

# **COMPUTER NETWORKING : CONCEPTS**

**CSE 3751**

## **Assignment -01**

1. Explain the functions of each layer in the OSI model, from the Physical layer (Layer 1) to the Application layer (Layer 7).
2. Discuss the similarities and differences between the OSI model and the TCP/IP model.
3. What is Data Encryption? Which of the OSI model layer is responsible for data encryption?
4. Describe the advantages and disadvantages of different network topologies such as star, bus, ring and mesh. In what scenarios would each topology be most appropriate, and why?
5. For  $n$  devices in a network, what is the number of cable links required for a mesh, ring, bus, and star topology?
6. Discuss the advantages of fibre optic cable over copper cable.
7. What is the difference between a private IP address and a public IP address? Explain why private IPs are used within local networks and the purpose of public IPs on the internet.
8. Describe how Network Address Translation (NAT) works and why it's essential in networking. Discuss the purpose of NAT in enabling private IPs to communicate on the internet.
9. Differentiate between Static NAT and Dynamic NAT. How does each method assign public IPs to private IPs? Explain how each type maintains mapping between public and private IP addresses.
10. 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.
11. What is the purpose of the Extended Unique Identifier (EUI-64) format in IPv6, and how is it used to generate unique addresses? Explain how EUI-64 creates a unique host portion of an IPv6 address using MAC addresses.
12. How does a device determine its own IP address using SLAAC in an IPv6 network? Outline the steps of SLAAC, including link-local address configuration and Router Advertisements (RAs).

13. You have been assigned the IP address range 192.168.10.0/24 for your network. How many usable host addresses are available in this subnet?
14. A company network uses Dynamic NAT to translate internal IPs to a pool of public IPs (e.g., 203.0.113.10 - 203.0.113.15). If they have 50 devices that need internet access, will this pool be sufficient? Why or why not? How many additional public IPs would they need if they want all 50 devices to access the internet simultaneously?
15. Explain the key differences between IPv4 and IPv6 addressing, including address format, size, and notation. Why was IPv6 developed, and what advantages does it offer over IPv4? Provide examples of an IPv4 address and an IPv6 address.
16. Determine the subnet to which the host 10.45.67.32/19 address belongs to?
17. Determine the first usable address of a network that has an end device with the 192.168.46.234/26 address?
18. Determine the broadcast address for the 172.30.56.48/28 network?
19. Explain the operation of IMAP (Internet Message Access Protocol) in order to synchronize the email message between the client application and email server by default over a network.
20. List the different type of ICMP messages that are used to check the end to end connectivity between hosts on a network.