

<b>CSE5003</b>	<b>ADVANCED NETWORKS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **FUNDAMENTALS OF COMMUNICATION NETWORKS**

Layers and standards-Packet and circuit switching- Protocols TCP/IP-Ipv6 addressing and routing.-Technical background- Signals and interference- Modulation and encoding- Switching and Multiplexing- Coding and error control.

### **NETWORK SECURITY**

Requirement-Encryption- Decryption- Message authentication and digital signature- Security in IP- QoS principles and protocols-Differential Service-RSVP and MPLS

### **INTERNETWORKING**

VLAN-Addressing and routing-network layer protocols-unicast and multicast routing-Mobile IP routing-Ad hoc networks routing-Evolution in the Ethernet-Switched and fast Ethernet-Infrastructure-Scaling to Gigabit architectures-Performance consideration-Physical components and wire protocols.

### **OPTICAL NETWORKS**

Optical layers- Services and interfacing- Photonic packet switching- Access networks- Network survivability- Protection- Optical IP- OTN/SONET/SDH layers structure and design relation to 10 Gbps Ethernet.

### **ADVANCED TOPICS**

SAN (Storage Area Networks) and Infiniband architectures-Home networking- DSL-cable modems- Zero copy systems-Intelligent networks-Future directions.

### **TEXT BOOK**

1. Fourouzan B, Data Communication and Networking, McGraw-Hill, 2004.

### **REFERENCES**

1. Ramaswami R and Sivarajan K, Optical Networks: A Practical Perspective, Morgan Kaufmann, 2001.
2. Clark T, IP SANs, Addison Wesley, 2002.
3. Kurose J.F, Ross K.W, Computer Networking, Top-down Approach Featuring the Internet, Addison Wesley, 2005.
4. Tanenbaum A. S, Computer Networks, Prentice-Hall, 2003.
5. Stallings W, High Speed Networks, Internet Performance and QoS, Prentice-Hall, 2002.

<b>CSE5102</b>	<b>INTERNET PROGRAMMING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **INTRODUCTION**

Introduction to the Internet and World Wide Web - World Wide Web Consortium (W3C) - History of the Internet History of the World Wide Web - History of SGML - XML Introduction to HyperText Markup Language - Editing HTML - Common Elements – Headers - Linking - Images - Unordered Lists - Nested and Ordered Lists - HTML Tables-Basic HTML Forms

### **DYNAMIC HTML**

Dynamic HTML Object Model and Collections, Event Model, Filters and Transitions, Data Binding with Tabular Data Control, Dynamic HTML-Structured Graphics ActiveX Controls, Dynamic HTML-Path, Sequencer and Sprite ActiveX Controls.

### **JAVASCRIPT**

JavaScript, Introduction to Scripting, Control Statements, Functions, Arrays, Objects.

### **XML**

Creating Markup with XML -Parsers and Well-formed XML Documents -Parsing an XML Document with msxml - Document Type Definition (DTD) - Document Type Declaration - Element Type Declarations - Attribute Declarations - Document Object Model - DOM Implementations - – DOM Components - path - XSL: Extensible Stylesheet Language Transformations (XSLT)

### **PERL, CGI AND PHP**

Perl - String Processing and Regular Expressions - Form Processing and Business Logic - Server-Side Includes - Verifying a Username and Password - Using DBI to Connect to a Database -PHP - Form Processing and Business Logic --Connecting to a Database - Dynamic Content in PHP

### **TEXT BOOKS**

1. Deitel and Deitel, Internet and World Wide Web How to Program, Pearson Education India, 3<sup>rd</sup> Edition , 2004.
2. Deitel and Deitel , XML How to Program, Pearson Education, 2001.

### **REFERNCES**

1. Negrino and Smith, Javascript for the World Wide Web, Peachpit Press,5<sup>th</sup> Edition, 2003.
2. Deitel and Deitel, Perl How to Program, Pearson Education, 2001.
3. Benoit Marchal, XML by Example, Que/Sams, 2<sup>nd</sup> Edition, 2002.

<b>CSE5103</b>	<b>MOBILE &amp; PERSONAL COMMUNICATIONS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **INTRODUCTION AND CELLULAR CONCEPTS**

Enabling Concepts for Mobile and Personal Communications - Mobile and Personal Communication: Past, Present, and Future - Mobile and Personal Communication: Some Related Network Aspects - The Cellular Concept - Multiple Access Technologies for Cellular Systems - Cellular System Operation and Planning: General Principles - Initial Implementations of the Cellular Concept: Analog Cellular Systems

### **DIGITAL CELLULAR MOBILE SYSTEMS**

Introduction - GSM: The European TDMA Digital Cellular Standard - IS-136: The North American TDMA Digital Cellular Standard (D-AMPS) - PDC: The Japanese TDMA Digital Cellular Standard - IS-95: The North American CDMA Digital Cellular Standard

### **MOBILE DATA COMMUNICATION**

Specialized Packet and Mobile Radio Networks - Circuit-Switched Data Services on Cellular Networks - Packet-Switched Data Services on Cellular Networks - Data Over Low Power Wireless or Cordless Telecommunications Networks - Wireless Local-Area Networks (wireless LANs) - Support of Mobility on the Internet: Mobile IP - Mobile Multimedia: Wireless ATM (WATM)

### **OTHER MOBILE SYSTEMS**

IMT-2000: Third-Generation Mobile Communication Systems - Introduction - IMT-2000 Radio Aspects - IMT-2000 Network Aspects - Global Mobile Satellite Systems - Introduction - The Iridium System - The Globalstar System - The ICO System - The Teledesic System

### **PERSONAL COMMUNICATION SYSTEMS**

CT2 (Cordless Telephony 2) Systems - DECT (Digital Enhanced Cordless Telecommunications - PACS (Personal Access Communication System) - PHS (Personal Handy Phone System) - PCS in North America - Personal Mobility and Universal Personal Telecommunication (UPT) - Introduction - UPT: Concept and Service Aspects - Functional Architecture for UPT - Numbering, Routing, and Billing Aspects - Scenarios for Partitioning and Location of Service Profile Information - Access Security - Requirements for UPT

### **TEXT BOOK**

1. Raj Pandya, Mobile and Personal Communication Systems and Services, Wiley-IEEE Press, April 2004.

**REFERENCES**

1. Vijay Garg, Joseph Wilkes E, Wireless and Personal Communications Systems Fundamentals and Applications, AT&T IPM Corporation, Prentice Hall Publication.
2. Dunlop J, and Smith D.G, Telecommunications Engineering, 3<sup>rd</sup> Edition.
3. Chapman and hall Bellamy, J.C , Digital Telephony, Wiley Publications.
4. Krzysztof Wesolowski, Mobile Communication Systems, Wiley Publications, 2002.

