

SEVENTH SEMESTER

CODE	COURSE TITLE	L	T	P	C
CS401	Distributed Computing	3	0	0	3
CS403	Network Security	3	0	0	3
CS405	Principles of Compiler Design	3	0	0	3
MA401	Operations Research	3	1	0	4
	Elective – II	3	0	0	3
	Elective –III	3	0	0	3
CS415	Compiler Design Laboratory	0	0	3	2
CS417	Network Performance Laboratory	0	0	3	2
CS449	Comprehensive Viva-Voce	0	0	2	2
	Project Phase – I	0	0	2	1
TOTAL CREDITS					
26					

LIST OF ELECTIVE FOR SEVENTH SEMESTER: (TWO)

1. CS451 MOBILE APPLICATION DEVELOPMENT
2. CS453 NETWORK PRINCIPLES & PROTOCOLS
3. CS455 INFORMATION SECURITY
4. CS459 WEB SERVICES
5. CS461 ADVANCED JAVA PROGRAMMING
6. CS463 IMAGE PROCESSING
7. CS465 FAULT TOLERANT COMPUTING SYSTEMS
8. EE451 NEURAL AND FUZZY LOGIC CONTROL (ANY ELECTIVE FROM OTHER DEPARTMENT)

SEVENTH SEMESTER

CS401 - DISTRIBUTED COMPUTING

Credits: 3

Objectives

- To impart advanced technologies for developing distributed systems
- To understand the development of Microkernel, Distributed algorithms, Time stamping in distributed systems
- To understand the assumptions and limitations of the underlying distributed systems

Unit-I Distributed Systems

Introduction: Goal - Advantages over centralized systems - Organization of multiprocessor systems - Hardware/software concepts - Review of layered protocols.

Unit-II Client/Server Model

Microkernel - RMI - Distributed algorithms - Time stamping - Circulating tokens - Diffusing computations.

Unit-III Mutual Exclusion Algorithm

Election algorithm - Detecting loss of tokens and regeneration - Distributed deadlock detection algorithms - Distributed termination algorithms.

Unit-IV File Replication

Semantics of file sharing - Remote access methods - Fault tolerant issues - Introduction to distributed operating systems.

Unit-V Introduction to Distributed Operating Systems

Motivations - Management systems - Levels of distribution transparency - Architecture - Introduction to concurrency control.

Outcomes

- Ability to analyze, design, build, and deploy distributed computer systems using a variety of current application technologies and architecture
- Ability to promote the utilization of industry standard distributed computing technologies such as J2EE and .NET

Teaching and Evaluation guidelines:

- 30% on Problems and Analysis (Higher Order Thinking), and 30% on Application (Medium Order Thinking), and 40% on Conceptual Understanding (Lower Order Thinking).

Text Books

1. George Coulouris and Jean Dollimore, and Tim Kindberg, "Distributed System Concepts and Design", 5th Edition, Pearson Education, 2013
2. A. S. Tanenbaum, "Distributed Operating Systems", Pearson Education, 2009.

Reference Book

1. S. Ceri and G.Pelagatti, "Distributed Databases - Principles and Systems", McGraw Hill, 1985

CS403 - NETWORK SECURITY

Credits: 3

Objectives

- To understand the network security, services, attacks, mechanisms, types of attacks
- To comprehend and apply authentication services, authentication algorithms
- To comprehend and apply network layer security protocols, Transport layer security protocols, Web security protocols.

Unit -I

Overview of Network Security, Security services, attacks, Security Issues in TCP/IP suite- Sniffing, spoofing, buffer overflow, ARP poisoning, ICMP Exploits, IP address spoofing, IP fragment attack, routing exploits, UDP exploits, TCP exploits.

Unit-II

Authentication requirements, Authentication functions - Message Authentication Codes - Hash Functions - Security of Hash Functions and MACs - MD5 message Digest algorithm - Secure Hash Algorithm - RIPEMD - HMAC Digital Signatures, Authentication protocols-Kerberos, X.509.

Unit-III

IP Security-AH and ESP, SSL/TLS, SSH, Web Security-HTTPS, DNS Security, Electronic Mail Security (PGP, S/MIME).

