTROLLERS
Instruction set addressing modes – operating modes- Interrupt system- RTC-Serial Communication Interface – A/D Converter PWM and UART.

UNIT V
PIC MICROCONTROLLER
CPU Architecture – Instruction set – interrupts- Timers- I2C Interfacing –UART- A/D Converter –PWM and introduction to C-Compilers.
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TEXT BOOKS:
1. Daniel Tabak , „" Advanced Microprocessors" McGraw Hill.Inc., 1995
2. James L. Antonakos , " The Pentium Microprocessor „" Pearson Education , 1997.
3. Steve Furber , „" ARM System –On –Chip architecture "Addision Wesley , 2000.
4. Gene .H.Miller ." Micro Computer Engineering ," Pearson Education , 2003.
5. John .B.Peatman , " Design with PIC Microcontroller , Prentice hall, 1997.

REFERENCE BOOKS:

1. James L.Antonakos ," An Introduction to the Intel family of Microprocessors „" Pearson Education 1999.
2. Barry.B.Brey," The Intel Microprocessors Architecture , Programming and Interfacing " , PHI,2002.
3. Valvano "Embedded Microcomputer Systems" Thomson Asia PVT LTD first reprint 2001.
     Readings: Web links www.ocw.nit.edu www.arm.com

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M.Tech I year I Semester (DSCE)

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3	0	0	3

(17D06105) ADVANCED OPERATING SYSTEMS
Elective-I

Course Objective:

- To Study in detail about kernel structures associated with various Operating systems
- To Study in detail about various system calls, statements and their arguments associated with Unix.
- To Study in detail about various system calls, statements and their arguments associated with Linux

Course Outcome:

 After completion of the course, students will be able to

- Get complete knowledge regarding different types of operating systems and their Kernel structures.
- To work effectively on Unix Platform
- To work effectively on Linux Platform

UNIT I
INTRODUCTION
General Overview of the System : History – System structure – User perspective – Operating system services – Assumptions about hardware. Introduction to the Kernel : Architecture of the UNIX operating system – Introduction to system concepts. The Buffer Cache: Buffer headers – Structure of the buffer pool – Scenarios for retrieval of a buffer – Reading and writing disk blocks – Advantages and disadvantages of the buffer cache.

UNIT II
UNIX I*:* Overview of UNIX system, Structure, files systems, type of file, ordinary & Special files, file permissions, Introduction to shell.UNIX basic commands & command arguments, Standard input / output Input / output redirection, filters and editors,System calls related file structures, input / output process creation & termination.

UNIT III
INTERPROCESS COMMUNICATION IN UNIX: Introduction, file and record locking, Client – Server example, pipes, FIFOs, Streams & Messages, Name Speces, Systems V IPC, Message queues, Semaphores, Shared Memory, Sockets & TLI.

UNIT IV
INTRODUCTION TO NETWORKS AND NETWORK PROGRAMMING IN UNIX: Network Primer, TCP/IP, Internet Protocols, Socket Programming, Introduction & overview, UNIX domain protocols, Socket Addresses, Elementary Socket system calls, Simple examples.

UNIT V
LINUX: Introduction to LINUX System, Editors and Utilities, Type of Shells,Shell Operations, File structure, File Management, Operations. Memory Management Policies: Swapping – Demand paging. The I/O Subsystem: Driver Interface – Disk Drivers – Terminal Drivers– Streams – Inter process communication.

TEXT BOOKS:
1. Maurice J.Bach, "The design of the UNIX Operating Systems", PHI
2. Kernighan & Pike, "The UNIX Programming Environment", PHI

REFERENCE BOOKS:
1. W.Richard Stevens, "UNIX Network Programming", PHI, 1998.
2. Richard Peterson, "The Complete reference LINUX", TMH
3. Ritchie & Yates, "UNIX User Guide".

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M.Tech I year I Semester (DSCE)

L	T	P	C
3	0	0	3

(17D06106) DISTRIBUTED EMBEDDED COMPUTING
Elective-I

OBJECTIVES:
- To expose the students to the fundamentals of Network communication technologies.
- To teach the fundamentals of Internet
- To study on Java based Networking
- To introduce network routing Agents
- To study the basis for network on-chip technologies

OUTCOMES: At the completion of the course, students will be able to:
- Explain the fundamentals of Network communication technologies, internet, and Java based networking.
- Analyze the analog/digital co-design of distributed embedded computing architecture.

UNIT I
THE HARDWARE INFRASTRUCTURE
Broad Band Transmission facilities – Open Interconnection standards – Local Area Networks – Wide Area Networks – Network management – Network Security – Cluster computers.

UNIT II
INTERNET CONCEPTS
Capabilities and limitations of the internet – Interfacing Internet server applications to corporate databases HTML and XML Web page design and the use of active components.

UNIT III
DISTRIBUTED COMPUTING USING JAVA
IO streaming – Object serialization – Networking – Threading – RMI – multicasting – distributed databases – embedded java concepts – case studies.

UNIT IV
EMBEDDED AGENT
Introduction to the embedded agents – Embedded agent design criteria – Behaviour based, Functionality based embedded agents – Agent co-ordination mechanisms and benchmarks embedded-agent. Case study: Mobile robots.

UNIT V
EMBEDDED COMPUTING ARCHITECTURE
Synthesis of the information technologies of distributed embedded systems – analog/digital co-design – optimizing functional distribution in complex system design – validation and fast prototyping of multiprocessor system-on-chip – a new dynamic scheduling algorithm for real-time multiprocessor systems.

TEXT BOOKS:
1. Dietel&Dietel, "JAVA how to program", Prentice Hall 1999.
2. SapeMullender, "Distributed Systems", Addison-Wesley, 1993.

REFERENCE BOOKS
1. George Coulouris and Jean Dollimore, "Distributed Systems – concepts and design",Addison – Wesley 1988.
2. "Architecture and Design of Distributed Embedded Systems", edited by Bernd Kleinjohann C-lab, Universitat Paderborn, Germany, Kluwer Academic Publishers, Boston, April 2001, 248 pp

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M.Tech I year I Semester (DSCE)	L	T	P	C
	3	0	0	3

(17D06107) PATTERN RECOGNITION AND COMPUTER VISION

OBJECTIVES :
- To create an appropriate knowledge base to machine learning and statistical pattern recognition. To provide basic ideas and techniques underlying the design of different artificial intelligence models.
- To provide an overview of the state-of-art algorithms used in machine learning.
- To study different optimization based methods and use the same for wide range of applications.

OUTCOMES:
- To be able to design feature recognition systems tailored to specific applications.
- To design and develop classifiers**.**
- To design and develop machine learning systems.

UNIT I
INTRODUCTION
Definition of learning systems- Goals and applications of machine learning- Aspects of developing a learning system- training data- concept representation- Function approximation.

UNIT II
ARTIFICIAL NEURAL NETWORKS
Neurons and biological motivation- Linear threshold units - Perceptrons- representational limitation and gradient descent training - Multilayer networks and back propagation - Hidden layers and constructing intermediate - distributed representations.

UNIT III
ARTIFICIAL INTELLIGENCE MODELS
Linear models: polynomial regression- over-fitting- model selection- logistic regression- Naive Bayes- Non-linear models: decision trees- instance-based learning- neural networks- Support Vector Machines: Maximum margin linear separators- Quadratic programming solution - maximum margin separators- Kernels for learning non-linear functions.

