Question 1:

Assume six devices are arranged in a mesh topology. How many cables are needed? How many ports are needed for each device?

Cables = n=(n-1)/2=(6*5)/2=15

ports in each device = (n-1) = 6-1 = 5

Question 2:

How do the layers of the Internet model correlate to the layers of the OSI model?

The application, presentation, and session layers of the OSI model are represented by the application layer in the Internet model. The lowest four layers of OSI correspond to the Internet model layers."

Question 3:

 What does the amplitude of a signal measure? What does the frequency of a signal measure? What does the phase of a signal measure?

The amplitude of a signal measures the value of the signal at any point. The frequency of a signal refers to the number of periods in one second. The phase describes the position of the waveform relative to time zero.

Question 4:

What is the difference between routing and routed protocols?

Similarly, in a network routers use routing protocols to determine the best path for a packet to travel through the inter-network more efficiently. Routed protocols are assigned to an interface and determine the method of delivering the packet

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Question 5:

Compare modified cut through and store and forward switches.

A cut-through device begins forwarding a frame after examining only the first part of its header. In contrast, a store-and-forward switch buffers the entire frame before making a forwarding decision. In general, this buffering before transmission can cause long delays.

Question 6:

Why is there no need for CSMA/CD on a full-duplex Ethernet LAN?

Because there is no CSMA/CD access method, because there is no collision.

Question 7 :

Discuss the three types of routing loops.

Split Horizon

A split horizon is a routing configuration that stops a route from being advertised back in the direction from which it came. Split Horizon mechanism states that if a neighboring router sends a route to a router, the receiving router will not propagate this route back to the advertising router on the same interface.

Route Poisoning

Route Poisoning is another method for avoiding routing loops. When a router detects that one of its connected routes has failed, the router will poison the route by assigning an infinite metric to it.

Hold-down Timers

Hold-down timer is another mechanism used to prevent bad routes from being restored and propagated by mistake. When a route is placed in a hold-down state, routers will neither advertise the route nor accept advertisements about it for a specific interval called the hold-down period.

Question 8:

What do we mean when we say that a bridge can filter traffic? Why is filtering important?

Bridges have access to station physical addresses and can forward a packet to the appropriate segment of the network. In this way, they filter traffic and help control congestion.

Question 9 :

Explain why most of the addresses in class A are wasted. Explain why a medium-size or large-size corporation does not want a block of class C addresses.

In class A With 24 bits total, 2^{24} combinations are possible, yielding 16,777,216 possible addresses which is sufficient for about 17 million individual devices. Most of the organizations have a small fraction of this number of devices.Thus,most of the addresses are not used and are wasted.