Unit-IV

Intruders, Viruses, Worms, Trojan horses, Distributed Denial-Of-Service (DDoS), Firewalls, IDS, Honey nets, Honey pots.

Unit-V

Introduction to wireless network security, Risks and Threats of Wireless networks, Wireless LAN Security (WEP, WPA).

Outcomes

- Be able to determine appropriate mechanisms for protecting the network.
- Design a security solution for a given application, system with respect to security of the system

Text Books

1. W. Stallings, "Cryptography and Network Security: Principles and Practice", 5/E, Prentice Hall, 2013

Reference Books

1. Atul Kahate, "Cryptography and Network Security", Tata McGraw-Hill, 2003
2. Yang Xiao and Yi Pan, "Security in Distributed and Networking Systems", World Scientific, 2007.
3. Aaron E. Earle, "Wireless Security Handbook", Auerbach publications, Taylor & Francis Group, 2006.

CS405 - PRINCIPLES OF COMPILER DESIGN

Credits: 3

Objectives

- To understand the various stages involved in the design of a compiler
- To have a grasp on the syntactic and semantic structure in the compiler design

Unit-I Introduction

Structure of a compiler - Different phases of a compiler - Finite automata and lexical analysis.

Unit-II Syntactic Specification

Context-free grammars - Derivation and parse trees - Basic parsing techniques.

Unit-III Parsers

LR Parsers: Simple LR, Canonical LR, and LALR - Syntax-directed translation schemes - Various forms of intermediate code.

Unit-IV Symbol Tables and Translation

Array references - procedure calls – declarations - case statements - Symbol tables - Run-time storage administration - Error detection and recovery.

Unit-V Code Optimization and Generation

Loop optimization – Directed Acyclic Graph (DAG) representation of basic blocks - Code generation from DAG's - Compilers: Yet Another Compiler (YACC) - Attributed parser generators.

Outcome

- To design, develop, and implement a compiler for any language.

Teaching and evaluation guidelines

- 40% on Analysis and Applications, 30% on Techniques and Methods, 20% on definitions

Text Books

1. A.V.Aho, Monica, R.Sethi, J.D.Ullman, "Compilers, Principles, Techniques and Tools", Pearson Education/ Addison Wesley, 2007
2. J.P. Tremblay, P.G. Sorrenson, "The Theory and Practice of Compiler Writing", McGraw Hill, 1985

MA401 - OPERATIONS RESEARCH

Credits: 4

Objectives

- To classify and formulate real-life problem for modelling, solving and applying for decision making.
- To study the formulation and various methods of solutions for linear programming, transportation, assignment, CPM and PERT problems
- To solve problems using dynamic programming method

Unit 1 - LINEAR PROGRAMMING: Formulation and graphical solution of LPP's. Reduction of a LPP to the standard form. Simplex method, Big-M method, Two-phase method. Dual linear programming problem. Solution of the primal problem from the solution of the dual problems. Transportation Problems: Initial basic feasible solution using N-W corner rule, row minimum, column minimum, least cost entry and Vogel's approximation method. Optimal solutions. Degeneracy in Transportation problems. Assignment Problem.

Unit 2 - CPM and PERT: Network diagram - Events and activities - Project planning - reducing critical events and activities - critical path calculations - example - sequencing problems - 2 machines and n jobs, n machines and 2 jobs, m machines and n jobs problem.

Unit 3 - Dynamic Programming: Formulation - Invest problem - General allocation problem - Stage coach problem - Production scheduling.

Unit 4 Game Theory-Two person Zero Sum game, saddle point determination, algebraic method, graphical method etc.

Unit 5 - Elements of Inventory Control: Economic lot size problems - Fundamental problems of EOQ. The problem of EOQ with finite rate of replenishment. Problems of EOQ with shortages - production instantaneous, replenishment of the inventory with finite rate.

Outcomes

- Analyzes the problems in engineering, management, or business environment, focusing on important details
- Formulate of real problems in terms of input-output-parameters relationships and identify the solution procedure

Teaching and Evaluation guidelines

- 30% on An Application (Higher Order Thinking), and 50% on diagrams and problems (Medium Order Thinking), and 20% on Definition (Lower Order Thinking).

