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## Set-1

- a. What do you mean by DCN in Computer Network?
- b. Why to learn Data communication and Computer Network?
- c. write down all application of communication and computer Network?

Ans to the question No: 1(a)

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

Ans to the question No: 1(b)

we learn Data communication and computer Network because -

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.

## Network Engineering:

Networking engineering is a complicated task, which involves software, ~~firmware~~ 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. 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 send output.

## Internet:

A network of networks is called an internetwork or the internet. It is the largest network in existence on this planet. The internet hugely connects all ~~the~~ 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 worldwide.

Internet uses very high speed backbone of fiber optics.

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

computer systems and peripherals are connected to form a network. They provide numerous advantages:

- Resource sharing such as printers and storage devices.
- Exchange of information by means of e-mails and FTP
- Information sharing by using web or Internet
- Interaction with other users dynamic web pages
- IP phones
- video conferences
- parallel computing
- instant messaging.

## Set-2

- a) Write down the basic component of computer network or DCN?
- b) Describe all basic component of computer network in details?
- c) What are the properties of Computer network?

Ans to the question No: 2 (a)

Computer networks share common devices, functions, and features including servers, clients transmission media, Shared data, Shared printers and other hardware and software resources, network interface card, local operating system and network operating system.

Ans to the question No: 2 (b)

Basic component of computer network or

D C N:

Servers:

Servers are computers that hold shared files, programs and the network operating system. Servers provide access to network resources to all the users of the network.

there are many different kinds of servers. For example: file servers, print servers, mail servers, communication servers, database servers, fax servers and web servers. Sometimes it is also called host computer, servers are powerful computer that store data or application and connect to resources that are shared by the user of a network.

Clients: clients are computers that access and use the network and shared network resources. Client computers are basically the customers or users of the network, as they request and receive services from the server.

Transmission Media: transmission media are the facilities used to inter connect computers in a network such as twisted-pair wire, coaxial cable, and optical fiber cable.

### Shared data:

Shared data are data that file servers provide to client such as data files, printer access programs and e-mail.

### Shared printers and other peripherals:

Shared printers and peripherals are hardware resources provided to the users of the network by servers. Resources provided include data files, printers, software or any other items used by clients on the network.

### Network Interface Card (NIC):

Each computer in a network has a special expansion card called a network interface card. The NIC prepares and sends data, receives data and controls data flow between the computer and the network. On the transmit side, the NIC passes frames of data to the physical link. On the receiver's side, the NIC

processes bits received from the physical layer and processes the message based on its contents.

### Local operating system:

A Local operating system allows personal computers to access files, print to a local printer and have and use one or more disk and CD drives that are located on the computer. Examples MS-DOS, Unix, Linux, Windows 98 etc. The network operating system is the software of the network.

### Network operating system:

The network operating system is a program that runs on computers and servers that allows the computers to communicate over the network.

### Hub:

Hub is a device that splits a network connection into multiple computers. When a

a computer requests information from a network or a specific computer, it sends the request to the hub through a cable. The hub will receive the request and transmit it to the entire network.

switch:

switch is a telecommunication device grouped as one of computer network components. switch is like a hub but built in with advanced features. It uses physical device addresses in each incoming messages so that it can deliver the messages to the right destination or port.

Router:

When we talk about computer network components, the other device that used to connect a LAN with an internet connection is called router. When we have two distinct networks or want to share a single internet

connection to multiple computers, we use router. There are two types of router: wired and wireless.

### LAN cable:

A Local area network cable is a wired cable used to connect a device to the internet or to other devices like computer, printers.

Ans to the question No: 2 (c)

### Properties of Computer network:

Scalability: By adding more processors, the scalability increases the system performance

### Reliability:

In case there is a failure in the hardware or issues in connectivity, reliability makes it easy to use other sources of data communication

Security: Users can take proper security actions, to keep the network safe.

Robustness: If there are by chance any defective nodes, the design of the network should allow it to function normally.

Migration: If the user decides to change the network, it should not affect its properties or operation and this is an advantage.

Sharing resources:

A computer network can share the resources from one computer to another.

