

1. (a) Describes Data Communication and Computer Network 5
(b) Applications of Data Communication and Computer Network 4
(c) Difference between Data Communication and Computer network 5
2. (a) What is the basic of computer networking? Explain the benefit of networking. (2+2)
(b) Describe the types of networking?
(c) Why do we need internet working? What is the difference between network and internet work. 5
3. (a) What is a Node and Routers? 3
(b) Explain different Data flow directions. 4
(c) What is Networks and explain characteristics of networks? 7

- 4.
- Define Network topology? 3
 - Describe the types of network topology? 8
 - Which network topology is best? 3

- 5.
- Explain different layers in OSI model? 5
 - Explain the layer of TCP/IP Model? 5
 - Write about peer-to-peer processing? 4

- 6.
- How does network security work? 9
 - Why cryptography is needed for networks security?
 - What is information security in cryptography? (3+2)
- c. What is the goal of cryptography. How do you use cryptography today? (2+3)

- 7.
- What is Ethernet? Define fast-Ethernet and Giga-Ethernet. 4
 - Define Virtual LAN. Write a Diagram to describe work system of VLAN. 6
 - Define point to point networks. Describe it briefly. 4

8. a. What is Firewall? What is Gateway? 5
- b. What do you mean by Data terminal Equipment?(DTE) 2
- c. Briefly describe client-server model. 2

Ans to the Ques No. 1 (a)

Describe Data Communication and Computer Network

Data Communication: Data communication refers to the exchange of data between a source and a receiver via form of transmission media such as a wire cable. Data communication is said to be local if communicating devices are in the same building or a similarly restricted geographical area.

Computer Network: Computer networks, two or more computers that are connected with one another for the purpose of communicating data electronically. Besides physically connecting computers and communication devices a network system serves the important function of establishing a cohesive architecture that allows a variety of equipment types to transfer information.

in a near-seamless fashion.

Ans to the Question No 1.(b)

Applications of Data Communication and Computer network.

Computer systems and peripherals are connected to form a network. They provide numerous advantages such as printers and storage devices.

→ Resource sharing such as printers and storage devices.

→ Exchange of information by means of e-Mail and FTP.

→ Information sharing by using web or internet.

→ IP phones

→ Video conference.

→ Parallel computing.

→ Instant messaging.

Ans to the Ques No. 31(c)

Q. Difference between Data Communication and Computer network. is given below:

Computer Network	Data Communication
Computer Network is best known to transfer the data and information across different geographies.	We can easily communicate and transfer the data across different modes through Data Communication.
A large community support provided by computer network and extensive documentation libraries.	Data communication also has one of the largest community supports.
Computer networks have different types of architectural layers for example client - server peer to peer or hybrid.	Data communication usually have 3 architectural design and can be useful in the multi nodes transmission across different regions and areas.
In Computer Network performance testing more preferred than Data Communication	Data communication doesn't help in any data binding process and direct inter related testing for the communication parameters is a little bit difficult than networking.

Ans to the Ques No. 2 (a)

Basics of computer networking: 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 the network operating system.

Benefits of computer networking:

Exchanging information on challenges, experiences and goals is a key benefit of networking because it allows you to gain insights that you may not have otherwise thought of. Similarly, offering helpful ideas to a contact is an excellent way to build your reputation as an innovative thinker.

Ans to the Ques. No. 2 (b)

the types of networking:

A computer networks is mainly four types:

- LAN
- PAN
- MAN
- WAN

LAN means Local Area Networks. Local area network is a group of computers connected to each other in a small area such as building, office etc. Lan is used for connecting two or more personal computers through a communication medium such as twisted pair coaxial cable etc. Local area networks provides higher security. The data is transferred at an extremely faster than any networks.

PAN means Personal Area Network. Personal Area network is a network arranged within an individual person. Typically within a range of 10 meters. Thomas Zimmerman was the first research scientist to bring the idea of the personal Area network. Personal area network covers an area of 30 feet.

