



## Course Name: Computer Networks and Internet Protocol

### Assignment 1 - Week 1 (Jan 2025)

#### TYPE OF QUESTION: MCQ/MSQ

Number of questions: 10

Total mark: 10 X 1 = 10

#### QUESTION 1

How many collision domains are in a 10-port hub, an 8-port switch (L2), and a 4-port router, respectively? A collision domain is the segment of a network, where if more than one device tries to send data simultaneously, it causes a collision and the data is lost.

- a) 1, 8, and 4, respectively.
- b) 10, 8, and 4, respectively.
- c) 10, 10, and 10, respectively.
- d) 5, 4, and 2, respectively.

**Answer: (a)**

#### **Detailed solution:**

Router has per-port broadcast and collision domain. Switch has a per-port collision domain with a single broadcast domain. Hub has a single collision and broadcast domain.

#### QUESTION 2

Map the devices with their associated layer in the TCP/IP model.

- |           |                    |
|-----------|--------------------|
| A. NIC    | 1. Physical Layer  |
| B. Router | 2. Data Link Layer |
| C. Bridge | 3. Network Layer   |
| D. Hub    | 4. Transport Layer |

- a) A-2, B-3, C-2, and D-1
- b) A-3, B-3, C-2, and D-1
- c) A-3, B-3, C-1, and D-2
- d) A-2, B-3, C-2, and D-2

**Answer: (a)**

#### **Detailed solution:**

Hub operates at Layer 1 of the TCP/IP model, while Bridge, NIC, and Switch(L2) work with MAC addresses at Layer 2. A Router works with IP addresses and it operates in a network layer.

## QUESTION 3

Map the protocols with their associated layer in TCP/IP.

- |         |                      |
|---------|----------------------|
| A. FTP  | 1. Physical Layer    |
| B. UDP  | 2. Data Link Layer   |
| C. PPP  | 3. Network Layer     |
| D. IP   | 4. Transport Layer   |
| E. HTTP | 5. Application Layer |

- a) A-1, B-2, C-3, D-4, and E-5
- b) A-5, B-4, C-3, D-2, and E-1
- c) A-5, B-2, C-2, D-3, and E-5
- d) A-5, B-4, C-2, D-3, and E-5

**Answer: (d)**

### **Detailed solution:**

File Transfer Protocol (FTP), and HyperText Transfer Protocol (HTTP) operate in an application layer; User Datagram Protocol (UDP) operates in a transport layer; Internet Protocol (IP) operates in a network layer; and Point to Point Protocol (PPP) operates in a data link layer. For more details, please refer to the lecture slides no. 5.

## QUESTION 4

Which of the following statement(s) are concerned with encapsulation in computer networks?

- I. It involves an addition of a header and trailer to the actual data as it moves down in the TCP/IP protocol stack.
  - II. At the transport layer, encapsulation includes port numbers and at the network layer, encapsulation includes IP addresses.
- a) Only (I)
  - b) Only (II)
  - c) Both (I) and (II)
  - d) Neither (I) nor (II)

**Answer: (c)**

### **Detailed solution:**

Encapsulation is the process of addition of a header and trailer while moving down from upper layer to lower layer like adding source and destination port numbers to the application layer data, adding source and destination IP addresses to the transport layer segment etc.

## **QUESTION 5**

Which of the following is NOT a disadvantage of the circuit switching technique over the packet switching technique in computer networks?

- a) Delay in the establishment of a dedicated connection between two hosts
- b) Inefficient utilization of the resources
- c) Less scalable
- d) Provides a dedicated communication path between two end hosts

**Answer: (d)**

### **Detailed solution:**

Circuit switching techniques establish a dedicated path for communication, and it remains unutilised in case of no data transmission. It also suffers from greater setup time delay, scalability issues, lack of fault tolerance, etc.

## **QUESTION 6**

Choose the FALSE statement.

- a) Bridges filter network traffic based on IP addresses.
- b) Hubs share bandwidth among all attached devices.
- c) Switch provides dedicated bandwidth for each LAN segment.

**Answer: (a)**

### **Detailed solution:**

Bridges filter network traffic based on MAC addresses.

## **QUESTION 7**

Which transport layer protocol will be chosen by an application that does not require any reliability?

- a) TCP
- b) UDP

**Answer: (b)**

### **Detailed solution:**

User Datagram Protocol (UDP) is a connectionless-oriented protocol and provides no reliability.

## **QUESTION 8**

You are a network administrator in your college. You are asked to do troubleshooting for an issue of a remote server using telnet. Which of the following consideration(s) should you keep in mind when using Telnet for this task?

- a) Telnet is more secure than SSH while making a remote connection.
- b) It is advisable to use telnet in a local network rather than on the internet to avoid security risks.
- c) Telnet encrypts all traffic by itself during communication.
- d) Telnet transmits data as a plaintext including login credentials.

**Answer: (b), (d)**

### **Detailed solution:**

Telnet is an insecure method to connect to a remote server. Its traffic is flowing in the networks as a plaintext including login credentials. For the security aspect, we adopt SSH instead of telnet.

## **QUESTION 9**

Choose the statement(s) that correctly describe(s) the roles and responsibilities of the Network Interface Card (NIC) in the computer networks.

- I. NIC takes over the responsibility of segmenting large chunks of data into smaller packets that can be transmitted over the networks.
  - II. It converts digital data from the computer's processor to an analog signal.
- a) Only (I)
  - b) Only (II)
  - c) Both (I) and (II)
  - d) Neither (I) nor (II)

**Answer: (c)**

### **Detailed solution:**

The NIC's primary role at the Data Link Layer is to ensure reliable frame-based transmission of data over a local network, including responsibilities for framing, MAC addressing, error detection, flow control, and managing access to the transmission medium. In computer networking, large send offload (LSO) is a technique for increasing egress throughput of high-bandwidth network connections by reducing CPU overhead. It works by passing a multipacket buffer to the network interface card (NIC). The NIC then splits this buffer into separate packets. The technique is also called TCP segmentation offload (TSO) or generic segmentation offload (GSO) when applied to TCP.

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## **QUESTION 10**

Identify the INCORRECT statement(s) related to Bridge and Switch (L2) in computer networks.

- a) For small enterprises (without the need for features like QoS, VLANs, and STP), a switch is more economical/suitable in the case of segmenting the traffic between two LANs than a bridge.
- b) Switches operate in full-duplex mode while bridges in half-duplex mode.
- c) Switches broadcast traffic to all ports, while bridges broadcast the traffic to designated ports (ports having the same VLAN port as the sender) by using a MAC address table.
- d) Switches and bridges are both equally important in modern, large, and complex networks.

**Answer:** (a), (c), and (d)

### **Detailed solution:**

Bridge and Switch (L2) Both are layer 2 devices. Bridges are replaced by multiport switches in large and complex networks. Bridges operate in only two ports and permit traffic in only one direction at a time. Switches have multiports and permit the traffic in full-duplex mode. It also supports modern features like QoS, VLANs, STP, etc. that are unavailable in the bridges. This is why switches are called more intelligent than bridges. Switches take support of the MAC address table to pass the traffic, so it reduces the floods of broadcast traffic to a great extent by just sending it to the ports having the same VLAN as the sender.

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