Text Book

1. Introduction to Operations Research by Kanti Swarup, Man Mohan & P. K. Gupta (Sultan Chand & Sons)

Reference Books

1. J.C.Pant : Introduction to Operatins Research, (Jain Brothers, New Delhi)
2. Hillier & Lieberman: Operations Research, TMH

CS415 - COMPILER DESIGN LABORATORY

Credits: 2

Objective

- To provide a deep insight into the various programmatic stages in building a Compiler

EXPERIMENTS

1. Design of lexical analyzers and parsers like recursive-descent parser for a block structured language with typical constructs
2. Exercises using LEX and YACC
3. C/C++ Program on Left Recursion elimination and Left factoring, SLR, and LALR
4. Quadruples/Triples generation using LEX and YACC for a subset of a block structured language

Outcomes

- Complete understanding of the working principles of a compiler
- Technical expertise to design, develop, and implement a compiler for any language

CS417 - NETWORK PERFORMANCE LABORATORY

Credits: 3

Objectives

- To learn the basic idea about open source network simulator NS2 and how to download, install and work with network simulators.
- To define the different agents and their applications like TCP, FTP over TCP, UDP, CBR and CBR over UDP etc.
- To introduce models, techniques, and tools frequently used in network research

EXPERIMENTS

- Network topology configuration using packet tracer/ns2 software.
- Wi-fi (Wireless LANs CSMA / CA, IEEE 802.11 b)
 1. Create scenarios, simulate, and study the variation of throughput and Mean Delay as the number of nodes increase.
 2. Understand and write a program to Encrypt and Decrypt the message by using Wired Equivalent Privacy (WEP).
- Transmission Control Protocol (TCP)
 1. Create a scenario, simulate, and study the performance of the different congestion control algorithms (Old Tahoe, Tahoe, and Reno).
 2. Write a program for any one of the flow control protocols i.e Stop and wait, Go back-N, selective repeat over UDP and verify through a simulator
- Routing Protocols (RIP and OSPF)
 1. Study the effect of different Routing protocols (RIP and OSPF) on network's performance through simulation.
 2. Implement, and verify through a simulator, a program to create sub-network and assign addresses based on the number of hosts connected to the network.
 3. Write algorithm, pseudo code and program to implement classless addressing to nodes in a network.
- MANET
 1. To create scenario and study the performance of MANET mobility model using NetSim simulation.
 2. Understand and write a program for different error detecting codes like cyclic redundancy code (CRC) and longitudinal redundancy code (LRC)
- CDMA
 1. Study how call-blocking probability varies as the load on a CDMA network is continuously increased.
 2. Study how the number of channels increases and the Call blocking probability decreases as the Voice activity factor of a CDMA network is decreased.

Outcomes

- To provide training in experimental design and technical presentation.
- To get acquainted with practical training on the theory learned in real-world network problems

LIST OF ELECTIVES FOR SEVENTH SEMESTER: (TWO)

CS451 - MOBILE APPLICATION DEVELOPMENT

Credits: 3

Objectives

- To learn the basics of mobile application development
- To get accustomed to Android platform
- To develop skills in developing basic Android applications

Unit – I Introduction to Android

Native Android Application; SDK Features; Introduction to Open Handset Alliance; Development Framework; Creating Application: Creating applications, Creating Virtual Device, Running and Debugging Application; Developing for Mobile and Embedded Devices; Android Development Tools

Unit – II User Interfaces and Resource Management

Basic UI Design; Fragments; Widget Toolbox; Creating New View; Adapters; Introduction to Intents; Intent Filters and broadcast Receivers; Device Monitoring Using Broadcast Intents; Downloading and Parsing Internet Resources; Download Manager; Internet Services

Unit – III Files and Database Handling

Saving Application Data; Shared Preferences; Preference Framework and Activity; Static File as Resource; File System; Introduction to SQLite Database; Querying SQLite; Content Provider; Adding Search to Application; Native Android Content Provider

