JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

IV Year B.Tech. ECM-I Sem	L	T/P/D	C
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(A70432) VLSI DESIGN

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Objectives:

The objectives of the course are to:

- Give exposure to different steps involved in the fabrication of ICs using MOS transistor, CMOS/BICMOS transistors and passive components.

- Explain electrical properties of MOS and BiCMOS devices to analyze the behavior of inverters designed with various loads.

- Give exposure to the design rules to be followed to draw the layout of any logic circuit.

- Provide concept to design different types of logic gates using CMOS inverter and analyze their transfer characteristics.

- Provide design concepts to design building blocks of data path of any system using gates.

- Understand basic programmable logic devices and testing of CMOS circuits.

UNIT –I:

Introduction: Introduction to IC Technology – MOS, PMOS, NMOS, CMOS & BiCMOS

Basic Electrical Properties: Basic Electrical Properties of MOS and BiCMOS Circuits: I_{ds}-V_{ds} relationships, MOS transistor threshold Voltage, g_m, g_{ds}, Figure of merit ωo; Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter analysis and design, Bi-CMOS Inverters.

UNIT -II:

VLSI Circuit Design Processes: VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, 2 µm CMOS Design rules for wires, Contacts and Transistors Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits.

UNIT –III:

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Gate Level Design: Logic Gates and Other complex gates, Switch logic, Alternate gate circuits, Time delays, Driving large capacitive loads, Wiring capacitance, Fan – in, Fan – out, Choice of layers.

UNIT -IV:

Data Path Subsystems: Subsystem Design, Shifters, Adders, ALUs, Multipliers, Parity generators, Comparators, Zero/One Detectors, Counters.

Array Subsystems: SRAM, DRAM, ROM, Serial Access Memories.

UNIT -V:

Programmable Logic Devices: PLAs, FPGAs, CPLDs, Standard Cells, Programmable Array Logic, Design Approach, Parameters influencing low power design.

CMOS Testing: CMOS Testing, Need for testing, Test Principles, Design Strategies for test, Chip level Test Techniques.

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TEXT BOOKS:

1. Essentials of VLSI circuits and systems – Kamran Eshraghian, Eshraghian Dougles and A. Pucknell, PHI, 2005 Edition

2. CMOS VLSI Design – A Circuits and Systems Perspective, Neil H. E Weste, David Harris, Ayan Banerjee, 3rd Ed, Pearson, 2009.

3. VLSI Design – M. Michael Vai, 2001, CRC Press.

REFERENCE BOOKS:

1. Introduction to VLSI Systems: A Logic, Circuit and System Perspective – Ming-BO Lin, CRC Press, 2011

2. CMOS logic circuit Design - John .P. Uyemura, Springer, 2007.

3. Modern VLSI Design - Wayne Wolf, Pearson Education, 3rd Edition, 1997.

4. VLSI Design- K .Lal Kishore, V. S. V. Prabhakar, I.K International, 2009.

5. Introduction to VLSI – Mead & Convey, BS Publications, 2010.

Course Outcomes:

Upon successfully completing the course, the student should be able to:

- Acquire qualitative knowledge about the fabrication process of integrated circuit using MOS transistors.

- Choose an appropriate inverter depending on specifications required for a circuit

- Draw the layout of any logic circuit which helps to understand and estimate parasitics of any logic circuit

- Design different types of logic gates using CMOS inverter and analyze their transfer characteristics

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- Provide design concepts required to design building blocks of data path using gates.
- Design simple memories using MOS transistors and can understand Design of large memories.
- design simple logic circuit using PLA, PAL, FPGA and CPLD.
- Understand different types of faults that can occur in a system and learn the concept of testing and adding extra hardware to improve testability of system.

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(A70515) COMPUTER NETWORKS

Objectives:

- To introduce the fundamental various types of computer networks.
- To demonstrate the TCP/IP and OSI models with merits and demerits.
- To explore the various layers of OSI Model.
- To introduce UDP and TCP Models.

UNIT-I

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

Physical Layer: Guided transmission media, wireless transmission media.

Data Link Layer – design issues, CRC Codes, Elementary Data link Layer protocols, sliding window protocol

UNIT-II

Multiple Access Protocols –ALOHA, CSMA, Collision free protocols, Ethernet-Physical Layer, Ethernet Mac Sub layer, data link layer switching & use of bridges, learning bridges, spanning tree bridges, repeaters, hubs, bridges, switches, routers and gateways.

UNIT-III

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

UNIT-IV

Internetworking: Tunneling, Internetwork Routing, Packet fragmentation, IPv4, Ipv6 Protocol, IP addresses, CIDR, IMCP, ARP, RARP, DHCP.

