# **Unit 1: Introduction to Computer Networks**

- 1. What is a computer network, and what are its key characteristics?
- 2. Describe the differences between PAN, LAN, MAN, and WAN.
- 3. Explain the concept of internetworks and their importance.
- 4. What are the various applications of computer networks?
- 5. Define and compare different network topologies such as star, ring, bus, and mesh.

### **Unit 2: Data Communication**

- 1. What are the main components of data communication?
- 2. Describe different transmission impairments and their effects on data communication.
- 3. Explain the different transmission modes in data communication.
- 4. What is a communication protocol, and what are its key components and functions?
- 5. How does signal attenuation affect data transmission?

# **Unit 3: Network Models**

- 1. What is a layered architecture in computer networks, and why is it beneficial?
- 2. Describe the OSI reference model and its layers.
- 3. Compare the OSI model with the TCP/IP protocol suite.
- 4. Explain the functions of the Application layer in the OSI model.
- 5. What are the primary functions of the Network layer in the OSI and TCP/IP models?

### **Unit 4: Physical Layer**

- 1. What services are provided by the Physical layer in a network?
- 2. Describe the differences between wired and wireless transmission media.

- 3. What are the main types of networking devices used at the Physical layer?
- 4. Explain the concept of signal encoding and modulation.
- 5. How does the Physical layer ensure reliable data transmission?

### **Unit 5: Data Link Layer - Error Detection and Correction**

- 1. What is the purpose of error detection and correction in the Data Link layer?
- 2. Explain the one-dimensional and two-dimensional parity methods.
- 3. How does the Hamming code work for error correction?
- 4. Describe the Cyclic Redundancy Check (CRC) method.
- 5. What is the difference between character stuffing and bit stuffing in framing?

#### **Unit 6: Data Link Layer - Flow and Error Control Protocols**

- 1. What are flow control protocols, and why are they important in data communication?
- 2. Describe the Stop-and-Wait protocol and its ARQ variant.
- 3. How does the Go-Back-N ARQ protocol work?
- 4. Explain the Selective Repeat ARQ protocol.
- 5. Compare the protocols used for noiseless and noisy channels.

#### **Unit 7: Data Link Layer - Medium Access Control Protocols**

- 1. What is the difference between pure ALOHA and slotted ALOHA protocols?
- 2. Explain persistent and non-persistent CSMA protocols.
- 3. How does the CSMA/CD protocol help in collision detection and resolution?
- 4. What are the key features of the CSMA/CA protocol?
- 5. Describe the role of medium access control in the Data Link layer.

# Unit 8: Network Layer - Logical Addressing

- 1. What is IPV4 addressing, and how does it differ from IPV6 addressing?
- 2. Explain the concept of classful and classless addressing in IPV4.
- 3. How is subnetting used to manage IP addresses efficiently?
- 4. Describe the Network Address Translation (NAT) process.
- 5. What is the Address Resolution Protocol (ARP), and how does it function?

# **Unit 9: Network Layer - Routing**

- 1. What are the key characteristics of unicast routing?
- 2. Compare different unicast routing algorithms.
- 3. How does broadcast routing differ from multicast routing?
- 4. What challenges are faced in routing in Adhoc networks?
- 5. Describe the role of routing protocols in network communication.

# **Unit 10: Transport Layer - Protocols**

- 1. What services are provided by the Transport layer in a network?
- 2. Differentiate between connection-oriented and connectionless services.
- 3. How is a connection established and released in the Transport layer?
- 4. Compare the TCP and UDP protocols.
- 5. What are the primary responsibilities of the Transport layer in ensuring reliable data transmission?

# **Unit 11: Transport Layer - Congestion Control and QoS**

1. What are the general principles of congestion control in networks?

- 2. Explain congestion avoidance and prevention policies.
- 3. Describe the different types of network traffic and their characteristics.
- 4. How does the leaky bucket algorithm work for traffic shaping?
- 5. Compare the leaky bucket and token bucket algorithms.

### **Unit 12: Application Layer – Services and Protocols**

- 1. What is the purpose of the Application layer in the OSI model?
- 2. Describe the remote login protocol (TELNET) and its uses.
- 3. How does the File Transfer Protocol (FTP) work?
- 4. Explain the functions of the Domain Name System (DNS).
- 5. Compare the different email protocols: SMTP, POP, and IMAP.

#### Unit 13: Internet and WWW

- 1. What are the basics of how the Internet operates?
- 2. Describe the Hypertext Transfer Protocol (HTTP) and its role in the <u>WWW</u>.
- 3. What security measures are implemented on the Internet, such as IPsec and VPN?
- 4. Explain the significance of the World Wide Web (WWW).
- 5. How does a Virtual Private Network (VPN) enhance Internet security?

#### **Unit 14: Network Security**

- 1. What are the primary goals of network security?
- 2. Explain the principles of cryptography and its applications in network security.
- 3. How is message integrity maintained in network communications?
- 4. Describe the methods used to secure email communication.

5. What are firewalls, and what are the different types of firewalls used for network security?