CCA-102: Data Communications
ASSIGNMENT

Q.1-: What are the different types of networks?

Ans:

1. Local Area Network (LAN)

We're confident that you've heard of these types of networks before – LANs are the most frequently discussed networks, one of the most common, one of the most original and one of the simplest types of networks. LANs connect groups of computers and low-voltage devices together across short distances (within a building or between a group of two or three buildings in close proximity to each other) to share information and resources. Enterprises typically manage and maintain LANs.

Using routers, LANs can connect to wide area networks (WANs, explained below) to rapidly and safely transfer data.

2. Wireless Local Area Network (WLAN)

Functioning like a LAN, WLANs make use of wireless network technology, such as Wi-Fi. Typically seen in the same types of applications as LANs, these types of networks don't require that devices rely on physical cables to connect to the network.

3. Wide Area Network (WAN)

Slightly more complex than a LAN, a WAN connects computers together across longer physical distances. This allows computers and low-voltage devices to be remotely connected to each other over one large network to communicate even when they're miles apart.

The Internet is the most basic example of a WAN, connecting all computers together around the world. Because of a WAN's vast reach, it is typically owned and maintained by multiple administrators or the public.

Q.2-: Explain the Shielded twisted pair (STP) and Unshielded twisted pair (UTP)

Ans: 1. Shielded Twisted Pair (STP) -: Shielded Twisted Pair or STP are also a twisted pair cables but are required to be grounded, wants more maintenance, have high data transmission capacity and are more costly then UTP.

2.Unshielded Twisted Pair (UTP) -:Unshielded Twisted Pair or UTP are twisted pair cables and are used to transmit both data and voice as their frequency range is suitable for transmission. UTPs are more cost effective and are not needed to be grounded.

Sr. No.	Key	Unshielded Twisted Pair (UTP)	Shielded Twisted Pair (STP)
1	Full for	UTP stands for Unshielded Twisted Pair.	STP stands for Shielded Twisted Pair.
2	Grounding	Grounding cable in not required.	Grounding cable is required.
3	Data Transmission Rate	Data Transmission Rate is slower than STP.	Data Transmission Rate is very high.
4	Cost	UTP cables are cheaper.	STP cables are expensive.
5	Maintenance	Low maintenance cost in case of UTP.	High maintenance cost in case of STP.
6	Noise	Noise is high in UTP.	Noise is quite less in STP.
7	Crosstalk	Possibility of crosstalk is very high in UTP.	Possibility of crosstalk is quiet low in STP.

Q.3-: What is difference between baseband and broadband transmission?

Ans: Baseband

Baseband transmissions typically use digital signaling over a single wire; the transmissions themselves take the form of either electrical pulses or light. The digital signal used in baseband transmission occupies the entire bandwidth of the network media to transmit a single data signal. Baseband communication is bidirectional, allowing computers to both send and receive data using a single cable. However, the sending and receiving cannot occur on the same wire at the same time.

Ethernet networks use baseband transmissions; notice the word "base"—for example, 10BaseT or 10BaseFL.

Using baseband transmissions, it is possible to transmit multiple signals on a single cable by using a process known as *multiplexing*. Baseband uses Time-Division Multiplexing (TDM), which divides a single channel into time slots. The key thing about TDM is that it doesn't change how baseband transmission works, only the way data is placed on the cable.

Broadband

Whereas baseband uses digital signaling, broadband uses analog signals in the form of optical or electromagnetic waves over multiple transmission frequencies. For signals to be both sent and received, the transmission media must be split into two channels. Alternatively, two cables can be used: one to send and one to receive transmissions.

Multiple channels are created in a broadband system by using a multiplexing technique known as *Frequency-Division Multiplexing (FDM)*. FDM allows broadband media to accommodate traffic going in different directions on a single media at the same time.

Q.4-: What is the difference between a hub, modem, router and a switch?

Ans: (1)-: Hub:

A hub is a device that allows **several network devices** to **connect** together to **exchange data** on a **single network** however, they have **no management component**. Network

hubs are also known as **repeaters**. They are less ‘intelligent’ than switches. Unlike switches, which forward data to the intended devices, hubs merely send the data packets to all its ports. So as the name repeaters suggests, it only repeats the data from an incoming port to all the other devices; this leads to frequent collisions between packets.

(2)-: Modem:

A modem is short for a **mo**dulator-**dem**odulator. Its function is to facilitate the transmission of data, by converting an **analogue signal to code** and **decoding digital information**. This means that it converts the telephone connection information into digital information for the computer to understand, and converts computer digits into analog waves so that it can be transmitted over telephone lines. It could be seen as the canter for information collection from WAN, as it directly connects to the outside world

(3)-: Router:

A network router **directs the data packets along networks**. A router has a minimum of two networks, usually LANs or WANs or a LAN and its ISP. However unlike a modem, it cannot work single standing, however is able to connect to multiple nodes.

(4)-: Switch:

A network switch’s primary function is to connect **network segments on a single network**. Therefore is quite different from a router and modem; it is used to expand the capability of the router, by providing additional posts. It connects many devices together on the same network; sending data to a device that needs or requests it. A switch is able to improve the performance of a network by increasing network capacity.

A switch connects two or more nodes in the same or different network. Unlike the router which labels through IP address, **switches use MAC addresses** to direct the data to its correct destination.

Q.5-: When you move the NIC cards from one PC to another PC, does the MAC address gets transferred as well?

Ans: The Media Access Control address (MAC address) for any network adapter is hard coded into the card itself. Each manufacturer of network adapters has a group of characters assigned that refer specifically to that company. I believe that is the first 1/2 of the MAC address which is 12 hexadecimal characters long. But the MAC address is part and parcel of the network adapter, just as your internal organs are part of you. When you move to a new house, you take your liver with you. In the same way, when you move a NIC to a different computer, it takes its MAC address with it.