A Class C address consists of a 24-bit network address and an 8-bit local host address. The first three bits in the network address indicate the network class, leaving 21 bits for the actual network address. Therefore, there are 2,097,152 possible network addresses and 256 possible local host addresses. Medium-size or large-size corporations require addresses in lakhs but class C provides only 256 addresses. Thus Class c addresses are not suitable for medium-size or large-size corporations.
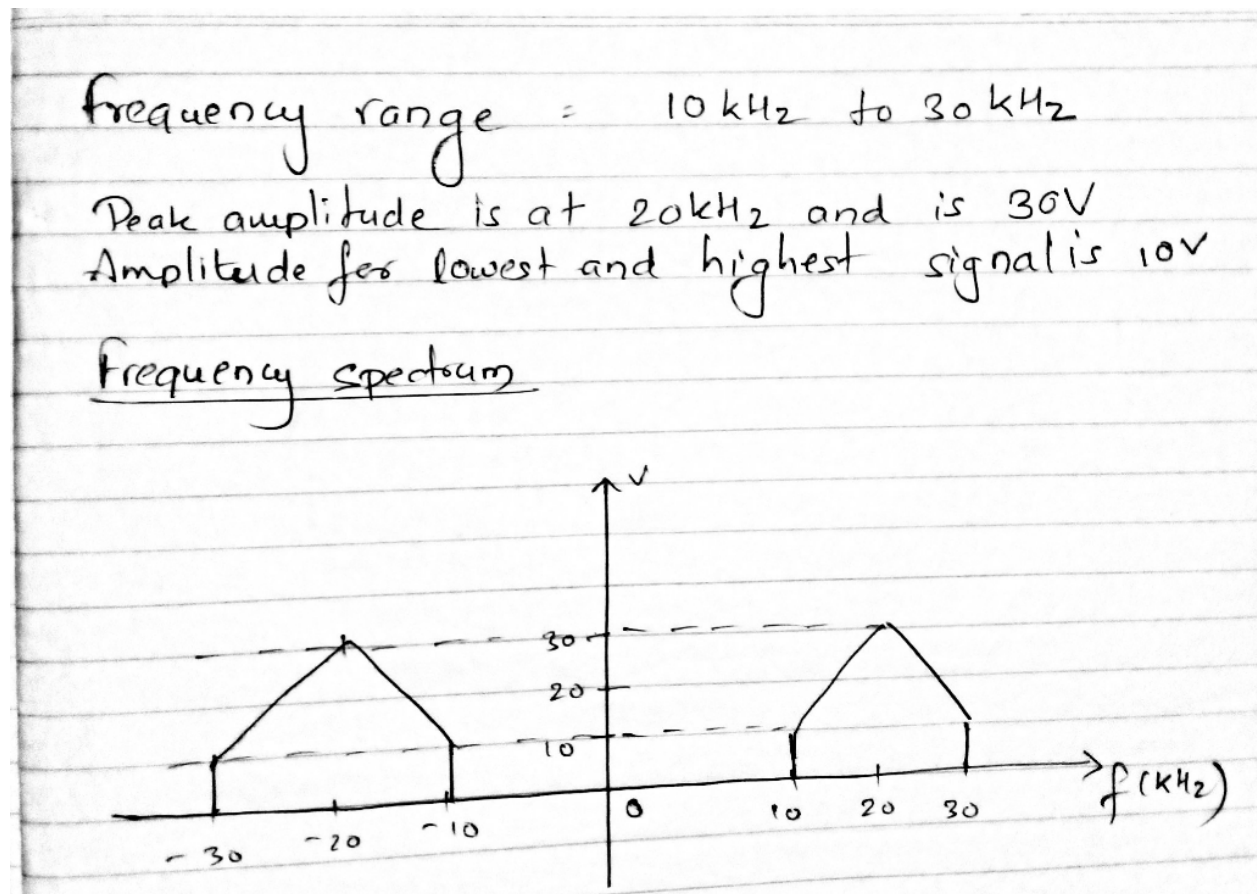

Question 10:

How does the hop count limit alleviate RIP's problems?

The hop count limit helps RIP instability by limiting the number of times a message can be sent through the routers, thereby limiting the back and forth updating that may occur if part of a network goes down."

Question 11.

A non-periodic composite signal contains frequencies from 10 to 30 KHz. The peak amplitude is 10V for the lowest and the highest signals and is 30V for the 20-KHz signal. Assuming that the amplitudes change gradually from the minimum to the maximum, draw the frequency spectrum

Question 12 :

Given the IP address 10.5.118.3 and the mask 255.255.255.0, what are all the subnet numbers if the same (static) mask is used for all subnets in this network?

The answer is 10.0.1.0, 10.0.2.0, 10.0.3.0, and so on, up to 10.255.254.0. The Class A network number is 10.0.0.0. The mask implies that the entire second and third octets, and only those octets, comprise the subnet field. The first subnet number, called the zero subnet (10.0.0.0), and the last subnet number, called the broadcast subnet (10.255.255.0), are reserved.

Question 13 :

Suppose a computer sends a packet at the network layer to another computer somewhere in the Internet. The logical destination address of the packet is corrupted. What happens to the packet? How can the source computer be informed of the situation?