UNIT IV
GAME THEORY
Fundamentals-Conflict- Strategy and Games- Game theory- The Prisoner‟s Dilemma- Games in normal and extensive forms – Representation- Examination- Examples.

UNIT V
OPTIMIZATION METHODS
Heuristic and Meta - heuristic search techniques - stochastic search methods-social algorithms: ant colony, artificial bee colony, particle swarm optimization-applications.

TEXT BOOKS:
1. Christopher Bishop, "Pattern Recognition and Machine Learning", Springer, 2006.
2. Richard Duda, Peter Hart and David Stork, "Pattern Classification", 2nd Edition, Wiley, 2001.
3. Tom Mitchell, "Machine Learning", McGraw-Hill, 1997.

REFERENCE BOOKS:

1. Russel, S.J. and Norvig, P., "Artificial Intelligence a Modern Approach", 2nd Edition, New Jersey, Prentice Hall, 2002
2. Rich, E. and Knight, K. "Artificial Intelligence", 2nd Edition, New York: McGraw-Hill, 1991.
3. E. N. Barron, "Game Theory: An Introduction", Wiley India Pvt Ltd., 2009.
4. Rajiv J. Kapadia, "Optimisation in Signal and Image Processing", John Wiley & Sons, 2010.

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M.Tech I year I Semester (DSCE)   **L   T   P   C**
                                                          3   0   0   3

(17D06108) ADVANCED DIGITAL SIGNAL PROCESSING
Elective-II

Course outcomes: Students will be able to
- Analyze discrete-time systems in both time & transform domain and also through pole-zero placement.
- Analyze discrete-time signals and systems using DFT and FFT.
- Design and implement digital finite impulse response (FIR) filters.
- Design and implement digital infinite impulse response (IIR) filters.
- Understand and develop multirate digital signal processing systems.

UNIT –I:
Review of DFT, FFT, IIR Filters and FIR Filters:
Multi Rate Signal Processing: Introduction, Decimation by a factor D, Interpolation by a factor I, Sampling rate conversion by a rational factor I/D, Multistage Implementation of Sampling Rate Conversion, Filter design & Implementation for sampling rate conversion.

UNIT –II:
Applications of Multi Rate Signal Processing:
Design of Phase Shifters, Interfacing of Digital Systems with Different Sampling Rates, Implementation of Narrow Band Low Pass Filters, Implementation of Digital Filter Banks, Sub-band Coding of Speech Signals, Quadrature Mirror Filters, Trans-multiplexers, Over Sampling A/D and D/A Conversion.

UNIT -III:
Non-Parametric Methods of Power Spectral Estimation: Estimation of spectra from finite duration observation of signals, Non-parametric Methods: Bartlett, Welch & Blackman- Tukey methods, Comparison of all Non-Parametric methods

UNIT –IV:
Implementation of Digital Filters:
Introduction to filter structures (IIR & FIR), Frequency sampling structures of FIR, Lattice structures, Forward prediction error, Backward prediction error, Reflection coefficients for lattice realization, Implementation of lattice structures for IIR filters, Advantages of lattice structures.

UNIT –V:
Parametric Methods of Power Spectrum Estimation: Autocorrelation & Its Properties,Relation between auto correlation & model parameters, AR Models - Yule-Walker & Burg Methods, MA & ARMA models for power spectrum estimation, Finite word length effect in IIR digital Filters – Finite word-length effects in FFT algorithms.

TEXT BOOKS:
1. Digital Signal Processing: Principles, Algorithms & Applications - J.G.Proakis& D. G. Manolakis, 4th Ed., PHI.
2. Discrete Time Signal Processing - Alan V Oppenheim & R. W Schaffer, PHI.
3. DSP – A Practical Approach – Emmanuel C. Ifeacher, Barrie. W. Jervis, 2 Ed., Pearson Education.

REFERENCE BOOKS:
1. Modern Spectral Estimation: Theory & Application – S. M .Kay, 1988, PHI.
2. Multi Rate Systems and Filter Banks – P.P.Vaidyanathan – Pearson Education.
3. Digital Signal Processing – S.Salivahanan, A.Vallavaraj, C.Gnanapriya, 2000,TMH
4. Digital Spectral Analysis – Jr. Marple

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M.Tech I year I Semester (DSCE)	L	T	P	C
	3	0	0	3

(17D06109) TEST AND TESTABILITY
Elective-II

Course Objective:
- To Study about different types of faults associated with logic circuits and types of testing by employing fault models to the logic circuits.
- To study in detail about different methods of simulation and algorithms associated with testing.
- To get clear knowledge regarding working BIST, different parameter and techniques associated with BIST.

Course Outcome:
After completion of this course the students will be able to
- Understand different types of faults associated with logic circuits and types of testing by employing fault models to the logic circuits.
- Study about different methods of simulation and algorithms associated with testing.
- Get complete knowledge about different methods of simulation and algorithms associated with testing.

UNIT-I: Introduction to Testing
Testing Philosophy, Role of Testing, Digital and Analog VLSI Testing, VLSI Technology Trends affecting Testing, Types of Testing, Fault Modeling: Defects, Errors and Faults, Functional Versus Structural Testing, Levels of Fault Models, Single Stuck-at Fault.

UNIT-II: Logic and Fault Simulation
Simulation for Design Verification and Test Evaluation, Modeling Circuits for Simulation, Algorithms for True-value Simulation, Algorithms for Fault Simulation.

UNIT -III: Testability Measures
SCOAP Controllability and Observability, High Level Testability Measures, Digital DFT and Scan Design: Ad-Hoc DFT Methods, Scan Design, Partial-Scan Design, Variations of Scan.

UNIT-IV: Built-In Self-Test
The Economic Case for BIST, Random Logic BIST: Definitions, BIST Process, Pattern Generation, Response Compaction, Built-In Logic Block Observers, Test-Per-Clock, Test-Per-Scan BIST Systems, Circular Self Test Path System, Memory BIST, Delay Fault BIST.

UNIT-V: Boundary Scan Standard
Motivation, System Configuration with Boundary Scan: TAP Controller and Port, Boundary Scan Test Instructions, Pin Constraints of the Standard, Boundary Scan Description Language: BDSL Description Components, Pin Descriptions.

TEXT BOOKS:
1. M.L. Bushnell, V. D. Agrawal, "Essentials of Electronic Testing for Digital, Memory and Mixed Signal VLSI Circuits", Kluwer Academic Pulishers.
2. M. Abramovici, M.A.Breuer and A.D Friedman, "Digital Systems and Testable Design", Jaico Publishing House.

REFERENCE BOOKS:
1. P.K. Lala, "Digital Circuits Testing and Testability", Academic Press.

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M.Tech I year I Semester (DSCE)	L	T	P	C
	3	0	0	3

(17D06110) FUZZY SYSTEMS AND NEURAL NETWORKS
Elective-II

Course Objective:
- To analyze basic neural computational models.
- To get in detail knowledge regarding different algorithms related to neural learning
- To study about different issues related probability and fuzziness and different types of fuzzy associative memories.

Course Outcome:
After completion of this course the students will be able to
- Understand functioning of basic neural computational models.
- Get complete knowledge regarding different algorithms related to neural learning
- Understand about different issues related probability and fuzziness and different types of fuzzy associative memories.

