

① a. What is network? What are the different kinds of network? Explain them.

1+3

b. Describe the OSI model with application.

7

c. Why to learn Data communication and computer Network?

3

Ans to the question no - 01(a)

Network: A network is a set of devices (often referred as nodes) connected by communication links.

Different types of network are :

i) LAN: LAN stands for Local area network is, usually privately owned and links the device in a single office building or campus. LAN are designed to allow resources to shared between personal computers on workstations.

ii) WAN: WAN stands for wide area network, provides long distance transmission of data, image, audio- and video information over large geographic areas that may comprise a country or even whole world.

iii) MAN: MAN stands for Metropolitan Area Network it is a network with a size between a LAN and WAN. It is normally covers the area inside a town or city.

Ans to the question no- 01(b)

Describe the OSI model with application.

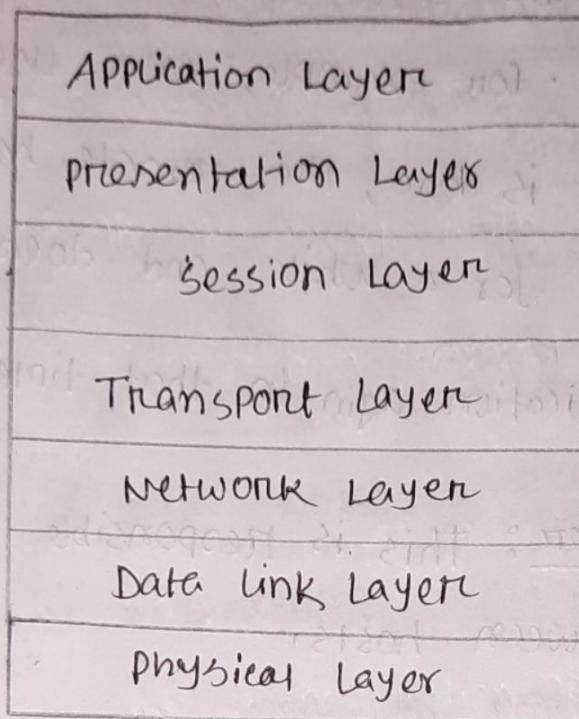


fig: OSI model.

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

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

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.

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

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

Data Link Layer: This layer is responsible for reading and writing data from and on to the link. Link errors are detected at this layer.

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

### Ans to the question no - 1(c)

We need to learn data communication and computer engineering because:

Network Engineering: Networking Engineering is a complicated task, which involves software, firmware, chip level engineering, hardware and electric pulsers. To ease network engineering, the whole networking concept is divided into multiple layers.

Internet: A network of networks is called an internetwork, or simply the internet. It is the largest network in existence on this planet.

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.

Q2. a. Discuss the similarities of OSI and TCP/IP model. 5

b. What is point to point networks?

Explain it briefly 4

c. What is virtual LAN? Explain virtual LAN with figure. 5

### Ans to the question no - 02 (g)

Similarities between OSI and TCP/ IP reference models.

- ⇒ Both the reference models are based upon layered architecture.
- ⇒ The layers in the models are compared with each other. The physical layer and data link layer of the OSI model correspond to the link layer of the TCP/IP model. The networks layers and transport layers are the same in both the models. The session layer, the presentation layer and the application layer of the OSI model together form the application layer of the TCP / IP model.

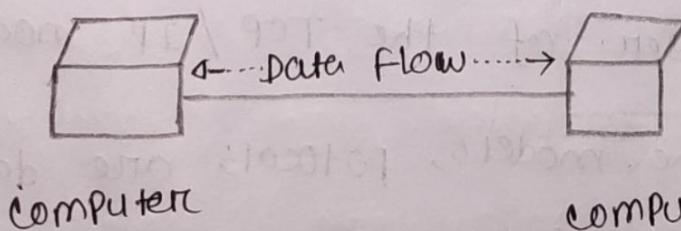
- ⇒ In both the models, protocols are defined in a layer-wise manner.

⇒ In both models, data is divided into packets and each packets may take the individual route from the source to the destination.

Ans to the question no-02(b)

Point to point networks: 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.



If the hosts are connected point-to-point logically, then may have multiple intermediate devices; but the end hosts are unaware of underlying network and see each other on if they are connected directly.

