

2025

(6th Semester)

BACHELOR OF COMPUTER APPLICATIONS

Paper : DCN-601

(Data Communications and Networking)

Full Marks : 70

Pass Marks : 45%

Time : 3 hours

(PART : B—DESCRIPTIVE)

(Marks : 45)

*The figures in the margin indicate full marks
for the questions*

1. (a) What is data transmission and why is it important in networking and communication systems? 3
 - (b) How does satellite communication work as a transmission medium? 4
 - (c) How do weather and environmental factors affect wireless transmission? 2
- Or**
- (d) Why is fibre-optic cable preferred for long distance and high-speed communication? 3

(2)

- (e) What is baseband transmission and how does it differ from broadband transmission? 3
- (f) Which factors determine whether an organization should use LAN, MAN or WAN? 3
2. (a) You are given an IP address 172.16.0.0/20. Create 11 subnetwork. Also find the range of IP addresses assigned to each network. 9
- Or
- (b) Describe the difference between VPI and VCI in ATM network. 2
- (c) What is IPv6 and why was it developed? 2
- (d) How does CIDR help in efficient IP address allocation and subnetting? Explain the key points. 5
3. (a) How do encapsulation and decapsulation work in the TCP/IP protocol suite? 4
- (b) What are the different types of ARP message and how do they function? 5

(3)

Or

- (c) Describe the TCP three-way handshake process for connection establishment. 4
- (d) Explain the architecture of NFS and how it enables file sharing over a network. 5
4. (a) Explain sliding window flow control. How does it improve efficiency compared to stop-and-wait? 5
- (b) What is crosstalk in transmission impairment? Explain the methods to minimize crosstalk. 4
- Or
- (c) What are the primary challenges of implementing multiplexing techniques in modern data networks? 5
- (d) Explain the role of error detection and retransmission mechanisms in connection-oriented services. 4
5. (a) Explain how multi-factor authentication improves security over single-factor authentication. 3
- (b) Explain the core principles of network security. 3

- (c) What are the best practices for securing a small windows LAN? 3

Or

- (d) How do DoS and DDoS affect networks? Explain how to mitigate the attacks. 4

- (e) What are the common network issues in a small LAN, and how can they be troubleshooted? 5

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(PART : A—OBJECTIVE)

(Marks : 25)

The figures in the margin indicate full marks for the questions

A. Put a Tick (✓) mark against the correct answer in the brackets provided : 1×10=10

1. In a ring topology, what happens when one device or connection fails?

(a) The entire network will stop functioning ()

(b) Only the failed devices will stop functioning ()

(c) Data is automatically rerouted to the nearest node ()

(d) The network continues to function without any issues ()

2. In full-duplex transmission mode, how is the data-flow managed?

- (a) Data can flow only in one direction at a time ()
- (b) Data flows simultaneously in both directions ()
- (c) Data flow is alternate, one direction at a time ()
- (d) There is no data flow at all ()

3. What is a port number used for in networking?

- (a) To define the physical location of the device ()
- (b) To specify the application or service in communication ()
- (c) To route data between different networks ()
- (d) To identify the operating system version ()

4. The _____ field determines the lifetime of IPv6 datagram.

- (a) hop limit ()
- (b) TTL ()
- (c) next header ()
- (d) None of the above ()

5. The default connection-type used by HTTP is

- (a) persistent ()
- (b) non-persistent ()
- (c) Both of the above ()
- (d) None of the above ()

6. The main responsibility of the session layer is to

- (a) establish, maintain and terminate communication sessions between devices ()
- (b) handle the flow control and error recovery of data transmission ()
- (c) provide logical addressing and packet forwarding ()
- (d) ensure that data is transmitted correctly between devices on the network ()

7. The primary purpose of multiplexing in networking is

- (a) to reduce the number of required communication channels ()
- (b) to encrypt data during transmission ()
- (c) to ensure data integrity across network ()
- (d) to provide error-free communication ()

8. In stop-and-wait ARQ, how does the receiver indicate to the sender that a data frame has been received correctly?

- (a) By sending an acknowledgement (ACK) message ()
- (b) By retransmitting the frame ()
- (c) By sending a random signal ()
- (d) By sending a negative acknowledgement (NACK) message ()

9. The example of a network security attack that aims to flood a network with traffic, making it unavailable to users is

- (a) man-in-the-middle attack ()
- (b) Denial of Service (DoS) attack ()
- (c) Phishing attack ()
- (d) Trojan horse attack ()

10. Public Key Infrastructure (PKI) is used

- (a) to establish a private and secure network ()
- (b) to verify the identity of users and provide encryption keys ()
- (c) to route network traffic securely ()
- (d) to filter harmful traffic from entering the network ()

(6)

B. Indicate whether the following statements are True (T) or False (F) by putting a Tick (✓) mark :

1×5=5

1. A hub transmits data to all connected devices regardless of the destination.

(T / F)

2. Static routing is used for large networks, while dynamic routing is used only for small networks.

(T / F)

3. Bus topology is highly scalable and can easily accommodate new devices without disrupting the network.

(T / F)

4. A DHCP server is responsible for managing IP address pool and assigning addresses to client devices.

(T / F)

5. Phishing attack involves tricking users into revealing sensitive information like passwords and credit card numbers.

(T / F)

(7)

C. Answer the following questions in short : 2×5=10

1. Suggest two points to improve the performance of network.

(8)

2. Explain the concept of carrier signal in modulation.

(9)

3. Compare stateful vs. stateless firewalls.

(10)

4. What is the difference between Secure Socket Layer (SSL) and Transport Layer Security (TLS)?

(11)

5. What is ethernet and why is it one of the most widely used networking technologies?