UNIT-I
INTRODUCTION: History of Neural Networks, Structure and functions of biological and artificial neuron, Neural network architectures, learning methods, evaluation of neural networks. McCulloch- Pitts neuron model, perception learning, Delta learning, Windrow- Hoff learning rules, linear seperability, Adaline, Modifications.

UNIT - II
SUPERVISED LEARNING: Architectures, Madalines, Back propagation algorithm, importance of learning parameter and momentum term, radial basis functions.
UNSUPERVISED LEARNING : Winner – Take – all learning, out star learning, learning vector quantizers, Counter propagation networks, Kohonen self – organizing networks, Grossberg layer, adaptive resonance theory, Hamming net.

UNIT – III
ASSOCIATIVEMEMORIES: Hebbian learning rule, continues and discrete Hopfild networks, recurrent and associative memory, Boltzman machines, Bi-directional associative memory

UNIT-IV
FUZZINESS VS PROBABILITY: Fuzzy Sets & Systems; The Geometry of Fuzzy sets; The Fuzzy Entropy Theorem; The Subsethood Theorem; The Entropy Subsethood Theorem.

UNIT - V
FUZZY ASSOCIATIVE MEMORIES: Fuzzy & Neural Function Estimators; Fuzzy Hebbian FAMs; Adaptive FAMs.

TEXT BOOKS:

1. J.M. Zurada, "Introduction to Artificial Neural Systems" - Jaico Publishing House, Bombay,2001.
2. KishanMehrotra ,Chelkuri. K.Mohan, Sanjay Ranka, "Elements of Artificial Neural Networks", Penram International

REFERENCE BOOKS:

1. S.N Sivanandham, S. sumathi, S.N.Deepa,"Introduction to Neural networks using matlab 6.0", Tata McGraw Hill, New Delhi, 2005.
2. B.Kosko, "Neural Networks & Fuzzy Systems", Prentice Hall (India) Ltd., 1992.

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(17D06111) STRUCTURAL DIGITAL SYSTEM DESIGN   LABORATORY

Course Objective:
- To understand about VHDL and Verilog Programming in all available styles.
- To understand differences between Verilog and VHDL.
- To represent the different digital blocks in verilog and VHDL in all available styles of modelling

Course Outcome:

After completion of this course the students will be able to understand
- Different modeling styles available in VHDL and Verilog and difference between them
- Difference between verilog and VHDL
- Representation of different digital modules in different modelling styles available in VHDL and Verilog

Using VHDL or Verilog do the following experiments
1. Design of 4-bit adder / subtractor
2. Design of Booth Multiplier
3. Design of 4-bit ALU
4. Design SISO, SIPO, PISO, PIPO Registers
5. Design of Ripple, Johnson and Ring counters
6. Design of MIPS processor
7. Design of Washing machine controller
8. Design of Traffic Light Controller
9. Design "1010" pattern detector using Mealy state Machine
10. Design "1100" recursive pattern detector using Moore state Machine
11. Design simple Security System Using FSM/ASM
12. Mini Project

Tools Required:
 VHDL or VERILOG

Hardware Required:
Computers with latest Configuration.

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(17D06112) COMPUTER NETWORKS LABORATORY

Course Objectives:
- To learn the concepts of fundamental computer network protocols
- To implement important computer networking protocols in a high – level programming language.
- To understand the fundamentals of Cryptography through practical implementation.
- To become acquainted with some of the important GUI based computer networking tools/SIMULATORS.

Course Outcomes:
After completing the course the students are able to:
- Simulate OSI model
- Implement routing, congestion control and error detection algorithms.
- Able to use the network simulation tools.
- Analyze the network performance based on simulation results.

PART-A

Implement using any high – level programming language:

1. Program to simulate OSI model
2. Write a program for error detecting code using CRC-CCITT (16-bits).
3. Write a program for frame sorting technique used in buffers.
4. Write a program for distance vector algorithm to find suitable path for transmission.
5. Implementation and study of Goback-N and selective repeat protocols
6. Write a program for congestion control using Leaky bucket algorithm.
7. Write a program for simple RSA algorithm to encrypt and decrypt the data.
8. Write a program for Hamming Code generation for error detection and correction.
9. Implementation of Data encryption and decryption

PART-B

1. Study of Network simulators like NS2/Glomosim/OPNET .
2. Simulate a three nodes point-to-point network with duplex links between them. Set the queue size vary the bandwidth and find the number of packets dropped.
3. Simulate a four node point-to-point network, and connect the links as follows: n0-n2, n1-n2 and n2-n3. Apply TCP agent between n0-n3 and UDP n1-n3. Apply relevant applications over TCP and UDP agents changing the parameter and determine the number of packets by TCP/UDP.
4. Simulate the different types of Internet traffic such as FTP a TELNET over a network and analyze the throughput.
5. Simulate the transmission of ping messaged over a network topology consisting of 6 nodes and find the number of packets dropped due to congestion.
6. Simulate an Ethernet LAN using N-nodes(6-10), change error rate and data rate and compare the throughput.

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(17D06201) EMBEDDED SYSTEM DESIGN

Course Objective:
- To study about current technologies, integration methods and hardware and software design concepts associated with processor in Embedded Systems.
- To study about a simple low power microcontrollers and their applications
- To get detail knowledge regarding testing and hardware software co- design issues pertaining to design of an Embedded System using low power microcontrollers

Course Outcome:
After completion of this course the students will be able to understand
- The issues relating to hardware and software design concepts associated with processor in Embedded Systems.
- The concept of low power microcontrollers.
- The hardware software co- design issues pertaining to design of an Embedded System using low power microcontrollers.

UNIT – I
Introduction to Embedded Electronic Systems and Microcontrollers:
An Embedded System-Definition, Embedded System Design and Development Life Cycle, An Introduction to Embedded system Architecture, The Embedded Systems Model, Embedded Hardware:The Embedded Board and the von Neumann Model, Embedded Processors: ISAArchitectureModels, Internal Processor Design, Processor Performance, Board Memory: Read-Only Memory (ROM), Random-Access Memory (RAM), Auxiliary Memory, Memory Management of External Memory and Performance, Approaches to Embedded Systems, Small Microcontrollers, Anatomy of a Typical Small Microcontroller, Small Microcontrollers Memory, Embedded Software, Introduction to small microcontroller (MSP430).

UNIT-II
MSP430 – I:
Architecture of the MSP430 Processor: Central Processing Unit, Addressing Modes, Constant Generator and Emulated Instructions, Instruction Set, Examples, Reflections on the CPU and Instruction Set, Resets, Clock System, Memory and Memory Organization.
Functions, Interrupts, and Low-Power Mode: Functions and Subroutines, Storage for Local Variables, Passing Parameters to a Subroutine and Returning a Result, Mixing C and Assembly Language, Interrupts, Interrupt Service Routines, Issues Associated with Interrupts, Low-Power Modes of Operation.

UNIT – III
MSP430 – II:
Digital Input, Output, and Displays: Parallel Ports, Digital Inputs, Switch Debounce, Digital Outputs, Interface between Systems, Driving Heavier Loads, Liquid Crystal Displays, Simple Applications of the LCD.
Timers: Watchdog Timer, Timer_A, Timer_A Modes, Timer_B,Timer_B Modes, Setting the Real-Time Clock, State Machines.

