COMPUTER NETWORKING : CONCEPTS

CSE 3751

Assignment -01

1. Explain briefly the functionalities of each protocol layer in OSI network model. Also name the PDU associated with each layer.

2. Compare the OSI model with the TCP/IP model. Which model do you think is more appropriate for setting up a computer network in an office?

3. State the difference between physical and logical address allocated to a device in a network. Name the protocol layer(s) associated with each of these addresses.

4. Illustrate the Ethernet header with suitable diagram.

5. How many service ports are available for use in transport layer? Categorize them highlighting the significance of each category.

6. A bit stream 1101011011 is transmitted using the standard CRC method. The generator polynomial is x^4+x+1. Find the value of actual bit string transmitted?

7. Define network topology. With the help of suitable diagrams differentiate physical and logical topology used in network architecture.

8. Assume that six devices are set up in a mesh, bus, ring and star configuration. For each topology, how many cable links are needed?

9. With the help of suitable diagram briefly explain the hub and spoke topology referred for design of a network. Highlight its similarity and differences as compare to star topology.

10. Discuss the advantages of fibre optic cable over copper cable.

11. Differentiate between Shielded Twisted Pair (STP) and Unshielded Twisted Pair (UTP) cables in terms of construction and EMI protection.

12. The refractive index of the core of an optical fiber is n1=1.48 and that of the cladding is n2=1.40

    (a) Does this optical fiber satisfy the necessary condition for the transmission of light through it?

    (b) Name and state the condition involved.

13. Compare and contrast between SMF and MMF. Use neat diagram wherever necessary.

14. With the help of neat diagram name and explain the function of different layers of coaxial cable from inner to outer

15. State the difference between a private IP address and a public IP address? Discuss how does private address space overcomes the limitation of classful addressing (i.e. wastage of IP address while using a default subnet mask).

16. When a packet passes through a Network Address Translation (NAT) device from an internal private network to an external public network, which fields in the IP header are modified, and why are these modifications necessary?

17. The list of private IP and the pool of public IP are as given below. Show the translation of each private IP to public IP using dynamic NAT based on the access to public address by the PCs in the order PC2, PC4, PC1 followed by PC3.

List of Inside Local Address	Pool of Inside Global Address
PC1 : 10.7.7.61	55.4.4.1
PC2 : 10.7.7.62	55.4.4.2
PC3 : 10.7.7.63	55.4.4.3
PC4 : 10.7.7.64	

18. What is Port Address Translation (PAT), and how does it allow multiple devices to share a single public IP address? Describe the concept of port mapping and how it is used in PAT to manage traffic.

19. Given the IPv4 address of two devices as 100.50.25.10 and 200.250.300.10. Mention whether both the IP addresses are valid or not. If yes find the class to which it belongs to. If no justify why the address is not valid.

20. Given the IPv6 address of a device as **2001:db8::1:0:0:1.** Rewrite the same in complete hex text format, where each hex text represents 16 bit field of the 128 bit IPv6 address. Also determine the routing prefix, subnet, and interface ID from the address.

21. State the significance of RS and RA message associated with IPv6 addressing. How does a newly end device connected to theIPv6 network uses RA message to obtain a valid self IP v6 address.

22. What is the purpose of the Extended Unique Identifier (EUI-64) technique in IPv6 addressing? Given the network prefix and 48 bit MAC ID as 2001:DB8:0:1111 and FC99: 4775: CEE0 respectively. Find the self-generated IPv6 address using EUI-64 technique.

23. State the use of subnet mask associated with IP address. With suitable example briefly explain how does the customized subnet mask overcomes the limitation of classful addressing.

24. Given the IP address of a device in CIDR notation as 192.168.10.10/26.

(a) Represent the subnet mask in dotted decimal notation.

(b) Determine the network ID it belongs to.

(c) How many usable addresses are possible in this network?

(d) Determine the 1st and last usable IP address in this network.

25. During network configuration the network professional has assigned the IP address to a PC as 192.168.1.126/25, which is connected directly to a router with IP address 192.168.1.129/25. Can the PC forward a packet through the router directly? Justify your answer.

26. A router uses the following routing table: Packet bearing a destination address 144.16.68.117 arrives at the router. On which interface will it be forwarded?

Destination	Mask	Interface
144.16.0.0	255.255.0.0	eth0
144.16.64.0	255.255.224.0	eth1
144.16.68.0	255.255.255.0	eth2
144.16.68.64	255.255.255.224	eth3

27. An ISP is granted the block 16.12.64.0/20. The ISP needs to allocate addresses for 8 organizations, each with 256 addresses.
   a) Find the number and range of addresses in the ISP block
   b) Find the range of addresses for each organization and the range of unallocated addresses.

28. Differentiate between FTP and TFTP in terms of reliability and features.

29. Briefly discuss the role of POP3 and IMAP in email communication?

30. Explain the DHCP 4-way handshake process with suitable diagram.