Unit – IV Background Services and User Experience Enhancement

Creating and Controlling Service; Binding Services to Activities; Background Threads; Alarms; Action Bar; Menus and Action Bar Items; Dialogs; Customizing Toast; Notifications; Adding Notification and Dialog to Earthquake Monitor

Unit – V Multimedia, Wireless Connectivity and Telephony

Audio and Video Handling; Manipulating Raw Audio; Sound Effects; Camera Programming; Video Recording; Managing Wireless Connectivity : WiFi, Bluetooth, Near Field Communication; Hardware Support for Telephony; Telephony Management; SMS and MMS

Outcomes

- Ability to design and develop Android applications
- Acquire skill set to execute applications in Android based devices

Reference Books

1. Reto Meier, “Professional Android 4 Application Development”, Wrox, 2012
2. Matt Gifford, “PhoneGap Mobile Application Development Cookbook”, PACKT, 2012
3. Adrian Kosmaczewski, “Mobile JavaScript Application Development”, O’RELLY, 2012

Objectives

- Understand the architecture of the Internet protocols as a layered model
- To understand the fundamentals of data transmission, encoding and multiplexing
- To understand how the various components of wide area networks and local area networks work together

Unit-I Introduction and Data link Layer

Introduction to Networks - Application of Networks - Architecture Topology Switching - SLIP, PPP -ALOHA protocols, CSMA/CD, IEEE 802.3, 802.4, 802.5, CSMA/CA, IEEE 802.11, IEEE 802.16.

Unit-II Network Layer Issues and Protocols

Network Layer Issues- Routing, Congestion control- Internetworking - Issues, Address Learning Bridges, Spanning tree, Source routing, Bridges, Routers, Gateway.

Unit-III Advanced Network Layer Issues and Protocols

Network Protocol- IP datagram - hop by hop routing, ARP, RARP, DHCP -Sub net Addressing, Address Masking, ICMP, RIP, RIPV2, OSPF, DNS, LAN and WAN Multicast.

Unit-IV Transport Layer Issues and Protocols

Transport Layer- Design issues, Connection Management, Transmission Control Protocol (TCP) - User Datagram Protocol (UDP), Streaming Control Transmission Protocol(SCTP).

Unit-V Application Layer Issues and Protocols

Application Layer Protocol- Telnet - TFTP - FTP - SMTP –Bootstrap Network Time Protocol- SNMP.

Outcomes

- Familiarization of the different layers of TCP/IP protocol stack
- Understanding of the working principle of different protocols at different layers

Teaching and Evaluation Guidelines

- 30% on Analysis (Higher Order Thinking) and 70% on Conceptual understanding (Lower Order Thinking).

Text Books

1. Andrew S. Tanenbaum and David J. Wetherall, “Computer Networks”, 5th Edition, Pearson, 2011
2. William Stallings, "Data and Computer Communications”, 9th Edition, Pearson, 2011

Reference Book

1. W Richard Stevens and G. Gabrani, "TCP/IP Illustrated - Volume I, The protocols", Pearson Education, 2009

CS459 - WEB SERVICES

Credits: 3

Objectives

- To understand the various types of protocols used in web, difference between web browser and web server.
- To understand the various web services and platform for web services development.
- To assess the communication in an secure way for transmission.

Unit – I Introduction to Protocols

Web Technology - Web 2.0 technologies, Introduction to Ajax, Ajax Design Basics, Introduction to WWW, TCP/IP, HTTP, ARP, ICMP FTP, UDP, routing protocols (RIP, OSPF, BGP), Network Management Protocols (SNMP), and Application-level protocols (FTP, TELNET, SMTP), URL, Web Browsers, Web Servers.

Unit – II Web Services

Evolution and differences with Distributed computing, XML - Name Spaces - Structuring With Schemas and DTD - Transformation - XML Infrastructure WSDL, SOAP, UDDI, ebXML - SOAP And Web Services in E-Com - Overview Of .NET And J2EE.

Unit – III Platform for Web Services Development

MVC Design Pattern and Web services - EJB, .NET, J2EE Architecture, J2EE Components & Containers, Specification, Application servers, Struts, Introduction to JSON.

