MIT(CS)-403
Introduction to Networking
BLOCK -1

Unit-1

Introduction to Networking , Historical Background , Network Technologies , Classification Based on Transmission Technology, Broadcast Networks , Point-to-Point Networks , Classification based on Scale , Local Area Network (LAN), Metropolitan Area Networks (MAN) , Wide Area Network (WAN) , The Internet and Its Applications

Unit-2

Introduction to data communication, Data, Signal, Signal Characteristics, Time-domain concepts, Frequency domain concepts , Frequency Spectrum, Digital Signal, Baseband and Broadband Signals

Unit-3

Introduction to transmission media , Guided transmission media, Twisted Pair, Base band Coaxial, Broadband Coaxial, Fiber Optics, Unguided Transmission, Satellite Communication, Introduction to Transmission Impairments and Channel Capacity , Delay distortion, Noise, Bandwidth and Channel Capacity

Unit-4

Transmission of Digital Signal and Analog Data to Analog Signal, Line coding characteristics , Line Coding Techniques, Analog Data, Digital Signals, Pulse Code modulation, Delta Modulation (DM), Introduction to Analog Data to Analog Signal , Amplitude Modulation (AM) , Angle Modulation, Frequency modulation, Phase modulation

Unit-5

Digital Data, Analog Signals and Multiplexing of Signals
Introduction to digital data, analog signals , Amplitude-shift keying (ASK), Frequency-Shift Keying (FSK), Phase Shift Keying (PSK), Introduction to Multiplexing of signals, Frequency-Division Multiplexing (FDM) , Wavelength-Division Multiplexing, Time-Division Multiplexing (TDM), Statistical Time-division Multiplexing, Orthogonal Frequency Division Multiplexing

BLOCK-2

Unit-1

Framing and Synchronization, Synchronous communication (bit-oriented), Asynchronous communication (word-oriented), Character Oriented Framing, Character stuffing, Data Rate Measures, DTE-DCE Interface ,

Unit-2

Introduction of error, Types of errors , Error Detecting Codes, Simple Parity Checking or One-dimension Parity Check, Two-dimension Parity Check, Checksum, Cyclic Redundancy Checks (CRC), Error Correcting Codes, Single-bit error correction

Unit-3

Flow Control Technique, Stop-and-Wait, Sliding Window, Error Control Techniques, Stop-and-Wait ARQ, Go-back-N ARQ, Selective-Repeat ARQ, Introduction to HDLC, HDLC Stations and Configurations, HDLC Operational Modes, 8 HDLC Non-Operational Modes, HDLC Frame Structure, HDLC Commands and Responses, HDLC Subsets

Unit-4

Introduction to switching technique, Circuit switching Technique, Switching Node, Public Switched Telephone Networks, 6 Message Switching, Message Switching, Virtual Circuit Packet Switching Networks, Datagram Packet Switching Networks, Virtual Circuit Versus Datagram Packet Switching

Unit-5

 Introduction of Synchronous Optical Network (SONET), Synchronization of Digital Signals, Basic SONET Signal, Physical Configuration and Network Elements, SONET Network Elements , Frame Format Structure, OVERHEAD, Virtual Tributaries and Pointers

BLOCK -3

UNIT-1

Introduction to x.25, Devices and Protocol Operation, X.25 session establishment and virtual circuits, X.25 Protocol Suite, Introduction to Frame Relay, Frame Relay Devices, Virtual Circuits, Frame Relay Layers

Unit-2

Introduction to Asynchronous Transfer Mode Switching (ATM), ATM Devices and the Network Environment , ATM Cell Format, ATM Virtual Connections, ATM Reference Model, ATM Applications

Unit-3

Introduction to network topology, Mesh Topology , Bus Topology, STAR Topology, Ring topology, Tree Topology, Unconstrained Topology, Combination of topology and transmission media