<b>CSE5104</b>	<b>NETWORK SECURITY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**INTRODUCTION**

Attacks - Services - Mechanisms - Conventional Encryption - Classical And Modern Techniques – Encryption Algorithms - Confidentiality.

**PUBLIC KEY ENCRYPTION**

RSA - Elliptic Curve Cryptography - Number Theory Concepts

**MESSAGE AUTHENTICATION**

Hash Functions - Digest Functions - Digital Signatures - Authentication Protocols.

**NETWORK SECURITY PRACTICE**

Authentication, Applications - Electronic Mail Security - IP Security - Web Security.

**SYSTEM SECURITY**

Intruders – Viruses – Worms – Firewalls Design Principles – Trusted Systems.

**TEXT BOOK**

1. Stallings, Cryptography and Network Security Principles and Practice, Prentice Hall, 3<sup>rd</sup> Edition, 2002.

**REFERENCES**

1. Bruce, Schneier, Applied Cryptography, Toha Wiley and Sons, 2<sup>nd</sup> Edition, 1996.
2. Pfleeger, Security in Computing, Pearson Education, 3<sup>rd</sup> Edition, 2003.

<b>CSE5105</b>	<b>NETWORK ROUTING PROTOCOLS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**CIRCUIT SWITCHING NETWORKS**

AT and T's, Dynamic alternative routing.

**PACKET SWITCHING NETWORKS**

Distance vector routing, Interdomain routing EGP,BGP, Link state Routing, Apple talk routing and SNA Routing

**HIGH SPEED NETWORKS**

Routing in optical networks, Routing in ATM networks, Routing in PLANET networks  
Deflection Routing

**MOBILE NETWORKS**

Routing in cellular radio mobile communication networks, Packet radio Routing

**MOBILE AD-HOC NETWORKS (MANET)**

Internet based mobile ad-hoc networking, communication strategies, routing algorithms  
Destination sequenced Distance Vector (DSDV), Dynamic source Routing (DSR), Ad-hoc On demand Distance Vector (AODV) & Temporarily Ordered Routing algorithm (TORA), Quality of service

**TEXT BOOK**

1. Steen Strub M, Routing in Communication networks, Prentice Hall International , New York, 1995

**REFERENCES**

1. William Stallings, High speed Networks TCP/IP and ATM Design Principles, Prentice Hall, New York, 1998.

<b>CSE5181</b>	<b>INTERNET PROGRAMMING LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>3</b>	<b>1</b>

### LIST OF EXPERIMENTS

1. Creating a web page with cascading style sheets and Embedded style sheets.
2. Create a web page with the following.
3. Order form using HTML form elements
4. Validate the details in client side by using java script
5. Design a web page to perform screen saver animations using java script
6. Design a web page to display the text file contents using data binding concepts in DHTML.
7. Design a HTML Editor using java applet.
8. Design a web page for library Management using java applet and JDBC.
9. Write a Java RMI program to copy a text file from server to client.
10. Design a web page to conduct On-line Quiz using java server pages.
11. Write a servlet program to do the following.
  - a. Set the URL of another server.
  - b. Display the header details during request of a page.
  - c. Display response header as well as contents during response from the server.
12. Design a web page to demonstrate session tracking Management using Java servlet.

<b>CSE5182</b>	<b>NETWORK LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>3</b>	<b>1</b>

**LIST OF EXPERIMENTS**

1. Retrieving data with URLs
2. Implementation of Socket Programming
  - a. Using TCP/IP
  - b. Using UDP
3. Implementation of FTP
4. Implementation of ECHO/PING/TALK
5. Implementation of Remote command Execution
6. Implementation of ARP
7. Implementation of RARP
8. Implementation of RMI / RPC
9. Implementation of Shortest Path Routing Algorithm
10. Implementation of Sliding Window Protocol

<b>CSE5106</b>	<b>WIRELESS NETWORKS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **INTRODUCTION**

Fundamentals of Wireless Communication - Transmission fundamentals - Wireless Communication Technology - Antennas and Propagation, Spread Spectrum, Modulation Techniques, Coding and Error Control.

### **WIRELESS NETWORKING, WIRELESS LANS & PANS**

Wireless Networking – Satellite Communication, Cellular Wireless Networks, Mobile IP and Wireless Access Protocol, Wireless LANs -Wireless LAN Technology, IEEE 802.11 Wireless LAN Standards, Bluetooth, HIPERLAN Standard, HomeRF.

### **AD-HOC WIRELESS NETWORKS & SECURITY**

Introduction - Issues in Ad Hoc Wireless Networks - Classifications of MAC Protocols - Classifications of Routing Protocols - Classifications of Transport Layer Protocols - Classification of Energy Management Schemes – Wired Equivalent Privacy(WEP) – The Extensible Authentication Protocol - Security in Ad Hoc Wireless Networks.

### **WIRELESS SENSOR NETWORKS**

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

### **RECENT ADVANCES IN WIRELESS NETWORKS**

Ultra-Wide-Band Radio Communication - Wireless Fidelity Systems - Optical Wireless Networks - The Multimode 802.11 -IEEE 802.11a/b/g - The Meghadoot Architecture - Next-Generation Hybrid Wireless Architectures.

### **TEXT BOOKS**

1. William Stallings, Wireless Communications and Networking, Pearson Education, 2<sup>nd</sup> Edition, 2005.
2. Siva Ram Murthy C, Manoj B.S, Ad Hoc Wireless Networks: Architectures and Protocols, Prentice Hall, 2004.

### **REFERENCES**

1. Kaveh Pahlavan and Prashant Krishnamurthy, Principles of Wireless Networks, Pearson Education.
2. Rappaport T.S, Wireless Communications: Principles and Practice, Prentice Hall., 2<sup>nd</sup> Edition.
3. Matthew Gast, Matthew Gast S, 802.11 Wireless Networks: The Definitive Guide (O'Reilly Networking) , O'Reilly Publication, 1 edition, 2002.