Unit – IV WS Security

Web Transactions, Coordination, Orchestration, and Choreography – tools BPEL, WS CDL Overview of Web service standards -BPEL4WS. WS-Security and the Web services security specifications, WS Reliable Messaging, WS-Policy, WS-Attachments.

Unit – V WS Case Study

Web Service Search Engine, Web Service Discovery and Web Service Composition. Web Service – SOAP vs. Web Service – REST.

Outcomes

- Ability to understand various web services, protocols used in web.
- Technical understanding of secure web and some case study related to web services

Teaching and Evaluation guidelines

- 30% on Protocol used (Higher Order Thinking), and 50% on diagrams and architecture (Medium Order Thinking), and 20% on Definition (Lower Order Thinking).

Text Books

1. Deitel, Deitel and Nieto, “Internet and World Wide Web – How to program”, Pearson Education Publishers, 2000.
2. Elliotte Rusty Harold, “Java Network Programming”, O’Reilly Publishers, 2002.

Reference Books

1. Ramesh Nagappan , Robert Skoczylas and Rima Patel Sriganesh, " Developing Java Web Services", Wiley Publishing Inc., 2004.
2. R. Krishnamoorthy and S. Prabhu, "Internet and Java Programming", New Age International Publishers, 2004.

CS461 - ADVANCED JAVA PROGRAMMING

Credits: 3

Objectives:

- To impart of students to design and develop enterprise strength distributed and multitier applications – Using Java Technology.
- To understand advanced Java programming concepts like interface, threads,Swings etc
- To impart of develop network programs in Java
- To understand Concepts needed for distributed and multi-tier applications
- To understand issues in enterprise applications development.

UNIT I - Java Fundamentals

Inheritance - Interface- Packages-Exception Handling - Applets - Java I/O streaming – filter and pipe streams – Byte Code interpretation - Threading –Swing.

UNIT II - Network Programming In Java

Sockets – secure sockets – custom sockets – UDP datagrams – multicast sockets – URL classes – Reading Data from the server – writing data – configuring the connection – Reading the header – telnet application – Java Messaging services.

UNIT III - Applications In Distributed Environment

Remote method Invocation – activation models – RMI custom sockets – Object Serialization – RMI – IIOP implementation – CORBA – IDL technology – Naming Services – CORBA programming Models - JAR file creation

UNIT IV - Multi-Tier Application Development

Server side programming – servlets – Java Server Pages - Applet to Applet communication – applet to Servlet communication - JDBC – Applications on databases – Multimedia streaming applications – Java Media Framework.

UNIT V - Enterprise Applications

Server Side Component Architecture – Introduction to J2EE – Session Beans – Entity Beans – Persistent Entity Beans.

Outcomes

- Ability to show competence in the use of the Java programming language in the development of small to medium-sized application programs
- Ability to demonstrate an introductory understanding of graphical user interfaces, multi-threaded programming, and event-driven programming.

Teaching and Evaluation guidelines:

50% on Methods and Techniques (Medium Order Thinking), 40 % on Programming (Higher Order Thinking), and 20% on Tool functions (Lower Order Thinking).

Text Books

1. Elliotte Rusty Harold, “ Java Network Programming”, O’Reilly publishers, 2013

2. Ed Roman, "Mastering Enterprise Java Beans", John Wiley & Sons Inc., 2004.
3. Hortsman & Cornell, "CORE JAVA 2 ADVANCED FEATURES, VOL II", Pearson Education, 2013.

Reference Books

1. Patrick Naughton, "COMPLETE REFERENCE: JAVA2", Tata McGraw-Hill, 2003.
2. Herbert Schildt, "JAVA2: COMPLETE REFERENCE", Kindle Edition, 2013

CS463-IMAGE PROCESSING

Credits: 3

Objectives

- To introduce fundamentals of Image Processing
- To understand the techniques and tools for digital image processing

Unit-I Introduction

Light - Brightness adaption and discrimination – Pixels - coordinate conventions - Imaging Geometry - Perspective Projection - Spatial Domain Filtering - sampling and quantization.