UNIT – IV
MSP430 Communication:
Communication Peripherals in the MSP430, Serial Peripheral Interface, SPI with the USI, SPI with the USCI, A Thermometer Using SPI Modes, Inter-integrated Circuit Bus(I²C) and its operations, State Machines for I²C Communication, A Thermometer Using I²C, Asynchronous Serial Communication, Asynchronous Communication with the USCI_A, A Software UART Using Timer_A, Other Types of Communication.

UNIT – V
MSP430 Case Studies:
Introduction to Code Composer studio (CC Studio Ver. 6.1) a tutorial, A Study of blinking LED, Enabling LED using Switches, UART Communication, LCD interfacing, Interrupts, Analog to Digital Conversion, General Purpose input and output ports, I²C.

TEXT BOOKS:
1. Tammy Noergaard "Embedded Systems Architecture: A Comprehensive Guide for Engineers and Programmers", Elsevier(Singapore) Pvt.Ltd.Publications, 2005.
2. John H. Davies "MSP430 Microcontroller Basics",Elsevier Ltd Publications, Copyright 2008.

REFERENCE BOOKS:
1. Manuel Jiménez Rogelio,PalomeraIsidoroCouvertier "Introduction to Embedded SystemsUsing Microcontrollers and the MSP430" Springer Publications, 2014.
2. Frank Vahid, Tony D. Givargis, "Embedded system Design: A Unified Hardware/Software Introduction", John Wily & Sons Inc.2002.
3. Peter Marwedel, "Embedded System Design", Science Publishers, 2007.
4. Arnold S Burger, "Embedded System Design", CMP Books, 2002.
5. Rajkamal, "Embedded Systems: Architecture, Programming and Design", TMH Publications,Second Edition, 2008.

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(17D06202) CPLD AND FPGA ARCHITECTURES AND APPLICATIONS

Course Outcomes

After completion of the course students able to

- Understand the features and architectures of industrial CPLDs with different families.
- Understand the features and architectures of industrial FPGAs with different families.
- Know the programming techniques used in FPGA design methodology.
- Design and implement complex real time digital circuits.

UNIT-I

Introduction to Programmable Logic Devices: Introduction, Simple Programmable Logic Devices – Read Only Memories, Programmable Logic Arrays, Programmable Array Logic, Programmable Logic Devices/Generic Array Logic; Complex Programmable Logic Devices – Architecture of Xilinx Cool Runner XCR3064XL CPLD, CPLD Implementation of a Parallel Adder with Accumulation.

UNIT-II

Field Programmable Gate Arrays: Organization of FPGAs, FPGA Programming Technologies, Programmable Logic Block Architectures, Programmable Interconnects, and Programmable I/O blocks in FPGAs, Dedicated Specialized Components of FPGAs, Applications of FPGAs.

UNIT –III

SRAM Programmable FPGAs: Introduction, Programming Technology, Device Architecture, the Xilinx XC2000, XC3000 and XC4000 Architectures.

UNIT –IV

Anti-Fuse Programmed FPGAs: Introduction, Programming Technology, Device Architecture, TheActel ACT1, ACT2 and ACT3 Architectures.

UNIT –V

Design Applications: General Design Issues, Counter Examples, A Fast Video Controller, A Position Tracker for a Robot Manipulator, A Fast DMA Controller, Designing Counters with ACT devices, Designing Adders and Accumulators with the ACT Architecture.

TEXT BOOKS

1. Field Programmable Gate Array Technology - Stephen M. Trimberger, Springer International Edition.
2. Digital Systems Design - Charles H. Roth Jr, LizyKurian John, Cengage Learning.

REFERENCE BOOKS

1. Field Programmable Gate Arrays - John V. Oldfield, Richard C. Dorf, Wiley India.
2. Digital Design Using Field Programmable Gate Arrays - Pak K. Chan/SamihaMourad, Pearson Low Price Edition.
3. Digital Systems Design with FPGAs and CPLDs - Ian Grout, Elsevier, Newnes.
4. FPGA based System Design - Wayne Wolf, Prentice Hall Modern Semiconductor Design Series.

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(17D06203) LINUX PROGRAMMING AND OOPS

OBJECTIVES:

- To understand and make effective use of Linux utilities and Shell scripting language (bash) to solve Problems.
- To implement in C some standard Linux utilities such as ls, mv, cp etc. using system calls.
- To develop the skills necessary for systems programming including file system programming, process and signal management, and interprocess communication.
- To get a clear understanding of object-oriented concepts.
- To understand object oriented programming through C++

Course Outcomes:

After completion of the course students able to

- Know the importance of Linux towards design of embedded systems
- Creation of programs in the Linux environment
- Understand the concepts of classes, polymorphism and inheritance

Unit -I: Linux Basics: Introduction to Linux, File System of the Linux, General usage of Linux kernel 7 basic commands, Linux users and group, Permissions for file, directory and users, Searching a file & directory, Zipping and unzipping concepts, Editors and Utilities. Memory Management Policies: Swapping – Demand paging.

Unit - II: Linux Utilities-File handling utilities, Security by file permissions, Process utilities, Disk utilities, Networking commands, Filters, Text processing utilities and Backup utilities. Sed-Scripts, Operation, Addresses, Commands, awk-Execution, Fields and Records, Scripts, Operation, Patterns, Actions, Associative Arrays, String and Mathematical functions, System commands in awk, Applications.

Unit - III: Shell programming with Bourne again shell(bash)- Introduction, shell responsibilities, pipes and Redirection, here documents, running a shell script, the shell as a programming language, shell meta characters, file name substitution, shell variables, command substitution, shell commands, the environment, quoting, test command, control structures, arithmetic in shell, shell script examples, interrupt processing, functions, debugging shell scripts.

Unit - IV: Introduction to Object Oriented Programming: Need for Object Oriented Programming - Characteristics of Object Oriented Languages – Comparison of C and C++ - Structures: Structures - Enumerations – Functions: Simple Functions – Passing Arguments to Functions – Returning Values from Functions – Reference Arguments - Overloaded Functions – Recursion – Inline Functions – Default Arguments – Scope and Storage Class – Returning by Reference – const Function Arguments.

Unit - V: Objects and Classes: A Simple Class – C++ Objects as Physical Objects – C++ Objects as Data Types - Constructors – Objects as Function Arguments - Copy Constructor – Structures and Classes – Classes, Objects and Memory - Static class data – Constant Member functions and constant objects - Arrays and Strings: Array Fundamentals – Arrays as Class Member Data – Array of Objects – C-Strings – The Standard C++ String Class.

TEXT BOOKS:
1. Unix System Programming using C++, T. Chan, PHI
2. Robert Lafore, Object Oriented Programming In C++, Fourth Edition, Tech Media, 2002. ISBN 0-672-32308-7

REFERENCE BOOKS: -
1. Beginning Linux Programming, 4th Edition, N. Mathew, R. Stones, Wrox, Wiley India Edition.
2. Unix Concepts and Applications, 4th Edition, Sumitabha Das, TMH
3. Stanley B. Lippman, JoseeLajoie, C++ Prime, Third Edition, Pearson Education.
4. BjarneStroustrup, Programming: Principles and Practice Using C+, Addison Wesley, Pearson Education.

