DCC Question Bank Solution

1. **List different IEEE 802 standards with their names**
2. **List IEEE 802 X standards for networks.**

Ans.:

1. 802.3: Ethernet
2. 802.4:Token Bus
3. 802.5:Token Ring
4. 802.11:Wi Fi(Wireless Fidelity)

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3. Describe Bluetooth architecture technologies.
4. Describe Piconet and Scatternet architecture with neat diagram

Ans.:

Bluetooth Architecture

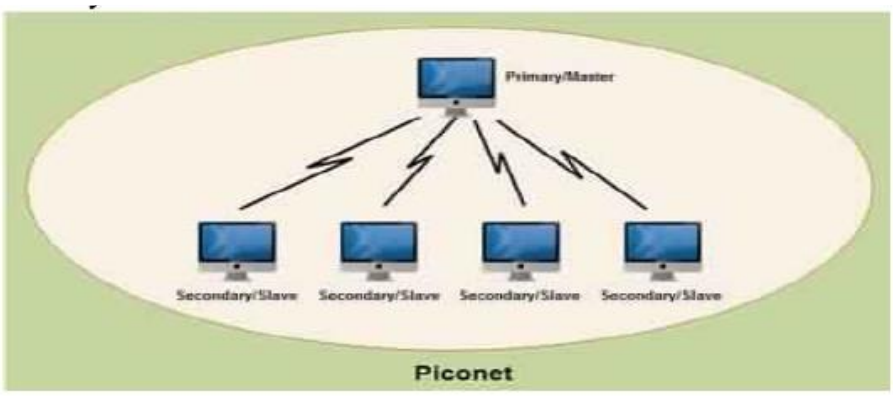
Bluetooth architecture defines two types of networks:

1. Piconet

2. Scatternet

1. Piconet

- Piconet is a Bluetooth network that consists of one primary (master) node and seven active secondary (slave) nodes.
- Thus, piconet can have up to eight active nodes (1 master and 7 slaves) or stations within the distance of 10 meters.
- There can be only one primary or master station in each piconet.
- The communication between the primary and the secondary can be one-to-on or one-to-many.



Piconet

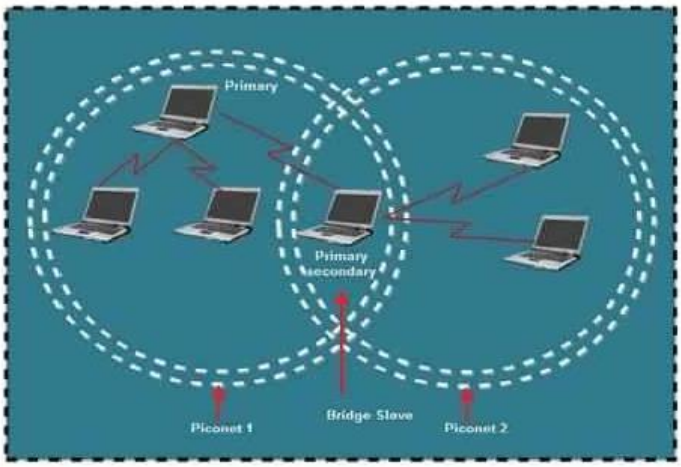
- All communication is between master and a slave. Salve-slave communication is not possible.
- In addition to seven active slave station, a piconet can have upto 255 parke nodes. These parked nodes are secondary or slave stations and cannot take part in communication until it is moved from parked state to active state.

2. Scatternet

- Scattemet is formed by combining various piconets.
- A slave in one piconet can act as a master or primary in other piconet.
- Such a station or node can receive messages from the master in the first piconet and deliver the message to its slaves in other piconet where it is acting as master.

This node is also called bridge slave.

- Thus a station can be a member of two piconets.
- A station cannot be a master in two piconets.



Scatternet

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5. Define Topology. List any 2 types of topologies

Ans:

Network topology refers to the physical or logical layout of a network. It defines the way different nodes are placed and interconnected with each other. Alternately, network topology may describe how the data is transferred between these nodes.

Types of topologies

Bus Topology

Star Topology

Ring Topology

- Tree Topology
- Mesh Topology
- Hybrid Topology

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6. State different types of Network topologies

Ans.:

1. Mesh Topology

2. Star Topology

3. Bus Topology

4. Ring Topology

5. Hybrid Topology

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7. Differentiate between Hub and Switch on the basis of layer, ports, device type and speed.

