1. **In the following pairs of OSI protocol layers and their functionality, which one is the CORRECT pair / s? [MSQ]**

    A. Network layer and Routing
    B. Data Link Layer and Bit synchronization
    C. Transport layer and End-to-end process communication
    D. Medium Access Control sublayer and Channel sharing

Answer:(A, C, D)
Explanation:

A. One of the main functions of the Network Layer is Routing. So it is CORRECT.
B. Bit Synchronization is always handled by the Physical Layer of the OSI model but not the Data Link Layer. So, it is INCORRECT.
C. End-to-end process communication is handled by the transport layer. So it is CORRECT.
D. MAC sublayer has 3 types of protocols (Random, Controlled and Channelized Access)

2. In the following pairs of OSI protocol layer and their functionality, which one is the CORRECT pair / s? [MSQ]

A. Segmentation and reassembly are done at hosts only, not at each intermediate router.
B. Application Layer allows the user or application to access the network.
C. Session Layer establishes, maintains, and synchronizes the interaction between the communicating systems.
D. Presentation Layer allows the process to add checkpoints or synchronization points in the stream of data.

Answer:(A, B, C):
Explanation:

A. **True,** Segmentation and reassembly are functionalities of the Transport Layer. The transport layer is absent at routers. So, segmentation and reassembly are done at only the source or destination.
B. **True**, Application Layer provides applications to users to access network resources.
C. **True**, the Session Layer establishes, maintains, and synchronizes the interaction between the communicating systems. Session Layer allows the process to add the checkpoints or synchronization points in the stream of data.
D. **False**: The Presentation Layer handles the syntax and semantics of the information sent.

3. In the following pairs of OSI protocol layers and their functionality, which one is the CORRECT pair / s? [MSQ]

A. Physical Layer maintains the same bit rate at the source and destination.
B. Physical Layer synchronizes sender and receiver clocks.
C. Physical layer is responsible for moving individual bits from one (node) to the next.
D. Physical layer defines the type of encoding.

Answer:(A, B, C, D)
Explanation:

These are all functionalities of the Physical layer:

I. Physical Layer maintains the same bit rate at the source and destination.
II. Physical Layer synchronizes the sender and receiver clocks.
III. Physical layer is responsible for moving individual bits from one (node) to the next.
IV. Physical layer defines the type of encoding.

4. Which of the following is/are CORRECT? [MSQ]

A. Physical addresses in the packet are modified from HOP to HOP.
B. Network Layer ensures packets belonging to the same message arrive intact and in order.
C. Network layer uses physical addresses for addressing.
D. Transport Layer treats every packet individually.

Answer:(A)
Explanation:

A. **True**, MAC addresses of the next HOP are updated at every intermediate router.
B. **False**. At Network Layer, all the packets belonging to the same message are treated as different packets.
C. **False**, Network layer uses logical addresses for addressing.
D. **False**, Transport Layer ensures that the whole message arrives intact and in order.

5. Match the following to one or more layers of the OSI model: [MSQ]

1. Transport Layer	a. Reliable process-to-process message delivery
2. Data Link Layer	b. Route selection
3. Network Layer	c. Defines frames
4. Application Layer	d. Provides user services such as e-mail and file transfer e. Uses service point addressing f. Delivery of individual packets of data g. Delivery of each packet independently

A. 1-g, 2-c, 3-b, 4-d
B. 1-b, 2-c, 3-a, 4-d
C. 1-a, 2-c, 3-b, 4-d
D. 1-e, 2-c, 3-f, 4-d

Answer:(C, D)
Explanation:
Transport Layer:
1. Reliable process-to-process message delivery
2. Uses service point addressing called port numbers

Data Link Layer:
1. Defines frames

Network Layer:
1. Route selection
2. Delivery of each packet independent of the entire message

Application Layer:
1. Provides user services such as e-mail and file transfer.

6. Which of the following statements is/are correct?

I. In the virtual circuit network, packets are never delivered out of order and In a datagram network, packets may be delivered out of order.
II. Virtual circuit network provides connection-oriented service, and Datagram network provides connectionless service.
III. Virtual circuit network is Highly reliable, and Datagram network is not reliable
IV. Virtual circuit networks are costly, and datagram networks are cost-efficient.

a. Only I
b. I & II
c. II & III
d. All of these

Answers:(D)
Explanation:
All the statements are correct.

7. **Choose the correct statement/s:**

A. The unit of communication at the physical layer is a bit.
B. The unit of communication at the network layer is a datagram.
C. The unit of communication at the transport layer is a segment.
D. The unit of communication at the transport layer is a user datagram or a packet.

Answer: (A, B, C, D)
Explanation:

Physical Layer - Bit
Data Link Layer - Frame
Network Layer - Datagram
Transport Layer - Segment or Packet and User Datagram, based on the protocols TCP and UDP, respectively.
Application Layer - Message

8. Choose the incorrect statement/s: [MSQ]

A. Computer used for forwarding IP packets is called an IP-router
B. Session Layer decides whether the way of communication between them is Half Duplex or Full Duplex.
C. The physical addresses will change from hop to hop, but the logical and port addresses usually remain the same
D. The two most typical network applications that use UDP are File Transfer Protocol (FTP) and the TELNET

Answer:(D)
Explanation:

A, B, C are all True,
D. Reliability is key for FTP and TELNET applications, So these applications use TCP.

9. Repeater functions at _____

a. Physical Layer
b. Data Link Layer
c. Network Layer
d. Both (A) and (B)

Answer:(A)
Explanation:
Repeater works at the Physical Layer.

10. Which of the following statements/is TRUE according to TCP/IP stack [MSQ]

A. IP hides the underlying network hardware from the network applications.
B. A set of interconnected physical networks that limit the range of an IP packet is called an "internet".
C. A node which is connected to n links needs 1 physical-layer protocol.
D. TCP/IP does not define any specific protocol for the Network Layer.

Answers: (A, B)
Explanation:

A. **True**, IP at the Network layer in TCP/IP to ensure Physical Network Independence, i.e. if you invent a new physical network, you can put it into service by implementing a new driver connecting network applications and the network.
B. **True**, it is the conceptual definition of the internet.
C. **False**: A node which is connected to n links needs n physical-layer protocols. The reason is that different links may use different physical-layer protocols.
D. **False**, TCP/IP defined a specific protocol at the Network layer called IP (Internet

Protocol).

11. Match the protocols from Group I to one or more in Group II:

Group I	Group II (port, TCP/UDP)
1. TELNET	**A. 23 TCP**
2. SMTP	**B. 25 TCP**
3. DHCP-SERVER	**C. 67 UDP**
4. FTP - DATA	**D. 20 TCP**
5. FTP - CONTROL	**E. 21 TCP**
6. DHCP-CLIENT	**F. 68 UDP**
	G. 67 TCP
	H. 68 TCP

A. 1- A,2-B,3-C,4-D,5-E,6-F
B. 1- B,2-B,3-C,4-E,5-D,6-F
C. 1- A,2-B,3-G,4-E,5-D,6-H
D. 1- B,2-B,3-G,4-D,5-E,6-H

Answer:(A)
Explanation:

Port Number	TCP/UDP	Protocol
20	**TCP**	**FTP-DATA**
21	**TCP**	**FTP-CONTROL**
22	**TCP**	**SSH**
23	**TCP**	**TELNET**
25	**TCP**	**SMTP**
67	**UDP**	**DHCP-SERVER**
68	**UDP**	**DHCP-CLIENT**
80	**TCP**	**HTTP**
110	**TCP**	**POP-3**
443	**TCP**	**HTTPS**