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

UNIT-V

The Internet Transport Protocols UDP-RPC, Real Time Transport Protocols, The Internet Transport Protocols- Introduction to TCP, The TCP Service Model, The TCP Segment Header, The Connection Establishment, The TCP Connection Release, The TCP Connection Management Modeling, The TCP

Sliding Window, The TCP Congestion Control, The future of TCP.

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

TEXT BOOKS:

1. Data Communications and Networking – Behrouz A. Forouzan, Fifth Edition TMH, 2013.

2. Computer Networks — Andrew S Tanenbaum, 4th Edition, Pearson Education.

REFERENCE BOOKS:

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education.

2. Understanding communications and Networks, 3rd Edition, W.A.Shay, Cengage Learning.

3. Introduction to Computer Networks and Cyber Security, Chwan-Hwa (John) Wu, J. David Irwin, CRC Press.

4. Computer Networks, L.L.Peterson and B.S.Davie, 4th edition, ELSEVIER.

5. Computer Networking: A Top-Down Approach Featuring the Internet, James F.Kurose,K.W.Ross,3rd Edition, Pearson Education.

Outcome :

- Students should be understand and explore the basics of Computer Networks and Various Protocols. He/She will be in a position to understand the World Wide Web concepts.

- Students will be in a position to administrate a network and flow of information further he/she can understand easily the concepts of network security, Mobile and ad hoc networks.

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(A70439) EMBEDDED SYSTEMS

Objective: To learn the method of designing a real time system.

UNIT- I : 8051 FAMILY ARCHITECTURE

8051 Microcontroller Architecture, Microcontroller 8051 Pins, 8051 Ports, Internal and External Memory, Counter and Timers, Serial Communication in 8051, Interrupts, Interrupts in 8051, External Interrupts.

UNIT - II

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Introduction to Real – Time Operating Systems : Tasks and Task States, Tasks and Data, Semaphores, and Shared Data; Message Queues, Mailboxes and Pipes, Timer Functions, Events, Memory Management, Interrupt Routines in an RTOS Environment.

UNIT - III

Basic Design Using a Real-Time Operating System : Principles, Semaphores and Queues, HardReal-Time Scheduling Considerations, Saving Memory and Power, An example RTOS like uC-OS (Open Source); Embedded Software Development Tools: Host and Target machines, Linker/ Locators for Embedded

Software, Getting Embedded Software into the Target System; Debugging Techniques: Testing on Host Machine, Using Laboratory Tools, An Example System.

UNIT – IV

ARM Processor Fundamentals: Registers, Current Program Status Register, Pipeline, Exceptions, Interrupts, the Vector Table, Core Extensions, Architecture Revisions, ARM Processor Families.

UNIT - V:

Introduction to the ARM Instruction Set: Data Processing Instructions, Branch Instructions, Load-Store Instructions, Software Interrupt Instruction, Program Status Register Instructions, Loading Constants, ARMv5E Extensions, Conditional Execution.

Introduction to the Thumb Instruction Set: Thumb Register Usage, ARM-Thumb Interworking, Other Branch Instructions, Data Processing Instructions, Single and Multiple- Register Load-Store Instructions, Stack Instructions, Software Interrupt Instruction. www.universityupdates.in

TEXT BOOKS:

1. Microcontrollers Architecture, Programming, Interfacing and System Design by Raj Kamal, 2e, Pearson.
2. ARM System Developer's Guide Design & Optimizing System Software by Sloss, Elsevier.

REFERENCES :

1. The 8051 Microcontroller & Embedded Systems using Assembly & C, by Kennet J Ayala and Dhananjay V. Gadre., Cengage Learning.
2. Embedded / Real Time Systems: Concepts, Design & Programming (Black Book) 2005 edition,by – KVKK Prasad.
3. Introduction to Embedded Systems – by Shibu K.V, MGH.

Outcomes:

Upon completion of this course, the student will be able to

- Understand the basics of an embedded system
- Design, implement and test an embedded system.

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(A70517) LINUX PROGRAMMING

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 develop the basic skills required to write network programs using Sockets.

UNIT- I

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, Applications, awk-Execution, Fields and Records, Scripts, Operation, Patterns, Actions, Associative Arrays, String and Mathematical functions, System commands in awk, Applications.

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- II

Files and Directories- File Concept, File types, File System Structure, file metadata-Inodes, kernel support for files, system calls for file I/O operations-open, creat, read, write, close, lseek, dup2,file status information-stat family, file and record locking- fcntl function, file permissions - chmod, fchmod,file ownership-chown,lchown, fchown, links-soft links and hard links – symlink, link, unlink.