Unit-II Spatial Domain Filtering

Intensity transformations - contrast stretching - histogram equalization - Correlation and convolution - Smoothing filters - sharpening filters - gradient and Laplacian.

Unit-III Filtering in Frequency Domain

Hottelling Transform - Fourier Transforms and properties - FFT (Decimation in Frequency and Decimation in Time Techniques) – Convolution – Correlation - 2-D sampling - Discrete Cosine Transform - Frequency domain filtering.

Unit-IV Image Restoration

Basic Framework - Interactive Restoration - Image deformation and geometric transformations - image morphing - Restoration techniques - Noise characterization - Noise restoration filters - Adaptive filters - Linear - Position invariant degradations - Estimation of Degradation functions - Restoration from projections.

Unit-V Image Compression

Encoder-Decoder model - Types of redundancies - Lossy and Lossless compression - Entropy of an information source - Shannon's 1st Theorem - Huffman Coding - Arithmetic Coding - Golomb Coding - LZW coding - Transform Coding - Sub-image size selection - blocking artifacts - DCT implementation using FFT - Run length coding - Lossy predictive coding - Motion Compensation

Outcomes

- Ability to use advanced image processing techniques
- Emphasis will be to develop engineering skills and intuitive understanding of the tools used in Image Processing.

Teaching and Evaluation guidelines

- 40% on Application (Higher Order Thinking), and 40% on Methods and Techniques (Medium Order Thinking), and 20% on Tool functions (Lower Order Thinking).

Text Books

1. Rafael C. Gonzalez , Richard E. Woods,” Digital Image Processing”, Third Edition, Prentice hall, 2011.
2. Anil Jain K, “Fundamentals of Digital Image Processing”, Prentice-Hall of India, 2001.

CS465 – FAULT TOLERANT COMPUTING

Credits: 3

Objectives

- To understand techniques to model faults
- To know how to generate tests and evaluate effectiveness
- To evaluate reliability of systems with permanent and temporary faults

Unit-I Introduction

Computer and Computation Distribution - System models and Fault models: Test generation for combinational circuits, sequential circuits, and Fault simulation.

Unit-II Fault Tolerance Concepts

Recovery in time, Fault detection techniques, Modeling Fault tolerant systems - Rollback modular redundancy and Exception Handling.

Unit-III Fault Tolerant in Real time Systems

Architecture of Fault tolerant computers general purpose commercial systems - High availability systems - Critical computations.

Unit-IV Fault Tolerant in Multiprocessor Systems

Communication Architectures, Shared memory Interconnections, loop architectures, Tree Networks, Graph Network and in Binary cube interconnection.

Unit-V Fault Tolerant Software

Design of fault Tolerant software - Reliability Models, Construction of acceptance tests, validation of Fault tolerant software.

Outcome

- To assess the relation between software testing and residual defects and security vulnerabilities

Teaching and evaluation guidelines

- 50% on Problems (Higher Order Thinking), and 30% on Algorithms (Medium Order Thinking), and 20% on Terms and Terminologies (Lower Order Thinking)

Text Books

1. Israel & Krishnan, "Fault Tolerant Systems" Elsevier Publications, 2007.
2. D. K. Pradhan, "Fault Tolerant computing - Theory and Techniques "Prentice Hall, 1986.

Reference Books

1. Levi & Agrawala, "Fault Tolerant Systems Design, McGraw hill, 1994.
2. MA. Breuer and A. D. Friedman, "Diagnosis and Reliable design of Digital Systems", Computer Sci. Press, 1976.

EE451-NEURAL NETWORK AND FUZZY LOGIC CONTROL

Credits: 3

Objectives

- To provide comprehensive knowledge of fuzzy logic control and adaptive fuzzy logic and to design the fuzzy control using genetic algorithm.
- To provide adequate knowledge of application of fuzzy logic control to real time systems.

Unit-I Architectures

Introduction – Biological neuron – Artificial neuron – Neuron modeling – Learning rules – Single layer – Multi layer feed forward network – Back propagation – Learning factors.

Unit-II Neural Networks for control

Feedback networks – Discrete time hop field networks – Transient response of continuous time networks – Applications of artificial neural network - Process identification – Neuro controller for inverted pendulum.

