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AssignmentModule - 1Q-1 What is Network?

→ A network is a collection of computers, servers, mainframes, peripherals, or other devices connected to facilitate communication and data sharing.

Q-2 Explain type of Network = LAN, MAN, and WAN?

→ LAN = Local Area Network

A group of computers and network devices connected together, usually within the same building. Home WiFi networks and small business networks are common examples of LANs.

LANs can also be fairly large, although if they take up multiple buildings, it is usually more accurate to classify them as wide area networks or MAN.

→ WAN = Wide Area Network

It is a technology that connects offices, data centers, cloud applications, and storage across a specific geographic area or the world. It spans beyond a single building ~~and~~ or large company, making it useful for businesses with international branch offices. The world's largest WAN is the Internet, which consists of many international networks.

→ MAN = Metropolitan Area Network

It is a computer network connecting computers within a metropolitan area, larger than a local area network but smaller than a wide area network, regardless of the area's demographics.

Q.3 What is Internet?

→ The internet is a global network that connects billions of computers across the world with each other and to the world wide web. It uses standard internet protocol suite (TCP/IP) to connect billions of computers world wide. It is set up by using cables such as optical fibers and other wireless and networking technologies.

Q.4 Define Network Topologies?

→ A network topology is the physical and logical arrangement of nodes and connections in a network.

Q.5 What is optical fiber module and connector?

→ A fibre-optic module is a component that is used to connect a fibre-optic cable to an electronic device. There are a number of different parts of a fibre-optic module, and different modules are designed with different specifications. The parts of the module are attached to a board which can be installed as a single unit in an electronic device.

An optical fibre connector is a flexible device that connects fibre cables

requiring a quick connection and disconnection. Optical fibers terminate fiber-optic connectors to fiber equipment or join two fiber connections without splicing. Hundreds of optical fiber connector types are available, but the key differentiator is defined by the mechanical coupling technique and dimensions. Optical fiber connectors ensure stable connections, as they ensure the fiber ends are optically smooth and the end-to-end positions are properly aligned.

### Q6 Explain Switch:

→ A network switch connects devices in a network to each other, enabling them to talk by exchanging data packets. Switches can be hardware devices that manage physical networks or software-based virtual devices.

A network switch operates on the data-link layer, or Layer 2, of the OSI model. In a LAN using Ethernet, a network switch determines where to send each incoming message frame by looking at the MAC (media access control) address. Switches maintain

tables that match each MAC address to the port receiving the MAC address.

There are several types of switches in networking :-

- Virtual switches
- Routing switches
- Managed switches
- Unmanaged switches
- Smart switches
- Stackable switches
- Modular switches

B-7 Explain Router.

→ A router receives and sends data on computer networks. Routers are sometimes confused with network hubs, modems, or network switches. However, routers can combine the functions of these components, and connect with these devices, to improve internet access or help create business networks.

Types of routers :-

- Cloud router :- It is used by service providers and cloud providers, provide maximum bandwidth for connecting traditional routers or switches, often

used by large enterprises with multiple employees.

- Edge router: An edge router is a network's outermost point of connection with external networks, including the internet. Optimized for bandwidth, they connect to other routers to distribute data to end users. They typically have only Ethernet ports, an input for the internet and multiple outputs for connecting additional routers. Edge routers and modems are interchangeable terms.

- Wireless router : It receives data from the edge router via a wired connection and sends it on to end users, typically via Wi-Fi, through the router usually also includes physical connection for connecting users or additional routers.

- Wireless router : It combines edge and distribution functions for home networks and internet access. Service providers offer full-featured routers, but budget-level routers

offer better performance, connectivity controls, and security.

- Virtual router = Virtual routers are cloud-based software that enables complex network functions to be virtualized, providing flexibility, scalability, and reduced hardware management for large businesses.

### Q8 Explain Modem.

- Modem stands for modulator/demodulator. The modem is defined as a networking device that is used to connect devices connected in the network to the internet. A modem converts analog signals from telephone wires into digital form, stored in 0s and 1s. It performs modulation and demodulation simultaneously, transferring digital data in personal systems. Modems also function as signal translators, converting analog signals into digital ones.

### Types of modems:

- = Optical Modem = It uses optical cable instead of metallic media for signal transfer, converting digital

data onto a pulse of light transmitted on the optical fibers.

- Digital Modem :- It converts digital data performing modulation on carrier light for transmission, converting 0s and 1s onto digital signals.
- Cable Modem :- It establishes communication between computer systems and Internet service providers, enabling high-speed data access through cable TV networks, typically connected to desktops or laptops.
- Dial Modem :- It is a device that converts data from telephones to computers, converting it from analog to digital form. It connects networking devices to a computer at one end and transmits data at a speed of 56kops per sec.

