MCA – 104 Data Communication & Computer Networks

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Course Objectives:

The key objective is to acquire a foundational understanding of computer network and communication technologies. As part of this course, students will be introduced to network models and standards, network protocols and their use, wired and wireless technologies, network security and detailed description of all layers in ISO/OSI and TCP/IP.

UNIT – I

Introduction: Data Communication, Network Components, Protocol & Standards, Standard Organization, Topologies, Transmission modes, Categories of Networks, Uses, Applications. The OSI Reference Model: Layered architecture, Functions of layers, TCP/IP reference model, Comparison of OSI & TCP/IP models.

Physical layer: Guided and wireless transmission media, Magnetic, twisted pair, coaxial cable, fibre optics, radio, microwave, infrared, Communication satellites, **IEEE standards**: 802.3 (Ethernet), 802.4 (TokenBus), 802.5 (Token Ring), 802.11(Wireless LAN), 802.15 (Bluetooth)

UNIT – II

Data Link and Mac Layer: Design issues, Framing techniques, Flow control, Error Control, Error Detecting code and Error Correcting codes, Data link Control and Protocols-- For noiseless Channel – Simplest Protocol, Stop-and-Wait Protocol, For Noisy Channel-- Stop-and-Wait ARQ, Go-Back-N ARQ, and Selective-Repeat ARQ Protocol, HDLC Protocol, and PPP Protocol, Multiple Access-- Random Access-- MA, CSMA, CSMA/CD, CSMA/CA, Controlled Access—Reservation, Polling, Token passing, Channelization--FDMA, TDMA, CDMA.

UNIT – III

Network Layer: Network layer design issues, Addressing, Routing algorithms-shortest path routing, flooding, distance vector routing ,link state routing, hierarchical routing, broadcast routing, multicast routing, routing for mobile hosts, Congestion Control algorithms – congestion prevention policies, congestion control in virtual circuit & datagram sub-networks, definition of quality of service, Internetworking – Tunneling, internet-work routing, fragmentation, Network layer in Internet –IP protocol, IP Address, OSPF, BGP, Internet multicasting, Mobile IP, IPv4, IPv6,Internet radio, VoIP.

Transport Layer: Concept of transport service, elements of transport protocols, TCP and UDP, A simple transport protocol, Remote procedure call, Performance issues in computer networks.

UNIT – IV

Application layer services &protocols: Domain name system, SMTP, File transfer protocol, HTTP, HTTPS, TELNET, World Wide Web.

Network Security: Attacks on Computers & Computer security-- Need for security, approaches, principles, types of attacks, Cryptography concept and techniques, Symmetric Key algorithms-- (DES), Asymmetric key algorithms--RSA, Digital signature , Firewalls. E-mail security, Web security, social issues in network security.

Text Book-

1. B.A. Forouzan, "Data Communication & Networking", 4th Edition Tata Mcgraw Hill.

Reference Books:

1. A.S. Tanenbaum, "Computer Networks", Prentice Hall, 1992, 4th edition.
2. William Stallings, "Data & Computer Communication", McMillan Publishing Co.
3. Black, "Data Networks", PHI, 1988.
4. Fred Halsall, "Data Communications, Computer Networks", Pearson Education.

Course Outcomes:

By the end of the course, Students will be able to

CO 1. Independently understand basic computer network technology.
CO 2. Understand and explain Data Communications System and its components.
CO 3. Different types of network topologies and protocols.
CO 4. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
CO 5. Identify the different types of network devices and their functions within a network.
CO 6. Understand and build the skills of subnetting and routing mechanisms.
CO 7. Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.

Note: In each theory paper, nine questions are to be set. Two questions are to set from each Unit and candidate is required to attempt one question from each unit. Question number nine will be compulsory, which will be of short answer type with 5-10 parts, out of the entire syllabus. In all, five questions are to be attempted.