Before using the destination address in an intermediate or the destination node, the packet goes through error checking that may help the node find the corruption (with a high probability) and discard the packet.

Normally the upper layer protocol will inform the source to resend the packet.

Question 14.

Performance is inversely related to delay. When you use the Internet, which of the following applications are more sensitive to delay?

   i.   Sending an e-maIL

ii.   **Copying a filE**

iii.   **Surfing the Internet**

Question 15:

Given the IP address 167.88.99.66 and the mask 255.255.192.0, what is the broadcast address and network ID?

broadcast address : 167.88.127.255
network ID : 167.88.64.0
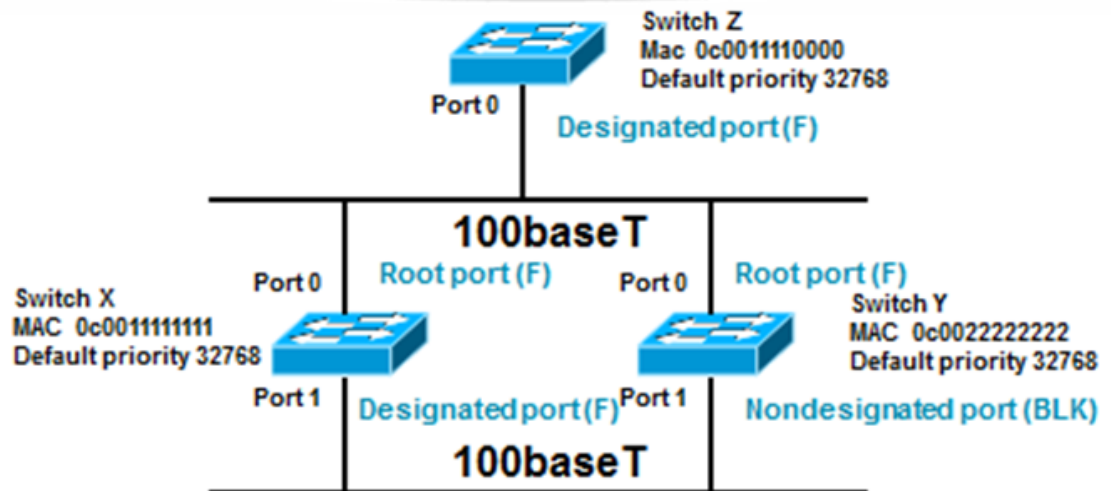

Question 16.

Given the IP address 10.5.118.3 and the mask 255.255.240.0, what are the assignable IP addresses and broadcasts in this subnet?

Answer

a.   **Assignable ip : 10.5.112.1 to 10.5.127.254**
b.   **Boradcost: 10.5.127.255**

Question 17.

Question 18:

IIUI is granted the block 16.0.0.0/8. The administrator wants to create 500 fixed-length subnets. i Find the subnet mask. ii Find the number of addresses in each subnet. iii Find the first and last addresses in subnet 1. iv Find the first and last addresses in subnet 500.

i) An administrator wants 500 fixed-length subnets, the number of subnets needs to be of power 2. Here, the number of subnets is 500, the number of extras is in the prefix length is $log_2 s$, where s = $2^{number\ of\ extra\ 1s}$ Now, 2^9 = 512. We need 500 subnets, which means we need to add nine more extra 1s $(log_2 500 = 8.96)$ to the site prefix. So, the number of extra 1s is 9 and possible subnets is 512. The subnet prefix is then /17. Therefore, the subnet mask is 255.255.128.0.

(ii) The site has $2^{32-8} = 2^{24} = 16777216$ addresses. Each subnet has $2^{32-17} = 2^{15} = 32,768$ addresses.

(iii)

First address in subnet 1 = 16.0.0.0

   net Mask = 255.255.128.0.

Wild card   = 0.0.127.255

Last address in subnet 1 = 16.0.127.255

Therefore, the last address in subnet 1 is 16.0.127.255.