MAN means Metropolitan Area Network

Metropolitan area network is a network that covers a larger geographic area by interconnecting a different LAN from a larger network. Government agencies use MAN to connect to the citizens and private industries. In MAN, various LAN's are connected to

each other through a telephone exchanging line. MAN is used in communication between the banks in a city. Also it can be used in Airline Reservation.

WAN means Wide Area Network. A wide area network is a network that extends over a large geographical area such as states or countries. A wide area network is quite bigger networks than the LAN. The internet is one of the biggest WAN in the world. A wide area network is widely used in the field of Business, government and education.

Ans to the Ques. No. 2 (c)

Why do we need internet working? What is the difference between network and internetwork?

Internet working ensures data communication among networks owned and operated by different entities using a common data communication and the internet Routing protocol. Internet working is only possible when all the connected networks use the same protocol or stack of communication methodologies.

A internet is defined as a group of locally connected computer's such as computers connected in an office building.

On the other hand, An internet work is a collection of individual networks, connected by intermediate networking devices that functions as a single large network. Internet working has evolved some problems such as isolated LANs : Duplication of resources, absence of network management.

What is a node and Routers ?

Node: Two or more computers are connected directly by an optical fiber or any other cable. A node is a point where a connection is established. It is a networks component that is used to send, receive and forward the electronic information.

Routers: The router is a networks device that connects two or more network segments. It is used to transfer information from the source to the destination.

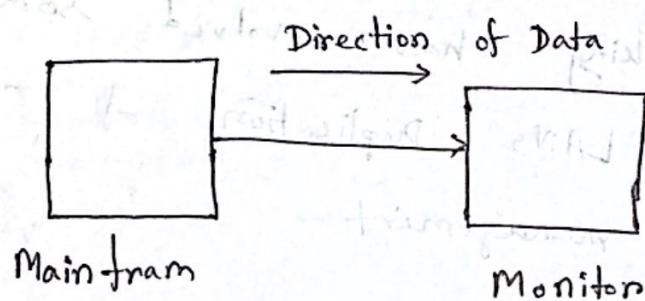
Ans to the Ques. No. 3 (b) of Question A

Explain different data flow direction:

Communication between any two devices can be simplex, half-duplex or full-duplex.

1. Simplex:

In Simplex mode, the communication is unidirectional, as on a one-way street.



2. Half-Duplex:

In half-duplex mode, each station can both transmit and receive but not at the same time. When one device is sending, the other can only receive and vice-versa which will represent in the following figure.

3. Full-Duplex:

In full-duplex mode (also called bidirectional) both stations can transmit and receive simultaneously. The full-duplex mode is like a two-way street with traffic flowing in both directions at the same time.

Ans to the Ques. No. 3 (c)

What is network and explain characteristics of network.

A network is a set of devices connected by communication links. A network must be able to meet a certain number of criteria. The most important of these are performance, reliability and security.

Performance: Performance can be measured in many ways including transit time and response time. Transit time is the amount of time required for a message to travel from one device to another.

Reliability: In addition to accuracy of delivery, network reliability is measured by the frequency of failure, the time it takes a link to recover from a failure, and the network's robustness in a catastrophe.

Security: Network security issues include protecting access, protecting data from damage and development and implementing policies and procedures for recovery from breaches and data losses.

Ans to the Ques. No. 4 (a)

Define Network Topology! ~~Network has structure~~ A network is arranged, including Network topology is the way a network is arranged, including the physical or logical description of how links and nodes are set up to relate to each other. There are numerous ways a network can be arranged all with different pros and cons and some are more useful in certain circumstances than others.

In other words, Network topology is the arrangement of the elements (links, nodes, etc) off a communication network.

Ans to the Ques. No. 4 (b)

Describe the type of Networks Topology:

There are six types of topology in computer networks

- i. Bus Topology
- ii. Ring Topology
- iii. Star Topology
- iv. Mesh Topology
- v. Tree Topology
- vi. Hybrid Topology

Bus Topology: Bus topology is a network type in which every computer and network device is connected to single cables when it has exactly two endpoints then it is called linear bus topology.