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Straight cable standard sequence  
568 A and 568 B.

→ 568 A:

White - Green

Green

White - Orange

Blue

White - Blue

Orange

White - Brown

Brown

568 B:

White - Orange

Orange

White - Green

Blue

White - Blue

Green

White - Brown

Brown

Q10

Explain DHCP Dynamic host configuration protocol? Explain Domain Naming service? What is protocol?



- DHCP is a network protocol that automates the assignment of IP addresses and configurations settings to devices, allowing them to join a network seamlessly without manual.
- DNS is a system translating human-readable domain names into IP addresses, facilitating user-friendly web browsing by providing a directory for internet resources.
- A protocol is a set of rules defining how data is transmitted and received over a network, ensuring standardized and efficient communication between devices in modern networking contexts.

Q-11 What is Unicast, Multicast and Broadcast?

→ Unicast = A communication where a message is sent from one sender to one receiver.

- Data is sent to a single recipient
- Uses a unique destination address
- Guaranteed delivery.

→ Broadcast = A communication where a message is sent from one sender to all receivers.

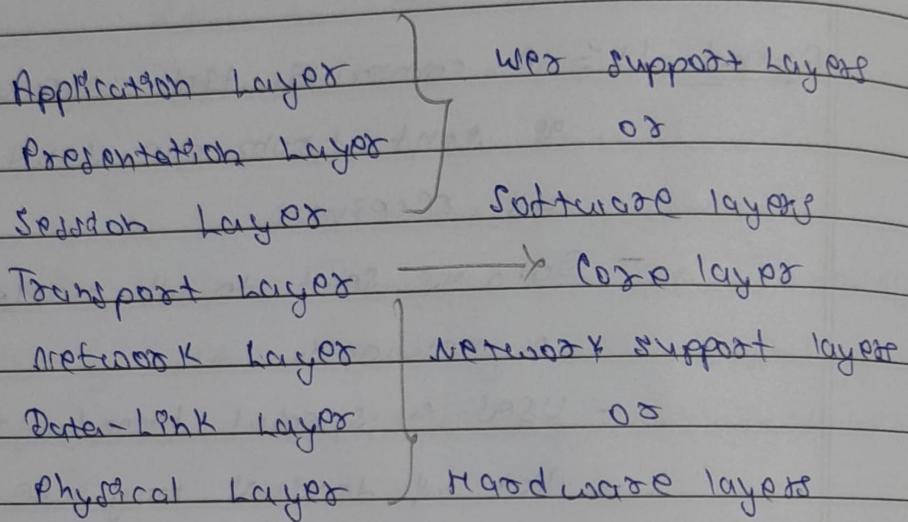
- Data is sent to all recipients on a network
- Uses a special broadcast address
- Not all devices may be interested in the data.

Multicast = A communication where a message is sent from one sender to a group of receivers.

- Data is sent to a group of recipients
- Uses a special multicast address
- Not all devices may be interested in the data.

Q-12 What is OSI model?

- It stands for open system interconnection.
- It is a layered architecture (consists of seven layers).
  - Each layer defines a set of functions which takes part in data communication.



→ Application Layer :- It is responsible for providing an interface for the user to interact with application services or networking services.

→ Presentation Layer :- It is responsible for defining a standard format to the data. It deals with data presentation. The major function described at this layer is :-

Encoding - Decoding  
Encryption - Decryption  
Compression - Decompression

→ Session Layer :- It is responsible for establishing, maintaining and terminating the session. Session ID is used to identify a session or interaction.

→ Transport Layer :- It provides data delivery mechanism between the applications in the network. The major functions described at the Transport layer are :-

- Identifying service
- Multiplexing & De-multiplexing
- Segmentation
- Sequencing & Reassembling
- Error correction
- Flow control

→ Network Layer :- It provides logical addressing and path determination in this layer. The protocols that work in this layer are :-

- Routed protocol
- Routing protocol

## → Data-link Layer :-

It has 2 sub layers :-

- MAC :- Media Access Control provided serializable transit of data across a physical link.
- LLC :- Logical Link Control provides communication with network layer negotiated with network layer using SAP and SNAP protocols.

→ Physical layer :- It defines the electrical, mechanical and functional specifications for communication between the network devices.

Mode of transmission of signals :-

3 ways :-

- Simplex
- Half-duplex
- Full-duplex

Q-15 What is port number?

→ Port number identifies the process to which an endpoint or network message is forwarded upon arrival at a server. All network-connected devices have standardized ports assigned to specific protocols, such as HTTP messages, which always go to port 80.

Q-17 Difference between TCP and UDP communication.