Directories-Creating, removing and changing Directories-mkdir, rmdir, chdir, obtaining current working directory-getcwd, Directory contents, Scanning Directories-opendir, readdir, closedir, rewinddir functions.

UNIT- III

Process – Process concept, Layout of a C program image in main

memory,Process environment-environment list, environment variables, getenv, setenv, Kernel support for process, process identification, process control - process creation, replacing a process image, waiting for a process, process termination, zombie process, orphan process, system call interface for process management-fork, vfork, exit, wait, waitpid, exec family, Process Groups, Sessions and Controlling Terminal, Differences between threads and processes.

Signals – Introduction to signals, Signal generation and handling, Kernel support for signals, Signal function, unreliable signals, reliable signals, kill, raise, alarm, pause, abort, sleep functions.

UNIT- IV

Interprocess Communication - Introduction to IPC, IPC between processes on a single computer system, IPC between processes on Different systems, pipes-creation, IPC between related processes using unnamed pipes, FIFOs-creation, IPC between unrelated processes using FIFOs(Named pipes), differences between unnamed and named pipes, popen and pclose library functions.

Message Queues- Kernel support for messages, APIs for message queues, client/server example.

Semaphores-Kernel support for semaphores, APIs for semaphores, file locking with semaphores.

UNIT- V

Shared Memory- Kernel support for shared memory, APIs for shared memory, shared memory example.

Sockets- Introduction to Berkeley Sockets, IPC over a network, Client-Server model, Socket address structures (Unix domain and Internet domain),Socket system calls for connection oriented protocol and connectionless protocol, example-client/server programs-Single Server-Client connection, Multiple simultaneous clients, Socket options-setsockopt and fcntl system calls, Comparison of IPC mechanisms.

TEXT BOOKS:

1. Unix System Programming using C++, T.Chan, PHI.
2. Unix Concepts and Applications, 4th Edition, Sumitabha Das, TMH.
3. Unix Network Programming , W.R.Stevens, PHI.

REFERENCE BOOKS:

1. Beginning Linux Programming, 4th Edition, N.Matthew, R.Stones, Wrox, Wiley India Edition.
2. Unix for programmers and users, 3rd Edition, Graham Glass, King Ables, Pearson.

3. System Programming with C and Unix, A.Hoover, Pearson.
4. Unix System Programming, Communication, Concurrency and Threads, K.A.Robbins and S.Robbins, Pearson Education.
5. Unix shell Programming, S.G.Kochan and P.Wood, 3rd edition, Pearson Education.
6. Shell Scripting, S.Parker, Wiley India Pvt. Ltd.
7. Advanced Programming in the Unix Environment, 2nd edition, W.R.Stevens and S.A.Rago, Pearson Education.
8. Unix and Shell programming, B.A.Forouzan and R.F.Gilberg, Cengage Learning.
9. Linux System Programming, Robert Love, O'Reilly, SPD.
10. C Programming Language, Kernighan and Ritchie, PHI

Outcomes:

- Work confidently in Linux environment.
- Work with shell script to automate different tasks as Linux administration.

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(A70434) CELLULAR AND MOBILE COMMUNICATIONS
(Elective - I)

Objectives:

The course objectives are:

- To provide the student with an understanding of the Cellular concept, Frequency reuse, Hand-off strategies.
- To enable the student to analyze and understand wireless and mobile cellular communication systems over a stochastic fading channel
- To provide the student with an understanding of Co-channel and Non-Co-channel interferences
- To give the student an understanding of cell coverage for signal and traffic, diversity techniques and mobile antennas.
- To give the student an understanding of frequency management, Channel assignment and types of handoff.

UNIT -I:

Introduction to Cellular Mobile Radio Systems:

Limitations of Conventional Mobile Telephone Systems, Basic Cellular Mobile System, First, Second, Third and Fourth Generation Cellular Wireless Systems, Uniqueness of Mobile Radio Environment- Fading -Time Dispersion Parameters, Coherence Bandwidth, Doppler Spread and Coherence Time.

Fundamentals of Cellular Radio System Design:

Concept of Frequency Reuse, Co-Channel Interference, Co-Channel Interference Reduction Factor, Desired C/I From a Normal Case in a Omni Directional Antenna System, System Capacity, Trunking and Grade of Service, Improving Coverage and Capacity in Cellular Systems- Cell Splitting, Sectoring, Microcell Zone Concept.

UNIT -II:

Co-Channel Interference:

Measurement Of Real Time Co-Channel Interference, Design of Antenna System, Antenna Parameters and Their Effects, Diversity Techniques-Space Diversity, Polarization Diversity, Frequency Diversity, Time Diversity.