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(17D06204) SENSORS AND ACTUATORS

Objectives
- To introduce the student to some basic principles and techniques of micro sensors and actuators
- understanding basic laws and phenomena on which operation of sensors and actuators-transformation of energy is based,

Outcomes: The student should after the course:
- Have knowledge about of the working principles and architecture of a large number of sensors and their elements.
- Be able to chose and use sensors and equipment for measuring mechanical quantities and temperature.
- Have knowledge about the architecture and working principles of the most common electrical motor types.
- Be able to chose and use electrical drives and actuators.
- Be able to cooperate in a active way with specialists in these areas.

UNIT -I:
Sensors / Transducers:

Principles – Classification – Parameters – Characteristics - Environmental Parameters (EP) – Characterization Mechanical and Electromechanical Sensors: Introduction – Resistive Potentiometer – Strain Gauge – Resistance Strain Gauge – Semiconductor Strain Gauges -Inductive Sensors: Sensitivity and Linearity of the Sensor –Types-Capacitive Sensors:– Electrostatic Transducer– Force/Stress Sensors Using Quartz Resonators – Ultrasonic Sensors

UNIT –II
Thermal Sensors:

Introduction – Gas thermometric Sensors – Thermal Expansion Type Thermometric Sensors – Acoustic Temperature Sensor – Dielectric Constant and Refractive Index thermosensors – Helium Low Temperature Thermometer – Nuclear Thermometer – Magnetic Thermometer – Resistance Change Type Thermometric Sensors –Thermoemf Sensors– Junction Semiconductor Types– Thermal Radiation Sensors –Quartz Crystal Thermoelectric Sensors – NQR Thermometry – Spectroscopic Thermometry – Noise Thermometry – Heat Flux Sensors Magnetic sensors: Introduction – Sensors and the Principles Behind – Magneto-resistive Sensors – Anisotropic Magnetoresistive Sensing – Semiconductor Magnetoresistors– Hall Effect and Sensors – Inductance and Eddy Current Sensors– Angular/Rotary Movement Transducers – Synchros – Synchro-resolvers - Eddy Current Sensors – Electromagnetic Flowmeter – Switching Magnetic Sensors SQUID Sensors

UNIT -III
Radiation Sensors:

Introduction – Basic Characteristics – Types of Photosensistors/Photo detectors– X-ray and Nuclear Radiation Sensors– Fiber Optic Sensors Electro analytical Sensors: Introduction – The Electrochemical Cell – The Cell Potential - Standard Hydrogen Electrode (SHE) – Liquid Junction and Other Potentials –

Polarization – Concentration Polarization-– Reference Electrodes - Sensor Electrodes – Electro ceramics in Gas Media.

UNIT –IV
Smart Sensors:

Introduction – Primary Sensors – Excitation – Amplification – Filters – Converters – Compensation– Information Coding/Processing - Data Communication – Standards for Smart Sensor Interface – The Automation Sensors –Applications: Introduction – On-board Automobile Sensors (Automotive Sensors)– Home Appliance Sensors – Aerospace Sensors — Sensors for Manufacturing –Sensors for environmental Monitoring

UNIT -V:
Actuators:

Pneumatic and Hydraulic Actuation Systems- Actuation systems – Pneumatic and hydraulic systems - Directional Control valves – Presure control valves – Cylinders - Servo and proportional control valves – Process control valves – Rotary actuators Mechanical Actuation Systems- Types of motion – Kinematic chains – Cams – Gears – Ratchet and pawl – Belt and chain drives – Bearings – Mechanical aspects of motor selection Electrical Actuation Systems-Electrical systems -Mechanical switches – Solid-state switches Solenoids – D.C. Motors – A.C. motors – Stepper motors

TEXT BOOKS
1. D. Patranabis – "Sensors and Transducers" –PHI Learning Private Limited.
2. W. Bolton – "Mechatronics" –Pearson Education Limited.

REFERENCE BOOKS
1. Sensors and Actuators – D. Patranabis – 2nd Ed., PHI, 2013

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(17D06205) INTERNET PROTOCOLS
Elective-III

Course Objectives:
- Understanding the Internet
- Practice with networks and protocols
- Critical judgment of theory and praxis

Course Outcomes:

1. Knowledge and understanding:
   a) Explain basic network routing concepts and algorithms; apply them into given topologies;
   b) Explain how the Internet protocol suite operates; describe the functions of various protocols; c) Explain the concept and usage of node addressing; classify addresses into network layers.

2. Skills and abilities:
   a) Examine data packets and compare communication patterns to protocol descriptions;
   b) Experiment with real network routers and configure them according to instructions.

UNIT -I
Internetworking Concepts: Principles of Internetworking, Connectionless Internetworking, Application level Interconnections, Network level Interconnection, Properties of thee Internet, Internet Architecture, Wired LANS, Wireless LANs, Point-to-Point WANs, Switched WANs, Connecting Devices, TCP/IP Protocol Suite.
IP Address: Classful Addressing: Introduction, Classful Addressing, Other Issues, Sub-netting and Super-netting
Classless Addressing: Variable length Blocks, Sub-netting, Address Allocation. Delivery, Forwarding, and Routing of IP Packets: Delivery, Forwarding, Routing, Structure of Router.
ARP and RARP: ARP, ARP Package, RARP.

UNIT -II
Internet Protocol (IP): Datagram, Fragmentation, Options, Checksum, IP V.6.
Transmission Control Protocol (TCP): TCP Services, TCP Features, Segment, A TCP Connection, State Transition Diagram, Flow Control, Error Control, Congestion Control, TCP Times.
Stream Control Transmission Protocol (SCTP): SCTP Services, SCTP Features, Packet Format, Flow Control, Error Control, Congestion Control.
Mobile IP: Addressing, Agents, Three Phases, Inefficiency in Mobile IP.
Classical TCP Improvements: Indirect TCP, Snooping TCP, Mobile TCP, Fast Retransmit/ Fast Recovery, Transmission/ Time Out Freezing, Selective Retransmission, Transaction Oriented TCP.

UNIT –III
Unicast Routing Protocols (RIP, OSPF, and BGP): Intra and Inter domain Routing, Distance Vector Routing, RIP, Link State Routing, OSPF, Path Vector Routing, BGP.
Multicasting and Multicast Routing Protocols: Unicast - Multicast- Broadcast, Multicast Applications, Multicast Routing, Multicast Link State Routing: MOSPF, Multicast Distance Vector: DVMRP.

UNIT -IV:
Domain Name System (DNS): Name Space, Domain Name Space, Distribution of Name Space, and DNS in the internet.
Remote Login TELNET: Concept, Network Virtual Terminal (NVT).
File Transfer FTP and TFTP: File Transfer Protocol (FTP).
Electronic Mail: SMTP and POP.
Network Management-SNMP: Concept, Management Components, World Wide Web- HTTP Architecture.

UNIT –V
Multimedia: Digitizing Audio and Video, Network security, security in the internet firewalls. Audio and Video Compression, Streaming Stored Audio/Video, Streaming Live Audio/Video, Real-Time Interactive Audio/ Video, RTP, RTCP, Voice Over IP. Network Security, Security in the Internet, Firewalls.

TEXT BOOKS:
1. TCP/IP Protocol Suite- Behrouz A. Forouzan, Third Edition, TMH
2. Internetworking with TCP/IP Comer 3 rd edition PHI

REFERENCE BOOKS:
1. High performance TCP/IP Networking- Mahbub Hassan, Raj Jain, PHI, 2005
2. Data Communications & Networking – B.A. Forouzan – 2nd Edition – TMH
3. High Speed Networks and Internets- William Stallings, Pearson Education, 2002.
4. Data and Computer Communications, William Stallings, 7th Edition., PEI.
5. The Internet and Its Protocols – AdrinFarrel, Elsevier, 2005.