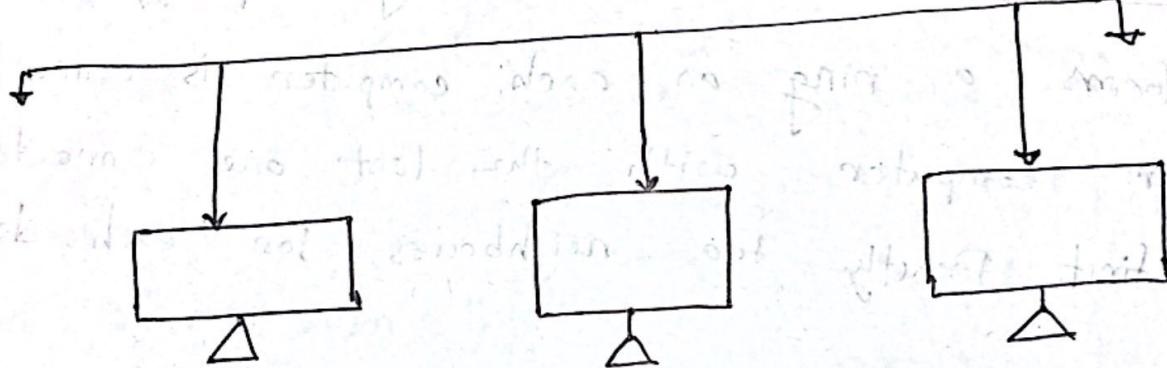


figure : Bus Topology.

feature of Bus topology:

- i. It transmit data only in one direction.
- ii. Every device is connected to a single cable.

Advantage of Bus topology:

- i. It is cost effective.
- ii. used in small networks.
- iii. Easy to expand joining two cables together.

Disadvantages of Bus topology:

- i. Cables fails then whole network fails.
- ii. Cable has a limited length.

Ring Topology: It is called ring topology because it forms a ring as each computer is connected to another computer, with the last one connected to the first. Exactly two neighbours for each device.

