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Ans to the Q. NO-01

a) What are the responsibilities of data link layer?

Answer: Specific responsibilities of data link layer include the following:

1. Framing
2. Physical addressing
3. Flow control
4. Error control
5. Access control

b) What is the purpose of Network Interface Card?

Answer: A Network Interface Card is a computer circuit board or card that is installed in a computer so that it can be connected to a network. Network Interface card provides a dedicated, full time connection to the network. It is a hardware component without which a computer can not be connected over a network. It also called network interface controller, network adapter or LAN adapter.

c) What is a MAC Address? Explain.

Answer: MAC (Media Access Control) addresses are globally unique addressed that are written into hardware at the time of manufacture. The MAC address is a unique value associated with a network adapter. MAC addresses are also known as hardware address or physical addresses. They uniquely identify an adapter on a LAN. MAC addresses are 12-digit hexadecimal numbers (48 bits in length). MAC sublayer resolves the contention for the shared media.

Ans to the Q.No ~ 02

a) State the difference between Fast Ethernet and Gigabit Ethernet.

Answer:

Fast Ethernet (100Mbps)	Gigabit Ethernet (1Gbps)
1. Upgrade the data rate to 100Mbps.	1. Upgrade the data rate to 1 Gbps.
2. Make it compatible with Standard Ethernet	2. Make it compatible with standard on Fast Ethernet.

b) What are the functions of LLC?

Answer: The IEEE Project 802 models take the structure of an HDLC frame and divide it into 2 sets of function.

One set contains the end user

portion of the HDLC frame the logical address, control information and data.

These functions are handled by the IEEE 802.2 logical link control (LLC) Protocol.

The LLC sublayer acts as an interface between the media access control (MAC) sublayer and the network layer.

c) What is Spanning-Tree Protocol (STP)?

Answer: Spanning-Tree Protocol (STP) as defined in the IEEE 802.1D is a link management Protocol that provides Path redundancy while preventing undesirable loops in the network. For an Ethernet network to function properly, only one active path can exist between two stations. Loops occur in networks for a variety of reasons. The most common reason you find loops in networks is the result of a deliberate attempt to provide redundancy - in case one link or switch fails, another link or switch can take over.

QUESTION -> Answer to the Q. NO-03

a) What is Ethernet ? Define Bluetooth.

Answer: Ethernet is a multiple access network meaning that a set of nodes send and receive frames over a shared link.

Bluetooth is a wireless LAN technology designed to connect devices of different functions such as telephones, notebooks, computers, cameras, printers, coffee makers and so on.

b) Why Ethernet is said to be 1-persistent Protocol?

Answer: The Ethernet is said to be a 1-persistent Protocol because an adapter with a frame to send transmits with probability one, whenever a busy line goes idle.

All the nodes can distinguish between idle and a busy link and "collision detect" means that a node listens as it begins to transmit and can therefore detect when a frame it is transmitting is interfered with a frame transmitted by another node.

c) What is VPN? Explain.

Answer: A VPN is a service that offers secure, reliable connectivity over a shared Public network infrastructure such as the internet. VPNs maintain the same security and management Policies as a private network. They are the most cost effective method of establishing a virtual Point-to-Point connection between remote users and an enterprise's customerris network. A VPN is a series of virtual connections routed over the internet which encrypts your data as it travels back and forth between client machine.

Ans to the Q.No-04

a) What is a buffer? Define flow control.

Answer: Each receiving device has a block of memory called a buffer, reserved for storing incoming data until they are processed.

Flow control refers to a set of procedures used to restrict the amount of data the sender can send before waiting for acknowledgement.

b) Explain What are the responsibilities of Data link layer?

Answer: The Data link layer transforms the Physical layer, a raw transmission facility, to a reliable link and is responsible for node-node delivery.

1. framing
2. Physical addressing
3. Flow control
4. Error control
5. Access control

c) Define HDLC. Write the types of frame fields contained in HDLC.

Answer: It is bit-oriented data link protocols designed to support both half-duplex communication over point to Point and midpoint link.

Each frame in HDLC may contain up to 6 fields.

1. Beginning flag field
2. An addressing field
3. A control field
4. An information field
5. FCS field
6. An ending flag field.

Ans to the Q. No-05

a) What is Network layer? Explain.

Answer: Layer-3 in the OSI model is called Network layer. Network layer manages options pertaining to host and network addressing, managing sub-networks and internetworking. Network layer takes the responsibility for routing packets from source to destination within or outside a subnet. Two different subnet may have different addressing schemes or non-compatible addressing types.

b) Describe Network Layer Functionalities.