	TCP	UDP
- Transmission control protocol		User Datagram protocol.
- Connection oriented.		Connection less.
- Supports Ack's		does not support Ack's
- Reliable communication		Unreliable communication
- Lower data Transportation factor data transportation		
- Protocol No. is 6		Protocol No. is 17
- Eg = HTTP, FTP, SMTP		Eg = DNS, DHCP, TFTP

Q15 What is flow control?

→ Flow control is a network technique that regulates data transfer between computers or nodes by ensuring that transmitting devices do not send more than they can handle, and if they receive more than they can process, the data is lost.

Q16 Difference between TCP/IP and OSI model?

	TCP / IP	OSI Model
-	Transmission control protocol / Internet protocol	Open system interconnection
-	It is a communication protocol that is based on standard protocols and allows the connection of hosts over a network	It is a structured model which deals with the functioning of a network
-	It comprises four layers.	It comprises seven layers.
-	It follows a horizontal approach.	It follows a vertical approach.
-	It is protocol dependent	It is protocol independent

Q-7 What is ARP broadcast?

→ Address Resolution protocol is a protocol that maps dynamic IP addresses to permanent physical machine addresses in a local area network (LAN). It converts 32 bit addresses to 48 bit addresses and vice-versa, as IP addresses in IPv4 use 32 bits and MAC addresses use 48 bits.

Q-8 What is MAC-address?

→ Media Access Control address, sometimes referred to as a hardware or physical address, is a unique, 12-character alphanumeric attribute that is used to identify individual electronic devices on a network.

An example of a MAC address is:-  
00-80-70-63-12-26.

Q-9 What is firewall use for?

→ Firewalls shield individual computer or network from malicious traffic and prevent malicious software from accessing it via the internet. They can block data from specific locations, applications, or ports while allowing necessary data through.

Q-20 What is IP address? Difference between IPv4 and IPv6 address. Assign multiple IPv4 on single network adapter on PC & what are network vulnerabilities?

→ An IP address is a unique numerical identifier assigned by an ISP to every device or network connected to the internet, used for communication across the internet. There are two common IPv4 and IPv6 versions.

IPv4

IPv6

- It has 32-bit address length. It has 128-bit address length.
- It supports manual and DHCP address configuration. It supports Auto and renumbering address config.
- Address representation of IPv4 is in decimal. Address representation of IPv6 is in hexadecimal.
- The security features dependent on the app. IPsec is an inbuilt security feature in the IPv6 protocol.
- In IPv4 checksum field is available. In IPv6 checksum field is not available.

→ These are the steps to add the second IP address to your existing network adapter.

- 1) Use the start menu to open the control panel.
  - 2) In windows xp, you will need to open network and internet connections.
  - 3) Open network connections.
  - 4) Open your network adapter.
  - 5) Click properties.
  - 6) Click Internet protocol (TCP/IP) then click properties.
  - 7) Click Advanced.
  - 8) On the IP settings tab, click Add.
  - 9) Type in the new IP address then click Add.
  - 10) Click OK to close the Advanced TCP/IP settings window.
  - 11) Click OK to close Internet protocol (TCP/IP) properties window.
  - 12) Click OK to close your network adapter properties window.
- ⇒ A network vulnerability is a weakness or flaw in software, hardware, or organizational processes, which when compromised by a threat, can result in a security breach.

(Q-2) Wireless router configuration for internet connection and wireless security?  
What is ~~security~~ wireless access point?

→ Wireless Router Configuration = Configuration of router for internet connection by accessing the web interface, setting up WLAN settings, and configuring wireless parameters for security. Ensure firmware is updated for optimal functionality.

→ Wireless Access Point (WAP) = A wireless access point functional wireless device connects to a wired network, extending coverage. It operates by receiving and retransmitting WiFi signals, enabling devices to access the network without physical cables.

→ Wireless Extender = A WiFi range extender amplifies and retransmits existing WiFi signals, expanding coverage to areas with weak reception. It's useful for eliminating dead zones and improving connectivity in large spaces where the router's signal is insufficient.

Q-22 Define list of cables in use of network :-  
Twisted pair and fiber optic.

→ Twisted pair :- It is a physical media consisting of a twisted pair of cables. The frequency range for twisted pair cable is from 0 to 3.5 KHz.

Types of twisted pair :-

- Unshielded Twisted pair

- shielded Twisted pair

⇒ Fibre Optic :- It is a communication cable which uses electrical signals.

It is a cable containing the plastic coated fibres that transmit the data through light pulses.

The plastic layers avoids heat, cold, Electromagnetic interference of the optical fibres from other cables.

Fibre optics provide faster data than copper wires.