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@ Write down the Application Layer Protocol.

Briefly explain them.

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2+3

Question:

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(a) What is data communication and computer network? Explain (3)

Answer: Data communications refers to the transmission of this digital data between two or more computers and a computer network is a telecommunications network that allows computers to exchange data.

The physical connection between networked computing devices is established using either cable media or wireless media. The best-known computer network is the Internet.

(b) Write down the applications of communication and computer network. (3)

Answer: The applications of communication and computer network is given below :

1. Resource sharing such as printers and

storage devices.

2. Exchange of information by means of e-Mails and FTP.
3. Information sharing by using Web or Internet.
4. Interaction with other users using dynamic web pages.
5. IP phones.
6. Video conferences.
7. Parallel computing.
8. Instant messaging.

Q) Why learning data communication and computer network is important? Explain with example. (5)

Answer: The importance of learning data communication and computer network is given below:

1. Network Basic Understanding: A system of interconnected computers and computerized peripherals such as printers is called computer network. This interconnection among computers facilitates information sharing among them. Computers may connect to each other by either wired or wireless media.

2. Network Engineering: Networking engineering is a complicated task, which involves software, firmware, chip level engineering, hardware, and electric pulses. To ease network engineering, the whole networking concept is divided into multiple layers. Each layer is involved in some particular task and is independent of all other layers. But as a whole, almost all networking tasks depend on all of these layers. Layers share data between them and they depend on each other only to take input and

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send output.

3. Internet: A network of networks is called an internetwork, or simply the internet. It is the largest network in existence on this planet. The internet hugely connects all WANs and it can have connection to LANs and Home networks. Internet uses TCP/IP protocol suite and uses IP as its addressing protocol. Present day, Internet is widely implemented using IPv4. Because of shortage of address spaces, it is gradually migrating from IPv4 to IPv6.

Internet enables its users to share and access enormous amount of information world wide. It uses WWW, FTP, email services, audio and video streaming etc.

At huge level, internet works on Client-

Server model. Internet uses very high speed backbone of fiber optics. To inter-connect various continents, fibers are laid under sea known to us as ~~number~~ submarine communication cable.

~~Q~~ What is IPv4 addressing? What destination address is 255.255.255.255 for? ~~(3)~~

Answer: The IPv4 address is a 32-bit number that uniquely identifies a network interface on a system, as explained in How IP addresses Apply to Network Interfaces. An IPv4 address is written in decimal digits divided into four 8-bit fields that are separated by periods. Each 8-bit field represents a byte of the IPv4 address.

255.255.255.255 - This address is reserved for network broadcasts, or messages that

should go to all computers on the network.

127.0.0.1 - This is called the loopback address, meaning your computer's way of identifying itself, whether or not it has an assigned IP address.

Q2

~~@ What is computer network with example? (2)~~

Answer: A system of interconnected computers and computerized peripherals such as printers is called computer network. This interconnection among computers facilitates information sharing among them. Computers may connect to each other by either wired or wireless media. An example of a computer network is the Internet, which connects millions of people all over the world.

⑥ Write down the classification of computer networks with explanation. (5)

Answer: Classification of Computer Networks:

Computer networks are classified based on various factors. They includes:

1. Geographical span
2. Inter-connectivity
3. Administration
4. Architecture

⑦ Geographical Span: Geographically a networks

can be seen in one of the following categories:

① It may be spanned across your table, among Bluetooth enabled devices. Ranging not more than few meters.

② It may be spanned across a whole building, including intermediate devices to connect all floors.

- ④ It may be spanned across a whole city.
- ⑤ It may be spanned across multiple cities or provinces.
- ⑥ It may be one network covering whole world.

2) Inter- Connectivity: Components of a network

can be connected to each other differently in some fashion. By connectedness we mean either logically, physically, or both ways.

① Every single device can be connected to every other device on network, making the network mesh.

② All devices can be connected to a single medium but geographically disconnected, creating bus like structure.

③ Each device is connected to its left and right peers only, creating linear structure.

- ① All devices connected together with a single device, creating star like structure.
- ② All devices connected arbitrarily using all previous ways to connect each other, resulting in a hybrid structure.