Ans.:

	Hub	Switch
Layer	Physical layer. Hubs are classified as Layer 1 devices per the OSI model.	Data Link Layer. Network switches operate at Layer 2 of the OSI model.
Function	To connect a network of personal computers together, they can be joined through a central hub.	Allow to connect multiple device and port can be manage, Vlan can create security also can apply
Data Transmission form	Electrical signal or bits	Frame (L2 Switch) Frame & Packet (L3 switch)
Transmission Type	Hubs always perform frame flooding; may be unicast, multicast or broadcast	First broadcast; then unicast & multicast as needed.
Ports	4/12 ports	Switch is multi port Bridge. 24/48 ports
Device Type	Passive Device (Without Software)	Active Device (With Software) & Networking device
Used in (LAN, MAN, WAN)	LAN	LAN
Table	A network hub cannot learn or store MAC address.	Switches use content accessible memory CAM table which is typically accessed by ASIC (Application Specific integrated chips).
Transmission Mode	Half duplex	Half/Full duplex
Broadcast Domain	Hub has one Broadcast Domain.	Switch has one broadcast domain [unless VLAN implemented]
Definition	An electronic device that connects many network device together so that devices can exchange data	A network switch is a computer networking device that is used to connect many devices together on a computer network. A switch is considered more advanced than a hub because a switch will on send msg to device that needs or request it
Spanning-Tree	No Spanning-Tree	Many Spanning-tree Possible
Collisions	Collisions occur commonly in setups using hubs.	No collisions occur in a full-duplex switch.

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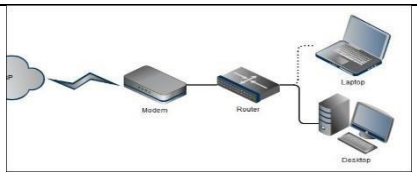
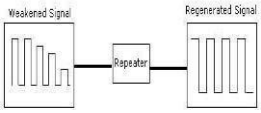
8. Compare Router and Repeater .

Ans.:

Router	Repeater
A router is a device like a switch that routes data packets based on their IP addresses.	Repeater regenerates the signal over the same network before the signal becomes too weak or corrupted so as to extend the length to which the signal can be transmitted over the same network.
Router is mainly a Network Layer device.	A repeater operates at the physical layer.
	

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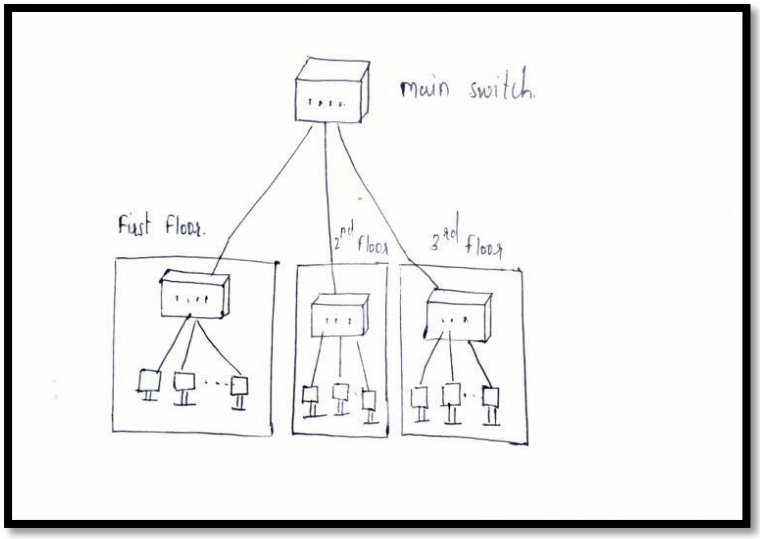
9. Draw and describe the connecting devices required for LAN for an organization using TREE Topology.