Non-Co-Channel Interference:

Adjacent Channel Interference, Near End Far End Interference, Cross Talk, Effects on Coverage and Interference by Power Decrease, Antenna Height Decrease, Effects of Cell Site Components.

UNIT -III:

Cell Coverage for Signal and Traffic:

Signal Reflections in Flat And Hilly Terrain, Effect of Human Made Structures, Phase Difference Between Direct and Reflected Paths, Constant Standard Deviation, Straight Line Path Loss Slope, General Formula for Mobile Propagation Over Water and Flat Open Area, Near and Long Distance Propagation, Path Loss From a Point to Point Prediction Model in Different Conditions, Merits of Lee Model.

Cell Site and Mobile Antennas:

Space Diversity Antennas, Umbrella Pattern Antennas, Minimum Separation of Cell Site Antennas, Mobile Antennas.

UNIT -IV:

Frequency Management and Channel Assignment:

Numbering And Grouping, Setup Access And Paging Channels, Channel Assignments to Cell Sites and Mobile Units, Channel Sharing and Borrowing, Sectorization, Overlaid Cells, Non Fixed Channel Assignment.

UNIT -V:

Handoffs and Dropped Calls:

Handoff Initiation, Types of Handoff, Delaying Handoff, Advantages of Handoff, Power Difference Handoff, Forced Handoff, Mobile Assisted and Soft Handoff, Intersystem Handoff, Introduction to Dropped Call Rates and their Evaluation.

TEXT BOOKS:

1. Mobile Cellular Telecommunications - W.C.Y. Lee, Mc Graw Hill, 2nd Edn., 1989.

2. Wireless Communications - Theodore. S. Rapport, Pearson Education, 2nd Edn., 2002.

3. Mobile Cellular Communication - Gottapu sashibhushana Rao, Pearson, 2012.

REFERENCE BOOKS:

1. Principles of Mobile Communications – Gordon L. Stuber, Springer International, 2nd Edn., 2001.

2. Modern Wireless Communications-Simon Haykin, Michael Moher,Pearson Eduction, 2005.

3. Wireless Communications Theory and Techniques, Asrar U. H. Sheikh, Springer, 2004.

4. Wireless Communications and Networking, Vijay Garg, Elsevier Publications, 2007.

5. Wireless Communications – Andrea Goldsmith, Cambridge University Press, 2005.

Outcomes:

By the end of the course, the student will be able to analyze and design wireless and mobile cellular systems.

The student will be able to understand impairments due to multipath fading channel.

The student will be able understand the fundamental techniques to overcome the different fading effects.

The student will be able to understand Co-channel and Non-Co-channel interferences

The student will be able to familiar with cell coverage for signal and traffic, diversity techniques and mobile antennas.

The student will have an understanding of frequency management, Channel assignment and types of handoff.

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(A70526) ARTIFICIAL INTELLIGENCE
(Elective-I)

Objectives:

- To learn the difference between optimal reasoning vs human like reasoning.
- To understand the notions of state space representation, exhaustive search, heuristic search along with the time and space complexities
- To learn different knowledge representation techniques.
- To understand the applications of AI: namely Game Playing, Theorem Proving, Expert Systems, Machine Learning and Natural Language Processing.

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UNIT-I

Introduction, History, Intelligent Systems, Foundations of AI, Sub areas of AI, Applications.

Problem Solving - State-Space Search and Control Strategies: Introduction, General Problem Solving, Characteristics of Problem, Exhaustive Searches, Heuristic Search Techniques, Iterative-Deepening A*, Constraint Satisfaction.

Game Playing, Bounded Look-ahead Strategy and use of Evaluation Functions, Alpha-Beta Pruning

UNIT-II

Logic Concepts and Logic Programming: Introduction, Propositional Calculus, Propositional Logic, Natural Deduction System, Axiomatic System, Semantic Tableau System in Propositional Logic, Resolution Refutation in Propositional Logic, Predicate Logic, Logic Programming.

Knowledge Representation: Introduction, Approaches to Knowledge Representation, Knowledge Representation using Semantic Network, Extended Semantic Networks for KR, Knowledge Representation using Frames.

UNIT-III

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Expert System and Applications: Introduction, Phases in Building Expert Systems, Expert System Architecture, Expert Systems Vs Traditional Systems, Truth Maintenance Systems, Application of Expert Systems, List of Shells and Tools.

Uncertainty Measure - Probability Theory: Introduction, Probability Theory, Bayesian Belief Networks, Certainty Factor Theory, Dempster-Shafer Theory.