③ Administration: From an administrator's point of view, a network can be private network which belongs a single autonomous system and cannot be accessed outside its physical or logical domain. A network can be public which is accessed by all.

④ Network Architecture: Computer Networks can be discriminated into various types such as Client-server, peer-to-peer or hybrid, depending upon its architecture.

⑤ There can be one or more systems acting as server. Other being client, requests

the server to server requests. Server takes and processes request on behalf of clients.

⑥ Two systems can be connected Point-to-Point, or in back-to-back fashion. They both reside at the same level and called peers.

⑦ There can be hybrid network which involves network architecture of both the above types.

~~e~~ Write down the types of computer network. Differentiate between computer network types.

Answer: There are many types of computer networks based on their size. Some of them are:

- Personal Area Network (PAN)
- Local Area Network (LAN)
- Metropolitan Area Network (MAN)
- Wide Area Network (WAN)
- Internetwork

• Personal Area Network:

A Personal Area Network (PAN) is smallest network which is very personal to a user. This may include Bluetooth enabled devices or infrared enabled devices. PAN has connectivity range up to 10 meters. PAN may include wireless computer keyboard and mouse, Bluetooth enabled headphones, wireless printers and TV remotes. For example, Piconet is Bluetooth-enabled Personal Area Network which may contain up to 8 devices connected together in a master-slave fashion.

• Local Area Network:

A computer network spanned inside a building and operated under single administrative system is generally termed as Local Area Network. Usually, LAN covers an organization, offices, schools, colleges or universities. Number of systems connected in LAN may vary from as least as

two to as much as 16 million. LAN provides a useful way of sharing the resources between end users. LANs are composed of inexpensive networking and routing equipment. It mostly operates on private IP addresses and does not involve heavy routing. LAN works under its own local domain and controlled centrally. LAN uses either Ethernet or Token-ring technology.

Ethernet is most widely employed LAN technology and uses star topology, while Token-ring is rarely seen. LAN can be wired, wireless or in both forms at once.

• Metropolitan Area Network:

The Metropolitan Area Network (MAN) generally expands throughout a city such as cable TV network. It can be in the form of Ethernet, Token-ring, ATM, or Fiber Distributed Data Interface (FDDI). Metro

Ethernet is a service which is provided by ISPs. This service enables its users to expand their Local Area Networks. For example, MAN can help an organization to connect all of its offices in a city. MAN provides uplink for LANs to WANs or internet.

- Wide Area Network:

As the name suggests, the Wide Area Network (WAN) covers a wide area which may span across provinces and even a whole country. Generally, telecommunication networks are Wide Area Network. These networks provide connectivity to MANs and LANs. Since they are equipped with very high speed backbone, WANs use very expensive network equipment.

WAN may use advanced technologies such as Asynchronous Transfer Mode (ATM), Frame Relay and Synchronous Optical Network (SONET).

● Internet:

A network of networks is called an internetwork, or simply the internet.

It is the largest network in existence on this planet. The internet hugely connects all WANs and it can have connection to LANs and Home networks.

Internet uses TCP/IP protocol suite and uses IP as its addressing protocol.

Internet enables its users to share

and access enormous amount of information world wide. Some of them are:

- Web sites
- E-mail
- Instant Messaging
- Blogging
- Social Media
- Marketing
- Networking
- Audio and Video Streaming

3

@ What is OSI model? Explain the layer in it. (5T)

Answer: Open System Interconnect is an open standard for all communications systems. OSI model is established by International Standard Organization (ISO). This model has seven layers:

1) Application Layer: This layer is responsible for providing interface to the application user. This layer encompasses protocols which directly interact with the user.

2) Presentation Layer: This layer defines how data in the native format of remote host should be presented in the layer's native format of host.

3) Session Layer: This layer maintains sessions between remote hosts. For example, once user/password authentication is done, the remote host maintains this session for a while and does

not ask for authentication again in that time span.

4) Transport Layer: This layer is responsible for end-to-end delivery between hosts.