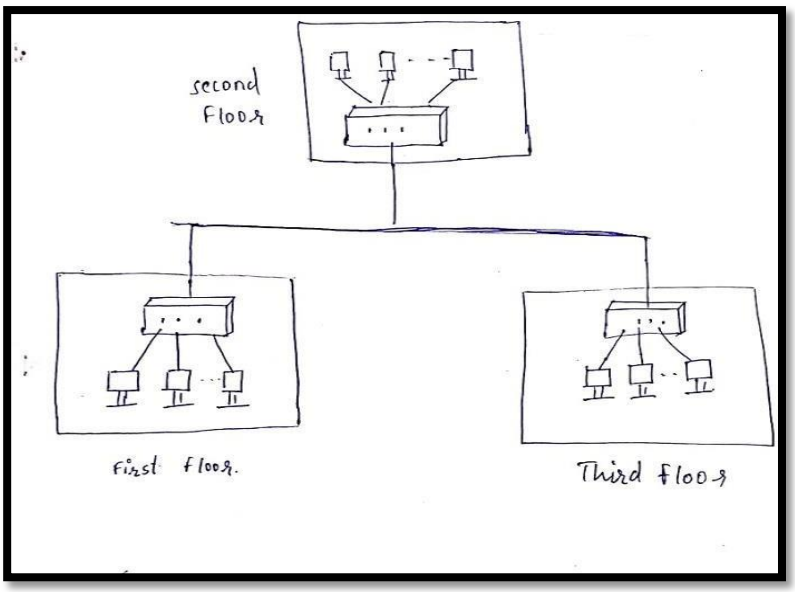
Ans.:

A tree topology is a special type of structure in which many connected elements are arranged like the branches of a tree

Here in the diagram the main switch is connected with three separate switches.

For each floor separate switch is connected with multiple terminals.





10.State the use of DHCP.

Ans.:

DHCP (Dynamic Host Configuration Protocol) is a client-server protocol that uses DHCP servers and DHCP clients. A DHCP server is a machine that runs a service that can lease out IP addresses and other TCP/IP information to any client that requests them. The DHCP server typically has a pool of IP addresses that it is allowed to distribute to clients, and these clients lease an IP address from the pool for a specific period of time, usually several days. Once the lease is ready to expire, the client contacts the server to arrange for renewal. DHCP

clients are client machines that run special DHCP client software enabling them to communicate with DHCP server.

DHCP clients obtain a DHCP lease for an IP address, a subnet mask, and various DHCP options from DHCP servers in a four-step process:

DHCP DISCOVER: The client broadcasts a request for a DHCP server.

DHCPOFFER: DHCP servers on the network offer an address to the client.

DHCPREQUEST: The client broadcasts a request to lease an address from one of the offering DHCP servers.

DHCPACK: The DHCP server that the client responds to acknowledges the client, assigns it any configured DHCP options, and updates its DHCP database. The client then initializes and binds its TCP/IP protocol stack and can begin network communication.

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11. With suitable diagram describe
(i)STAR Topology (ii) RING Topology

Ans.:

(i) STAR Topology

Star topology is a network topology where each individual piece of a network is attached to a central node (often called a hub or switch). The attachment of these network pieces to the central component is visually represented in a form similar to a star.

The hub and hosts, and the transmission lines between them, form a graph with the topology of a star. Data on a star network passes through the hub before continuing to its destination. The hub manages and controls all

functions of the network. It also acts as a repeater for the data flow.

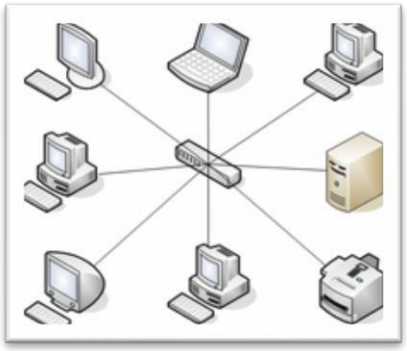

Fig a: Star topology

The star network is one of the most common computer network

topologies.

(ii) **RING Topology**

A ring network is a network topology in which each node connects to exactly two other nodes, forming a single continuous pathway for signals through each node - a ring.
Data travels from node to node, with each node along the way handling every packet.

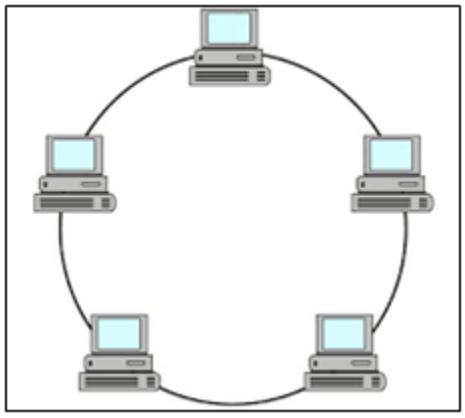

Fig b: Ring Topology

Ring topology refers to a specific kind of network setup in which devices are connected in a ring and pass information to or from each other according to their adjacent proximity in the ring structure. This type of topology is highly efficient and handles heavier loads better than bus topology.

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12. Define Subnet and Supernet.

Ans.:

A **subnet** is a logical partition of an IP network into multiple, smaller network segments. It is typically used to subdivide large networks into smaller, more efficient subnetworks.