### Set - 3

- (a) what is protocol in computer network ?
- (b) Briefly discuss the classification of computer networks ?
- (c) mention the disadvantages of computer network ?

Ans to the question No: 3(a)

### Protocol:

A protocol is a set of rules that govern data communications. A protocol defines what is communicated, how it is communicated and when it is communicated. The key elements of a protocol are syntax, semantics and timing.

Ans to the question No: 3(b)

### Classification of Computer Networks:

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

- (i) Geographical span
- (ii) Inter-connectivity
- (iii) Administration
- (iv) Architecture

## Geographical Span:

Geographically a network can be seen in one of the following categories:

- Ⓐ It may be spanned across your table, among bluetooth enabled devices. Ranging not more than few meters.
- Ⓑ It may be spanned across a whole building, including intermediate devices to connect all floors.
- Ⓒ It may be spanned across a whole city
- Ⓓ It may be spanned across multiple cities or provinces.
- Ⓔ It may be one network covering whole world.

## 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.

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

④ All devices can be connected to a single medium but geographically disconnected creating bus like structure.

⑤ Each device is connected to its left and right peers only, creating linear structure.

⑥ All devices connected together with a single device, creating star like structure.

⑦ All devices connected arbitrarily using all previous ways to connect each other, resulting in a hybrid structure.

### Administration:

From an administrator's point of view, a network can be private network which belongs a single autonomous system and cannot accessed outside its physical or logical domain.

A network can be public which is accessed by all.

## Network Architecture:

Computer networks can be discriminated into various types such as client-server, peer-to-peer or hybrid, depending upon its architecture.

- There can be one or more systems acting as Server. Other being client, requests the server to serve requests. Server takes and processes request on behalf of clients.
- Two systems can be connected point-to-point or in back-to-back fashion. They both reside at the same level and called peers.
- There can be hybrid network which involves network architecture of both the above types.

Ans to the question No: 3 (c)

### Disadvantages of Computer Networking:

- ④ constant administration is required which requires time
- ④ Some components of the network that has been designed may not work after some years and that needs to be replaced.
- ④ Initially, when the setup is getting ready, the investment cost for hardware and software can be costly.
- ④ Proper computer security, precautions like firewalls and file encryption are required regularly as intruders can steal the data.

(a) ~~Define network function~~

### Set-4

(a) What is the OSI Model?

(b) Explain the different layers of the

OSI model.

(c) Define Internet model. Discuss all Internet  
model layers briefly.

Ans to the question No - 4 (a)

OSI model:

OSI model stands for open system interconnection. It's a reference model which describes that how different application will communicate to each other over the computer network.

Ans to the question No: 4(b)

The different layers of the OSI model are given below -

Physical layer

Converts data bit into an electrical impulse

## Datalink Layer

Data packet will be encoded and decoded into bits.

## Network Layer

Transfer of datagrams from one to another

## Transport Layer

Responsible for data transfer from one to another

## Session Layer

Manage and control signals between computers.

## Presentation Layer

Transform data into application layer format

## Application Layer

An end user will interact with the application Layer.

Ans to the question No: 4(c)

### Internet Model:

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.

### Internet Models Layers:

#### Application Layer:

This Layer defines the protocol which enables user to interact with the network for example: FTP, HTTP etc.

### ◻ Transport Layer:

This layer defines how data should flow between hosts. Major protocol of this layer is transmission control protocol. This layer ensures data delivered between hosts is in-order and is responsible for end-to-end delivery.

### ◻ Internet Layer: Internet protocol works on this layer. This layer facilitates host addressing and recognition. This layer defines routing.

### ◻ 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.

## Set - 5

- (a) What is HTTP and what port does it use?
- (b) Explain the characteristics of Computer networking
- (c) What do you mean by classes of Network?
- (d) What are the different types of computer network? Explain each briefly.

Ans to the question No: 5(a)

### HTTP:

HTTP is HyperText Transfer Protocol and it is responsible for web content. Many web pages are using HTTP to transmit the web content and allow the display and navigation of HyperText. It is the primary Protocol and port used here is TCP port 80.