UNIT-IV

Machine-Learning Paradigms: Introduction. Machine Learning Systems. Supervised and Unsupervised Learning. Inductive Learning. Learning Decision Trees (Text Book 2), Deductive Learning. Clustering, Support Vector Machines.

Artificial Neural Networks: Introduction, Artificial Neural Networks, Single-Layer Feed-Forward Networks, Multi-Layer Feed-Forward Networks, Radial-Basis Function Networks, Design Issues of Artificial Neural Networks, Recurrent Networks.

UNIT-V

Advanced Knowledge Representation Techniques: Case Grammars, Semantic Web

Natural Language Processing: Introduction, Sentence Analysis Phases, Grammars and Parsers, Types of Parsers, Semantic Analysis, Universal Networking Knowledge.

TEXT BOOKS:

1. Saroj Kaushik. Artificial Intelligence. Cengage Learning. 2011
2. Russell, Norvig: Artificial intelligence, A Modern Approach, Pearson Education, Second Edition. 2004

REFERENCE BOOK:

1. Rich, Knight, Nair: Artificial intelligence, Tata McGraw Hill, Third Edition 2009.

Outcomes:

- Possess the ability to formulate an efficient problem space for a problem expressed in English.
- Possess the ability to select a search algorithm for a problem and characterize its time and space complexities.
- Possess the skill for representing knowledge using the appropriate technique.
- Possess the ability to apply AI techniques to solve problems of Game Playing, Expert Systems, Machine Learning and Natural Language Processing.

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(A70529) COMPUTER GRAPHICS

(Elective-I)

Objectives:

- To make students understand about fundamentals of Graphics to enable them to design animated scenes for virtual object creations.
- To make the student present the content graphically.

UNIT- I

Introduction: Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices

Output primitives: Points and lines, line drawing algorithms, mid-point circle and ellipse algorithms, Filled area primitives: Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms.

UNIT- II

2-D Geometrical transforms: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems.

2-D Viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm.

UNIT- III

3-D Object representation: Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-spline curves, Bezier and B-spline surfaces, sweep representations, octrees BSP Trees,

3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations, 3-D viewing: Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping.

UNIT- IV

Visible surface detection methods: Classification, back-face detection, depth-buffer, scan-line, depth sorting, BSP-tree methods, area sub-division and octree methods

Illumination Models and Surface rendering Methods: Basic illumination

models, polygon rendering methods

UNIT- V

Computer animation: Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications

TEXT BOOKS:

1. "Computer Graphics C version", Donald Hearn and M. Pauline Baker, Pearson education.

2. "Computer Graphics Second edition", Zhigand xiang, Roy Plastock, Schaum's outlines, Tata Mc Graw hill edition.

REFERENCE BOOKS:

1. "Computer Graphics Principles & practice", second edition in C, Foley, VanDam, Feiner and Hughes, Pearson Education.

2. "Procedural elements for Computer Graphics", David F Rogers, Tata Mc Graw hill, 2nd edition.

3. "Principles of Interactive Computer Graphics", Neuman and Sproul, TMH.

4. "Principles of Computer Graphics", Shalini, Govil-Pai, Springer.

5. "Computer Graphics", Steven Harrington, TMH

6. Computer Graphics, F.S.Hill, S.M.Kelley, PHI.

7. Computer Graphics, P.Shirley, Steve Marschner&Others,Cengage Learning.

8. Computer Graphics & Animation, M.C.Trivedi, Jaico Publishing House.

9. An Integrated Introduction to Computer Graphics and Geometric Modelling, R.Goldman, CRC Press, Taylor&Francis Group.

10. Computer Graphics, Rajesh K.Maurya, Wiley India.

Outcomes:

- Students can animate scenes entertainment.
- Will be able work in computer aided design for content presentation..
- Better analogy data with pictorial representation.

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(A70436) DIGITAL IMAGE PROCESSING
(Elective-II)

Objectives:

The objectives of the course are to:

- Provide the student with the fundamentals of digital image processing.
- Give the students a taste of the applications of the theories taught in the subject. This will be achieved through the project and some selected lab sessions.
- Introduce the students to some advanced topics in digital image processing.
- Give the students a useful skill base that would allow them to carry out further study should they be interested and to work in the field.

UNIT -I:

Digital Image Fundamentals & Image Transforms: Digital Image Fundamentals, Sampling and Quantization, Relationship between Pixels,

Image Transforms: 2-D FFT, Properties, Walsh Transform, Hadamard Transform, Discrete Cosine Transform, Haar Transform, Slant Transform, Hotelling Transform.