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(17D06206) MEMS AND ITS APPLICATIONS

Elective-III

OBJECTIVES:
- To understand the fundamentals of MEMS and Microsystems.
- To learn MEMS accelerometers and actuators design techniques, including interfacing and packaging techniques

Course Outcomes: Upon completion of the course, students will have:
- An ability to analyze the working of MEMS and Microsystems components.
- An ability to design the MEMS accelerometer and to design Electrostatic actuators.
- An ability to analyze the working of RF and Optical MEMS.

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UNIT - I

Introduction Basic structures of MEM devices – (Canti-Levers, Fixed Beams diaphragms).Broad Response of Micro electromechanical systems (MEMS) to Mechanical (Force, pressure etc.)Thermal, Electrical, optical and magnetic stimuli, compatibility of MEMS from the point of power dissipation, leakage etc.

UNIT - II

Review Review of mechanical concepts like stress, strain, bending moment, deflection curve. Differential equations describing the deflection under concentrated force, Distributed force, distributed force, Deflection curves for canti-levers- fixed beam. Electrostatic excitation – columbic force between the fixed and moving electrodes.Deflection with voltage in C.L, Deflection Vs Voltage curve, critical fringe field – field calculations using Laplace equation.Discussion on the approximate solutions – Transient response of the MEMS.

UNIT-III

Types Two terminal MEMS - capacitance Vs voltage Curve – Variable capacitor.Applications of variable capacitors.Two terminal MEM structures.Three terminal MEM structures – Controlled variable capacitors – MEM as a switch and possible applications.

UNIT-IV

MEM Circuits & Structures MEM circuits & structures for simple GATES- AND, OR, NAND, NOR, Exclusive OR, simple MEM configurations for flip-flops triggering applications to counters, converters. Applications for analog circuits like frequency converters, wave shaping. RF Switches for modulation. MEM Transducers for pressure, force temperature.Optical MEMS.

UNIT-V

MEM Technologies Silicon based MEMS- Process flow – Brief account of various processes and layers like fixed layer, moving layers spacers etc., and etching technologies. Metal Based MEMS: Thin and

thick film technologies for MEMS. Process flow and description of the processes, Status of MEMS in the current electronics scenario.

TEXT BOOKS
1. MEMS Theory, Design and Technology - GABRIEL. M.Review, R.F.,2003, John wiley& Sons. .
2. Strength of Materials –ThimoShenko, 2000, CBS publishers & Distributors. 3. MEMS and NEMS, Systems Devices; and Structures - ServeyE.Lyshevski, 2002, CRC Press.

REFERENCE BOOKS
   1. Sensor Technology and Devices - Ristic L. (Ed) , 1994, Artech House, London.

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(17D06207) SYSTEM ON CHIP DESIGN
Elective-III

OBJECTIVES:
- To introduce architecture and design concepts underlying system on chips.
- Students can gain knowledge of designing SoCs.
- To impart knowledge about the hardware-software design of a modest complexity chip all the way from specifications, modeling, synthesis and physical design.

OUTCOMES: Upon successful completion of the program the students shall
- Explain all important components of a System-on-Chip and an embedded system, i.e. digital hardware and embedded software;
- Outline the major design flows for digital hardware and embedded software;
- Discuss the major architectures and trade-offs concerning performance, cost and power consumption of single chip and embedded systems;

UNIT-I
Introduction to the System Approach:System Architecture, Components of the system, Hardware & Software, Processor Architectures, Memory and Addressing. System level interconnection, An approach for SOC Design, System Architecture and Complexity.

UNIT-II
Processors: Introduction , Processor Selection for SOC, Basic concepts in Processor Architecture, Basic concepts in Processor Micro Architecture, Basic elements in Instruction handling. Buffers: minimizing Pipeline Delays, Branches, More Robust Processors, Vector Processors and Vector Instructions extensions, VLIW Processors, Superscalar Processors.

UNIT-III
Memory Design for SOC: Overview of SOC external memory, Internal Memory, Size, Scratchpads and Cache memory, Cache Organization, Cache data, Write Policies, Strategies for line replacement at miss time, Types of Cache, Split – I, and D – Caches, Multilevel Caches, Virtual to real translation , SOC Memory System, Models of Simple Processor – memory interaction.

UNIT-IV
Interconnect Customization and Configuration: Inter Connect Architectures, Bus: Basic Architectures, SOC Standard Buses , Analytic Bus Models, Using the Bus model, Effects of Bus transactions and contention time. SOC Customization: An overview, Customizing Instruction Processor, Reconfiguration Technologies, Mapping design onto Reconfigurable devices, Instance- Specific design, Customizable Soft Processor, Reconfiguration - overhead analysis and trade-off analysis on reconfigurable Parallelism.

UNIT-V
Application Studies / Case Studies: SOC Design approach, AES algorithms, Design and evaluation, Image compression – JPEG compression.

TEXT BOOKS

1. Computer System Design System-on-Chip - Michael J. Flynn and Wayne Luk, Wiely India Pvt. Ltd.
2. ARM System on Chip Architecture – Steve Furber –2nd Ed., 2000, Addison Wesley Professional. s

REFERENCE BOOKS

1. Design of System on a Chip: Devices and Components – Ricardo Reis, 1st Ed., 2004, Springer
2. Co-Verification of Hardware and Software for ARM System on Chip Design (Embedded Technology) – Jason Andrews – Newnes, BK and CDROM.
3. System on Chip Verification – Methodologies and Techniques – PrakashRashinkar, Peter Paterson and Leena Singh L, 2001, Kluwer Academic Publishers.

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(17D06208) NETWORK SECURITY AND CRYPTOGRAPHY
Elective-IV

Course Objective:
- To study about need and role of security and cryptography in computer networks.
- To study about different techniques associated with encryption.
- To study about different algorithms associated with computer networks.
- To study about different security architecture and designing issues related to fire walls.

Course Outcome:
After completion of this course students will be able to know
- The need and role of security and cryptography in computer networks.
- Gain knowledge about different techniques associated with encryption.
- Functioning of different algorithms associated with computer networks.
- Gain knowledge regarding different security architecture and designing issues related to fire walls.

UNIT – I
Introduction: Attacks, services and mechanisms, security attacks, security services, a model for internet work security, protection through cryptography, the role of cryptography in network security.

UNIT – II
Conventional Encryption: Substitution techniques and transposition techniques, block cipher principles, block cipher design principles, block cipher modes of operation. The data encryption standard

UNIT – III
Public-key encryption: Principles of public-key cryptosystems, the RSA algorithm, key management. Authentication requirements, authentication functions, message authentication codes, hash functions.

UNIT – IV
Digital Signatures and Authentication Protocols: Digital signatures, Digital signature standard, Authentication Protocols, MD5, message digest algorithm, secure hash algorithm, HMAC.

UNIT – V
Mall security & IP security: Pretty good privacy, IP security overview, IP security architecture, Intruders, viruses and related threats, firewall design principles

TEXT BOOKS:
1. W. Stallings**, "**Cryptography & Network Security", 3/e, PHI, 2003
2. Eric Maiwald**, "**Fundamental of Network Security", Dreamtech press Osborne MGH, 2004
3. Sean Convery, " Network Security Architectures, Published by Cisco Press, First Ed. 2004.