(iv) Here, point to be noted that subnet 500 is the last subnet used by the organization, it is not the last possible subnet. To find the address in subnet 500, we need to add 499 × 32,768 = 16,351,232 in base 256 (0.249.228.0) to the first address in subnet 1.

First address in subnet 1   = 16.0.0.0

Number of addresses   = 0.249.128.0

First address in subnet 500 = 16.249.128.0

Wild card   = 0.0.127.255

Last address in subnet 500 = 16.249.255.255

Therefore, the first address is 16.249.128.0 and the last address is 16.249.255.255 in the last subnet 500.

Question 18:

 An ISP has a block of 1024 addresses. It needs to divide the addresses among 1024 customers. Does it need subnetting? Explain your answer.

No. If you have one IP per customer, you don't need to create smaller subnets.

Explain

There are actually two options. If your ISP uses subnetting (a router with 32 egress ports), the prefix length for each customer is net sub = 32. However, it does not require routers and subnetting. Each customer can connect directly to the ISP server. In this case, the entire customer address set can be taught in a single block of prefix length n (prefix length assigned to the ISP).

Question 18:

You design a network for DCS who wants the same subnet mask on every subnet. The DCS will use network 10.0.0.0 and needs 200 subnets, each with 200 hosts maximum. What subnet mask would you use to allow the most growth in subnets? Which mask would work and would allow for the most growth in the number of hosts per subnet?

Network 10.0.0.0 is a Class A network,

so you have 24 host bits with no subnetting.

To number 200 subnets, you will need at least 8 subnet bits because 2^8 is 256. Likewise, to number 200 hosts per subnet, you will need 8 host bits. So, you need to pick a mask with at least 8 subnet bits and 8 host bits. 255.255.0.0 is a mask with 8 subnet bits and 16 host bits. That would allow for the 200 subnets and 200 hosts, while allowing the number of hosts per subnet to grow to 2^16-2—quite a large number. Similarly, a mask of 255.255.255.0 gives you 16 subnet bits, allowing 2^16-2 subnets, each with 2^8-2 hosts per subnet.

Question 19:

Imagine that a router has an interface E0 with IP address 168.10.1.1 and E1 with IP address 10.1.1.1. If the commands router rip and network 10.0.0.0, with no other network commands, are configured in the router, does RIP send updates out Ethernet 0?

Answer: No. There must be a network statement for network 168.10.0.0 before RIP advertises out that interface. The network command simply selects the connected interfaces on which to send and receive updates.

Question 20:

What type of routing protocol algorithm uses a hold-down timer? What is its purpose?

Distance vector.

Hold-down helps prevent counting-to-infinity problems. After learning that a route has failed, a router waits for a hold-down timer before believing any new information about the route.

Question 21:

You have two computers connected by an Ethernet hub at home. Is this a LAN, a MAN, or a WAN? Explain your reason.

LAN, because the geographical area spanned by the network would be very small, connects two computers locally.

Question 22:

When a party makes a local telephone call to another party, is this a point-to-point or multipoint connection? Explain your answer.

**Point to point because it is a local call between only two parties.**

Question 23:

What command sets the password that is required after you enter the enable command? Is that password encrypted by default?

Enable password or enable secret. The password in the enable command is not encrypted by default. The enabled secret password is encrypted using MD5.

Question 24

How do the layers of the Internet model correlate to the layers of the OSI model?
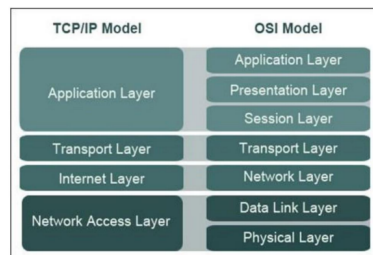
Question 25:

If the data link layer can detect errors between hops why do we require another checking mechanism at the transpose layer?