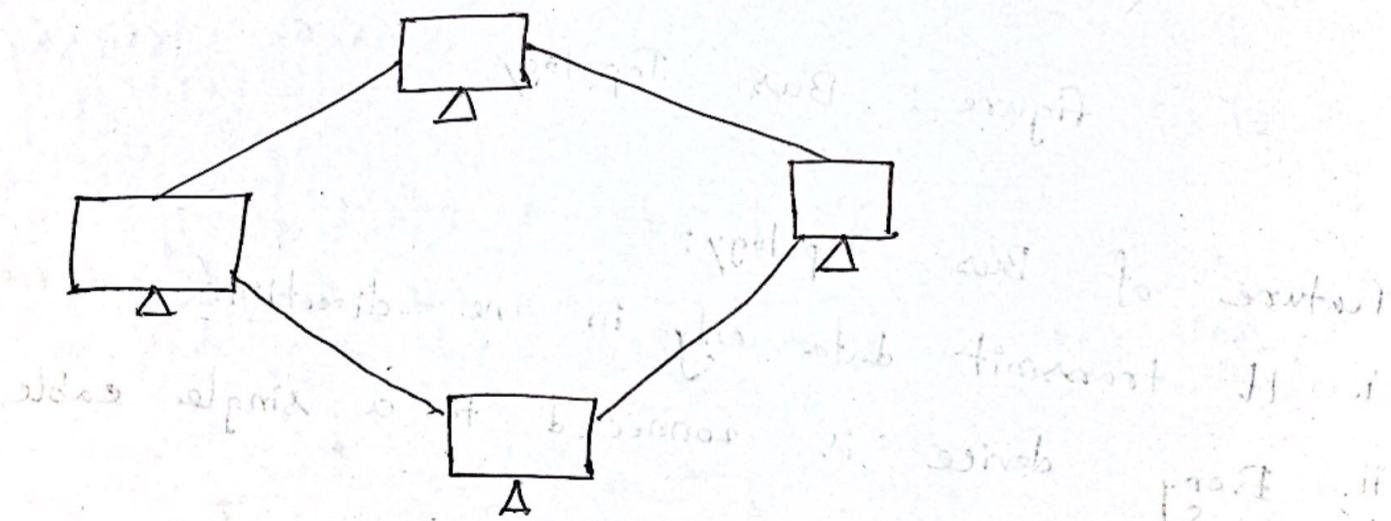


fig : Ring Topology.

Advantages of Ring Topology:

- i. Transmitting network is not affected by high traffic or by adding more nodes. as only the nodes having tokens can transp. transmit data.

ii. cheap to install and expand.

Disadvantages of Ring Topology:

- i. Troubleshooting is difficult in ring topology.
- ii. Adding or deleting the computers disturbs the network activity.
- iii. Failure of one computer disturbs the whole network.

Star Topology: In this type of topology all the computers are connected to a single hub through a cable.

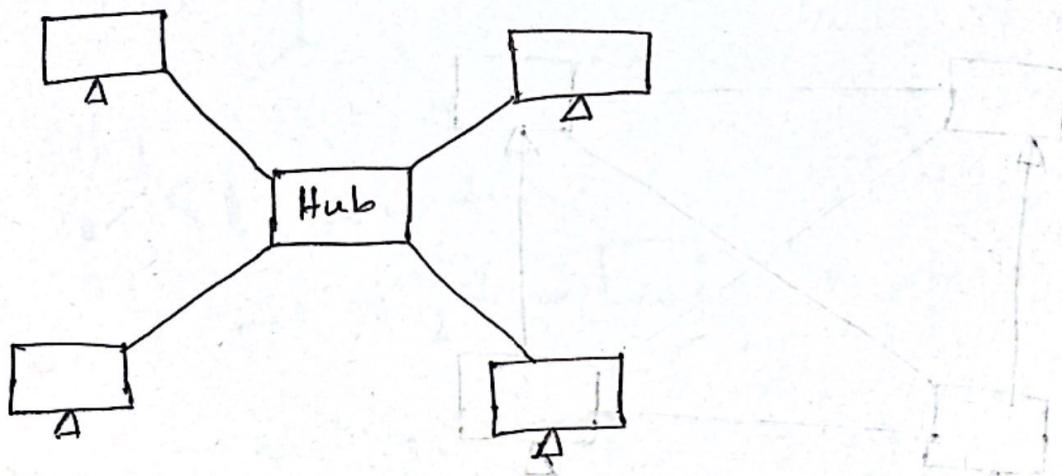


fig: star topology.

Advantages of star topology:

- i. Fast performance with few nodes and low networks traffic.
- ii. Hub can be upgraded easily.

iii. Easy to setup and modify.

Disadvantages of star topology:

i. Cost of installation is high.

ii. Expensive to use.

iii. Performance is based on the main hub that is it depends on its capacity.

Mesh Topology: Mesh topology is a point to point

connection to other nodes or devices. All the network nodes are connected to each other. Mesh has $\frac{n(n-1)}{2}$ physical channels to link n devices.