Answer: Devices which work on Network Layer mainly focus on routing. Routing may include various tasks aimed to achieve a single goal. These can be-

- Addressing devices and networks.
- Populating routing tables or static routes.
- Internetworking between two different subnets
- Delivering packets to destination with best efforts
- Provides connection-oriented and connection less mechanism.

c) Explain Network Layer Features.

Answer: With its standard functionalities

Layer 3 can provide various features

as :-

- Quality of Service management.
- Load balancing and link management.
- Security
- Interrelation of different protocols and subnets with different schema
- Different logical network design over the physical network design.
- L3 VPN and tunnels can be used to provide end to end dedicated connectivity.

Ans to the Q.No - 06

a) Explain Address Resolution Protocol.

Answer: While communication a host needs layer-2 (MAC) address of the destination machine which belongs to the same broadcast domain on network.

A MAC address is physically burnt into the Network Interface Card (NIC) of a machine and it never changes.

On the other hand, IP address on the public domain is rarely changed.

If the NIC is changed in case of some fault the MAC address is also changed.

b) What is ICMP? Explain briefly.

Answer: ICMP is network diagnostic and error reporting Protocol. ICMP belongs to IP Protocol suite and uses IP as carrier Protocol. ICMP Packet after constructing it is encapsulated in IP Packet. Because IP itself is a best effort non-reliable Protocol so is ICMP. Any feedback about network is sent back to the organization host. If some error in the network occurs, it is reported by means of ICMP. ICMP contains dozens of diagnostic and error reporting messages.

c) Explain Internet Protocol Version 4.

Answer: IPv4 is 32-bit addressing scheme used as TCP/IP host addressing mechanism. IP addressing enables every host on the TCP/IP network to be uniquely identifiable.

IPv4 provides hierarchical addressing scheme which enables it to divide the network into sub-networks, each with well-defined number of hosts. IP addresses are divided into many categories. IPv4 also has well-defined address spaces to be used as private addresses and public addresses.

Ans to the Q. No-07

a) What is meant by bit stuffing? Mention the various architecture in a LAN.

Answer: Bit stuffing is the process of adding one extra 0 whenever there are 5 consecutive 1's in the data so that the receiver doesn't mistake the data for a flag.

LAN dominated by 4 architectures -

1. Ethernet

2. Token bus

3. Token ring

4. Fiber distributed data interface.

b) Describe Anycast Routing.

Answer: Anycast Packet forwarding is a mechanism where multiple hosts can have same logical address. When a packet destined to this logical address is received, it is sent to the host which is nearest in routing topology. Anycast routing is done with help of DNS server. Whenever an Anycast packet is received it is enquired with DNS to where send it. DNS provides the IP address which is the nearest IP configured on it.

C) Explain Unicast Routing Protocols.

Answer: There are two kinds of routing protocols available to route unicast packets:-

- Distance Vector Routing Protocol -

Distance vector is simple routing protocol which takes routing decision on the number of hops between source and destination. A route with less number of hops is considered as the best route.

- Link State Routing Protocol -

Link state protocol is slightly complicated protocol than distance vector. It takes into account the states of links of all the routers in a network.

Ans to the Q. NO-08

a) What is Broadcast routing? Explain.

Answer: Broadcast routing can be done in two ways -

① A router creates one data packet and then sends it to each host one by one. In this case the router creates a data packet with different destination addresses. All packets are sent as unicast but because they are sent to all, it simulates as if router is broadcasting.

② Secondly, when router receives a packet that is to be broadcasted, it simply floods those packets out of all interfaces.

b) Describe Multicast Routing Protocols.

Answer: Unicast routing protocols use graphs while Multicast routing protocols use trees, i.e. spanning tree to avoid loops. The optimal tree is called shortest Path Spanning tree.

- DVMRP - Distance Vector Multicast Routing Protocols
- MOSPF - Multicast Open shortest Path First.
- CBT - Cone Based Tree
- PIM - Protocol independent Multicast Protocol. Independent Multicast is commonly used now. It has two flavors:-
- PIM Dense mode
- These mode uses source-based trees.

It is used in dense environment such as LAN.

• PIM Sparse Mode

This mode uses shared trees. It is used in sparse environment such as WAN.

c) Write about Routing Algorithms.

Answer: The routing algorithms are as follows:-

Flooding -

Flooding is the simplest method of packet forwarding. When a packet is received, the routers send it to all the interfaces except the one

on which it was received. This creates too much burden on the network, and lots of duplicate packets wandering in the network.

• Shortest Path

Routing decision in networks, are mostly taken on the basis of cost between source and destination. Hop count plays major role here.

Common shortest path algorithms are:-

1. Dijkstra's algorithm
2. Bellman Ford algorithm
3. Floyd Warshall algorithm