UNIT -II:

Image Enhancement (Spatial Domain): Introduction, Image Enhancement in Spatial Domain, Enhancement Through Point Operation, Types of Point Operation, Histogram Manipulation, Linear and Non – Linear Gray Level Transformation, Local or Neighborhood Operation, Median Filter, Spatial Domain High-Pass Filtering.

Image Enhancement (Frequency Domain): Filtering in Frequency Domain, Obtaining Frequency Domain Filters from Spatial Filters, Generating Filters Directly in the Frequency Domain, Low Pass (Smoothing) and High Pass (Sharpening) Filters in Frequency Domain.

UNIT -III:

Image Restoration: Degradation Model, Algebraic Approach to Restoration, Inverse Filtering, Least Mean Square Filters, Constrained Least Squares Restoration, Interactive Restoration.

UNIT -IV:

Image Segmentation: Detection of Discontinuities, Edge Linking And Boundary Detection, Thresholding, Region Oriented Segmentation.

Morphological Image Processing: Dilation and Erosion: Dilation, Structuring Element Decomposition, Erosion, Combining Dilation and Erosion, Opening and Closing, The Hit or Miss Transformation.

UNIT -V:

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Image Compression: Redundancies and their Removal Methods, Fidelity Criteria, Image Compression Models, Huffman and Arithmetic Coding, Error Free Compression, Lossy Compression, Lossy and Lossless Predictive Coding, Transform Based Compression, JPEG 2000 Standards.

TEXT BOOKS:

1. Digital Image Processing - Rafael C. Gonzalez, Richard E. Woods, 3rd Edition, Pearson, 2008
2. Digital Image Processing- S Jayaraman, S Esakkirajan, T Veerakumar- TMH, 2010.

REFERENCE BOOKS:

1. Digital Image Processing and Analysis-Human and Computer Vision Application with using CVIP Tools - Scotte Umbaugh, 2nd Ed. CRC Press, 2011
2. Digital Image Processing using MATLAB – Rafael C. Gonzalez, Richard E Woods and Steven L. Eddings, 2nd Edition, TMH, 2010.
3. Fundamentals of Digital Image Processing – A.K.Jain , PHI, 1989
4. Digital Image Processing and Computer Vision – Somka, Hlavac, Boyle- Cengage Learning (Indian edition) 2008.
5. Introductory Computer Vision Imaging Techniques and Solutions- Adrian low, 2008, 2nd Edition
6. Introduction to Image Processing & Analysis – John C. Russ, J. Christian Russ, CRC Press, 2010.
7. Digital Image Processing with MATLAB & Labview – Vipula Singh, Elsevier.

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Outcomes:

Upon successfully completing the course, the student should:

- Have an appreciation of the fundamentals of Digital image processing including the topics of filtering, transforms and morphology, and image analysis and compression.

- Be able to implement basic image processing algorithms in MATLAB.
- Have the skill base necessary to further explore advance d topics of Digital Image Processing.
- Be in a position to make a positive professional contribution in the field of Digital Image Processing.
- At the end of the course the student should have a clear impression of the breadth and practical scope of digital image processing and have arrived at a level of understanding that is the foundation for most of the work currently underway in this field.

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(A70519) CLOUD COMPUTING
(Elective-II)

Objectives:

- To explain the evolving computer model called cloud computing.
- To introduce the various levels of services that can be achieved by cloud.
- To describe the security aspects in cloud.

UNIT- I

Systems Modeling, Clustering and Virtualization

Distributed System Models and Enabling Technologies, Computer Clusters for Scalable Parallel Computing, Virtual Machines and Virtualization of Clusters and Data centers.

UNIT- II

Foundations

Introduction to Cloud Computing, Migrating into a Cloud, Enriching the 'Integration as a Service' Paradigm for the Cloud Era, The Enterprise Cloud Computing Paradigm.

UNIT- III

Infrastructure as a Service (IAAS) & Platform and Software as a Service (PAAS / SAAS)

Virtual machines provisioning and Migration services, On the Management of Virtual machines for Cloud Infrastructures, Enhancing Cloud Computing Environments using a cluster as a Service, Secure Distributed Data Storage in Cloud Computing.

Aneka, Comet Cloud, T-Systems', Workflow Engine for Clouds, Understanding Scientific Applications for Cloud Environments.

UNIT- IV

Monitoring, Management and Applications

An Architecture for Federated Cloud Computing, SLA Management in Cloud Computing, Performance Prediction for HPC on Clouds, Best Practices in Architecting Cloud Applications in the AWS cloud, Building Content Delivery networks using Clouds, Resource Cloud Mashups.