Unit-III Fuzzy Systems

Classical sets – Fuzzy sets – Fuzzy relations – Fuzzification – Defuzzification – Fuzzy rules.

Unit-IV Fuzzy Logic control

Membership function – Knowledge base – Decision-making logic – Optimization of membership function using neural networks – Adaptive fuzzy system – Introduction to genetic algorithm.

Unit-V Application of Fuzzy logic control

Fuzzy logic control – Inverted pendulum – Image processing – Home heating system – Blood pressure during anesthesia – Introduction to neuro fuzzy controller.

Outcomes

- Provides comprehensive knowledge of fuzzy logic control and adaptive fuzzy logic
- Ability to design the fuzzy control using genetic algorithm

Teaching and Evaluation guidelines

- 40% on Application (Higher Order Thinking), and 40% on Methods and Techniques (Medium Order Thinking), and 20% on Tool functions (Lower Order Thinking).

Text Books

1. Jacek M. Zurada, "Introduction to Artificial Neural Systems", Jaico Publishing home, 2002.
2. Timothy J. Ross, "Fuzzy Logic with Engineering Applications", Tata McGraw Hill, 1997.
3. John Yen & Reza Langari, 'Fuzzy Logic – Intelligence Control & Information', Pearson Education, New Delhi, 2003.

CS455 - HIGH SPEED NETWORKS

Credits: 3

Objectives

- To get an introduction about ATM and Frame relay.
- To be provided with an up-to-date survey of developments in High Speed Networks.

Unit-I Introduction

High Speed Networks: Frame Relay Networks - Asynchronous Transfer Mode (ATM): ATM Protocol Architecture, ATM logical Connection, ATM Cell, ATM Service Categories, ATM Adaptation Layer (AAL). High Speed LANs: Fast Ethernet, Gigabit Ethernet, Fiber Channel. Wireless LANs: applications, requirements – Architecture of 802.11.

Unit-II Congestion and Traffic Management

Queuing Analysis - Queuing Models – Single Server Queues – Effects of Congestion – Congestion Control – Traffic Management – Congestion Control in Packet Switching Networks – Frame Relay Congestion Control.

Unit-III TCP and ATM Congestion Control

TCP Flow control – TCP Congestion Control –Retransmission–Timer Management – Exponential RTO back off – KARN's Algorithm –Window Management – Performance of TCP over ATM. Traffic and Congestion control in ATM – Requirements – Attributes – Traffic Management Frame work, Traffic Control – ABR traffic Management – ABR rate Control, RM cell formats, ABR Capacity allocations – GFR traffic management.

Unit-IV Integrated and Differentiated Services

Integrated Services Architecture: Approach, Components, and Services. Queuing Discipline: Fair Queuing (FQ), Bit Round Fair Queuing (BRFQ), Generalized Processor Sharing (GPS) and Weighted Fair Queuing (WFQ) – Random Early Detection (RED), Differentiated Services.

Unit-V Protocols for QoS Support

RSVP: Goals & Characteristics, Data Flow, RSVP operations, Protocol Mechanisms. Multi Protocol Label Switching (MPLS): Operations, Label Stacking, and Protocol details. Real Time Protocol (RTP): Protocol Architecture and Data Transfer Protocol. Real Time Control Protocol (RTCP).

Outcomes

- To know the techniques involved to support real-time traffic and congestion control.
- To be provided with different levels of Quality of Service (QoS) to different applications.

Teaching and evaluation guidelines

- 40% on Problems, 40 % on Comparisons and Statements, 20% on Techniques and Definitions

Text Book

1. William Stallings, "HIGH SPEED NETWORKS AND INTERNET", Pearson Education, Second Edition, 2002.

Reference Books

1. Warland & Pravin Varaiya, "HIGH PERFORMANCE COMMUNICATION NETWORKS", Jean Harcourt Asia Pvt. Ltd., II Edition, 2001.
2. Irvan Pepelnjk, Jim Guichard and Jeff Apcar, "MPLS and VPN architecture", Cisco Press, Volume 1 and 2, 2003