Ans to the question No: 5(b)

The main characteristics of computer networking are mentioned below -

### Topology:

This deals with how the computers or nodes are arranged in the network.

The computer are arranged physically or logically.

### Protocol:

Deals with process of how computers communicate with one another.

### Medium:

This is nothing but the medium used by computers for communication.

Ans to the question No: 5(c)

### Classes of Network:

The classes of IPV4 are of 5 types:

Class A	0.0.0.0 to 127.255.255.255
Class B	128.0.0.0 to 191.255.255.255
Class C	192.0.0.0 to 223.255.255.255
Class D	224.0.0.0 to 239.255.255.255
Class E	240.0.0.0 to 247.255.255.255

Ans to the question No: 5(d)

There are 4 major types of networks.

### ④ Personal Area Network (PAN):

It is the smallest and basic network type that is often used at home. It is a connection between the computer and

another device such as phone, printer, modem tablets etc.

### Local Area Network (LAN):

LAN is used in small offices and Internet cafes to connect a small group of computers to each other. Usually, they are used to transfer a file or for playing the game in a network.

### metropolitan Area Network (MAN):

It is a powerful network type than LAN. The area covered by a MAN is small town, (city) etc. A huge server is used to cover such a larger span of area for connection.

## Wide Area Network (WAN):

It is more complex than LAN and covers a large span of the area typically a large physical distance. The ~~internet~~ is the largest WAN which is spread across the world.

WAN is not owned by any single organization but it has distributed ownership.

## Set-6

- (a) Differentiate communication and transmission?
- (b) mention all effectiveness of Data communication
- (c) What is Network Topology? Name the different types of network topology topologies and brief their advantages?
- (d) what is cryptography in computer network? mention its types of cryptography?

Ans to the question no: 6(a)

communication:

communication means the process of sending and receiving data between two media (data is transferred between source and destination in both ways).

~~Transmitt~~

Transmission:

Through Transmission the data gets transferred from source to destination (only one way). It is treated as the physical movement of data.

## Ans to the question No: 6(b)

The effectiveness of a data communications system depends on four fundamental characteristics:

### a) delivery:

The system must deliver data to the correct destination. Data must be received by the intended device or user and only by that device or user.

### b) Accuracy:

The system must deliver the data accurately. Data that have been altered in transmission and left uncorrected are unusable.

### Timeliness:

The system must deliver data in a timely manner. Data delivered late are useless. In the case of video and audio, timely delivery means delivering data as they are produced, in the same order that they are produced and without significant delay. This kind of delivery is called real time transmission.

### Jitter:

Jitter refers to the variation in the packet arrival time. It is the uneven delay in the delivery of audio or video packet. For example, let us assume that video packets are sent every 30ms. If some of the packets arrive with

3D-ms delay and others with 4D-ms delay.  
an uneven quality in the video is the result.

### Ans to the question NO: 6 (C)

#### Network topology:

Network topology is the arrangement of the elements of a communication network. Network Topology can be used to define or describe the arrangement of various types of telecommunication networks, including command and control radio networks, industrial field busses and computer networks.

Network topologies are classified as below-

### Bus topology:

In Bus Topology, all the devices of the network are connected to a common cable. As the devices are connected to a single cable, it is also termed as

Linear Bus Topology.

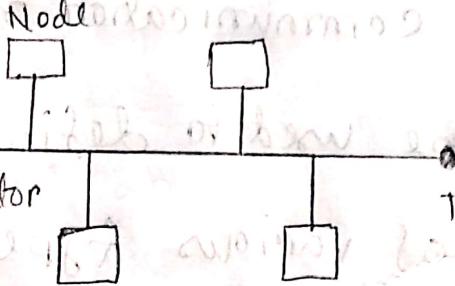


Figure: Bus Topology

The advantage of bus Topology is that it can be installed easily. And the disadvantage is that if the backbone cable breaks then the whole network will be down.

## Star Topology:

In Star Topology, there is a central controller or hub to which every node or device is connected through a cable. In this topology, the devices are not linked to each other. If a device needs to communicate with the other, then it has to send the signal or data to the central hub. And then the hub sends the same data to the destination device.