5) Network Layer: This layer is responsible for address assignment and uniquely addressing hosts in a network.

6) Data Link Layer: This layer is responsible for reading and writing data from and onto the line. Link errors are detected at this layer.

7) Physical Layer: This layer defines the hardware, cabling wiring, power output, pulse rate etc.

Q Briefly explain various LAN technologies.

Answer: Let us go through various LAN technologies in brief:

• Ethernet

Ethernet is a widely deployed LAN technology. This technology was invented by Bob Metcalfe and D.R. Boggs in the year 1970. It was standardized in IEEE 802.3 in 1980.

Ethernet is a shared media network which uses shared media has high probability of data collision. Ethernet uses Carrier Sense Multi Access/Collision Detection (CSMA/CD) technology to detect collisions.

Ethernet connector is network interface card equipped with 48 bits MAC address. This helps other Ethernet devices to identify and communicate with remote devices in Ethernet.

Traditional Ethernet uses 10BASE-T specifications. The number 10 depicts 10Mbps speed, BASE stands for baseband, and T stands for Thick Ethernet. Ethernet follows star topology with segment length up to 100 meters.

• Fast - Ethernet

To encompass need of fast emerging software and hardware technologies, Ethernet extends itself as Fast - Ethernet. It can run on UTP, optical fiber, wirelessly too. It can provide speed up to 100 MBPS. This standard is named as 100 BASE-T in IEEE 803.2 using Cat - 5 twisted pair cable. It uses CSMA/CD technique for wired media sharing among the Ethernet hosts and CSMA/CA technique for wireless Ethernet LAN.

• Giga - Ethernet

After being introduced in 1995, Fast - Ethernet could enjoy its high - speed status only for 3 years till Giga - Ethernet introduced. Giga - Ethernet provides speed up to 1000 mbits/s. IEEE 802.3ab standardize Giga - Ethernet over UTP using Cat - 5, Cat - 5e and Cat - 6.

cables. IEEE 802.3ah defines Giga-Ethernet over fiber.

• Virtual LAN

LAN uses Ethernet which in turn works on shared media. Shared media in Ethernet create one single Broadcast domain and one single Collision domain. Introduction of switches to Ethernet has removed single collision domain issue and each device connected to switch works in its separate collision domain. But even switches can not divide a network into separate Broadcast domains.

Virtual LAN is a solution to divide a single Broadcast domain into multiple Broadcast domains. Host in one VLAN cannot speak to a host in another. By default, all hosts are placed into the same VLAN.

Q What is internet model. What are the layers in internet model? (3)

Answer: Internet uses TCP/IP protocol suite, also known as internet suite. This defines Internet Model which contains four layered architecture. OSI model is general communication model but Internet Model is what the internet uses for all its communication. The internet is independent of its underlying network architecture so is its Model. This Model has the following layers:

1. Application Layer

2. Transport Layer

3. Internet Layer

4. Link layer

1) Application Layer: This layer defines the protocol which enables user to interact with

the network. For example, FTP, HTTP etc.

2) Transport Layer: This layer defines how data should flow between hosts. Major protocol at this layer is Transmission Control Protocol (TCP). This layer ensures data delivered between hosts is in order and is responsible for end-to-end delivery.

3) Internet Layer: Internet protocol (IP) works on this layer. This layer facilitates host addressing and recognition. This layer defines routing.

4) Link Layer: This layer provides mechanism of sending and receiving actual data. Unlike its OSI model counterpart, this layer is independent of underlying network architecture and hardware.

Q

Q Define cryptography. How it works? (2+3)

Answer: Cryptography is a technique to encrypt the plain-text data which makes it difficult to understand and interpret. There are several cryptographic algorithms available present day as described below:

- i. Secret key
- ii. Public key
- iii. Message Digest

Encryption

i. Secret key: Both sender and receiver have one secret key. This secret key is used to encrypt the data at sender's end. After the data is encrypted, it is sent on the public domain to the receiver. Because the receiver knows and has the secret key, the encrypted data packets can easily be decrypted. Example of secret key encryption is Data

Encryption Standard (DES). In Secret key encryption it is required to have a separate key for each host on the network making it difficult to manage.

ii. Public key Encryption: In this encryption system, every user has its own secret key and it is not in the shared domain. The secret key is never revealed on public domain. Along with secret key, every user has its own but public key.