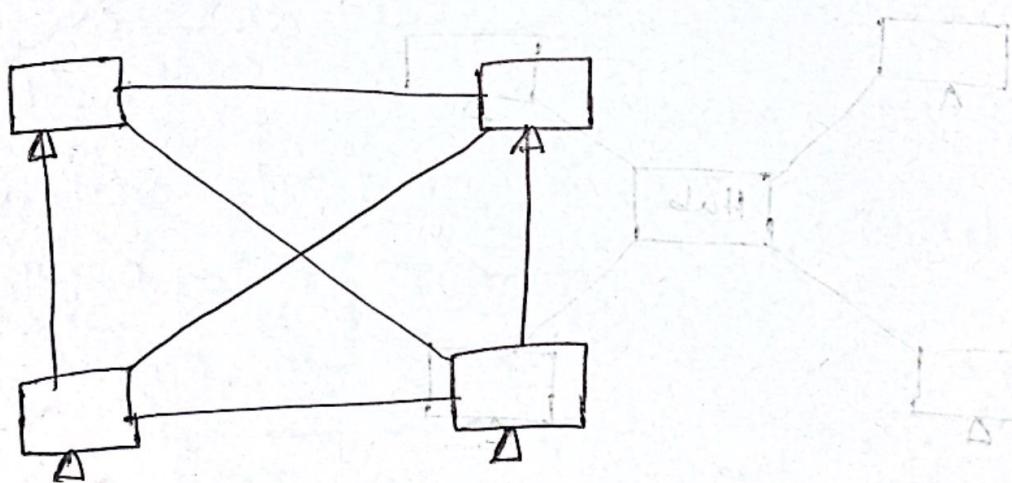


fig : Mesh topology.

Advantages of Mesh topology:

i. Each connection can carry its own data load.

ii. It is robust.

iii. Provides security and privacy.

Disadvantage of Mesh topology: ~~both~~ maintenance

i. Installation and configuration is ~~more difficult~~.

ii. cabling cost is more.

Disadvantages of Mesh Topology:

i. Installation and configuration is ~~more difficult~~.

Tree topology: Tree topology has a root node and all other nodes are connected to it forming a hierarchy. It is also called hierarchical topology.

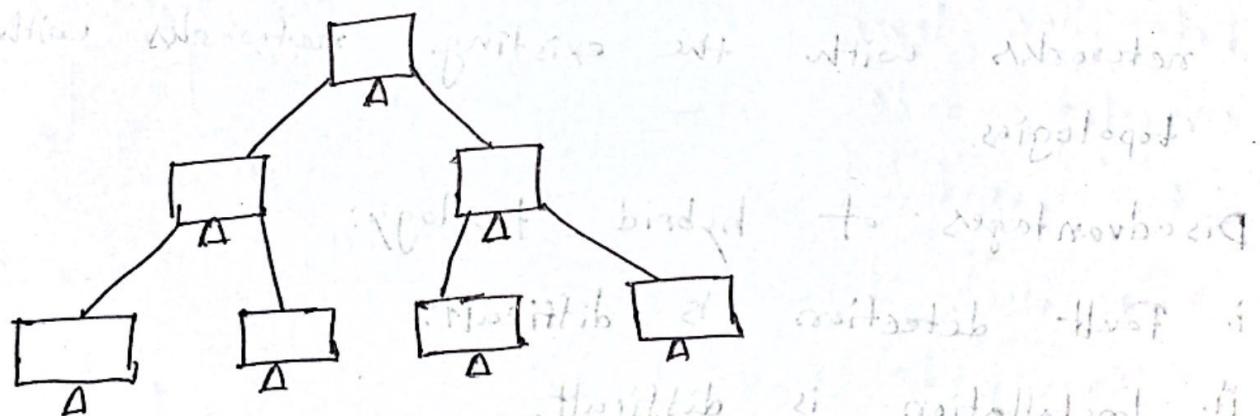


fig: a) Tree topology.

Advantage of tree topology:

i. Easily managed and maintained error detection is easily done.

Disadvantages of tree topology:

1. Heavily cabled.
2. Costly.
3. Central hub fails, network fails.

Hybrid Topology: A combination of two or more topology

is known as hybrid topology. For example, a combination of star and mesh topology is known as hybrid topology.

Advantages of hybrid topology:

- i. Scalable as we can further connect other computer networks with the existing networks with different topologies.

Disadvantages of hybrid topology:

- i. Fault detection is difficult.
- ii. Installation is difficult.
- iii. Design is complex so maintenance is high thus expensive.