<b>CSE5107</b>	<b>HIGH SPEED NETWORKS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **HIGH SPEED NETWORKS**

Fast Ethernet technology, FDDI, SONET and SDH standards, Performance of HIGH speed LAN- throughput, delay and reliability - Wave length division multiplexed LAN- routing and switching MDM networks, Gigabit LAN.

### **ISDN and STANDARDS**

Overview of ISDN – user interface, architecture and standards. Packet switched call over ISDN, B and D channels, link access procedure (LAPD) ISDN layered architecture, signaling. Limitations of Narrowband ISDN (N-ISDN) and evolution of broad band ISDN (B-ISDN)

### **ASYNCHRONOUS TRANSFER MODE NETWORKS**

ATM protocol architecture, ATM adaption layer, fast packet switching techniques and VP/VC encapsulation. ATM cells, ATM cell header interpretation, source characteristics.

### **ATM TRAFFIC MANAGEMENT**

Traffic management issues in ATM-resource management, connection management, policing and reactive control principles. Discrete time queue analysis and application to CAC, leaky bucket and ECN/ICN

### **ATM SIGNALING AND DATA COMMUNICATION OVER ATM**

ATM signaling fundamentals and meta-signaling - TCP/IP over ATM-challengers and proposal LAN emulation over ATM. Performance of Data Communication over ATM

### **TEXT BOOK**

1. Stallings.W, High Speed Networks, TCP-IP and ATM design Principles, Prentice Hall of India, Delhi, 2002

### **REFERENCES**

1. Jean Walrand and Pravin Varaiya, High Performance Communication Networks, Morgan Kaufmann, 2<sup>nd</sup> Edition, 2000.
2. William Stallings, ISDN and Broadband ISDN with Frame Relay and ATM, Prentice Hall; 4<sup>th</sup> Edition, 1998

CSE5108	<b>SIMULATION OF COMMUNICATION SYSTEMS AND NETWORKS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **MODELLING OF COMMUNICATION SYSTEM**

Model of speech and picture signals, Pseudo noise sequences, Non-linear sequences, Analog channel model, Noise and fading, Digital channel model-Gilbert model of bustry channels, HF, Troposcatter and satellite channels, Switched telephone channels, Analog and Digital communication system models, Light wave system models.

### **SIMULATION OF RANDOM VARIABLES AND RANDOM PROCESS**

Univariate and multivaraiate models, Transformation of random variables, Bounds and approximation, Random process models-Markov AND ARMA Sequences, Sampling rate for simulation, Computer generation and testing of random numbers

### **ESTIMATION OF PERFORMANCE MEASURES**

Quality of an estimator, estimator for SNR, Probability density functions of analog communication system, BER of digital communication systems, Montre carlo method and Importance sampling method, estimation of power spectral density of a process

### **COMMUNICATION NETWORKS**

Queuing models, M/M/I and M/M/I/N queues, Little formula, Burke's theorem, M/G/I queue, Embedded Markov chain analysis of TDM systems, Polling, Random access systems

### **NETWORK OF QUEUES**

Queues in tandem, store and forward communication networks, capacity allocation, Congestion and flow chart, Routing model, Network layout and Reliability

### **TEXT BOOK**

1. Jeruchim M.C, Philip Balaban and Sam Shanmugam S, Simulation of communications systems , Plenum Press, New York, 1992

### **REFERENCES**

1. Law A.M and David Kelton W, Simulation Modelling and analysis, Mc Graw Hill Inc., New York , 1991
2. Hayes J.F, Modelling and Analysis of Computer Communication networks, Plenum Press, New York, 1984

<b>CSE5109</b>	<b>NETWORK MANAGEMENT</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **TECHNOLOGY SERVICES AND COMPUTER NETWORK TECHNOLOGY**

Introduction to Network Management-IT Services, Challenges, and Opportunities - Economics of IT Services-Network Management Systems and Organization-Network Components, Topologies, and Internet Architecture-Bridged and Router Networks-Ring Networks, Virtual LANs, and Broadband Services

### **NETWORK MANAGEMENT**

Network Management Basics-Network Management Architectures and applications Management Standards and Models - Network Management Functions-Configuration Management and Auto-discovery-Configuration Database & Reports-Abstract Syntax Notation One (ASN.1)

### **SNMP PROTOCOL**

SNMP v1:Structure of Management Information-Std. Management Information Base (MIBs), Network Management Functions: Fault Management-Fault Identification and Isolation-Event Correlation Techniques. SNMP v2: Version 2 Protocol Specification-Version 2 MIB Enhancements-MIB-II, Case Diagrams - Security Management - Protecting Sensitive Information - Host and User Authentication-Key Management. SNMP v3: Version 3 Protocol & MIB - SNMP v3 User Based Security Model - View Based Access Model - Network Management Functions: Accounting Management - Performance Management- Network Usage, Metrics and Quotas

### **REMOTE NETWORK MONITORING RMON**

RMON1: Statistics Collection- Alarms and Filters-Remote Network Monitoring RMON 2-Monitoring Network Protocol Traffic-Application-Layer Visibility-Management Tools, Systems and Applications-Test and Monitoring Tools-Integrating Tools-Development Tools- Web-based Enterprise Management-Enterprise Network Management: Network Management System Requirements- Network Management Applications and Systems

### **TELECOMMUNICATIONS MANAGEMENT FOR SERVICE PROVIDERS**

Telecommunications Network Management-ATM Management-Management of broadband Networks- Real-time OSs for Next-Generation Service Management-The Operations Systems Implications of Managing Next-Generation Networks Managing a Portfolio of Broadband Access Technologies-Next-Generation Network Design-Experiences in Establishing a Nationwide Broadband Network -Quality of Service in Heterogeneous Networks-Customer-Empowered Networking

### **TEXT BOOK**

1. Subramanian, M, Network Management: Principles and Practice, Addison-Wesley, 2000.

**REFERENCES**

1. Mauro D.R. and Schmidt K.J, Essential SNMP, O'Reilly and Associates, Sebastopol, CA, 2001.
2. Peterson L and Davie B, Computer Networks: A Systems Approach, Morgan Kaufmann Publishers, 3<sup>rd</sup> Edition, 2003.
3. Mahbub Hassan and Raj Jain, High Performance TCP/IP Networking, Prentice Hall, 1<sup>st</sup> edition, 2004.