Public key is always made public and is used by senders to encrypt the data. When the user receives the encrypted data, he can easily decrypt it by using its own secret key.

Example of public key encryption is Rivest-Shamir-Adleman (RSA).

iii. Message Digest: In this method, actual data is not sent, instead a hash value is calculated and sent. The other end user, computes its own hash

value and compares with the one just received. If both hash values are matched, then it is accepted otherwise rejected.

Example of Message Digest is MD5 hashing.

~~It is mostly used in authentication where user password is cross checked with the one saved on the server.~~

b) What is network topology? Explain different types of network topology. (4)

Answer: 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 those nodes.

There are several types of network topology. They are given below:

i) Bus topology: In the bus network topology, every node is connected in series along a linear

path. This arrangement is found today primarily in cable broad band distribution networks.

ii) Star topology: In the star network topology, a central node has a direct connection to all other nodes. Switched local-area networks (LANs) based on Ethernet switches, including most wired home and office networks, have a physical star topology.

iii) Ring topology: In the ring topology, the nodes are connected in a closed loop configuration. Some rings will pass data only in one direction, while others are capable of transmission in both directions. These bidirectional ring networks are more reslient than bus networks because traffic can reach a node by moving in either direction.

Metro networks based on Synchronous Optical Network Technology (SONET) are the primary example of ring networks today.

iv) Mesh topology: The mesh network topology links nodes with connections so that multiple paths between at least some points of the network are available. A network is said to be fully meshed if all nodes are directly connected to all other nodes, and partially meshed if only some nodes have multiple connections to others. The Internet is a mesh network.

v) Tree topology: The tree network topology, also called a star of stars, is a network where star topologies are themselves connected in a star configuration. Many larger Ethernet switch networks including data center networks are configured as trees.

Q. Define security threats. Categorize security threats. (5)

Answer: Network security is a broad term that covers a multitude of technologies, devices and processes. In its simplest term, it is a set of rules and configurations designed to protect the integrity, confidentiality and accessibility of computer networks and data using both software and hardware technologies. Every organization, regardless of size, industry or infrastructure, requires a degree of network security solutions in place to protect it from the ever-growing landscape of cyber threats in the wild today.

Security threats can be divided into the following categories:

i) Interruption: Interruption is a security threat in which availability of resources is attacked. For example, a user is unable to access its web-

server or the web-server is hijacked.

ii) Privacy - Breach: In this threat, the privacy of a user is compromised. Someone, who is not the authorized person is accessing or intercepting data sent or received by the original authenticated user.

iii) Integrity: This type of threat includes any alteration or modification in the original context of communication. The attacker intercepts and receives the data sent by the sender and the attacker then either modifies or generates false data and sends to the receiver. The receiver receives the data assuming that it is being sent by the original sender.

iv) Authenticity: This threat occurs when an attacker or a security violator, poses as a genuine person and accesses the resources or communicates with other genuine users.

5

Q Define Application Layer. How OSI and ISO related to each other? (1+2)

Answer: An application layer is an abstraction layer that specifies the shared communications protocols and interface methods used by hosts in a communications network.

OSI and ISO related to each other—

The International Standards Organization, or the International Organization of Standards (ISO) is a multinational body dedicated to worldwide agreement on international standards. An ISO standard that covers all aspects of network communications is the Open Systems Interconnection (OSI) model.

Q Define client-server model. How two processes in client-server model can interact? (6)

Answer: A client-server network is a specific type of online network comprised of a single central computer acting as a server that directs multiple other computers, which are referred to as the clients. By accessing the server, clients are then able to reach shared files and information saved on the serving computer. Examples of computer applications that use the client-server model are E-mail, network printing and the World Wide Web.

In a client-server model, whether a computer is a client, server or both, is determined by the nature of the application that requires the service functions. For example, a single computer can run web server and file server software at the same time to serve different data to clients making different kinds of request.