Ans to the question no-02(c)

Virtual LAN: LAN uses Ethernet which in turn works on shared media. Shared media in Ethernet creates one signal 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 cannot 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 virtual LAN cannot speak

to a host in another. By default, all

hosts are placed into the same virtual

LAN.

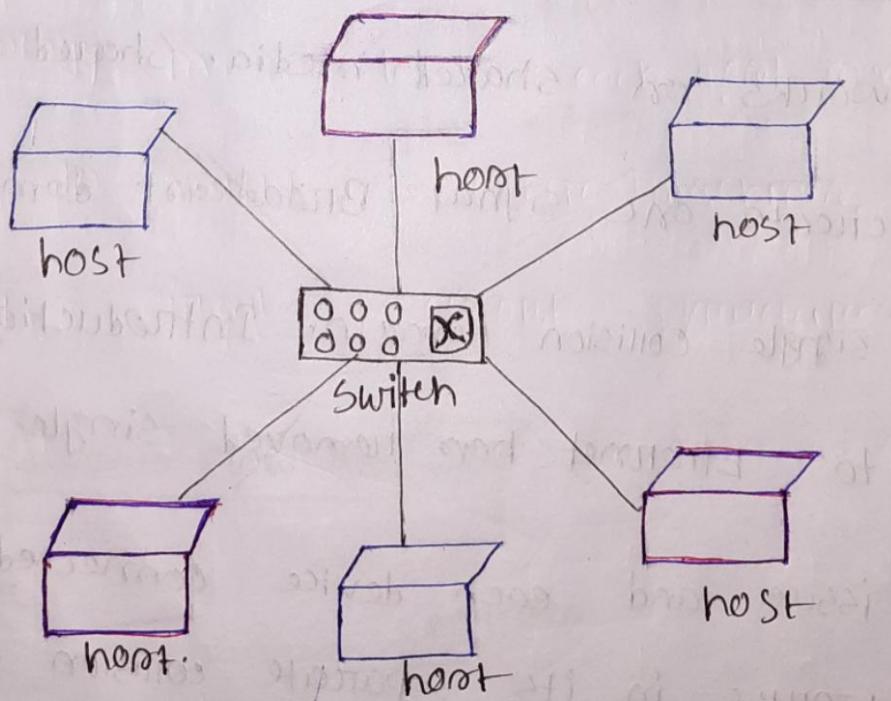


fig : virtual LAN.

In this diagram, different Virtual LANs are depicted in different colors. Hosts in one Virtual LAN, even if connected on the same switch cannot see or speak to other hosts in different virtual LANs. Virtual LAN is Layer-2 technology which works closely on Ethernet.

To route packets between two different virtual LANs a Layer-3 device such as Router is required.

- ③ a. Describe Ring, star and Bus network topology with their advantages and disadvantages.
- b. With example describe the levels of addresses are used in an internet employing the TCP/IP protocols.

Ans to the question no - 03(a)

Ring topology: In ring topology, each host machine connects to exactly two other machines, creating a circular network structure.

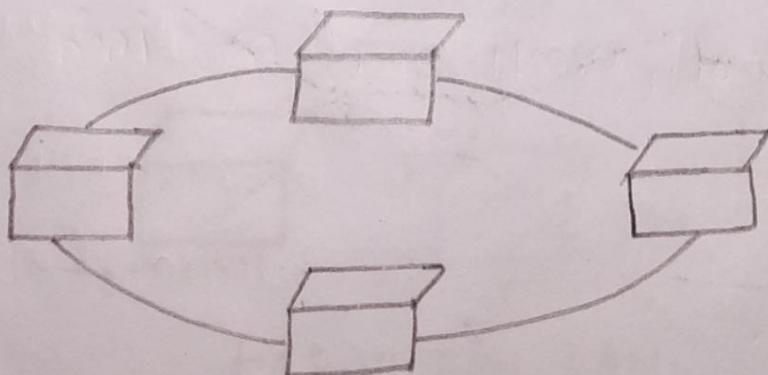


Fig : Ring topology.

### Advantage

- i) Easy to install and configure.
- ii) fault isolation is simplified.

### Disadvantage

- i) Unidirectional traffic.
- ii) A break in a ring can disable the entire network.