<b>CSE5183</b>	<b>NETWORK SIMULATION LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>3</b>	<b>1</b>

## **LIST OF EXPERIMENTS**

### **I . STUDY OF GLOMOSIM AND NS – 2 SIMULATORS**

#### **II .SIMULATION USING GLOMOSIM**

1. Simulate Ad hoc network using AODV protocol.
2. Simulate Ad hoc network using DSDV protocol.
3. Simulate Ad hoc network using DSR protocol.

#### **III .SIMULATION USING NETWORK SIMULATOR -2**

1. Simulate Ad hoc network using AODV protocol.
2. Simulate Ad hoc network using DSDV protocol.
3. Simulate Ad hoc network using DSR protocol.
4. Simulate a MPLS network using LDP protocol.
5. Simulate a MPLS network for differentiated Services.
6. Simulate a MPLS network providing alternate LSPs under protection scheme.

<b>CSE5184</b>	<b>NETWORK TESTING AND MONITORING LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>3</b>	<b>1</b>

**LIST OF EXPERIMENTS**

1. IP Monitoring
2. Network management using Cisco Works
3. Network protocol analysis
4. Network Traffic Engineering
5. Network Delay analysis
6. Troubleshooting basic network problems (IP configuration, NIC)
7. Bandwidth Measuring/Monitoring/Engineering
8. Network Hacker Monitoring
9. Enterprise Management using Tivoli - Net View
10. Use of Network Monitoring/testing Tools

<b>CSE5110</b>	<b>TELECOMMUNICATION AND SWITCHING TECHNIQUES</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **EVOLUTION OF TELECOMMUNICATION SWITCHING AND CIRCUIT**

Evolution of Public Switched Telecommunication Networks Strowger exchange, Crossbar exchange, Stored programme exchange Digital exchange – Basic Telecommunication equipments – Telephone handset, Hybrid circuit, Echo suppressors and cancellers, PCM coders, Modems and Relays.

### **ELECTRONIC SWITCHING**

Circuit Switching, Message switching, Centralized stored programme switching, Time switching, Spare switching, Combination switching – Digital switching system hardware configuration, Switching system software, Organization, Switching system call processing software, Hardware software integration.

### **TELECOMMUNICATION SIGNALLING AND TRAFFIC**

Channel associated signaling, Common channel signaling, SS7 signaling protocol, SS7 protocol architecture, Concept of Telecommunication traffic, Grade of service, Modeling switching systems, Blocking models and Delay systems.

### **INTEGRATED DIGITAL NETWORKS**

Subscriber loop characteristics, Local access wire line and wire less PCM / TDM carrier standards transmission line codes, Digital multiplexing techniques, Synchronous, Asynchronous, Plesiocronous multiplexing techniques, SONET / SDH, Integrated Digital Network (IDN) environment – Principles of Integrated Services Digital Network (ISDN) – Cellular Mobile Communication Principles.

### **DATA NET WORKS**

Data transmission in PSTN – Connection oriented and Connection less protocols – packet switching – ISO-OSI architecture-Satellite based data networks – Multiple access techniques – LAN, WAN – standards – TCP / IP – Internet – Principle of ATM networks.

### **TEXT BOOK**

1. Viswanathan T, Telecommunication Switching System and Networks, Prentice Hall of India Ltd., 1994.

**REFERENCES**

1. Behrouz Forouzan, Introduction to Data Communication and Networking, McGraw- Hill, 1998.
2. Lawton L.S, Integrated Digital Networks, Galgotia Publication Pvt., Ltd., New Delhi, 1996.

<b>CSE5111</b>	<b>OPTICAL NETWORKS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **OPTICAL NETWORK TECHNOLOGY**

Telecommunication Network Architecture and Services-Circuit Switching-Packet Switching-Optical Networks-Optical Layers-Optical Packet Switching-Transmission Basis- Network Evaluation – Propagation of Signals in Optical Fiber-Modulation and Demodulation formats.

### **OPTICAL NETWORK COMPONENTS**

Components: Coupler-Isolators and Circulators-Multiplexers and Filters-Optical Amplifiers-Transmitters-Detectors- Switches- Wavelength Converters, Transmission System Engineering: Power penalty- Gain Saturation and Equalization in EDFA- Power Transient and Automatic Control-Cross Talk- Dispersion- Wave Length Stabilization- Fiber Non linearities- Soliton system- over all design Consideration.

### **OPTICAL NETWORKS**

SONET/SDH: Multiplexing- Layers-Frame Structure-Elements of SONET/SDH Infrastructure- ATM: Functions-Adaptation Layer-QOS-Flow Control- Signaling and Routing, IP: Routing and Forwarding- QOS- MPLS, SAN: ESCON- Fiber Channel- HIPPI

### **WDM NETWORK DESIGN**

WDM Network Elements: Line Terminal- Line Amplifier- OXC and its configuration, WDM Network Design: Cost Trade Offs – LTD and RWA Problem- Dimensioning Wave Length Routing Network- Statistical and Maximum Load Dimensioning Model.

### **ADVANCED OPTICAL NETWORKS**

Access Network: Overview- HFC- FTTC, Photonic Packet Switching: OTDM-Synchronization-Buffering-Header processing- Burst Switching- NTT's Optical ATM switches-AON-CORD, Long- Haul Networks- Long- Haul Network Case Study- Long-Haul Undersea Networks- Metro Networks- Metro Ring Case Study

### **TEXT BOOK**

1. Ramaswami R and Sivarajan K, Optical Networks: A Practical Perspective, Morgan Kaufmann, 2<sup>nd</sup> Edition, 2001.

### **REFERENCES**

1. Stern T.E and Bala K, Multiwavelength Optical Networks: A Layered Approach, Addison-Wesley.
2. Agrawal G.P, Fiber-Optic Communication Systems, John Wiley and Sons

<b>CSE5112</b>	<b>E-COMMERCE TECHNOLOGY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **INTRODUCTION`**

Infrastructure for Electronic Commerce - Networks - Packet Switched Networks - TCP/IP Internet protocol - Domain name Services - Web Service Protocols - Internet applications - Utility programs - Markup Languages - Web Clients and Servers - Intranets and Extranets - Virtual private Network.