Two processes in client-server model can interact in various ways:

↳ Sockets

↳ Remote Procedure Calls (RPC)

- **Sockets:** In this paradigm, the process acting as server opens a socket using a well known (or known by client) port and waits until some client request comes. The second process acting as a client also opens a socket but instead of waiting for an incoming request, the client processes 'requests first'.

- **Remote Procedure Calls:** This is a mechanism where one process interacts with another by means of procedure calls. One process (client) calls the procedure lying on remote host. The process on remote host is said to be server. Both processes are allocated stubs. This communication happens in the following way:

- The client process calls the client stub. It passes all the parameters pertaining to program local to it.
- All parameters are then packed and a system call is made to send them to other side of the network.
- Kernel sends the data over the network and the other end receives it.
- The remote host passes data to the server stub where it is unmarshalled.
- The parameters are passed to the procedure and the procedure is then executed.
- The result is sent back to the client in the same manner.

Q) Draw the client-server model for two processes to interact. (5)

Answer: The structure is given below:

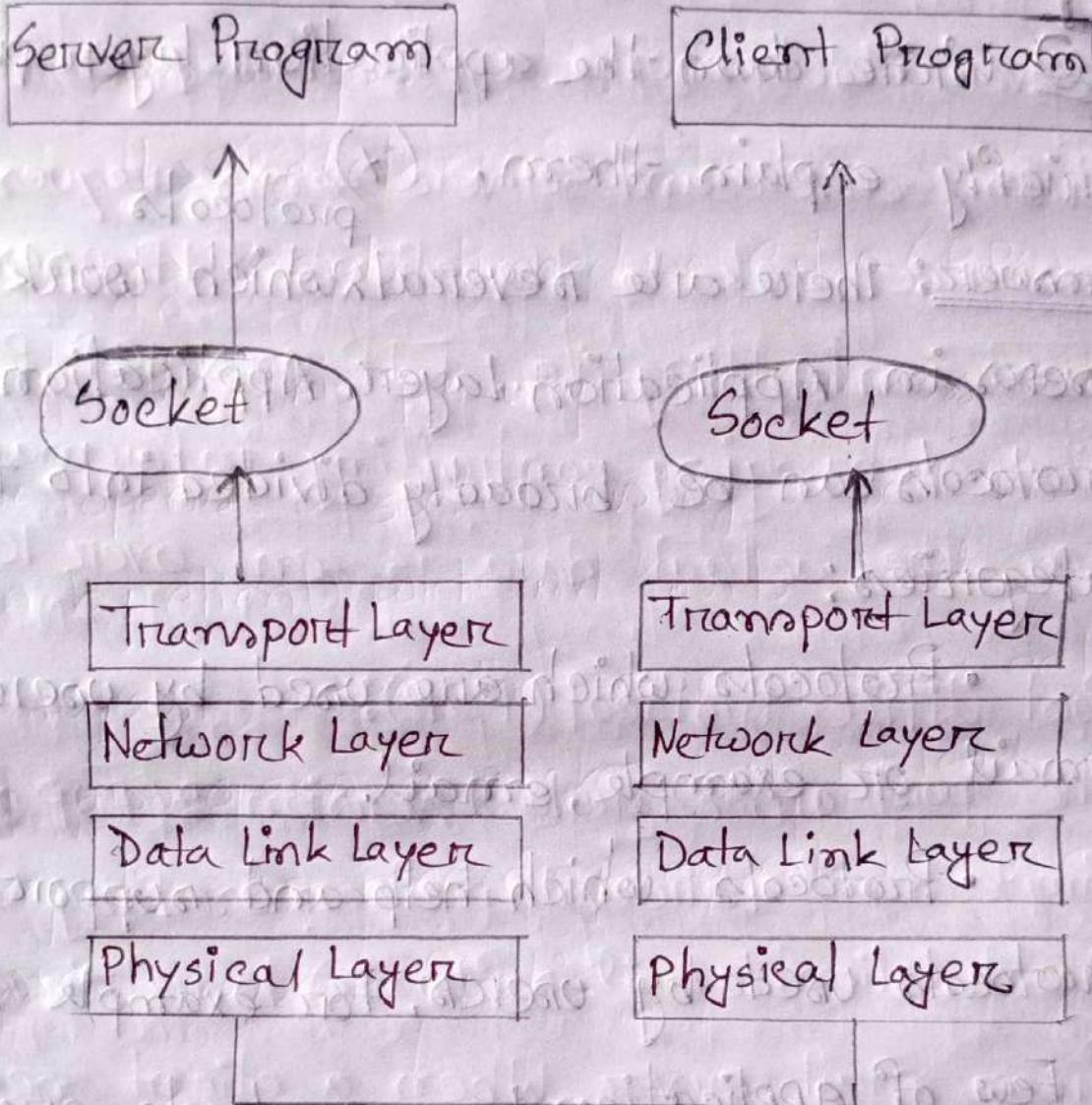


Figure: Client-Server Model

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@ Write down the application layer protocol. Briefly explain them. (7) protocols

Answer: There are several which work for users in Application Layer. Application layer protocols can be broadly divided into two categories:

- Protocols which are used by users. For example, email.
- Protocols which help and support protocols used by users. For example DNS.

Few of application layer protocols are described below:

Domain Name System:

The domain name system (DNS) works on client server model. It uses UDP protocol for transport layer communication. DNS uses hierarchical domain based naming scheme.

The DNS server is configured with Fully Qualified Domain Names (FQDN) and email addresses mapped with their respective Internet Protocol addresses.

Simple Mail Transfer Protocol:

The Simple Mail Transfer Protocol (SMTP) is used to transfer electronic mail from one user to another. This task is done by means of email client software (User Agents) the user is using. User Agents help the user to type and format the email and store it until internet is available.

When an email is submitted to send, the sending process is handled by Message Transfer Agent which is normally comes inbuilt in email client software.