### Star Topology:

All hosts in star topology are connected to a central device, known as hub device, using a point-to-point connection. That is, there exists a point to point connection between hosts and hub.

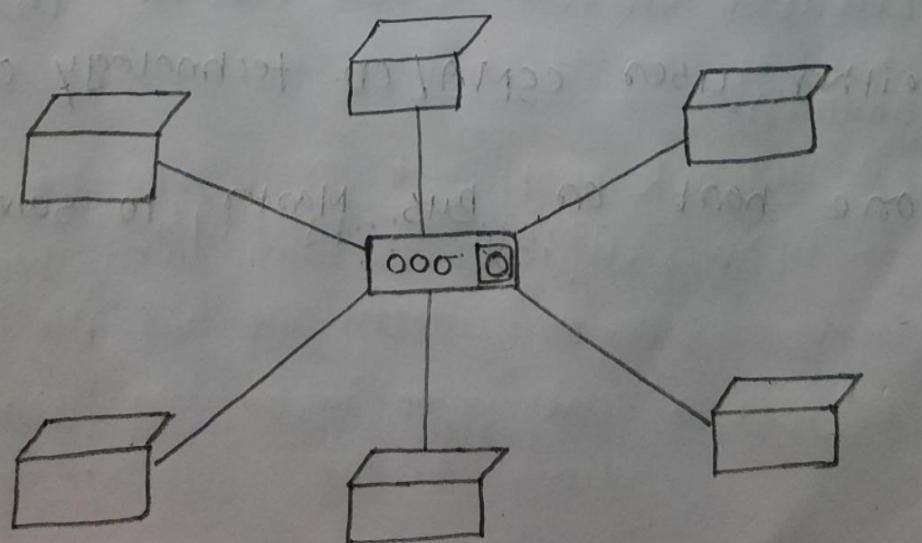


fig: Star Topology

### Advantage

- i) Easy to identify fault.
- ii) Less expensive.

### Disadvantage

- i) Dependency on single point.
- ii) Each node must be linked to a central hub.

### Bus Topology :

In case of Bus topology, all devices share single communication line or cable. Bus topology may have problem while multiple hosts sending data at the same time. Therefore, Bus topology either uses CSMA/CD technology or recognizes one host as Bus Master to solve the issue.

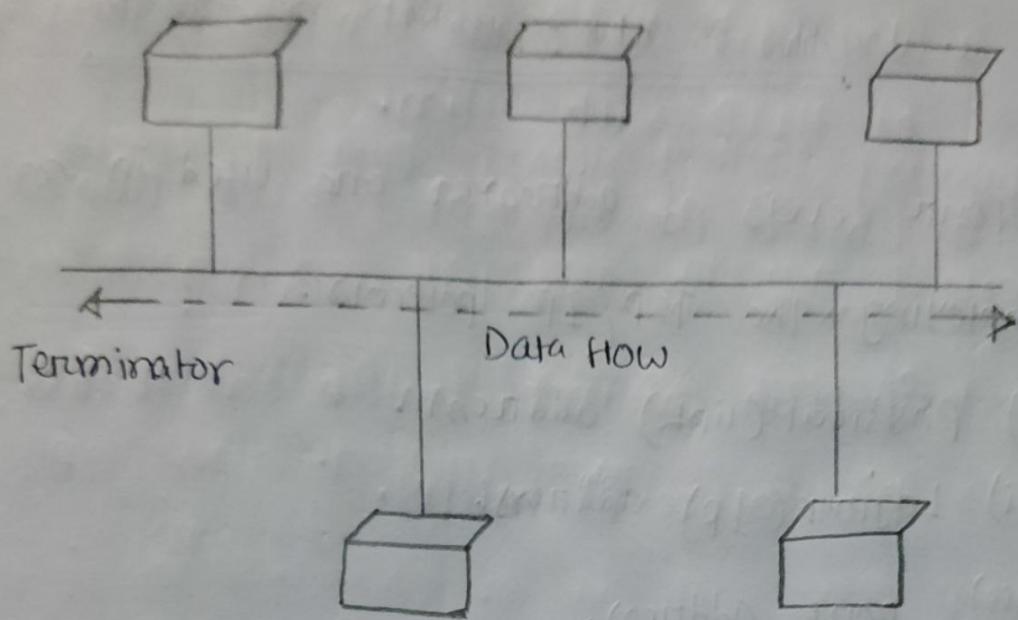


fig: Bus Topology

### Advantage:

- Bus topology is easy to extend and many other servers and systems can add in.
- It is very cheap in terms of costing.