### **CORE TECHNOLOGY**

Electronic Commerce Models - Shopping Cart Technology - Data Mining - Intelligent Agents – Internet Marketing - XML and E-Commerce

### **ELECTRONIC PAYMENT SYSTEMS**

Real world Payment Systems - Electronic Funds Transfer - Digital Payment -Internet Payment Systems – Micro Payments - Credit Card Transactions - Case Studies.

### **SECURITY**

Threats to Network Security - Public Key Cryptography - Secured Sockets Layer - Secure Electronic Transaction - Network Security Solutions - Firewalls.

### **INTER/INTRA ORGANIZATIONS ELECTRONIC COMMERCE**

EDI - EDI application in business - legal, Security and Privacy issues - EDI and Electronic commerce - Standards - Internal Information Systems - Macro forces - Internal commerce - Workflow Automation and Coordination - Customization and Internal commerce - Supply chain Management.

### **TEXT BOOK**

1. Ravi Kalakota and Andrew Whinston B, Frontiers of Electronic commerce, Addison Wesley, 1996

### **REFERENCES**

1. Pete Loshin, Paul Murphy A, Electronic Commerce, Jaico Publishers, 2<sup>nd</sup> Edition, 1996.
2. David Whiteley, e-Commerce:Strategy, Technologies and Applications, McGraw Hill, 2000.

<b>CSE5113</b>	<b>EMBEDDED SYSTEMS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **INTRODUCTION TO EMBEDDED SYSTEM AND HARDWARE FUNDAMENTALS**

Examples of Embedded Systems-Typical Hardware- Terminology-Gates-A Few Other Basic Considerations-Timing Diagrams-Memory- Interrupts:Microprocessor Architecture-Interrupt Basics-The Shared-Data Problem-Interrupt Latency.

### **SOFTWARE ARCHITECTURES FOR EMBEDDED SYSTEMS**

Round-Robin-Round-Robin with Interrupts-Function-Queue-Scheduling Architecture-Real-Time Operating System Architecture-Selecting an Architecture Forth/Open Firmware: Introducing Forth-. String Words-Stack Manipulation- Creating New Words-Comments- if ... else- Loops-. Data Structures-Interacting with Hardware and Memory-Forth Programming Guidelines

### **REAL-TIME OPERATING SYSTEMS**

Tasks and Task States-Tasks and Data-Semaphores and Shared Data-Operating System Services-Message Queues, Mailboxes, and Pipes-Timer Functions-Events-Memory Management-Interrupt Routines in an RTOS Environment.

### **BASIC DESIGN USING A REAL-TIME OPERATING SYSTEM**

Overview-Principles-An Example-Encapsulating Semaphores and Queues-Hard Real-Time Scheduling Considerations-Saving Memory Space-Saving Power-Embedded Software Development Tools-Host and Target Machines.-Linker/Locators for Embedded Software-Getting Embedded Software into the Target System

### **DEBUGGING TECHNIQUES AND AN EXAMPLE SYSTEM**

Testing on Your Host Machine-Instruction Set Simulators-The assert Macro-Using Laboratory Tools- An Example System-What the Program Does-Environment in Which the Program Operates-A Guide to the Source Code-Source Code.

### **TEXT BOOKS**

1. David Simon , An Embedded Software Primer, Addison Wesley.
2. John Catsoulis, Designing Embedded Hardware, O'Reilly Publications, May 2005.

### **REFERENCES**

1. Raj Kamal, Embedded Systems: Architecture and Programming, Mc Graw Hill Publications, 1st Edition , 2003.

<b>CSE5114</b>	<b>WEB TECHNOLOGY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **INTRODUCTION**

Introduction – Network concepts – Web concepts – Internet addresses - Retrieving Data with URL – HTML – DHTML : Cascading Style Sheets - Scripting Languages : Javascript – Vbscript.

### **COMMON GATEWAY INTERFACE**

Common Gateway Interface: Programming CGI Scripts – HTML Forms – Custom Database Query Scripts – Server Side Includes – Server security issues – XML.

### **JAVA PROGRAMMING**

Java fundamentals: Classes – Inheritance – Packages – Interfaces – Exceptions Handling – Multi threading – Applets

### **SERVER SIDE PROGRAMMING**

Server side Programming – Active server pages – Java server pages – Java Servlets: Servlet container – Exceptions – Sessions and Session Tracking – Using Servlet context – Dynamic Content Generation – Servlet Chaining and Communications.

### **APPLICATIONS**

Simple applications – Internet Commerce – Database connectivity – Online databases – EDI Applications in Business – Plug-ins – Firewalls

### **TEXT BOOK**

1. Deitel and Deitel, Neito, INTERNET and WORLD WIDE WEB - How to program, Pearson education asia, 2001

### **REFERENCES**

1. Norton D and Schildt H, Java 2: The complete Reference, TMH, 2000.
2. Elliotte Rusty Herold , Java Network Programming ,O'Reilly Publications, 3<sup>rd</sup> Edition, 2004.

<b>CSE5115</b>	<b>HIGH SPEED SWITCHING ARCHITECTURE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **HIGH SPEED NETWORK**

LAN and WAN network evolution through ISDN to BISDN - Transfer mode and control of BISDN - SDH multiplexing structure - ATM standard , ATM adaptation layers.

### **LAN SWITCHING TECHNOLOGY**

Switching concepts; Switch forwarding techniques; switch path control - LAN switching; cut through forwarding; store and forward - virtual LANs.

### **ATM SWITCHING ARCHITECTURE**

Switch models - Blocking networks – basic and enhanced banyan networks - sorting networks – merge sorting - rearrange able networks - full and partial connection networks - nonblocking networks – recursive network – construction and comparison of non-blocking network - switches with deflection routing – shuffle switch - tandem banyan.

### **QUEUES IN ATM SWITCHES**

Internal queuing – Input, output and shared queuing - multiple queuing networks – combined input, output and shared queuing – performance analysis of queued switches.

### **IP SWITCHING**

Addressing mode - IP switching types-flow driven and topology driven solutions - IP Over ATM address and next hop resolution – multicasting - IPv6 over ATM.

### **TEXT BOOK**

1. Ranier Handel, Manfred Huber N, Stefan Schrodder, ATM Networks-concepts, protocols, applications, Adisson Wesley, New York, 3<sup>rd</sup> Edition, 1999.

