***ASSIGNMENT-ONE***

***DATA and COMPUTER COMMUNICATION***

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**Chapter 1 – QUESTION/ANSWER**

**Question 1-1** Identify the five components of a data communications system.

**Answer** - The five components of a data communication system are the sender, the receiver,the transmission medium, the message, and the protocol.

**Question 1-2** What are the three criteria necessary for an effective and efficient network?

**Answer**- The three criteria are performance, reliability, and security.

**Question1-3** What are the advantages of a multipoint connection over a point-to-point one?

**Answer-** Advantages of a multipoint over a point-to-point configuration (type of connection) include ease of installation and low cost.

**Question 1-4** What are the two types of line configuration?

**Answer**- Line configurations (or types of connections) are point-to-point and multipoint.

**Question1-5** Categorize the four basic topologies in terms of line configuration.

**Answer**- We can divide line configuration in two broad categories:

* Point-to-Point: mesh, Star, and Ring.
* Multipoint: Bus

**Question1-6** What is the difference between half-duplex and full-duplex transmission modes?

**Answer-** In half-duplex transmission, only one entity can send at a time; in a full duplex transmission, both entities can send at the same time.

**Question 1-7** Name the four basic network topologies, and cite an advantage of each type.  
We give an advantage for each of four network topologies:

**Answer-**

* a. Mesh: Secure
* b. Bus: Easy Installation
* c. Star: Robust
* d. Ring: Easy Fault Isolation

**Question 1-8** For n devices in a network, what is the number of cable links required for a mesh, ring, bus, and star topology?

**Answer-** The number of cables for each type of network is:

* Mesh: n (n − 1) / 2
* Star: n
* Ring: n – 1
* Bus: one backbone and n drop lines

**Question 1-9** What are some of the factors that determine whether a communication system is a LAN or WAN?

**Answer-** The general factors are size, distances (covered by the network), structure, and ownership.

**Question 1-10** What is an internet? What is the Internet?

**Answer-** An internet is an interconnection of networks. The Internet is the name of a specific worldwide network

**Question 1-11** Why are protocols needed?

**Answer**- A protocol defines what is communicated, in what way and when. This providesaccurate and timely transfer of information between different devices on a network.

**Question 1-12** In a LAN with a link-layer switch. Host 1 wants to send a message to Host 3. Since communication is through the link-layer switch, does the switch need to have an address? Explain.

**Answer**- A link-layer switch is designed not to broadcast messages. This means that itshould have the link-layer address of each station to forward the packet to that particular station, not to others.

**Chapter 1 – PROBLEM**

**Problem 1-3** Assume six devices are arranged in a mesh topology. How many cables are needed? How many ports are needed for each device?

**Solution-**

* Cable links: n (n – 1) / 2 = (6 × 5) / 2 = 15
* Number of ports: (n – 1) = 5 ports needed per device

**Problem 1-4** For each of the following four networks, discuss the consequences if a connection fails.

* Five devices arranged in a mesh topology
* Five devices arranged in a star topology (not counting the hub)
* Five devices arranged in a bus topology
* Five devices arranged in a ring topology

**Solution-**

* Mesh topology: If one connection fails, the other connections will still be working.
* Star topology: The other devices will still be able to send data through the hub; there will be no access to the device which has the failed connection to the hub.
* Bus Topology: All transmission stops if the failure is in the bus. If the dropline fails, only the corresponding device cannot operate.
* Ring Topology: The failed connection may disable the whole network unless it is a dual ring or there is a by-pass mechanism.

**Chapter 2 – QUESTION/ANSWER**

**Question 2-1** What is the first principle we discussed in this chapter for protocol layering that needs to be followed to make the communication bidirectional?

**Answer-** To make the communication bidirectional, each layer needs to be able to provide

two opposite tasks, one in each direction.

**Question 2-2** Which layers of the TCP/IP protocol suite are involved in a link-layer switch?

**Answer-** The link-layer switch is normally involved in the first two layers of the TCP/IP protocol suite:

* the physical layer,
* the data-link layer.

**Question 2-3** A router connects three links (networks). How many of each of the following layers can the router be involved with?

**Answer-**The router is involved in:

* three physical layers,
* three data-link layers,
* one network layer.

**Question 2-4** In the TCP/IP protocol suite, what are the identical objects at the sender and the receiver sites when we think about the logical connection at the application layer?

**Answer-** The identical objects are the two messages: one sent and one received.

**Question 2-5** A host communicates with another host using the TCP/IP protocol suite. What is the unit of data sent or received at each of the following layers?

**Answer**-

* a. At the application layer, the unit of data is a message.
* b. At the network layer, the unit of data is a datagram.
* c. At the data-link layer, the unit of data is a frame.

**Question 2-6** Which of the following data units is encapsulated in a frame?

**Answer-** A frame is a link-layer data unit. It encapsulates a data unit coming from the network layer. In this case, the data unit is a datagram.

**Question 2-7** Which of the following data units is decapsulated from a user datagram?

**Answer-** A user datagram is a transport-layer data unit. It decapsulates a data unit going to the application layer. In this case, the data unit is a message.

**Question 2-8** Which of the following data units has an application-layer message plus the header from layer 4?

**Answer-** The data unit should belong to layer 4. In this case, it is a user datagram.

**Question 2-9** List some application-layer protocols mentioned in this chapter.

**Answer-** We mentioned HTTP, FTP, SMTP, SNMP, TELNET, SSH, and DNS.

**Chapter 2 – PROBLEM**

**Problem 2-6** Match the following to one or more layers of the TCP/IP protocol suite:

a. route determination

b. connection to transmission media

c. providing services for the end user

**Solution**-

* The network layer is responsible for route determination.
* The physical layer is the only layer that is connected to the transmission media.
* The application layer provides services for the end users.

**Problem 2-7** Match the following to one or more layers of the TCP/IP protocol suite:

a. creating user datagrams

b. responsibility for handling frames between adjacent nodes

c. transforming bits to electromagnetic signals

**Solution-**

* User datagrams are created at the transport layer.
* The data-link layer is responsible for handling frames between adjacent nodes.
* The physical layer is responsible for transforming bits to electromagnetic signals.

**Problem 2-8** In Figure 2.10 (in the book), when the IP protocol encapsulates the transport-layer packet, how does it know to which upper-layer protocol (UDP or TCP) the packet should be delivered?

**Solution-** There should be an upper-layer identifier in the header of the IP protocol to define

to which upper-layer protocol the encapsulated packet belongs. The identifier is called

the protocol field.