### Disadvantage

- Bus topology's efficiency decreases when number of nodes are increase.
- Security is not very well as all computers receive same signal from the common bus.

Ans to the question no - 03(b)

four levels of addresses are used in an internet employing the TCP/IP protocols.

- i) Physical (link) address.
- ii) Logical (IP) address.
- iii) port address.
- iv) specific address.

Physical address: The physical address also known as the link address. It is the address of a node as defined by its LAN or WAN. For example, Ethernet uses a 6-byte (48 bit) physical address.

07:01:02:01:2c:4b

Logical address: A logical address in the internet is currently a 32-bit address that can uniquely define a host connected to the internet. No two publicly addressable hosts on the internet can have the same IP address.

192.168.50.50

Specific address: URL, e-mail address etc.

Port address: There are many applications in the computer. Each application runs with a port no. On the computer the port numbers are commonly used with TCP / IP connection.

- ④ a. Why HTTP used? Mention the request type of HTTP with action. 5
- b. What is the difference between primary server and secondary server? 4
- c. Explain Internet Control Message Protocol (ICMP) briefly. 5

Ans to the question no - 04(a)

### HTTP used

- \* To access data on world wide web.
- \* To transfer information between computer over www.

### Request type of HTTP:

- i) GET → Requests a document from the server.
- ii) HEAD → Requests a information about a document but not the document itself.
- iii) POST → sends some information from the client to the server.

- iv) PUT → sends some information from the client to the server.
- v) TRACE → Echoes the incoming request.
- vi) CONNECT → Reserves
- vii) OPTION → Inquires about available options.

Ans to the question no - 04 (b)

Difference between primary servers and secondary servers.

Primary server	secondary server.
i) A primary server is a server that stores a file about the zone for which it is an authority.	i) A secondary server that gathers the complete information about a zone from another server and stores the file.
ii) It is creating a responsible, maintaining and updating the zone file.	ii) The secondary server neither creates nor updates the zone file.
iii) It stores the zone file on a local disk.	iii) If updating is requested required, it must be done by the primary server.

### Ans to the question no-04(c)

Internet control Message protocol (ICMP) :-

ICMP is network diagnostic and error reporting protocol. ICMP belongs to IP protocol suite and uses IP as carrier protocol. After constructing ICMP packet, it is encapsulated in IP packet.

Because IP itself is a best-effort non-reliable protocol, so is ICMP. Any feedback about network is sent back to the originating host.

If some error in the network occurs, it is reported by means of ICMP. ICMP

contains dozen of diagnostic and error reporting messages. ICMP-echo and ICMP-echo reply are the most commonly used ICMP

message to check the reachability of

end-to-end hosts. When a host receives an ICMP-echo request, it is bound to send back an ICMP-echo-reply. If there is any problem in the transit network, the ICMP will report the problem.

- ⑤
- a. Describe the header file of TCP segment format. 7
  - b. Distinguish between connection oriented and connectionless service. 5
  - c. What is peer-to-peer process? 2

Ans to the question no -05 (a)

TCP header:

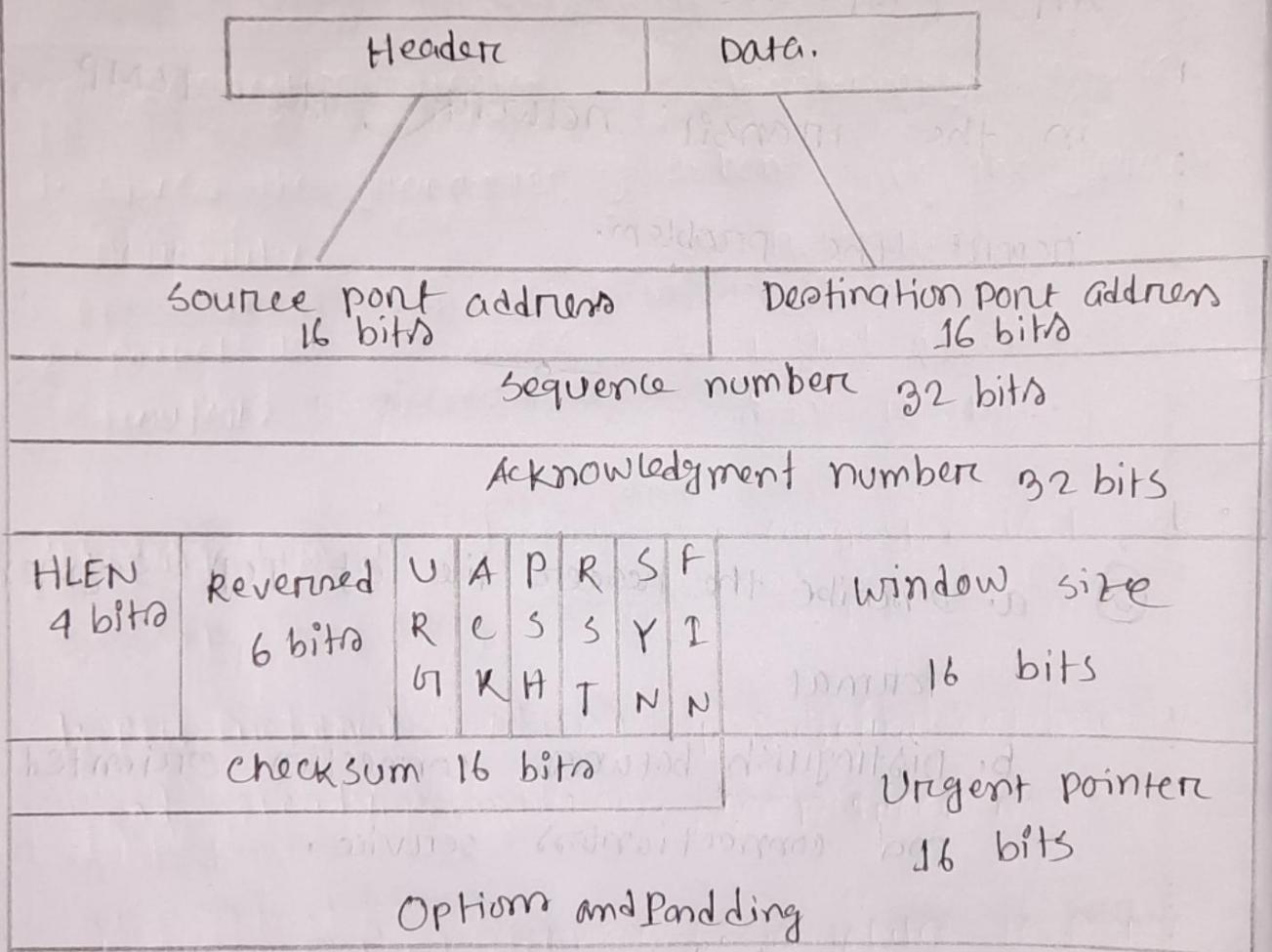


fig : TCP header.

Source port (16-bits) : It identifies source port of the application process on the sending device.

Destination port (16-bits) : It identifies source port of the application process on the receiving device.

Sequence Number (32-bits) : Sequence number of data bytes of a segment in a session.

Acknowledgement Number (32-bits) : When ACK flag is set, this number contains the next sequence number of the data byte expected and works as acknowledgement of the previous data received.

Data offset (4-bits) : This field implies both, the size of TCP header (32-bit words) and the offset of data in current packet in the whole TCP segment.

### Ans to the question no-05(b)

Distinguish between connection oriented and connectionless service.

Connection-oriented	Connectionless service
1. Gives the guarantee of reliability	1. don't give the guarantee of reliability.
2. packet flow the same router.	2. packet doesn't flow the same Router.
3. Congestion is not possible	3. congestion is possible.
4. preferred by long and steady communication.	4. Preferred by bursty communication.
5. is related to telephone system.	5. is related to postal system.

Ans to the question no-05(c)

Peer-to-peer:

Both remote processes are executing at same level and they exchange data using some shared resource.