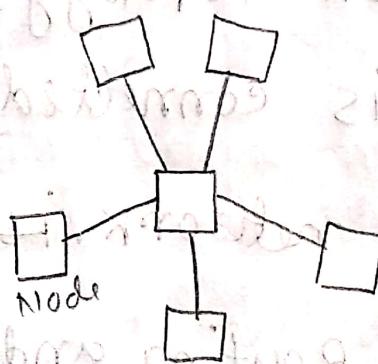


Figure: Star Topology

The advantages of the star topology is that if a link breaks then only that particular link is affected. The whole network remains undistributed. The main disadvantage of the star topology is that all the devices of the network are dependent on a single point (hub); If the central hub gets failed, then the whole network gets down.

### Mesh Topology:

In a mesh topology, each device of the network is connected to all other devices of the network. ~~is on~~ mesh topology uses Routing and flooding techniques for data transmission.

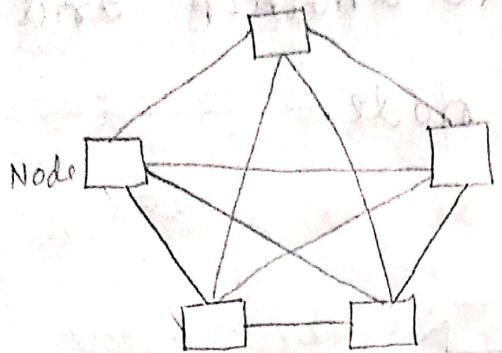


Figure: Mesh Topology

The advantage of mesh topology is if one link breaks then it does not affect the whole network. And the disadvantage is huge cabling is required and it is expensive.

### ④ Ring Topology:

In Ring Topology, each device of the network is connected to two other devices on either side which in turn forms a loop. Data or signal in ring topology flow only in a single direction.

from one device to another and reaches the destination node.

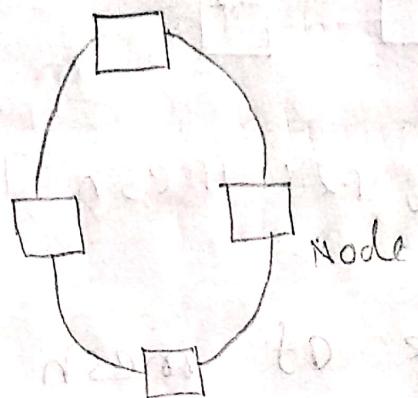


Figure: Ring Topology

The advantage of ring Topology is that it can be installed easily. Adding or deleting devices to the network is also

easy. The main disadvantage of ring topology is the data flows only in one direction. And if a break a node in the network can effect the whole network.

## Tree Topology:

Tree Topology is the combination of star and bus topology. This topology is best to be used on larger network. Tree topology is used to identify the system on the network, to share information across network and allows users to have many servers on the network. Tree Topology is the best topology because the signals that are transmitted by the root node are received by all the computers at the same time.

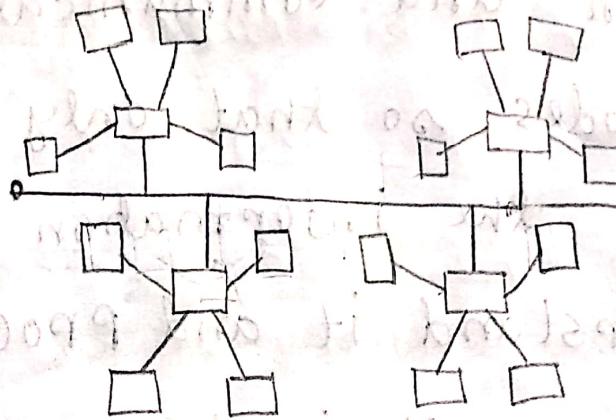


Figure: Tree Topology

The tree topology has some advantages such as it is highly flexible, centralized monitoring and point-to-point connection and the disadvantages of this topology is that it is difficult to configure, there is a single point of failure.