A **supernet** is created by combining several Internet Protocol (IP) networks or subnets into one network with a single classless interdomain routing (CIDR) prefix. The new combined network has the same routing prefix as the collection of the prefixes of the subnets. The procedure used to create a supernet is commonly called supernetting.

13.What is IP address? State IP address classes with their range.

Ans.:

An IP address is an address used to uniquely identify a device on an IP network.

Classes and range:

Class A - 1.0.0.1 to 126.255.255.254
Class B - 128.1.0.1 to 191.255.255.254
Class C - 192.0.1.1 to 223.255.254.254
Class D - 224.0.0.0 to 239.255.255.255
Class E - 240.0.0.0 to 254.255.255.254

14.Enlist different layers in OSI and TCI/IP Model

Ans.:

OSI Layer

- Application Layer

- Presentation Layer
- Session Layer
- Transport Layer
- Network Layer
- Data link Layer
- Physical Layer

TCP/IP Layers

- Host-to-network Layer
- Internet layer
- Transport Layer
- Application Layer

15.Differentiate between TCP & UDP

Ans.:

UDP v/s TCP		
Characteristics/ Description	**UDP**	**TCP**
General Description	Simple High speed low functionality "wrapper" that interface applications to the network layer and does little else	Full-featured protocol that allows applications to send data reliably without worrying about network layer issues.
Protocol connection Setup	Connection less data is sent without setup	Connection-oriented; Connection must be Established prior to transmission.
Data interface to application	Message base-based is sent in discrete packages by the application.	Stream-based; data is sent by the application with no particular structure
Reliability and Acknowledgements	Unreliable best-effort delivery without acknowledgements	Reliable delivery of message all data is acknowledged.
Retransmissions	Not performed. Application must detect lost data and retransmit if needed.	Delivery of all data is managed, and lost data is retransmitted automatically.
Features Provided to Manage flow of Data	None	Flow control using sliding windows; window size adjustment heuristics; congestion avoidance algorithms
Overhead	Very Low	Low, but higher than UDP
Transmission speed	Very High	High but not as high as UDP
Data Quantity Suitability	Small to moderate amounts of data.	Small to very large amounts of data.

16. Describe working of Data link layer and network layer in detail.

Ans.:

Data Link (Layer 2) At OSI Model, Layer 2, data packets are encoded and decoded into bits. It furnishes transmission protocol knowledge and management and handles errors in the physical layer, flow control and frame synchronization. The data link layer is divided into two sub layers: The Media Access Control (MAC) layer and the Logical Link Control (LLC) layer. The MAC sub layer controls how a computer on the network gains access to the data and permission to transmit it. The LLC layer controls frame synchronization, flow control and error checking.

Functions of data link layer:

1. **Framing:** Data-link layer takes packets from Network Layer and encapsulates them into Frames. Then, it sends each frame bit-by-bit on the hardware. At receiver' end, data link layer picks up signals from hardware and assembles them into frames.
2. **Addressing:** Data-link layer provides layer-2 hardware addressing mechanism. Hardware address is assumed to be unique on the link. It is encoded into hardware at the time of manufacturing.
3. **Synchronization:** When data frames are sent on the link, both machines must be synchronized in order to transfer to take place.
4. **Error Control:** Sometimes signals may have encountered problem in transition and the bits are flipped. These errors are detected and attempted to recover actual data bits. It also provides error reporting mechanism to the sender.
5. **Flow Control:** Stations on same link may have different speed or capacity. Data-link layer ensures flow control that enables both machines to exchange data on same speed.
6. **Multi-Access:** When host on the shared link tries to transfer the data, it has a high probability of collision. Data-link layer provides mechanism such as CSMA/CD to equip capability of accessing a shared media among multiple Systems.

17. Compare IPv4 with IPv6. (Any 4 Points)

Ans.:

IP Service	IPv4	IPv6
IP header	Consists of a 20-byte field containing multiple fields.	Consists of a 40-byte field containing fewer fields, making it simpler, and provides better routing efficiency.
Addressing range	Requires a 32-bit dotted-decimal address to provide 4.3 x 109 (4.3 billion) addresses.	Requires a 128-bit hexadecimal address to provide 3.4 x 1028 addresses with multiple scopes.
Address types	Includes unicast, multicast, and broadcast addresses.	Includes unicast, multicast, and anycast addresses. No broadcast addresses means that it is not susceptible to broadcast storms.
Autoconfiguration	Supports stateful configuration (Dynamic Host Configuration Protocol, DHCP).	Supports stateless autoconfiguration or stateful configuration (DHCPv6).
Security	IPsec must be configured.	IPsec is a mandatory part of the stack, but it still has to be configured.
Mobility	Mobility is not built in, but it supports mobile IP.	Mobile IP is built in, with optimized routing.
Quality of service (QoS)	Supports differentiated service and integrated service.	Supports differentiated service and integrated service, but the header compresses better because of fewer fields.
IP multicast	Heavy application use.	Heavy application and protocol stack use.
ICMP	Mostly used to provide messaging information.	Used extensively to provide messaging and protocol functions.

