CAP7001:DATA COMMUNICATION AND NETWORKING

L:2 T:0 P:2 Credits:3

Course Outcomes: Through this course students should be able to

CO1 :: understand the fundamental concepts of data flow and criteria for the selection of transmission media.

CO2 :: demonstrate the techniques for IP allocation in the networks and creation of the subnets.

CO3 :: interpret the working of the static and dynamic routing protocols to connect two or more networks.

CO4 :: analyze the working of various application services in the network communications.

Unit I

Network basics : data communication characteristics, components, data representation, transmission modes, network design, network classifications, protocols, layered architecture, OSI model, TCP/IP protocol suite, addressing mechanisms in layers

Unit II

Physical layer : analog and digital signals, data rate, transmission impairments, guided media, unguided media, networking devices

Unit III

Data link layer : type of errors, error detection and correction techniques, framing, data link layer protocols, flow and error control, stop-and-wait ARQ, go-back-n ARQ, selective repeat ARQ, multiple access control protocols, random access, controlled access, channelization

Unit IV

Network layer : classful addressing, public and private addresses, network address translation (NAT), static routing, dynamic routing, distance vector routing, RIP, link state routing, OSPF, default routing

Unit V

Transport layer : port addresses, socket address, user datagram protocol (UDP), transmission control protocol (TCP), 3-way handshaking, congestion control, quality of service, techniques to improve QoS

Unit VI

Application layer : domain name system (DNS), Dynamic Host Configuration Protocol (DHCP), remote logging, TELNET, electronic mail, file transfer, WWW, HTTP, simple network management protocol (SNMP), IPSec, VPN, firewalls

List of Practicals / Experiments:

Networking basics

- demonstration of packet tracer installation and packet tracer interface
- design a peer-to-peer network using the packet tracer, check the connectivity using pingcommand,sending PDU in real time mode and simulation mode
- design two isolated networks in packet tracer to demonstrate the difference in working of huband switch
- design a network with hybrid topology that includes a bus backbone and three star networks,checkthe connectivity using ping command, sending PDU in real time mode and simulation mode

Connectivity between networks and routing

- connect two networks using a single router and configure the router for communication betweenthetwo networks
- connect two or more networks with a router in each network and configure the routers forstaticrouting
- connect two or more networks with a router in each network and configure the routers fordynamicrouting using RIP

- use static routing to connect the subnets of a network assigned with the followingnetwork197.34.21.0/24
- use FLSM to divide the network into subnet where every subnet supports at least 56 hosts

Configuring network services

- configure HTTP server and demonstrate the process to access a website using IP address in realtimeand simulation mode
- configure DNS server for two domain names with two HTTP servers in the networks anddemonstratethe process to access both the servers using name resolution in real time and simulationmode switch
- configure DHCP server and demonstrate how DHCP server assigns dynamic IP addresses to thenodesin local network
- configure DHCP server and demonstrate how DHCP server assigns dynamic IP addresses to thenodesin some other network
- configure the FTP server and demonstrate the working of FTP in real time and simulation mode
- configure two e-mail servers with different domain names and with at least four users in eachdomain
- demonstrate the process of sending and receiving e-mail messages in real time andsimulation mode

Text Books:

1. CCNA 200-301 OFFICIAL CERT GUIDE, VOLUME 2 by WENDELL ODOM, CISCO PRESS

2. DATA COMMUNICATIONS AND NETWORKING WITH TCPIP PROTOCOL SUITE by BEHROUZ A. FOROUZAN, M.G.Hills

References:

1. COMPUTER NETWORKS by ANDREW S. TANENBAUM, DAVID J. WETHERALL, NICK FEAMSTER, PEARSON

2. DATA AND COMPUTER COMMUNICATIONS by WILLIAM STALLING, PEARSON