

CS637 HIGH SPEED NETWORKS

(Elective –II)

Objectives of the Course:

- *To explain local area wireless network technologies (802.11 and Bluetooth) and their security weaknesses.*
- *To Architect a secure wireless network infrastructure for their organization, including strong encryption and centralized authentication.*
- *To explain hacker threat and the major techniques hackers use against wireless networks.*
- *To use various hacking and vulnerability assessment tools to assess the security of their own networks.*
- *To identify (and fix) vulnerabilities and mis-configurations in major wireless network technologies*

UNIT - I**Switching and Data Transmission**

ISO-OSI reference model. TCP/IP reference model, Circuit-switched networks, Datagram networks, Virtual-circuit networks, Structure of a switch, Telephone network, Dial-up modems, Digital Subscriber line, Cable TV networks

Data Link Layer

Error Detection and Correction: Introduction, Block coding, Linear Block codes, Cyclic codes, Checksum - **Data Link Control:** Framing, Flow and Error control, Protocols, Noiseless channels, Noisy channels, HDLC, Point-to-Point Protocol

UNIT - II

Multiple Access: Random Access, Controlled Access, Channelization – **Connecting Devices:** Connecting LANs, Backbone Networks, Virtual LANs.

High Speed Networks

Frame Relay: Packet-Switching Networks, Frame Relay Networks – **Asynchronous Transfer Mode (ATM) :** ATM Protocol Architecture, ATM Logical Connections, ATM Cells, ATM Service Categories, ATM Adaptation Layer (AAL)- **High-Speed LANs :** The Emergence of High-Speed LANs, Ethernet, Fiber Channel, Wireless LANs.

UNIT - III**Network Layer**

Logical Addressing: IPv4 Addresses, IPv6 Addresses, - **Internet Protocol:** Internetworking, IPv4, IPv6, Transition from IPv4 to IPv6 - **Network Delivery - Routing:** Forwarding, Unicast Routing Protocols, Multicast Routing Protocols

Transport Layer and Application Layer

Protocols: Process-to-Process delivery, User Datagram Protocol (UDP), TCP, SCTP -**Congestion control:** Data traffic, Congestion, Congestion control, Quality of Service

UNIT - IV

Domain Name System: Name space, Domain Name Space, Distribution of Name Space, DNS in the internet, Resolution, DNS messages, E-mail

Needs and Goals for Network Design

Analyzing Business Goals and Constraints: Using a Top-Down Network Design Constraints, Analyzing Business Goals, Analyzing Business constraints – **Analyzing Technical Goals & Tradeoffs:** Scalability, Availability, Network Performance, Security, Manageability, Usability, Adaptability, Affordability, Making Network Design Tradeoffs – **Characterizing Network Traffic:** Characterizing Traffic Flow, Traffic Load, Traffic Behavior, Quality of Service Requirements

UNIT - V

Logical Network Design

Designing Network Design: Hierarchical Network Design, Redundant Network Design Topologies, Modular Network Design, Designing a Campus Network Design Topology, Designing the Enterprise Edge Topology, Secure Network Design Topologies

Designing Models for Addressing and Naming: Guidelines for Assigning Network Layer Addresses, Using a Hierarchical Model for Assigning Addresses, Designing a Model for Naming.

Selecting Switching and Routing Protocols

Selecting Bridging & Switching Protocols, Spanning Tree Protocol Enhancements - **Selecting Routing Protocols:** Characterizing Routing protocols, IP Routing, Novell NetWare Routing, Using Multiple Routing Protocols in an Internet work

TEXT BOOKS:

1. Data Communications and Networking, *Behrouz A. Forouzan*, Fourth Edition, *Tata McGraw Hill*
2. High Speed Networks and Internets – Performance and Quality of Service, *William Stallings*, Second Edition, Pearson Education.
3. Top-Down Network Design, *Priscilla Oppenheimer*, Second Edition, Pearson Education(CISCO Press)

REFERENCE BOOKS:

1. Guide to Networking Essentials, *Greg Tomsho, Ed Tittel, David Johnson*, Fifth Edition, Thomson.
2. Computer Networks, *Andrew S. Tanenbaum*, Fourth Edition, Prentice Hall.
3. An Engineering Approach to Computer Networking, *S.Keshav*, Pearson Education.
4. Campus Network Design Fundamentals, *Diane Teare, Catherine Paquet*, Pearson Education (CISCO Press)
5. Computer Communications Networks, Mir, Pearson Education.