-o-

⑥ a. What is socket address? Why TCP is called

connection oriented, reliable protocol? 1+4

b. Define client-server model. How two processes

in client-server model can interact? 6

c. what is TCP/IP? How does it works ? 3

Ans to the question no-6(a)

### Socket address:

Process-to-process delivery needs two identifiers, IP address and the port number, at each end to make a connection. The combination of an IP address and a port number is called a socket address.

### Multiplexing:

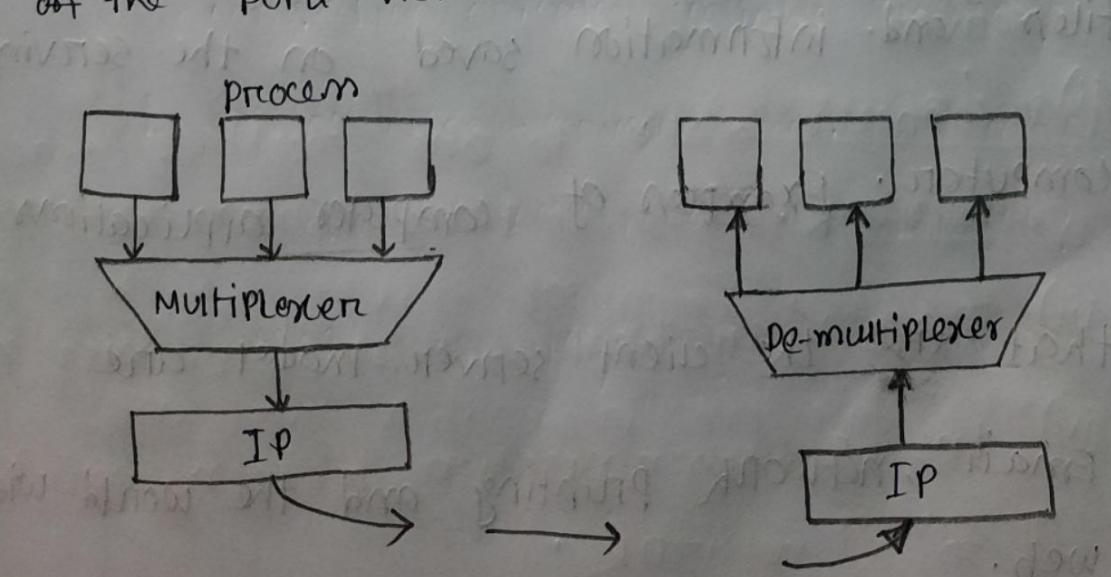
At the sender site, there may be several processes that need to send packets. However, there is only one transport layer protocol at any time. This is many-to-one relationship and requires multiplexing. The protocol accepts messages from different processes differentiated by their assigned port numbers.

After adding the header, the transport layer passes the packet to the network layer.

### De-multiplexing:

At the receive site, the relationship is one-to-many and requires demultiplexing. The transport layer receives datagrams from the network layer.

After error checking and dropping of the headers, the transport layer delivers each message to the appropriate process based on the port number.



Ans to the question no-06 (b)

client server model: A client server model 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 Email, network printing and the world wide web.

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

- i) Sockets: The process acting as server opens a socket using a well-known 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.
- ii) Remote Procedure call: This is mechanism where one process interacts with another by means of procedure calls. One process calls the procedure lying on remote host. The process on remote host is said to be server. Both processes are allocated stubs.

Ans to the question no-06(c)

TCP: TCP is responsible for taking large amounts of data, compiling it into packets and sending them on their way.

IP: It is the locational aspect of the pair allowing the packets of information to be sent and received to the location.

They work in the following fashion:

- i) Physical network interconnect nodes and servers.
- ii) connects hosts to one another across network.
- iii) Resolves all host-to-host communication.
- iv) Ensure communication between applications on a network.

7. a. How network services help in our life? 5
- b. write down the applications of communication and computer network. 9.
- c. Different between physical and logical address. 5.

Ans to the question no- 7(a)

Network services are given below.

file services :

- i) file sharing: one of the reason which give birth of networking was file sharing. file sharing enables its users to share their data with other users.
- ii) file transfer: This is an activity to copy one more file from one computer to another computer.