The error between the nodes can be detected by the data link layer control,but the error between the node(between input port and output port) of the node cannot be detected by the data link layer.

Question 26 :

List the three traditional switching methods. What are the most common today?

The three traditional switching methods are pocket switching, circuit switching and message switching. The most common today are circuit switching and packet switching.

Question 27 :

 What is the purpose of BGP?

The purpose of the BGP is, peering BGP makes peering possible without peering network would not be able to send and receive information.When a network router is connected to other network.It doesn't know which network is best to send or receive information.BGP provides different peering option a router has and chooses the one closest to the router.

Question 28 :

What is the difference between a part address, a logical address, and a physical address?

 Port Address: is the address of a process on a host.

 Logical Address: (IP) in the internet is currently a 32-bit address that can uniquely define a host connected to the internet.

Physical Address: is an address of node as defined by i) LAN or WAN.

Question 28 :

 Dialog control and synchronization are two responsibilities of the session layer in this OSI model. Which layer do you think is responsible for these duties in the Internet model?

 In the internet model the application layer is responsible for their duties,because in the Internet model the session layer is present in the Application layer , therefore the application layer is responsible for these duties.

Question 29:

What is the difference between packet switching network and ciruits switching network?Why use packet network for data when circuit switched networks have served us well with voice for a lot many years?

Circuit Switching Vs Packet Switching

Circuit Switching	Packet Switching
Physical path between source and destination	No physical path
All packets use same path	Packets travel independently
Reserve the entire bandwidth in advance	Does not reserve
Bandwidth Wastage	No Bandwidth wastage
No store and forward transmission	Supports store and forward transmission

We use packet networks rather than circuit switch because if ensures that more of the bandwidth of all cables are fully utilized.It makes better use of Packets.

Question 30:

What is the difference between connection-oriented and connectionless services?Why does there need to be connectionless service when connection-oriented services are typically more reliable?

Connection-oriented	Connectionless
Route packet based on identifier (connection ID in every packet)	Route packet based on destination address, which is in every packet
Forwarding table specifies the output port and outgoing identifier value as function of the incoming identifier value	Routing table specifies the output port depending on the destination address
Forwarding table set up by signaling during connection establishment.	Router executes distributed algorithm to share network state information and dynamically calculate the routing table
Connection must be re-established in cases of failure	Packets are rerouted around failures, robust against failures

There is need of connection-less service because it gurantee data packet transfer from one end to other with a connection.

Question 31 :

Compare modified cut through and store and forward switches.?

Store & forward switching	Cut through switching
1.Support error checking through CRC	Invalid frames exist Ethernet

Invalid frames exist Ethernet Checking. Ethernet frames will be dropped frames will be forwarded if its If it is smaller than 64 bytes.	frames will be forwarded if its First 6 bytes are recognized.
2. Error free forwarding bad frame will be Bad frames will be forwarding Discarded before forwarding.	Bad frames will be forwarding Which will cause error frames.
3. Waiting time is long it takes time to Waiting time is low because Store the entire frame.	Switch will not store the entire frame or PACKET

Question 32:

What are the advantages of dividing an Ethernet LAN with a bridge?

The Advantage of Dividing an Ethernet LAN with a Bridge is that it connects two different LAN or Segments of Some LAN. A Bridge is used to segregate data by Dividing it into two used Streams. In This Way it Effectively reduces the Streams. In this way it Effectively reduces the traffic How over a LAN.

Question 33:

What is the difference between direct and indirect delivery?

Direct Delivery : The Router is not used to forward the packet because destination is same network

Indirect Delivery : Packets are sent to an intermediate point for fowrarding , Usually A Router.

Question 34:

Name the advantages of optical fiber over twisted pair and coxail cable:

Greater Bandwidth.

faster Speed.

Longer Distance

Better Reliability

More Flexible.

Question 35:

How is the preamble field different from the SFD field?