UNIT- V

Governance and Case Studies

Organizational Readiness and Change management in the Cloud age, Data Security in the Cloud, Legal Issues in Cloud computing, Achieving Production Readiness for Cloud Services. www.universityupdates.in

TEXT BOOKS:

1. Cloud Computing: Principles and Paradigms by Rajkumar Buyya, James Broberg and Andrzej M. Goscinski, Wiley, 2011.

2. Distributed and Cloud Computing, Kai Hwang, Geoffery C.Fox, Jack J.Dongarra, Elsevier, 2012.

REFERENCE BOOKS:

1. Cloud Computing : A Practical Approach, Anthony T.Velte, Toby J.Velte, Robert Elsenpeter, Tata McGraw Hill, rp2011.

2. Enterprise Cloud Computing, Gautam Shroff, Cambridge University Press, 2010.

3. Cloud Computing: Implementation, Management and Security, John W. Rittinghouse, James F.Ransome, CRC Press, rp2012.

4. Cloud Application Architectures: Building Applications and Infrastructure in the Cloud, George Reese, O'Reilly, SPD, rp2011.

5. Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, Tim Mather, Subra Kumaraswamy, Shahed Latif, O'Reilly, SPD, rp2011.

Outcomes:

* Ability to understand the virtualization and cloud computing concepts.

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IV Year B.Tech. ECM-I Sem

	L	T/P/D	C
	4	-/-/-	4

(A70520) DATA WAREHOUSING AND DATA MINING
(Elective-II)

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Objectives:

Study data warehouse principles and its working learn data mining concepts understand association rules mining. Discuss classification algorithms learn how data is grouped using clustering techniques.

UNIT-I

Data warehouse: Introduction to Data warehouse, Difference between operational database systems and data warehouses, Data warehouse Characteristics, Data warehouse Architecture and its Components, Extraction-Transformation-Loading, Logical(Multi-Dimensional), Data Modeling, Schema Design, Star and Snow-Flake Schema, Fact Consultation, Fact Table, Fully Addictive, Semi-Addictive, Non Addictive Measures; Fact-Less-Facts, Dimension Table Characteristics; OLAP Cube, OLAP Operations, OLAP Server Architecture-ROLAP, MOLAP and HOLAP.

UNIT-II

Introduction to Data Mining: Introduction, What is Data Mining, Definition, KDD, Challenges, Data Mining Tasks, Data Preprocessing, Data Cleaning, Missing data, Dimensionality Reduction, Feature Subset Selection, Discretization and Binaryzation, Data Transformation; Measures of Similarity and Dissimilarity- Basics.

UNIT-III

Association Rules: Problem Definition, Frequent Item Set Generation, The APRIORI Principle, Support and Confidence Measures, Association Rule Generation; APRIOIRI Algorithm, The Partition Algorithms, FP-Growth Algorithms, Compact Representation of Frequent Item Set- Maximal Frequent Item Set, Closed Frequent Item Set.

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UNIT-IV

Classification: Problem Definition, General Approaches to solving a classification problem , Evaluation of Classifiers , Classification techniques, Decision Trees-Decision tree Construction , Methods for Expressing attribute test conditions, Measures for Selecting the Best Split, Algorithm for Decision tree Induction ; Naive-Bayes Classifier, Bayesian Belief Networks; K- Nearest neighbor classification-Algorithm and Characteristics.

UNIT-V

Clustering: Problem Definition, Clustering Overview, Evaluation of Clustering

Algorithms, Partitioning Clustering-K-Means Algorithm, K-Means Additional issues, PAM Algorithm; Hierarchical Clustering-Agglomerative Methods and divisive methods, Basic Agglomerative Hierarchical Clustering Algorithm, Specific techniques, Key Issues in Hierarchical Clustering, Strengths and Weakness; Outlier Detection.

TEXT BOOKS:

1) Data Mining- Concepts and Techniques- Jiawei Han, Micheline Kander, Morgan Kaufmann Publishers Elsevier 2 Edition, 2006.

2) Introduction to Data Mining, Pang-Ning Tan, Vipin Kumar, Michael Steinbanch, Pearson Education

REFERENCE BOOKS:

1) Data Mining Techniques, Arun K Pujari, 3rd Edition, Universities Press.

2) Data Warehousing Fundamentals, Pualraj Ponnaiah, Wiley Student Edition.

3) The Data Warehouse Life Cycle Toolkit – Ralph Kimball, Wiley Student Edition.

4) Data Mining, Vikaram Pudi, P Radha Krishna, Oxford University Press.

Outcomes:

- Student should be able to understand why the data warehouse in addition to database systems.

- Ability to perform the preprocessing of data and apply mining techniques on it.

- Ability to identify the association rules, classification and clusters in large data sets.