### Communication Services:

- i) Email: Electronic mail is a communication method and something a computer user cannot work without.
- ii) Social Networking: Recent technologies have made technical life social. Now they can share their thoughts, pictures and videos.
- iii) Remote access: This service enables user to access the data residing on the remote computer.

### Application services:

- i) Databases: This application service is one of the most important service which can store data and information and also process it.

- i) web services: It is used to connect to the internet and access files and information services provided by the internet services.
- iii) Resource Sharing: To use resources efficiently and economically, network providers a mean to share them.

Ans to the question no-7(b)

The application of communication and computer network is given below:

- i) Resource sharing such as printers and storage devices.
- ii) Exchange of information by means of E-mail and FTP.

- iii) Information sharing by using web or internet.
- iv) Interaction with other users using dynamic web pages.
- v) IP phones.
- vi) video conference.
- vii) parallel computing.
- viii) Instant messaging.

Ans to the question no - 7(c)

Difference between physical and logical address.

Logical Address	Physical Address
1. Virtually generated by CPU.	1. Exists within the MMU.
2. Viewable	2. Not viewable.
3. Logical address space	3. Physical address space.
4. Used to access physical address.	4. Not directly accessed.
5. Generated by the central processing unit.	5. Computed by the memory management unit.
6. variable	6. constant.

8. a. Draw the client server model for two processes to interact. 4
- b. What common software problems can lead to network defects? 3
- c. How many layers are there under TCP/IP? 2
- d. Define security threats. categorize security threats. 5

Ans to the question no - 8(a)

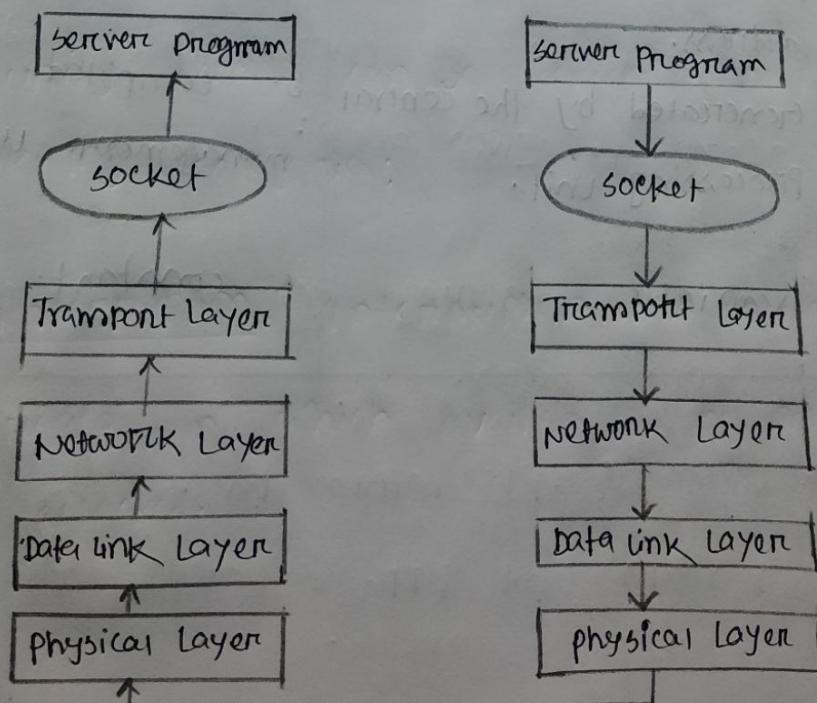


fig: Client Server model.

(b) Ans to the question no- 8(b)

Software related problems can be any on a combination of the following:

i) Client-server problems.

ii) Application conflicts.

iii) Error in configuration.

iv) Protocol mismatch.

v) Security issues.

vi) User policy and right issues.

Ans to the question no- 8(c)

There are four layers:

i) Application layers.

ii) Transport layers.

iii) Internet layers.

iv) Network interface.

(d) Ans to the question no- 8(d)

Network security is a broad term that covers a multitude of technologies, devices and processes. In the simplest term, it is a set of rules and configuration designed to protect the integrity, confidentiality and accessibility of computer networks.

Security threats can be divided into the following categories:

- i) Interruption: Interruption is a security threat in which availability of resources is attacked.

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 on the web-server is hacked.

iii) Integrity: This type of threat includes any alteration or modification in the original context of communication.

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