**ECAP453 : DATA COMMUNICATION AND NETWORKING**

**Course Outcomes: Through this course student should be able to**

**CO1 :: Recognize different networking devices and their functionalities**

**CO2 :: Understand the importance of data communication**

**CO3 :: Utilize the role of protocols in networking**

**CO4 :: Analyse the services and features of the various layers of network**

**Unit-1:** **Introduction to data communication and computer networks:**

data communication system-components and characteristics; protocol – its component and functions; definition, characteristics, applications and classification of computer networks – PAN, LAN, MAN, WAN, internetworks, network topologies.

**Unit-2: Data and signals:**

analog and digital data, analog and digital signals, transmission impairments, performance metrics, transmission modes: simplex, half duplex and full duplex.

**Unit-3 Digital and Analog Transmission**

digital transmission: line coding, modulation: PCM, DM, ASK, FSK, PSK, amplitude, frequency and phase modulation.

**Unit-4: Network models:**

layered architecture, benefits of layered architecture, OSI reference model,   
TCP/IP protocol suite, functions of layers in OSI and TCP/IP models, addressing in OSI and TCP/IP models.

**Unit-5: Physical layer:**

services of physical layer, transmission medium – wired and wireless, switching – message switching, circuit switching, datagram packet switching, virtual circuit packet switching, networking devices - modem, repeater, network interface card, connectors, transceiver, hub-active, passive and intelligent; bridge-local, remote, wireless; switches, routers-static and dynamic; gateways

**Unit-6: Data link layer - error and flow control:**

introduction, types of errors, one and two dimensional parity method, hamming code, cyclic redundancy check (crc); framing- character stuffing, bit stuffing, introduction to flow and error control, protocols for noiseless and noisy channels - simplest protocol, stop-and-wait protocol; stop-and-wait ARQ, go-back-n ARQ, selective repeat ARQ.

**Unit-7: Data link layer - medium access control protocols:**

High- level Data Link Control Protocol (HDLC), Point-to-Point Protocol (PPP), random access - pure ALOHA and slotted ALOHA, persistent and non-persistent CSMA, CSMA/CD, CSMA/CA; controlled access.

**Unit-8: Network layer - logical addressing:** IPV4 addressing, classful addressing, classless addressing, subnetting, network address translation, classless interdomain routing, IPV6 addressing, internet control messaging protocol (ICMP), address resolution protocol (ARP), reverse address resolution protocol (RARP).

**Unit- 9: Network layer – routing:**

unicast routing: routing characteristics, routing algorithms, comparison of routing algorithms; broadcast and multicast routing: broadcast routing, multicast routing, routing in adhoc networks; routing protocols: distance vector, link state, path vector.

**Unit-10: Transport layer - protocols:**

services of transport layer, multiplexing and demultiplexing, connection oriented and connectionless services, connection establishment, connection release, port addressing, connectionless transport using UDP, connection oriented transport using TCP – handshaking

**Unit -11:  Transport layer - congestion control and QoS:**

general principles of congestion control, congestion avoidance and prevention policies; quality of service- types of traffic, traffic shaping, leaky bucket algorithm, token bucket algorithm.

**Unit -12:  Application layer – services and protocols:**

remote login (TELNET), file transfer protocol (FTP), domain name system (DNS), e-mail - simple mail transfer protocol (SMTP), post office protocol (POP), internet message access protocol (IMAP).

**Unit -13:** **Internet and WWW:**

internet basics, hypertext transfer protocol (http), world wide web (www), securing e-mail, security in internet – IPsec, VPN, overview of digital signature and digital certificates technology.

**Unit -14: Network Security:**

network security issues, goals of network security, approaches to network security, cryptography, principles of cryptography, encryption and decryption, public/private key encryption, firewalls, types of firewall technology - network level and application level; IP packets filter screening routers, limitations of firewalls.

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**Books :**

**Text Books:**

1. DATA COMMUNICATION AND NETWORKING by B.A. FOROUZAN, MCGRAW HILL EDUCATION

**References:**

1. DATA AND COMPUTER COMMUNICATIONS by WILLIAM STALLINGS, PEARSON