### **REFERENCES**

1. John Chiong A, Internetworking ATM for the internet and enterprise networks, McGraw Hill, New York, 1998.
2. Achille Patavina, Switching Theory: Architectures and performance in Broadband ATM Networks, John Wiley and Sons Ltd., New York.1998.

<b>CSE5116</b>	<b>SATELLITE COMMUNICATION</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **ORBITAL MECHANICS**

Kepler's laws of motion, Orbits, Orbit Equations, Orbit Description, Locating the Satellite in the Orbit and with Respect to Earth, Orbital Elements-Look Angle Determination and Visibility - Orbital Perturbations, Orbit Determination, Launch Vehicles, Orbital Effects in Communication System - Performance Attitude control; Satellite launch vehicles. spectrum allocations for satellite systems.

### **SPACECRAFT SUB SYSTEMS AND EARTH STATION**

Spacecraft Subsystems, Altitude and Orbit Control, Telemetry and Tracking, Power Systems, Communication Subsystems, Transponders, Antennas, Equipment Reliability, Earth Stations, Example of payloads of operating and planned systems.

### **SPACE LINKS**

The Space Link, Satellite Link Design - Satellite uplink -down link power Budget, Basic Transmission Theory, System Noise Temp, G/T Ratio, Noise Figure, Downlink Design, Design of Satellite Links for Specified C/N - Microwave Propagation on Satellite-Earth Paths. Interference between satellite circuits, Energy Dispersion, propagation characteristics of fixed and mobile satellite links.

### **MULTIPLE ACCESS TECHNIQUES AND NETWORK ASPECTS**

Single access vs. multiple access (MA). Classical MA techniques: FDMA, TDMA. Single channel per carrier (SCPC) access - Code division multiple access (CDMA). Demand assignment techniques. Examples of MA techniques for existing and planned systems (e.g. the satellite component of UMTS). Mobile satellite network design, ATM via satellite. TCP/IP via satellite - Call control, handover and call set up procedures. Hybrid satellite-terrestrial networks

### **SERVICES AND APPLICATIONS**

Fixed and mobile services - Multimedia satellite services - Advanced applications based on satellite platforms - INTELSAT series - INSAT, VSAT, Remote Sensing - Mobile satellite service: GSM. GPS, INMARSAT, Navigation System, Direct to Home service (DTH), Special services, E-mail, Video conferencing and Internet connectivity

### **TEXT BOOK**

1. Dennis Roddy, Satellite Communications, McGraw Hill International Editions, Third Edition, 2001

**REFERENCES**

1. Bruce Elbert R, The Satellite Communication Applications Hand Book, Artech House Boston, 1997.
2. Wilbur Pritchard L, Hendri Snyderhood S, Robert Nelson A, Satellite Communication Systems Engineering, Prentice Hall, New Jersey, 2<sup>nd</sup> Edition, 1993.

<b>CSE5117</b>	<b>VLSI DESIGN</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **OVERVIEW OF VLSI DESIGN METHODOLOGY**

VLSI Design Process – Architectural Design – Logical Design – Physical Design – Layout Styles – Full Custom Semi Custom approaches – Overview of wafer fabrication – Wafer processing – Silicon gate NMOS process – CMOS process – N well – P well – Twin Tub – Silicon On Insulator

### **BASIC ELECTRICAL PROPERTIES OF MOS AND CMOS CIRCUITS**

NMOS and PMOS enhancement transistors – Threshold voltage – MOS device equations – Basic DC equations – Second order effect – Small signal AC characteristics – NMOS and CMOS inverter – Inverter delay – Pass Transistor – Transmission gate

### **LAYOUT DESIGN RULES**

Need for design rules – Mead Conway design rules for the Silicon gate NMOS process- CMOS N well / P well design rules – Sheet resistance – Area Capacitance – Wiring Capacitance

### **LOGIC DESIGN**

Switch logic- Gate Logic – Inverter – Two input NAND and NOR gate- Other forms of CMOS logic – Dynamic CMOS logic – Clocked CMOS logic – Precharged domino CMOS logic – Structure Design – Simple combinational logic design examples – Parity generator – Multiplexer – Clocked sequential circuits – 2 Phase clocking – Charge storage – Dynamic Register Element – NMOS and CMOS dynamic shift register

### **SUB SYSTEM DESIGN PROCESS**

Design of a 4 bit shifter – 4 bit arithmetic processor – ALU Subsystem – Implementing ALU functions with an Adder – Carry look ahead adders – Multipliers – Serial/ Parallel Multipliers – Pipelined multiplier array – Modified booth's algorithm – high density memory – FSM – PLA Control Implementation

### **TEXT BOOK**

1. Douglas Pucknell A and Kamran Eshranhian, Basic VLSI Design, PHI, 3<sup>rd</sup> Edition, 2004

### **REFERENCES**

1. Neil H E and Kamran Eshranhian, Principles of CMOS VLSI Design : A System Perspective, Addison Wesley, 2<sup>nd</sup> edition, 2002
2. Wayne Wolf, Modern VLSI Design, Pearson Education Inc., 1997

<b>CSE5118</b>	<b>MOBILE COMPUTING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**INTRODUCTION**

Medium Access Control : Motivation for Specialized MAC- SDMA- FDMA- TDMA- CDMA- Comparison of Access mechanisms – Tele communications : GSM- DECT- TETRA – UMTS- IMT-2000

**SATELLITE SYSTEMS**

Basics- Routing- Localization- Handover- Broadcast Systems: Overview – Cyclic Repetition of Data- Digital Audio Broadcasting – Digital Video Broadcasting

**WIRELESS LOCAL AREA NETWORKS**

Infrared Vs Radio Transmission – Infrastructure Networks- Ad hoc Networks- IEEE 802.11 – HIPERLAN – Bluetooth.

**WIRELESS ASYNCHRONOUS TRANSFER MODE**

Motivation for QATM, Wireless ATM working group- WATM services- Reference Model – Functions – Radio Access Layer – Handover- Location Management- Addressing Mobile Quality of Service- Access Point Control Protocol

**MOBILE TRANSPORT LAYER AND WAP**

Traditional TCP- Indirect TCP- Snooping TCP- Mobile TCP- Fast retransmit/ Fast Recovery- Transmission/ Timeout Freezing – Selective Retransmission- Transaction Oriented TCP. WAP - Architecture – Datagram Protocol- Transport Layer Security- Transaction Protocol- Session Protocol- Application Environment.