Unit-4

Introduction to Medium Access Control (MAC) Techniques, Round Robin Techniques, Polling, Token Passing, Contention-based Approaches, ALOHA, CSMA, CSMA/CD

Unit-5

Introduction to IEEE 802.3 and Ethernet, Ethernet Architecture, Encoding for Signal Transmission, The Ethernet MAC Sublayer, The Basic Ethernet Frame Format

Block-4

Unit-1

Introduction Token Ring (IEEE 802.5), Token Ring Operation, Priority System, Ring Maintenance, Physical Layer, Frame Format, Introduction Token Bus (IEEE 802.4), 5 Introduction to High Speed LANs – Token Ring Based, FDDI, Media Access Control, OSI model

Unit-2

Switched Ethernet, Fast Ethernet, Gigabit Ethernet and Brief History and the IEEE 802.3, Gigabit Ethernet Protocol Architecture, Gigabit Ethernet Protocol Architecture, Media Access Control Layer

Unit-3

Introduction of Wireless LANs , Transmission Media , Infrared, Microwave , Radio, Medium Access Control, Carrier Sense Multiple Access with Collision Avoidance (CSMA-CA), introduction to IEEE 802.11 extensions

Unit-4

Introduction to Bluetooth, Bluetooth Architecture , Bluetooth Layers, Layer 1: Radio Layer, Layer 2: Baseband Layer, Layer 3: Link Manager Protocol, Layer 4: Host Controller Interface, Logical Link Control and Adaptation Protocol, Layer 6: Radio Frequency Communication (RFCOMM), Layer 7: Service Discovery Protocol, Telephony Control Protocol Spec (TCS)

Unit-5

Introduction to Cellular Telephone Networks, Cellular Telephone System, Frequency Reuse Principle, Transmitting and Receiving, Mobility Management, First Generation,, Second Generation System, Third Generation

Block-5

Unit-1

Introduction to Satellite Networks, Categories of Satellites, Frequency Bands , Low Earth Orbit Satellites, Medium Earth Orbit Satellites, GEO Satellites,

Unit-2

Introduction to Internetworking Devices, Repeaters , Hubs , Bridges, Switches , Routers, Gateways

Unit-3

Introduction to Internet Protocol (IP), IP Addressing , Subnetting, Network Address Translation (NAT) , Address Resolution Protocol (ARP) , IP Datagram, Multiplexing and Demultiplexing , IPV6

Unit-4

Introduction Transport and Application Layer Protocols , User Datagram protocol (UDP) , Transmission Control Protocol (TCP), Client-Server Paradigm and its Applications

Unit-5

Introduction to Routing, Routing Algorithm Metrics, Fixed or Static Routing, Flooding, Intradomain versus Interdomain

Block-6

Unit-1

Introduction to RIP – Routing Information Protocol, Routing Table Format , RIP Timers, RIP Message Format, RIP version 2

Unit-2

Introduction to Open Shortest Path First (OSPF), OSPF Message Format, Introduction to Border Gateway Protocol, BGP Functionality and Route Information Management, BGP Fixed Header Format, BGP Message type,

Unit-3

Introduction to Congestion Control, Congestion Control Techniques, Leaky Bucket Algorithm, Token Bucket Algorithm , Congestion control in virtual Circuit, Flow Control Versus Congestion control,

Unit-04

Introduction to Cryptography , Symmetric Key Cryptography, 1 Monoalphabetic Substitution, Polyalphabetic Substitution, Transpositional Cipher, Block Ciphers, Data Encryption Standard(DES), Triple DES , Public key Cryptography, RSA, Introduction to Secured Communication, Authentication, Integrity and Nonrepudiation using Digital Signature, User Authentication using symmetric key cryptography, User Authentication using Public Key Cryptography, Virtual Private Network (VPN)

Unit-05

Introduction to Firewalls, Access Control Policies , Firewall Capabilities, Limitations of a Firewall, Types of Firewalls, Firewall Configurations, Active Firewall Elements.