REFERENCE BOOKS:

1. Stewart S. Miller, "Wi-Fi Security", McGraw Hill, 2003.
2. Charles B. Pfleeger, Shari Lawrence Pfleeger, "Security In Computing", 3rd Edition, Pearson Education, 2003.
3. Jeff Crume, "Inside Internet Security" Addison Wesley, 2005.
4. AtulKahate, "Cryptography and Network Security", Tata McGraw Hill, 2003.
5. Bruce Schneier, "Applied Cryptography", John Wiley and Sons Inc, 2001.

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(17D06209) DIGITAL IMAGE AND VIDEO PROCESSING
Elective-IV

OBJECTIVES:
- To provide the basic concepts of image & pattern recognition.
- To give an exposure to basic image processing and modeling techniques.
- To provide an understanding of various concepts related to video object extraction.
- To prepare students for development and implementation of algorithms

OUTCOMES:
- To be able to design pattern recognition systems.
- To design and implement feature extraction techniques for a given application.
- To design a suitable classifier for a given application.

UNIT-I
IMAGE FUNDAMENTALS AND TRANSFORMS
Image Representation- Sampling and Quantization - Two dimensional DFT- Discrete cosine Transform - Walsh - Hadamard transform - Wavelet transform - Construction of Wavelets-Types of wavelets - principal component analysis.

UNIT -II
PROCESSING AND MODELING OF IMAGES
Pre-processing -Point operations – contrast stretching – Histogram - Histogram equalization - Image segmentation- pixel based, edge based, region based segmentation - Morphological image processing - Edge and texture models - Image registration - Colour Image Processing –

UNIT-III J
SPATIAL FEATURE EXTRACTION
Feature selection - Localized feature extraction- Boundary Descriptors - Moments - Texture Descriptors - Co-occurrence features

UNIT-IV
CLASSIFIERS
Kernel based approaches - clustering methods - Maximum Likelihood Estimation- Bayesian approach- Pattern Classification

UNIT-V
VIDEO OBJECT EXTRACTION
Back ground subtraction – Frame difference - Static and dynamic background modeling - optical flow techniques-Handling occlusion- scale and appearance changes - Shadow removal.

TEXT BOOKS:

1. A.K.Jain, "Fundamentals of Digital Image Processing", Prentice-Hall, 2002.
2. R.C.Gonzalez and R.E.Woods, „Digital Image Processing", Second Edition, Pearson Education, 2002.
3. A.Bovik, "Handbook of Image and Video Processing", 2nd Edition, Academic Press, 2005.
4. Mark Nixon and Alberto Aguado, "Feature Extraction and Image Processing", Academic Press, 2008.

REFERENCE BOOKS:

1. John C.Russ, "The Image Processing Handbook", CRC Press, 2007.
2. Richard O. Duda, Peter E. Hart and David G. Stork., "Pattern classification", Wiley, 2001

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M.Tech I year II Semester (DSCE)	L	T	P	C
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(17D06210) LOW POWER VLSI DESIGN
Elective-IV

Course Outcomes :
 After completion of this subject, students will be able to
- Under stand the concepts of velocity saturation, Impact Ionization and Hot Electron Effect
- Implement Low power design approaches for system level and circuit level measures.
- Design low power adders, multipliers and memories for efficient design of systems.

UNIT –I:
Fundamentals:
Need for Low Power Circuit Design, Sources of Power Dissipation – Switching Power Dissipation, Short Circuit Power Dissipation, Leakage Power Dissipation, Glitching Power Dissipation, Short Channel Effects –Drain Induced Barrier Lowering and Punch Through, Surface Scattering, Velocity Saturation, Impact Ionization, Hot Electron Effect.

UNIT –II:
Low-Power Design Approaches:
Low-Power Design through Voltage Scaling – VTCMOS circuits, MTCMOS circuits, Architectural Level Approach –Pipelining and Parallel Processing Approaches. Switched Capacitance Minimization Approaches: System Level Measures, Circuit Level Measures, Mask level Measures.

UNIT –III:
Low-Voltage Low-Power Adders:
Introduction, Standard Adder Cells, CMOS Adder's Architectures – Ripple Carry Adders, Carry LookAhead Adders, Carry Select Adders, Carry Save Adders, Low-Voltage Low-Power Design Techniques –Trends of Technology and Power Supply Voltage, Low-Voltage Low-Power Logic Styles.

UNIT –IV:
Low-Voltage Low-Power Multipliers:
Introduction, Overview of Multiplication, Types of Multiplier Architectures, Braun Multiplier, BaughWooley Multiplier, Booth Multiplier, Introduction to Wallace Tree Multiplier.

UNIT –V:
Low-Voltage Low-Power Memories:
 Basics of ROM, Low-Power ROM Technology, Future Trend and Development of ROMs, Basics of SRAM, Memory Cell, Precharge and Equalization Circuit, Low-Power SRAM Technologies, Basics of DRAM, Self-Refresh Circuit, Future Trend and Development of DRAM.

TEXT BOOKS:
1.CMOS Digital Integrated Circuits – Analysis and Design – Sung-Mo Kang, Yusuf Leblebici, TMH, 2011.
2. Low-Voltage, Low-Power VLSI Subsystems – Kiat-Seng Yeo, Kaushik Roy, TMH Professional Engineering.

REFERENCE BOOKS:

1. Introduction to VLSI Systems: A Logic, Circuit and System Perspective – Ming-BO Lin, CRC Press, 2011.
2. Low Power CMOS Design – Anantha Chandrakasan, IEEE Press/Wiley International, 1998.
3. Low Power CMOS VLSI Circuit Design – Kaushik Roy, Sharat C. Prasad, John Wiley & Sons, 2000.

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(17D06211) LINUX PROGRAMMING AND OOPS LABORATORY

List of Experiments
PART – A
Linux Programming Lab:
Note: Any 6 Programs form the following

1. Introduction to LINUX Operating System.
2. Installation of LINUX Operating System (Red Hat-5).
3. Study of general purpose utilities commands.
4. Study of user & session management commands.
5. Study of file system navigation commands, text processing tools, and communication commands.
6. Study of VI editor.
7. Study of Shell Script.
8. Execute C & C++ programs in Linux.
9. Installation using RPM/YUM server.
10. Back up using TAR command.

List of Experiments
PART – B
Note: Any 6 Programs form the following

OOPs Programs (Using C++ compiler)

1. Write a C++ program to illustrate the static variable functionality using sum of a Fibonacci series as an example
2. To write a C++ program to demonstrate default arguments with a simple example
3. To write a C++ program to demonstrate the use of constructors and destructors
4. To write a C++ program to illustrate the operator overloading concept using Matrix addition   as an example
5. To write a C++ program to illustrate the single inheritance using banking system as an example.
6. To write a C++ program to illustrate hybrid inheritance concept using student database
creation as an example.
7. To write a C++ program to illustrate exception handling concept using stack operation as an example
8. To write a C++ program to illustrate exception handling concept using queue operation as an example

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(17D06212) CPLD & FPGALAB

OBJECTIVES:

FPGAs are important platform used throughout the industry both in their own right in building complete systems. They are also used as validation/verification platforms prior to undertaking cost and time intensive design and fabrication of custom VLSI designs. Starting from high level design entry in the form VHDL/Verilog codes, the students will be carrying out complete hardware level FPGA validation of important digital algorithms. In addition, exercises on the SPICE simulation of the basic CMOS analog building blocks will be carried out.