**TEXT BOOK**

1. Schiller J, Mobile Communication, Addison Wesley, 2006.

**REFERENCES**

1. William Stallings, Wireless Communication and Networks, Pearson Education, 2004.
2. Singhal, WAP-Wireless Application Protocol, Pearson Education, 2005

<b>CSE6101</b>	<b>NETWORK MANAGEMENT</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **TECHNOLOGY SERVICES AND COMPUTER NETWORK TECHNOLOGY**

Introduction to Network Management-IT Services, Challenges, and Opportunities - Economics of IT Services-Network Management Systems and Organization-Network Components, Topologies, and Internet Architecture-Bridged and Router Networks-Ring Networks, Virtual LANs, and Broadband Services

### **NETWORK MANAGEMENT**

Network Management Basics-Network Management Architectures & Applications Management Standards and Models - Network Management Functions-Configuration Management & Auto-discovery-Configuration Database & Reports-Abstract Syntax Notation One (ASN.1)

### **SNMP PROTOCOL**

SNMP v1: Structure of Management Information-Std. Management Information Base (MIBs), Network Management Functions: Fault Management-Fault Identification and Isolation-Event Correlation Techniques. SNMP v2: Version 2 Protocol Specification-Version 2 MIB Enhancements-MIB-II, Case Diagrams - Security Management - Protecting Sensitive Information - Host and User Authentication-Key Management. SNMP v3: Version 3 Protocol & MIB - SNMP v3 User Based Security Model - View Based Access Model - Network Management Functions: Accounting Management - Performance Management- Network Usage, Metrics and Quotas

### **REMOTE NETWORK MONITORING RMON**

RMON1: Statistics Collection- Alarms and Filters-Remote Network Monitoring RMON 2-Monitoring Network Protocol Traffic-Application-Layer Visibility-Management Tools, Systems and Applications-Test and Monitoring Tools-Integrating Tools-Development Tools- Web-based Enterprise Management-Enterprise Network Management: Network Management System Requirements- Network Management Applications and Systems

### **TELECOMMUNICATIONS MANAGEMENT FOR SERVICE PROVIDERS**

Telecommunications Network Management-ATM Management-Management of broadband Networks- Real-time OSs for Next-Generation Service Management-The Operations Systems Implications of Managing Next-Generation Networks Managing a Portfolio of Broadband Access Technologies-Next-Generation Network Design-Experiences in Establishing a Nationwide Broadband Network -Quality of Service in Heterogeneous Networks-Customer-Empowered Networking

### **TEXT BOOK**

1. Subramanian M, Network Management: Principles and Practice, Addison-Wesley, 2000.

**REFERENCES**

1. Mauro D.R and Schmidt K.J, Essential SNMP, O'Reilly and Associates, Sebastopol, CA, 2001.
2. Peterson L and Davie B, Computer Networks: A Systems Approach, Morgan Kaufmann Publishers, 3<sup>rd</sup> Edition, 2003.
3. Mahbub Hassan and Raj Jain, High Performance TCP/IP Networking, Prentice Hall, 1<sup>st</sup> edition, 2004.

<b>CSE6102</b>	<b>ENTERPRISE NETWORK DESIGN</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **INTRODUCTION TO NETWORK CONCEPTS, STANDARDS AND PROTOCOLS**

Introduction to Computer Networks - Networking Standards and Reference Models - Computer Network Protocols – Data Communication Fundamentals - Transmission Basics and Networking Media

### **LOCAL AND WIDE AREA NETWORK TOPOLOGIES AND HARDWARE**

Physical and Logical Topologies - Network Switching - Ethernet Local Area Networks - Networking Hardware - Wide Area Networking Technologies - WAN Topologies - WANs and WAN Transmission Methods - WAN Implementation and Remote Connectivity

### **ENTERPRISE NETWORKING WITH WINDOWS 2000 AND NETWARE**

Network Operating Systems - Networking with Windows 2000 – Enterprise Networking with NetWare - NetWare Based Networking

### **ENTERPRISE NETWORKING WITH UNIX**

Networking with UNIX – Internetworking with TCP/IP for Enterprise Applications - Networking with TCP/IP: Internet, Intranet and Extranet - Internet Applications for Enterprise

### **ENTERPRISE NETWORK MANAGEMENT**

Troubleshooting Network Problems - Maintaining and Upgrading Computer Networks - Managing Network Design and Implementation - Enterprise Network Security: Issues, Concepts, and Techniques - Introduction to Network Security - Ensuring Network Integrity and Availability

### **TEXT BOOK**

1. Tamara ,Network Guide Networks , Thomson Learning, 2<sup>nd</sup> edition

<b>CSE6103</b>	<b>CONVERGENT NETWORKS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **TRADITIONAL VOICE NETWORKS**

Traditional voice networks – state of voice communication – Enterprise Telephonic Signaling – Signaling Systems – Call routing and dial plan – defining and measuring voice quality

### **PACKET VOICE AND DATA NETWORKS**

Voice digitization and coding –Quality of Service criteria for packet telephony – WAN protocols for integrated voice and data service, Design considerations for WAN protocols

### **VOICE/DATA INTEGRATION**

Review of IP features for voice / data integration, Voice over IP transport and Signaling protocols ,Initial Network Planning and Design, Delay Budgets and Loss Plans, Establishing an Integrated Dialing Plan

### **IMPLEMENTATION AND CISCO ROUTER CONFIGURATION**

Enabling Network-Wide Quality of Service, Establishing Router-PBX Connectivity, Establishing Network-Wide Calling Capability, Resolving Voice Quality Issues

### **IP TELEPHONY**

IP Basics – IP Telephony Concepts: From Legacy Telephony to IP Telephony Supplementary Services / Extended phone Features –Unified Messaging – Unity Administration, Call Management.

### **TEXT BOOK**

1. Scott Keagy Integrating Voice and Data Networks, Cisco Press. 2000

### **REFERENCE**

1. Oliver C. Ibe, Converged Network Architecture, Delivering voice and data over IP, ATM and frame relay, John Wiley and Sons, 1st edition, 2001

<b>CSE6104</b>	<b>STORAGE AREA NETWORKS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **INTRODUCTION TO SAN**

Data Access in the Internet Era: Availability Requirements for Network Storage-Traditional Client/Server Computing with Direct Attached Storage-Network Storage Architectures That Overcome DAS Limitations, Establishing a Context for Understanding Storage Networks: The Three Primary Functions of Storage Networking-Connecting-Storing-Filing, File Systems, and Operating Systems-SAN and NAS as Storing and Filing Applications, Getting Down with Storage I/O: Requirements for Storage I/O-The I/O Path.