File Transfer Protocol:

The file transfer protocol (FTP) is the most widely used protocol for file transfer over the network. FTP uses TCP/IP for communication and it

works on TCP port 21. FTP works on Client, Server Model where a client requests file from server and server sends requested resource back to the client. FTP uses out-of-band controlling i.e., FTP uses TCP port 20 for exchanging controlling information and the actual data is sent over TCP port 21.

Post Office Protocol (POP):

The post office protocol version 3 (POP 3) is a simple mail retrieval protocol used by User Agents (client email software) to retrieve mails from mail servers. When a client needs to retrieve mails from server, it opens a connection with the server on TCP port 110. User can then access his mails and download them to the local computer. POP 3 works in two modes. The most common mode, the delete mode. The second mode, the keep mode.

Hyper Text Transfer Protocol (HTTP) :

The Hyper Text Transfer Protocol (HTTP) is the foundation of World Wide Web. Hypertext is well organized documentation system, which uses hyperlink to link the pages in the text documents. HTTP works on client server model. When a user wants to access any HTTP page on the internet, the client machine at user end initiates a TCP connection to server on port 80. When the server accepts the client request, the client is authorized to access web pages.

HTTP versions:

- HTTP 1.0 uses non persistent HTTP. At most one object can be sent over a single TCP connection.
- HTTP 1.1 uses persistent HTTP. In this version, multiple objects can be sent over a single TCP connection.

(b) What is an example of a process application layer protocol? What types of applications run on the application layer? (2+5)

Answer: The following list shows example of application layer protocols: Standard TCP/IP services such as the ftp, tftp and telnet commands. Simple Network Management Protocol (SNMP), which enables network management. Router Discovery Server Protocol (RDISC) and Routing Information Protocol (RIP) routing protocols.

The application layer is present at the top of the OSI model. It is the layer through which users interact.

Application Layer Protocol:

1. TELNET:

Telnet stands for the Telecommunication Networks. It helps in terminal emulation. It allows Telnet client to access the resources of the Telnet server.

2. FTP:

FTP stands for File Transfer Protocol. It is the protocol that actually lets us transfer files. It can facilitate this between any two machines using it. But FTP is not just a protocol but it is also a program.