#### Ans to the question No: 6(d)

#### Cryptography:

Cryptography is technique of securing information and communications through use of codes so that only those person for whom the information is intended can understand it and process it. Thus preventing unauthorized access to information. The prefix 'Crypt' means "hidden".

## Types of Cryptography:

In general there are three types of cryptography.

### ■ Symmetric Key Cryptography:

It is an encryption system where the sender and receiver of message use a single common key to encrypt and decrypt messages. Symmetric key system are faster and simpler but the problem is that sender and receiver have to somehow exchange key in a secure manner. The most popular symmetric key cryptography system is Data Encryption System.

### Hash functions:

There is no usage of any key in this algorithm. A hash value with fixed length is calculated as per the plain text which

makes it impossible for contents of plain text to be recovered. Many operating systems use hash functions to encrypt passwords.

### Asymmetric Key cryptography:

Under this system a pair of keys is used to encrypt and decrypt information. A public key is used for decryption. Public Key and private key is used for decryption. Public key and private key are different. Even if the public key is known by everyone the intended receiver can only decode it because he alone knows the private key.

## Set-7

- (a) What do you mean by LAN Technologies?
- (b) Do you need Ethernet for Internet?
- (c) Write down the difference between Ethernet and Internet.
- (d) Define security threats. Categorize all security threats.

Ans to the question No 7 (a)

### LAN Technologies:

Local Area Network (LAN) is a data communication network connecting various terminals or computers within a building or limited geographical area. The connection among the devices could be wired or wireless. Ethernet, Token Ring and wireless LAN using IEEE 802.11 are examples of standard LAN technologies.

### Ans to the question No: 7 (b)

The Ethernet does not need to be connected to the Internet. When Ethernet is used to connect devices locally (Local Area Network or LAN) the devices can communicate with each other using the Ethernet.

Ans to the Question No: 7(c)

## Difference Between Ethernet and Internet -

Ethernet	Internet
A networking technology that is used in LAN where the computer connected within a primary physical space	A global system of interconnected computer networks that use the TCP/IP protocol to link devices worldwide
Local Area Network (LAN) covers a small geographical area	Wide Area Network (WAN) covers a large geographical Area
more secure since outside devices have no access to the network	Less secure since any user can access the network and obtain the required information
there are multiple ethers	There is only one Internet.

Ans for the Question No: 7(d)

### Security threats:

Network security 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.

Today's network architecture is complex and is faced with a threat environment that is always changing and attackers that are always trying to find and exploit vulnerabilities. For these reasons there are many network security management tools and application are used.

security threats can be divided into the following categories-

### ■ Interruption:

Interruption is a security threat which availability of resource is attacked. For example, a user is unable to access its web-server or the web-server is hijacked.

### ■ 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.

**■ 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 sender and attacker then either modifies or false data and sends to the receiver.

**■ 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.

## Set-8

- (a) what do you mean by Application Layer
- (b) Define client server model. Mention the processes in client server model
- (c) Draw the client server model for two processes to interact.
- (d) Write down the difference between client server and peer to peer Network.

Ans to the question No: 8(a)

### Application Layer:

Application Layer is the top most layer in OSI and TCP/ IP layered model.

This layer exists in both layered models because of its significance, of interacting with user and user applications.

This layer is for applications which are involved in communication system.

A user may or not directly interacts with the applications. Application layer is where the actual communication is initiated and reflects. Because this layer is on the top of the layer stack, it does not serve any other layers. Application

layer takes the help of Transport and all layers below it to communicate or transfer its data to the remote host.

Ans to the question No: 8(b)

### Client server Model:

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

Email, network printing and the world wide web.