OUTCOMES: At the end of the course, the student should be able to:

1. Given a digital system specification, the student should be able to map it onto FPGA paltform and carry out a series of validations design starting from design entry to hardware testing.
2. In addition, the student also will be able to design and carry out time domain and frequency domain simulations of simple analog building blocks, study the pole zero behaviors of feedback based circuits and compute the input/output impedances.

EXPERIMENTS:

1. Design and implement logic gates. Verify results using CPLD/FPGA kits.
2. Design and implement Counter. Verify results using CPLD/FPGA kits.
3. Design and implement Shift Register. Verify results using CPLD/FPGA kits.
4. Design Micro Blaze Processor and implement addition/ subtraction operation.
5. Design Micro Blaze Processor and implement Multiplication Operation.
6. Design Micro Blaze Processor and implement Comparator Operation.
7. Find IP for ADC operation and verify it by using Chip-scope technique.
8. Find IP for DAC operation and verify it by using Chip-scope technique.
9. Design 4-bit RAM and place it in Bank 0/1.
10. Design 4-bit ROM and verify using Chip-scope technique.
11. Generate bit file for Counter and Register codes.
12. Program EPROM with generated bit files.

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(17D20301) RESEARCH METHODOLOGY
(Elective V-OPEN ELECTIVE)

UNIT I

Meaning of Research – Objectives of Research – Types of Research – Research Approaches – Guidelines for Selecting and Defining a Research Problem – research Design – Concepts related to Research Design – Basic Principles of Experimental Design.

UNIT II

Sampling Design – steps in Sampling Design –Characteristics of a Good Sample Design – Random Sampling Design.
Measurement and Scaling Techniques-Errors in Measurement – Tests of Sound Measurement – Scaling and Scale Construction Techniques – Time Series Analysis – Interpolation and Extrapolation.
Data Collection Methods – Primary Data – Secondary data – Questionnaire Survey and Interviews.

UNIT III

Correlation and Regression Analysis – Method of Least Squares – Regression vs Correlation – Correlation vs Determination – Types of Correlations and Their Applications

UNIT IV

Statistical Inference: Tests of Hypothesis – Parametric vs Non-parametric Tests – Hypothesis Testing Procedure – Sampling Theory – Sampling Distribution – Chi-square Test – Analysis of variance and Co-variance – Multi-variate Analysis.

UNIT V

Report Writing and Professional Ethics: Interpretation of Data – Report Writing – Layout of a Research Paper – Techniques of Interpretation- Making Scientific Presentations in Conferences and Seminars – Professional Ethics in Research.

Text Books:

Research Methodology:Methods And Techniques – C.R.Kothari, 2nd Edition,New Age International Publishers.
Research Methodology: A Step By Step Guide For Beginners- Ranjit Kumar, Sage Publications (Available As Pdf On Internet)
Research Methodology And Statistical Tools – P.Narayana Reddy And G.V.R.K.Acharyulu, 1st Edition,Excel Books,New Delhi.

REFERENCES:

1. Scientists Must Write - Robert Barrass (Available As Pdf On Internet)
2. Crafting Your Research Future –Charles X. Ling And Quiang Yang (Available As Pdf On Internet)

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(17D20302) HUMAN VALUES AND PROFESSIONAL ETHICS
(Elective V-OPEN ELECTIVE)

Unit I:
HUMAN VALUES:Morals, Values and Ethics-Integrity-Work Ethic-Service learning – Civic
Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty - Courage- Co
Operation – Commitment – Empathy –Self Confidence Character – Spirituality.

Unit II:
ENGINEERING ETHICS: Senses of Engineering Ethics- Variety of moral issues – Types of
inquiry – Moral dilemmas – Moral autonomy –Kohlberg‟s theory- Gilligan‟s theory- Consensus
and controversy – Models of professional roles- Theories about right action- Self interest -
Customs and religion –Uses of Ethical theories – Valuing time –Co operation – Commitment.

Unit III :
ENGINEERING AS SOCIAL EXPERIMENTATION: Engineering As Social Experimentation
– Framing the problem – Determining the facts – Codes of Ethics – Clarifying Concepts –
Application issues – Common Ground - General Principles – Utilitarian thinking respect for
persons.

 UNIT IV:
ENGINEERS RESPONSIBILITY FOR SAFETY AND RISK: Safety and risk – Assessment of
safety and risk – Risk benefit analysis and reducing riskSafety and the Engineer- Designing for
the safety- Intellectual Property rights(IPR).

UINIT V:
GLOBAL ISSUES: Globalization – Cross culture issues- Environmental Ethics – Computer
Ethics – Computers as the instrument of Unethical behavior – Computers as the object of
Unethical acts – Autonomous Computers- Computer codes of Ethics – Weapons Development -
Ethics .

 Text Books :
1. "Engineering Ethics includes Human Values" by M.Govindarajan, S.Natarajan and
V.S.SenthilKumar-PHI Learning Pvt. Ltd-2009.
 2. "Engineering Ethics" by Harris, Pritchard and Rabins, CENGAGE Learning, India Edition,
2009.
3. "Ethics in Engineering" by Mike W. Martin and Roland Schinzinger – Tata McGrawHill–
2003.
 4. "Professional Ethics and Morals" by Prof.A.R.Aryasri, Dharanikota Suyodhana-Maruthi
Publications.

5. "Professional Ethics and Human Values" by A.Alavudeen, R.Kalil Rahman and M.Jayakumaran , Laxmi Publications.

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M.Tech III semester (DSCE)   **L   T   P   C**
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(17D20303) INTELLECTUAL PROPERTY RIGHTS
(Elective V-OPEN ELECTIVE)

UNIT – I
Introduction To Intellectual Property: Introduction, Types Of Intellectual Property, International Organizations, Agencies And Treaties, Importance Of Intellectual Property Rights.

UNIT – II
Trade Marks : Purpose And Function Of Trade Marks, Acquisition Of Trade Mark Rights, Protectable Matter, Selecting And Evaluating Trade Mark, Trade Mark Registration Processes.

UNIT – III
Law Of Copy Rights : Fundamental Of Copy Right Law, Originality Of Material, Rights Of Reproduction, Rights To Perform The Work Publicly, Copy Right Ownership Issues, Copy Right Registration, Notice Of Copy Right, International Copy Right Law.
Law Of Patents : Foundation Of Patent Law, Patent Searching Process, Ownership Rights And Transfer

UNIT – IV
Trade Secrets : Trade Secrete Law, Determination Of Trade Secrete Status, Liability For Misappropriations Of Trade Secrets, Protection For Submission, Trade Secrete Litigation.
Unfair Competition : Misappropriation Right Of Publicity, False Advertising.

UNIT – V
New Development Of Intellectual Property: New Developments In Trade Mark Law ; Copy Right Law, Patent Law, Intellectual Property Audits.
International Overview On Intellectual Property, International – Trade Mark Law, Copy Right Law, International Patent Law, International Development In Trade Secrets Law.

TEXT BOOKS & REFERENCES:

1. Intellectual Property Right, Deborah. E. Bouchoux, Cengage Learing.
2. Intellectual Property Right – Nleashmy The Knowledge Economy, Prabuddha Ganguli, Tate Mc Graw Hill Publishing Company Ltd.,