3. TFTP:

The Trivial File Transfer Protocol (TFTP) is the stripped-down, stock version of FTP, but it's the protocol of choice if you know exactly what you want and where to find it. It's a technology for transferring files between network devices, and is a simplified version of FTP.

4. NFS:

It stands for network file system. It allows remote hosts to mount file systems over a network and interact with those file systems as though they are mounted locally. This enables system administrators to consolidate resources onto

centralized servers on the network.

5. SMTP:

It stands for Simple Mail Transfer Protocol. It is a part of the TCP/IP protocol. Using a process called "store and forward," SMTP moves your email on and ~~across~~ across networks. It works closely with something called the Mail Transfer Agent (MTA) to send your communication to the right computer and email inbox. Port number for SMTP is 25.

6. LPD:

It stands for line Printer Daemon. It is designed for printer sharing. It is the part that receives and processes the request. A "daemon" is a server or agent.

7. X window:

It defines a protocol for the writing of graphical user interface-based client/server applications. The idea is to allow a program, called a client, to run on one computer. It is primarily used

in networks of interconnected mainframes.

8. SNMP:

It stands for Simple Network Management Protocol. It gathers data by polling the devices on the network from a management station at fixed or random intervals, requiring them to disclose certain information.

9. DNS:

It stands for Domain Name Service. Every time you use a domain name, therefore, a DNS service must translate the name into the corresponding IP address. For example, the domain name www.abc.com might translate to 198.105.232.4.

10. DHCP:

It stands for Dynamic Host Configuration Protocol. It gives IP addresses to hosts. There is a lot of information a DHCP server can provide to a host when the host is registering for an IP address with the DHCP server. Port number for DHCP is 67, 68.

Q How network services help in our life? (Q) (A)

Answer: There are several network services. The network services help in our life.

Directory Services:

- **Accounting:** In an organization, a number of users have their user names and passwords mapped to them. Directory services provide means of storing this information in encrypted form and make available when requested.
- **Authentication and Authorization:** User credentials are checked to authenticate a user at the time of login and/or periodically. User accounts can be set into hierarchical structure and their access to resources can be controlled using authorization schemes.
- **Domain Name Services:** DNS is widely used and one of the essential services on which internet works. The system maps IP addresses to domain names, which are easier to

remember and recall than IP addresses. Because network operates with the help of IP addresses and humans tend to remember website names, the DNS provides website's IP address which is mapped to its name from the back-end on the request of a website name from the user.

File Services:

File services include sharing and transferring files over the network.

- **File Sharing:** One of the reason which gave birth to networking was file sharing. File sharing enables its users to share their data with other users. Users can upload the file to a specific server, which is accessible by all intended users.
- **File Transfer:** This is an activity to copy or move file from one computer to another computer or to multiple computers, with help of underlying network. Network enables its user to locate other users in the network and transfers files.

Communication Services:

- **Email:** Electronic mail is a communication method and something a computer user cannot work without. This is the basis of today's internet features. Email system has one or more email servers. All its users are provided with unique IDs.
- **Social Networking:** Recent technologies have made technical life social. The computer savvy peoples, can find other known peoples or friends can connect with them, and can share thoughts, pictures and videos.
- **Internet Chat:** Internet chat provides instant text transfer services between two hosts. Two or more people can communicate with each other using text based Internet Relay Chat Services. These days, voice chat and video chat are very common.
- **Discussion Boards:** Discussion boards provide a mechanism to connect multiple peoples with same interests. It enables the users

to put queries, suggestions etc. Which can be seen by all other users. Other may respond as well.

- **Remote Access:** This service enables user to access the data residing on the remote computer. This feature is known as Remote desktop. This can be done via some remote device.

Application Services: These are nothing but providing network based services to the users such as web services, database managing and resource sharing.

- **Resource Sharing:** To use resources efficiently and economically, network provides a mean to share them. This may include Servers, Printers and Storage Media etc.

- **Databases:** This application service is one of the most important services. It stores data and information, processes it and enables the users to retrieve it. efficiently by using queries.

Databases help organizations to make decisions

based on statistics.