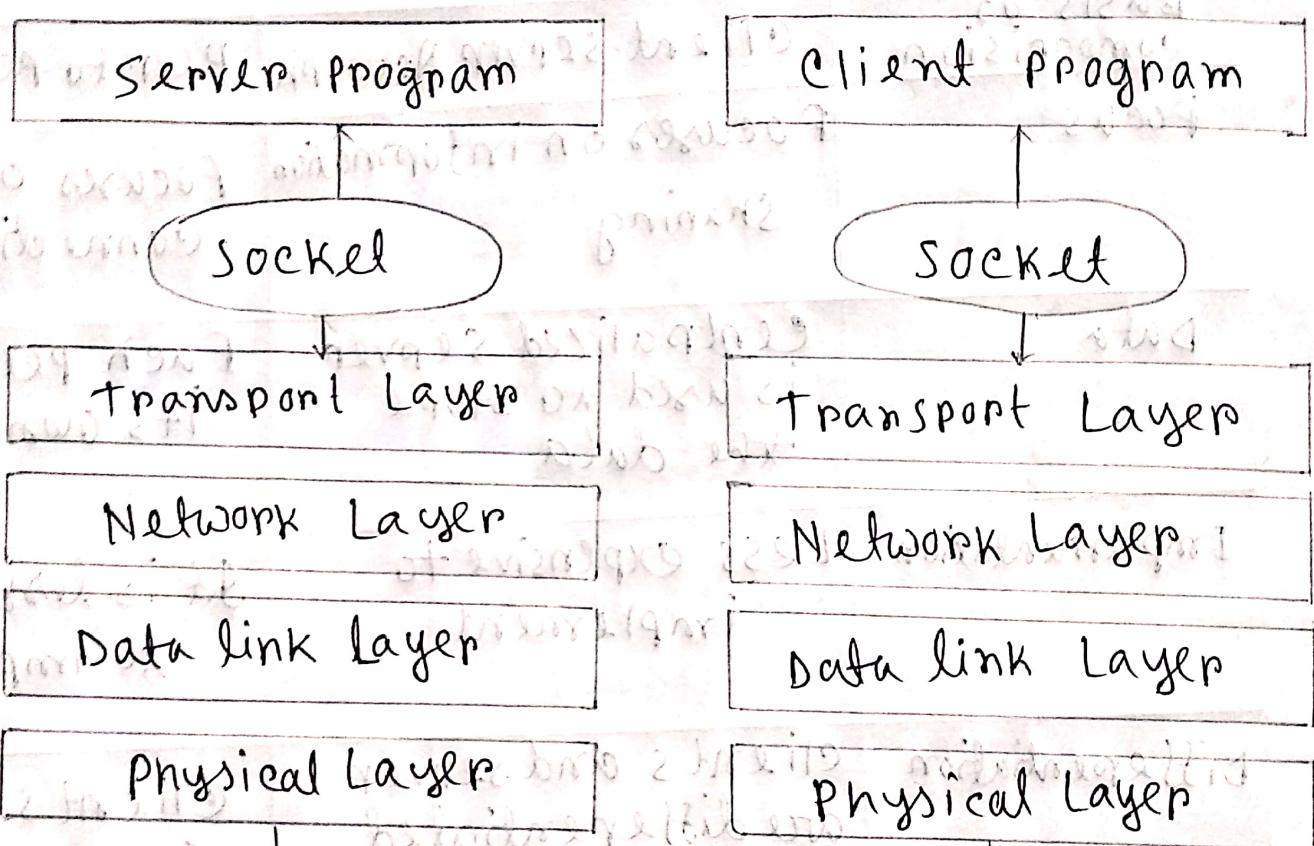
Two processes in client-server model can interact in various ways.

① Sockets

② Remote Procedure calls

### Ans to the Question No- 8 (c)

The structure is given below.



Ans to the question No: 8(d)

Difference between Client-Server and peer-to-peer network.

Basis of comparison	Client-Server Network	Peer-to-Peer Network
Focus	Focuses on information sharing	Focuses on connectivity
Data	Centralized Server is used to store the data	Each peer has its own data
Implementation	Less expensive to implement	It is less expensive to implement
Differentiation	clients and server are differentiated Specific server and clients are present	clients and server are not differentiated
Service	The client requests for service and server responds with a service	Each and every node can make both request and respond for the service.

Basis of Comparison	Client server Network	Peer-to-peer Network
Stability	Client-server Network is more stable and scalable	Peer-to-peer Network are less stable if number of peers is increased.
Security	It is very much secure than peer-to-peer Network	It is less secure than Client server Network
Reliability	It is less reliable	It is more reliable