- Ability to solve real world problems in business and scientific information using data mining

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IV Year B.Tech. ECM-I Sem

	L	T/P/D	C
	-	-/3/-	2

(A70594) COMPUTER NETWORKS LAB

Objective:

- To Understand the functionalities of various layers of OSI model
- To understand the operating System functionalities

List of Programs:

1. Implement the data link layer framing methods such as character, character stuffing and bit stuffing.

2. Implement on a data set of characters the three CRC polynomials – CRC 12, CRC 16 and CRC CCIP.

3. Implement Dijkstra 's algorithm to compute the Shortest path thru a graph.

4. Take an example subnet graph with weights indicating delay between nodes. Now obtain Routing table art each node using distance vector routing algorithm

5. Take an example subnet of hosts . Obtain broadcast tree for it.

6. Take a 64 bit playing text and encrypt the same using DES algorithm.

7. Write a program to break the above DES coding

8. Using RSA algorithm Encrypt a text data and Decrypt the same.

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	-	-/3/-	2

(A70596) LINUX PROGRAMMING LAB

Objectives:

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- To write shell scripts to solve problems.
- To implement some standard Linux utilities such as ls,cp etc using system calls.
- To develop network-based applications using C.

List of sample problems:

Note: Use Bash for Shell scripts.

1. Write a shell script that accepts a file name, starting and ending line numbers as arguments and displays all the lines between the given line numbers.

2. Write a shell script that deletes all lines containing a specified word in one or more files supplied as arguments to it.

3. Write a shell script that displays a list of all the files in the current directory to which the user has read, write and execute permissions.

4. Write a shell script that receives any number of file names as arguments checks if every argument supplied is a file or a directory and reports accordingly. Whenever the argument is a file, the number of lines on it is also reported.

5. Write a shell script that accepts a list of file names as its arguments, counts and reports the occurrence of each word that is present in the first argument file on other argument files.

6. Write a shell script to list all of the directory files in a directory.

7. Write a shell script to find factorial of a given integer.

8. Write an awk script to count the number of lines in a file that do not contain vowels.

9. Write an awk script to find the number of characters, words and lines in a file.

10. Write a C program that makes a copy of a file using standard I/O and system calls.

11. Implement in C the following Linux commands using System calls
    a). cat b) mv

12. Write a C program to list files in a directory. www.universityupdates.in

13. Write a C program to emulate the Unix ls –l command.

14. Write a C program to list for every file in a directory, its inode number and file name.

15. Write a C program that redirects standard output to a file.Ex: ls > f1.

16. Write a C program to create a child process and allow the parent to display "parent" and the child to display "child" on the screen.

17. Write a C program to create a Zombie process.

18. Write a C program that illustrates how an orphan is created.

19. Write a C program that illustrates how to execute two commands concurrently with a command pipe. Ex:- ls –l | sort.

20. Write C programs that illustrate communication between two unrelated processes using named pipe(FIFO File).

21. Write a C program in which a parent writes a message to a pipe and the child reads the message.

22. Write a C program (sender.c) to create a message queue with read and write permissions to write 3 messages to it with different priority numbers.

23. Write a C program (receiver.c) that receives the messages (from the above message queue as specified in (22)) and displays them.

24. Write a C program that illustrates suspending and resuming processes using signals.

25. Write Client and Server programs in C for connection oriented communication between Server and Client processes using Unix Domain sockets to perform the following:

    Client process sends a message to the Server Process.The Server receives the message,reverses it and sends it back to the Client.The Client will then display the message to the standard output device.

26. Write Client and Server programs in C for connection oriented communication between Server and Client processes using Internet Domain sockets to perform the following:

    Client process sends a message to the Server Process.The Server receives the message,reverses it and sends it back to the Client.The Client will then display the message to the standard output device.

27. Write C programs to perform the following:

    One process creates a shared memory segment and writes a message("Hello") into it. Another process opens the shared memory segment and reads the message(ie. "Hello").It will then display the message("Hello") to standard output device.

TEXT BOOKS:

1. Beginning Linux Programming, 4th Edition, N.Matthew, R.Stones,Wrox, Wiley India Edition.

2. Advanced Unix Programming, N.B.Venkateswarulu, BS Publications.

3. Unix and Shell Programming, M.G. Venkatesh Murthy, Pearson Education.

4. Unix Shells by Example, 4th Edition, Elllie Quigley, Pearson Education.

5. Sed and Awk, O.Dougherty&A.Robbins,2nd edition, SPD.

Outcomes:

- Ability to understand the Linux environment

- Ability to perform the file management and multiple tasks using shell scripts in Linux environment