• **Web Services:** World Wide Web has become the synonym for internet. It is used to connect to the internet, and access files and information services provided by the internet servers.

Q) Difference between Client- Server and Peer-to-Peer Network. (4) (4) (5)

Answer:

Client - Server Network	Peer - To - Peer Network
In Client - Server Network, clients and servers are differentiated, specific server and clients are present.	In Peer - to - Peer Network, clients and servers are not differentiated.
Client - Server Network focuses on information sharing.	While Peer - to Peer Network, focuses on connectivity.
In Client - Server Network, centralized server is used to store the data.	While in Peer - to - Peer Network, Each peer has its own data.

Client-Server Network	Peer-To-Peer Network
In Client-Server Network, servers respond the service which is request by Client.	While in Peer-to-Peer Network, each and every node can do both request and respond for the services.
Client-Server Network are costlier than Peer-to-Peer Network.	While Peer-to-Peer Network are less costlier than Client-Server Network.
Client-Server Network are more stable than Peer-to-Peer Network.	While Peer-to-Peer Network are less stable if number of peer is increase.
Client-Server Network is used for both small and large networks.	While Peer-to-Peer Network is generally suited for small networks with fewer than 40 computers.

Q) What is the purpose of networking? (2)

Answer: The purpose of networking is the exchange of information, advice, and referrals, via the informational interview process, to assist in

attaining your goal of changing careers.

8

Q Define Internetwork. (2)

Answer: A network of networks is called an internetwork or simply the internet. It is the largest network in existence on this planet. The internet hugely connects all WANs and it can have connection to LANs and Home networks. Internet uses TCP/IP protocol suite and uses IP as its addressing protocol. Present day, Internet is widely implemented using IPv4. Because of shortage of address spaces, it is gradually migration migrating from IPv4 to IPv6.

Q Define Point-to-Point network. (2)

Answer: Point-to-Point networks contains exactly two hosts such as computer, switches

or routers, servers connected back-to-back using a single piece of cable. Often, the receiving end of one host is connected to sending end of the other and vice-versa.

Q Identify the components of data communication systems. (5)

Answer: The components of data communication systems is given below:

1. **Message:** The message is the information (data) to be communicated. Popular forms of information include text, numbers, pictures, audio and video.

2. **Sender:** The sender is the device that sends the data message. It can be a computer, workstation, telephone handset, video camera and so on.

3. **Receiver:** The receiver is the device that receives the message. It can be a computer,

workstation, telephone handset, television and so on.

4. Transmission medium: The transmission medium is the physical path by which a message travels from sender to receiver.

Some examples of transmission media include twisted-pair wire, coaxial cable, fiber-optic cable, and radio waves.

5. Protocol: A protocol is a set of rules that govern data communications. It represents an agreement between the communicating devices. Without a protocol, two devices may be connected but not communicating, just as a person speaking French cannot be understood by a person who speaks only Japanese.

Q) What is TCP/IP and how does it work? (2+3)

Answer:

TCP: As indicated in the name, there are two layers to TCP/IP. The top layer, TCP is responsible for taking large amounts of data, compiling it into packets and sending them on their way to be received by a fellow TCP layer, which turns the packets into useful information/data.

IP: The bottom layer, IP is the locational aspect of the pair allowing the packets of information to be sent and received to the correct location. If you think about IP in terms of a map, the IP layer serves as the packet GPS to find the correct destination. Much like a car driving on a highway, each packet passes through a gateway computer, which serve to forward the packets to the right destination.

(S+5) The four abstraction layers are the link layer (lowest layer), the Internet layer, the transport layer and the application layer (top layer).

They work in the following fashion:

1. The Link Layer is the physical network equipment used to interconnect nodes and servers.
2. The Internet Layer connects hosts to one another across networks.
3. The Transport Layer resolves all host-to-host communication.
4. The Application Layer is utilized to ensure communication between applications on a network.

In English, the four abstraction layers embedded in TCP/IP allow packets of

data, application programs and physical network equipment to communicate with one another over the Internet to ensure packets are sent intact and to the correct location.