The preamble is a 56-bit field that provides an alert and timing pulse. It is added to the frame at the physical layer and is not formally part of the frame. SFD is a onebyte field that serves as a start of frame. SFD is not serving as the synchronization but preamble does this between source and receiver.

Question 36:

Distinguish between baseband transmission and broadband transmission? Baseband Transmission

1. In baseband transmission, the type of signalling used is digital.

2. Baseband Transmission is bidirectional in nature.

3. Signals can only travel over short distances.

4. It works well with bus topology. .

5. In baseband transmission, Manchester and Differential Manchester encoding are used.

Broadband Transmission

1.In broadband transmission, the type of signalling used is analog.

2.Broadband Transmission is unidirectional in nature.

3.Signals can be travelled over long distances without being attenuated.

4.It is used with a bus as well as tree topology

5.Only PSK encoding is used.

Question 37

We send a voice signal from a microphone to a recorder. Is this baseband or broadband transmission? **When we send a Voice signal from a microphone to a recorder , it is base transmission because no modulation is involved.**

Question 38:

Why is it important that nodes in sensor nets consume very little power?

Since large numbers of sensor nodes are densely deployed, neighbor nodes may be very close to each other. Hence, multihop communication in wireless sensor networks is expected to consume less power than traditional single hop communication. Furthermore, the transmission power level can be kept low, which is highly desirable in covert operations.

Question 39:

Can a routing table in a datagram network have two entries with the same destination address?Explain

There cannot be two entries with the same destination address in a datagram network because they are unique, meaning there is no address alike in the routing table.

Question 40:

How can a wireless node interface with the communication of another node when the two nodes are separated by a distance greater than the transmission range of either node?

Question 41:

Show a routing table for a host that is connected to a LAN without being connected to the Internet?

Table 6.3 *Routing table for Exercise 14*

Mask	Network Address	Next-Hop Address	Interface
/27	202.14.17.224	-----	m1
/18	145.23.192.0	-----	m0
default	default	130.56.12.4	m2

Question 42:

What are the advantages of a multipoint connection over a point-to-point connection?

Ease of installation, Low Cost. Point to point is for connecting 2 devices, whereas in multipoint more than 2 devices share the link. Therefore, multipoint connection provides more reliability.

Question 43:

Suppose the length of a 10Base5 cable is 2500m.If the speed of propagation in a thick coaxial cable is 200,000,000m/s,how long does it take for a bit to travel from the beginning to the end of the network?

Assume there are 10ur delay in the equipment. We can calculate the propagation time as t=(2500 m)/(200,000,00) = 12.5us.To get the total delay,we need to add propagation dealy in the equipment(10us).This results in T =22.5us.

Question 44:

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

In half duplex mode, both stations can transmit and receive, but only one at a time. When one station sends a message, it cannot receive messages. In full duplex mode, both stations can transmit and receive messages simultaneously.

Question 45:

Suppose the length of a 10Base5 cable is 2500 m. If the speed of propagation in a thick coaxial cable is 200,000,000 m/s, how long does it take for a bit to travel from the beginning to the end of the network? Assume there are 10 μs delay in the equipment.

We can calculate the propagation time as t = (2500 m) / (200,000.000) = 12.5 μs. To get the total delay, we need to add propagation delay in the equipment (10 μs). This results in T = 22.5 μs

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Question 46:

A light signal is travelling through a fiber. What is the delay in the signal if the length of the fiber-optic cable is 10 m, 100 m, and 1 Km (assume a propagation speed of 2 x 108 m)?

Answer: The delay = distance / (propagation speed). Therefore, we have:

a) Delay = 10 / (2 × 108) = 0.05 ms

b) Delay = 100 / (2 × 108) = 0.5 ms

c) Delay = 1000 / (2 × 108) = 5 ms

Question 47:

Can a routing table in a datagram network have two entries with the same destination address? Explain.

Answer: In a datagram network, the destination addresses are unique. They cannot be duplicated in the routing table.