18.State functions of Network layer

Ans.:

Functions of the Network layer are as follows:

1. It is responsible for routing packets from the source host to the destination host. The routes can be based upon static tables that are rarely changed, or they can be automatically updated depending upon network conditions.
2. The data link layer assigns the physical address locally. When the data packets are routed to remote locations, a logical addressing scheme is required to differentiate between the source system and the destination system. This is provided by the network layer.
3. This layer also provides mechanisms for congestion control.
4. The network layer tackles issues like transmission delays, transmission time, avoidance of jitters, etc.

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19. Describe types of IP address classes.

Ans.

Class A:
Class A range for first byte is 0-127. Class A type of IP addresses have First byte consisting of Network address with first bit as 0 and the next 3 bytes with host id. Hence, number of hosts are more when compared to number of networks. The default subnet masks for class A networks is 255.0.0.0. Class A networks have their network addresses from 1.0.0.0 to 126.0.0.0, with the zero's being replaced by node addresses.

Class B: Class B range for first byte is 128-191. This type has first two bytes specifying network ID with starting two bits as 10 and last two bytes referring to host ID. The default subnet masks for class B is 255.255.0.0. Network addresses for these ranges from 128.0.0.0 to 191.0.0.0.

Class C: Class C range for first byte is 192-223. This class has first three bytes referring to network with starting bits as 110 and last byte signifies Host ID. Here, number of networks is more when compared to number of hosts in each network. The default subnet masks for class C is 255.255.255.0 The network IP addresses for these range from 192.0.0.0 to 223.0.0.0.

Class D: Class D range for first byte is 224-239 Class D is used for multicasting and its starting bits are 1110

Class E: Class E range for first byte is 240-255 .Class E is reserved for future use and its starting bits are 1111

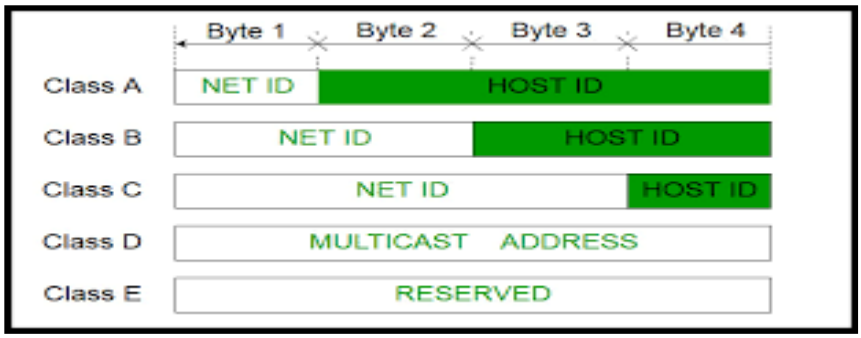

Fig : IP address classes

20.Compare OSI and TCP/IP network models

Ans.:

TCP/IP	OSI
Implementation of OSI model	Reference model
Model around which Internet is developed	This is a theoretical model
Has only 4 layers	Has 7 layers
Considered more reliable	Considered a reference tool
Protocols are not strictly defined	Stricter boundaries for the protocols
Horizontal approach	Vertical approach
Combines the session and presentation layer in the application layer	Has separate session and presentation layer
Protocols were developed first and then the model was developed	Model was developed before the development of protocols
Supports only connectionless communication in the network layer	Supports connectionless and connection-oriented communication in the network layer
Protocol dependent standard	Protocol independent standard

21. Describe working of Transport layer and session layer in detail.

Ans.:

Transport (Layer 4) Model, Layer 4, provides transparent transfer of data between end systems, or hosts, and is responsible for end-to-end error recovery and flow control. It ensures complete data transfer from source to destination.

Session (Layer 5) This layer establishes, manages and terminates connections between applications. The session layer sets up, coordinates, and terminates conversations, exchanges, and dialogues between the applications at each end. It deals with session and connection coordination.