Q.6-: When troubleshooting computer network problems, what common hardware-related problems can occur?

Ans: The network consists of hardware, problems can vary from a defective network card or hard drive malfunctioning, a bad starting materials or incorrect configuration

Q.7-: In a network that contains two servers and twenty workstations, where is the best place to install an Anti-virus program?

Ans: The best solution is to install anti-virus on all the computers in the network. This will protect each device from the other in case some malicious user tries to insert a virus into the servers or legitimate users.

Q.8-: Define Static IP and Dynamic IP? Discuss the difference between IPV4 and IPV6.

Ans: Difference between Static and Dynamic IP address:

(1)-: Static IP - A static IP address is simply an address that doesn't change. Once your device is assigned a static IP address, that number typically stays the same until the device is decommissioned or your network architecture changes. Static IP addresses generally are used by servers or other important equipment.

Static IP addresses are assigned by Internet Service Providers (ISPs). Your ISP may or may not allocate you a static IP address depending on the nature of

your service agreement. We describe your options a little later, but for now assume that a static IP address adds to the cost of your ISP contract.

(2)-: As the name suggests, dynamic IP addresses are subject to change, sometimes at a moment's notice. Dynamic addresses are assigned, as needed, by Dynamic Host Configuration Protocol (DHCP) servers.
We use dynamic addresses because IPv4 doesn't provide enough static IP addresses to go around. So, for example, a hotel probably has a static IP address, but each individual device within its rooms would have a dynamic IP address.
On the internet, your home or office may be assigned a dynamic IP address by your ISP's DHCP server. Within your home or business network, the dynamic IP address for your devices -- whether they are personal computers, smartphones, streaming media devices, tablet, what have you -- are probably assigned by your network router. Dynamic IP is the standard used by and for consumer equipment.

Difference Between IPv4 and IPv6:

IPV4	IPV6
IPv4 has 32-bit address length	IPv6 has 128-bit address length
It Supports Manual and DHCP address configuration	It supports Auto and renumbering address configuration
In IPv4 end to end connection integrity is Unachievable	In IPv6 end to end connection integrity is Achievable
It can generate 4.29×109 address space	Address space of IPv6 is quite large it can produce 3.4×1038 address space
Security feature is dependent on application	IPSEC is inbuilt security feature in the IPv6 protocol

Q.9-: Discuss TCP/IP model in detail.

Ans: TCP/IP means Transmission Control Protocol and Internet Protocol. It is the network model used in the current Internet architecture as well. **Protocols** are set of rules which govern every possible communication over a network. These protocols describe the movement of data between the source and destination or the internet. They also offer simple naming and addressing schemes.

Q.10-: What is a Web Browser (Browser)? Give some example of browsers.

Ans: A **web browser** is a type of software that allows you to find and view websites on the Internet. Even if you didn't know it, you're using a web browser right now to read this page! There are many different web browsers, but some of the most common ones include **Google Chrome**, **Internet Explorer**, **Safari**, **Microsoft Edge**, and **Mozilla Firefox**.

Q.11-: What is a search engine? Give example.

Ans: A search engine is a web-based tool that enables users to locate information on the World Wide Web. Popular examples of search engines are Google, Yahoo!, and MSN Search. Search engines utilize automated software applications (referred to as robots, bots, or spiders) that travel along the Web, following links from page to page, site to site. The information gathered by the spiders is used to create a searchable index of the Web.

Q.12-: What is the Internet & WWW? What are the uses of internet in our daily life?

Ans: *The Internet* is a global network of networks while *the Web*, also referred formally as World Wide Web (www) is collection of information which is accessed via *the Internet*. Another way to look at this difference is; *the Internet* is infrastructure while *the Web* is service on top of that infrastructure. Alternatively, *the Internet* can be viewed as a big book-store while *the Web* can be viewed as collection of books on that store. At a high level, we can even think of *the Internet* as hardware and *the Web* as software.

Uses of internet our daily life -

1. Online Booking

Online booking is an astonishing tool on the internet. By this, we can book a train ticket, flight ticket (International and domestic), and you can book a taxi which will pick-up you from your doorstep.

In the present climate, you do not have to wait in queue for hours for ticket booking at the ticket counter. Now, while sitting at home you can book tickets online with the help of the laptop, tab, or Smartphone provided you should have an internet connection.

Q.13-: What is an Internet Service Provider? Give some example of ISP in India.

Ans: A company that provides subscribers with access to the Internet. BSNL, Airtel, Vodafone etc. are some examples of ISP in India.

Q.14-: Discuss the difference between MAC address, IP address and Port address.

Ans: (1)-: MAC Address -:

MAC Address is a unique 6-byte (48-bit) address that is usually permanently burned into a network interface card (NIC) or other physical-layer networking device and that uniquely identifies the device on an Ethernet-based network.

(2)-: IP Address -:

IP address stands for internet protocol address; it is an identifying number that is associated with a specific computer or computer network. When connected to the internet, the IP address allows the computers to send and receive information.

(3)-: Port Address -:

Translation (PAT) is an extension of Network **Address** Translation (NAT) that permits multiple devices on a LAN to be mapped to a single public IP **address** to conserve IP **addresses**.

Q.15-: How do we view my Internet browser's history?

Ans: If you are using Windows, Linux, or macOS, there are quick shortcut key combinations that allow you to view your history.

Windows and Linux users: CTRL

Apple users: Command + Shift + H

Once one of the above shortcut keys is pressed, a history section similar to the example below should appear. In the following screenshot, browsing history is being viewed in Google Chrome.