MSCCS-Final / MCA 2nd Year
Syllabus

Course Code: MSCCS-205, 11/MCA-205
Course Name: Data Communication and Networks

Unit 1: Transmission Terminology
Components of Data Communication, Terminologies, Analog and Digital Transmission, Transmission Impairments, Transmission Media.

Unit 2: Data Encoding & Communication Techniques
Data Encoding Modulation, Asynchronous & Synchronous Transmission, Error Detection Techniques.

Unit 3: Multiplexing & Communication Hardware
Definition and need of Multiplexing, Frequency Division Multiplexing: Bandwidth, Wavelength, Time Division Multiplexing, Synchronous Time Division Multiplexing, Statistical Time Division Multiplexing, Modems: Functions & Uses of Modem, Multiplexers/De-Multiplexers, Concentrators: Role in Data Transmission.

Unit 4: Introduction to Computer Networks
Define Network, Network Goals/Motivation, Applications of Networks, Types of Networks: Point-to-Point Network (or Switched Network): Network Topology, Network Technology, Broadcast Network, Classification of Network: LAN, MAN, WAN, Wireless Network.

Unit 5: Computer Networks
Layered Architecture, Reference Model: OSI reference model, TCP/IP reference model, Internet Protocol Stack, Connection oriented and connection less services, Example of networks: Novell Netware, Arpanet, Internet, Examples of data communication services: X.25 Networks, Frame relay, Broadcast ISDN and ATM.

Unit 6: Physical Layer
Transmission Media: Guided media, Unguided Media, Narrow Band ISDN: Service, Architecture, Interface, Perspective on N-ISDN, Broadband ISDN: Virtual Circuits vs. Circuit Switching, Protocol Structure, ATM: Transmission in ATM networks, High Speed LAN: FDDI.

Unit 7: Data Link Layer & LAN
Data Link Layer Services, DLL Protocols: Sliding Window Protocol, DLL in HDLC, Internet and ATM, Multiple access Protocols: Channel Partitioning Protocols, Random Access Protocols.

Unit 8: Local Area Network
LAN & Application, Wired and Wireless, ARP & RARP, Ethernet Technologies: 10 Base /100 Base, Gigabit Ethernet, Networking essentials: Hubs, Bridges, Switches.

Unit 9: Network Layer and Routing
Network Service Model, Routing: Distance Vector, Link State, Hierarchical, IGMP, IP Addressing: IPv4, IPv6, Transmission from IPv4 to IPv6, Autonomous system routing, Inter-Autonomous System routing.

Unit 10: Transport Services and Mechanism

Role of Transport layer and Services, Relation between Transport Layer and Network Layer, Multiplexing and De-multiplexing, Connectionless Transport (UDP): UDP Segment structure, UDP checksum; Connection Oriented Transport (TCP): TCP Segment structure, Round Trip time estimation, Reliable data transfer, Flow control, TCP connection management; Congestion Control: Causes and cost of Congestion, approaches to congestion control, TCP congestion control, ATM ABR congestion control: What is ATM?, Service categories, rate based congestion control, Quality of Service: Approaches to QoS Support, ATM AAL Layer Protocols, SCTP (Stream Control Transmission Protocol).

Unit 11: Application Layer and Network Security

Application Services and Protocols, World Wide Web, Hypertext Transfer protocol (HTTP), File Transfer Protocol (FTP), Domain Name System, Simple Mail Transfer Protocol, Multimedia, Remote Procedure Call, Security in computer networks: Principles of Cryptography, Symmetric Key, Asymmetric Key (Public key), Digital Signature, Firewalls; Security in different layers: Secure E-mail, Secure Socket Layer, IP Security.

Unit 12: The Internet

Internet Protocol: Name and Address, Flat and Hierarchical structure, Packet format, IP over Ethernet, ICMP: Error reporting message, Echo request and reply, ICMP message format, ping program, Round trip time.