### **SAN DEVICES AND SUBSYSTEMS**

Storage Devices: Disk Drives-Tape Drives, Storage Subsystems: Subsystem Architecture-Common Functions of Storage Subsystems-JBOD-Tape Subsystems and Disk Subsystems for Backup, SCSI Storage Fundamentals and SAN Adapters: The Architecture and Logic of SCSI-SCSI Command Basics- HBAs and Network Storage Interfaces, Device Interconnect Technologies for Storage Networks: Fundamental Concepts in Storage Interconnects-Legacy DAS Interconnects-Serial Storage Interconnects

### **DATA REDUNDANCY AND It's APPLICATIONS**

Introduction to Data Redundancy and Mirroring: The Necessity of Redundancy in Storage Networks-Mirroring, Bigger, Faster, More Reliable Storage with RAID: RAID History-RAID Fundamentals-Parity Redundancy in RAID-Strips and Stripes Stripe Depth-RAID 5-Avoiding Parity Limitations of RAID with RAID 10-RAID Product Options, Redundancy Over Distance with Remote Copy: Fundamentals of Remote Copy-Remote Copy Application Processing-Remote Copy Implementation Options-Examples of Remote Copy Architectures, Connection Redundancy in Storage Networks and Dynamic Multipathing: Redundant I/O Path Elements-Dynamic Multipathing.

### **STORAGE AND DATA MANAGEMENT**

Storage Virtualization: The Power in Volume Management Software and SAN Virtualization Systems-The Concept of Storage Virtualization-A Review of Technologies Used in Storage Virtualization-Virtualization Products: Volume Managers and SAN Virtualization Systems-Performance of SAN Virtualization -Scaling Storage with Virtualization-Address Space Manipulation Techniques-Storage Pooling-Extending Management Functions in Volume Management and SAN Virtualization Systems-Reliability and Risk Considerations, Network Backup: The Foundation of Storage Management-Fundamentals of Backup and Recovery-Backup Operations-Backup Applications in Storage Networks-Disk-Based Backup.

**FILING SYSTEMS AND DATA MANAGEMENT IN SAN**

File System Fundamentals: The Strange and Wonderful Relationship Between File Systems and Operating Systems-File System Structures-File System Constructs and Functions, Network File Systems and Network Attached Storage :Fundamentals of Network File Systems-The Complete I/O Process for File I/O in a Network-NFS and CIFS Protocols for Network File Systems-Applications for Network File Storage-Extended Features of Network File Systems-Network Attached Storage (NAS), New Directions in Network Filing: Clustered File Systems- Distributed File Systems, and Network Storage for Databases-Cluster File Systems-Super-Scaling Network File Systems with SAN-Based Distributed File Systems-Network Storage for Databases, Data Management: Managing Data in Time-Historical Versions of Files-Storing Data in Compliance with Government Regulations-Capacity Management-Tiered Storage-Information Life Cycle Management

**TEXT BOOK**

1. Marc Farley, Storage Networking Fundamentals: An Introduction to Storage Devices, Subsystems, Applications, Management, and File Systems, Cisco Press 2005.

**REFERENCES**

1. Ulf Troppens, Rainer Erkens, Wolfgang Müller, Storage Networks Explained: Basics and Application of Fibre Channel SAN, NAS iSCSI and InfiniBand John Wiley and Sons, 2004.
2. Tom Clark, Designing Storage Area Networks: A Practical Reference for Implementing Fibre Channel and IP SANs Addison Wesley, 2/e, 2003.
3. The Fibre Channel Association ,Fibre Channel Storage Area Networks , 1<sup>st</sup> Edition, 2001.

<b>CSE6105</b>	<b>GRID COMPUTING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**GRID COMPUTING**

Introduction - Definition - Scope of grid computing

**GRID COMPUTING INITIATIVES**

Grid Computing Organizations and their roles – Grid Computing analog – Grid Computing road map.

**GRID COMPUTING APPLICATIONS**

Merging the Grid sources – Architecture with the Web Devices Architecture.

**TECHNOLOGIES**

OGSA – Sample use cases – OGSA platform components – OGSi – OGSA Basic Services.

**GRID COMPUTING TOOL KITS**

Globus Toolkit – Architecture, Programming model, High level services – OGSi .Net middleware Solutions.

**TEXT BOOK**

1. Joshy Joseph and Craig Fellenstein, Grid Computing, PHI, 2003

**REFERENCES**

1. Ahmar Abbas, Grid Computing: A Practical Guide to technology and Applications, Charles River media, 2003.
2. Daniel Minoli ,A Networking Approach to Grid Computing, Wiley-Inter science,2004
3. Mark Baker and Rajkumar Buyya, Cluster Computing at a Glance, High Performance Cluster Computing: Architectures and Systems (Vol. 1), Prentice Hall, NJ, USA, 1999

<b>CSE6106</b>	<b>NETWORK SYSTEM DESIGN USING NETWORK PROCESSORS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**INTRODUCTION**

Introduction and overview-Basic Terminology and Example Systems  
- Review of Protocols and Packet Formats

**TRADITIONAL PROTOCOL PROCESSING SYSTEMS**

Conventional computer hardware and its use in low-end network systems- Algorithms for protocol processing-packet processing functionality-Software architectures for protocol processing on conventional hardware-advanced hardware architectures

**NETWORK PROCESSOR TECHNOLOGY**

Motivation for network processors-Complexity of network processor design-network processor architectures-Scaling a network processor-a review of commercial network processor architectures-languages

**NETWORK PROCESSORS AND PROGRAMMING**

Discussion of Intel® IXP2XXX network processor-Intel®: reference platform; embedded RISC processor-Intel®: programmable packet processor hardware and programming-Intel®: more on programming the packet processors- a programming example-Programming example; switching fabrics

**ALTERNATIVE ARCHITECTURES**

Network processor design tradeoffs-Active and programmable networks-Active network applications-Commercial network processors-Benchmarks for Network Processors

**TEXT BOOK**

1. Comer D, Network Systems Design Using Network Processors, Intel® IXP1200 Version, Prentice Hall, 2003..