Ans to the Ques. No. 9 (e)

Which Networks Topology is best? star network topology is best suited for smaller networks and works efficiently when there is limited number of nodes one has to ensure that the hub or the central node is always working and extra security features should be added to the hub because it is the heart of the networks. Also data can be transferred at fastest speed in star topology.

Ans 1 to the Qn No. 5 (a)

Explain different layers in OSI model

The OSI Model is a conceptual framework used to describe the function of a networks system.

the 7 layers of the OSI Model.

Physical layer: The lowest layers of the OSI Model is concerned with electrically or optically transmitting raw unstructured data bits across the network from the physical layer of the sending device to the physical layer of the receiving device.

Data link layer: At the data links layer, directly connected nodes are used to perform node-to-node data transfer where data is packaged into frames.

- Network layer
- Transport layer
- Session layer
- Presentation layer.
- Application Layer.

At this Layer, both the end user and the application layer interact directly with the software application.

Ans to the Qus. No. 5 (b)

Explain the layers of TCP / IP Model

TCP / IP protocol suite is made of five layers: physical, data link, networks, transport, transport and application. At the transport layer, TCP / IP defines these protocols

- TCP
- UDP
- sCTP

1. Physical and Data Link Layers

2. Networks Layer

a. Internet working Protocol (IP)

b. Address Resolution Protocol

c. Internet Control Message Protocol

d. Internet Group Message Protocol

3. Transport Layers

a. User Datagram Protocol

b. Transmission control Protocol

c. Stream control Transmission Protocol.

4. Application Layers

Ans to the Ques. No. 5(e)

Write about peer-to-peer processing

Within a single machine, each layer calls upon the services of the layer just below it. Layer 3, for example, uses the services for layer 4. Between machines, layer x on one machine communicates with layer x on another machine. This communication is governed by an agreed-upon series of rules and conventions called protocols. The processes on each machine that communicate at a given layer are called peer-to-peer processes. Communication between machines is therefore a peer-to-peer process using the protocols appropriate to a given layer.

Ans to the Ques No. 61(a)

How does network security work

There are many layers to consider when addressing network security across an organization. Attacks can happen at many layers in the network. Security hardware, software and policies must be designed to address each area. Network security typically consists of three different controls: Physical, technical and administrative.

Physical Network Security: Physical security controls are designed to prevent unauthorized personnel from gaining physical access to network components such as router, cabling cupboards and so on.

Technical network security: Technical security controls protect data that is stored on the network or which is in transit across, into or out of the network.

Administrative network security: Administrative security controls consist of security policies and processes that control user behaviour, including how user are authenticated, their level of access and also how if staff members implement changes to the infrastructure.

Ans to the Ques. No. 6 (b)

Why cryptography is needed for networks security
In data and telecommunications, cryptography is used to protect data and information. It is necessary when communicating over any untrusted medium, which includes just about any network, particularly the internet. Cryptography, then not only protects data from theft or alteration, but can also be used for user authentication.

Information security in cryptography: Information security uses cryptography to transform usable information into a form that renders it unusable by anyone other than an authorized user. This process is called encryption.

Ans to the Ques. No. 6 (c)

What is the goal of cryptography? How do you use cryptography today?
Cryptography is the science of using mathematics to encrypt and decrypt data. Cryptography enables you to store sensitive information or transmit it across insecure networks (like the internet) so that it cannot be read by anyone except the intended

What is Cryptography?

Cryptography is the process of transforming data into a form that can only be understood by the intended recipient.

→ Data privacy

→ Data authenticity

→ Data integrity.

Using cryptography today: Modern cryptography uses sophisticated mathematical equations (algorithms) and secret keys to encrypt and decrypt data. Today, cryptography is used to provide security and integrity to our data and both authentication and anonymity to our communications. Authentication and digital signatures are a very important application of public key cryptography.

Ans to the Ques No. 7 (a)

What is Ethernet? Define Fast-Ethernet and Giga-Ethernet?

Ethernet: Ethernet is way of connecting computers together in a local area network or LAN. It has been the most widely used method of linking computers together in LAN.

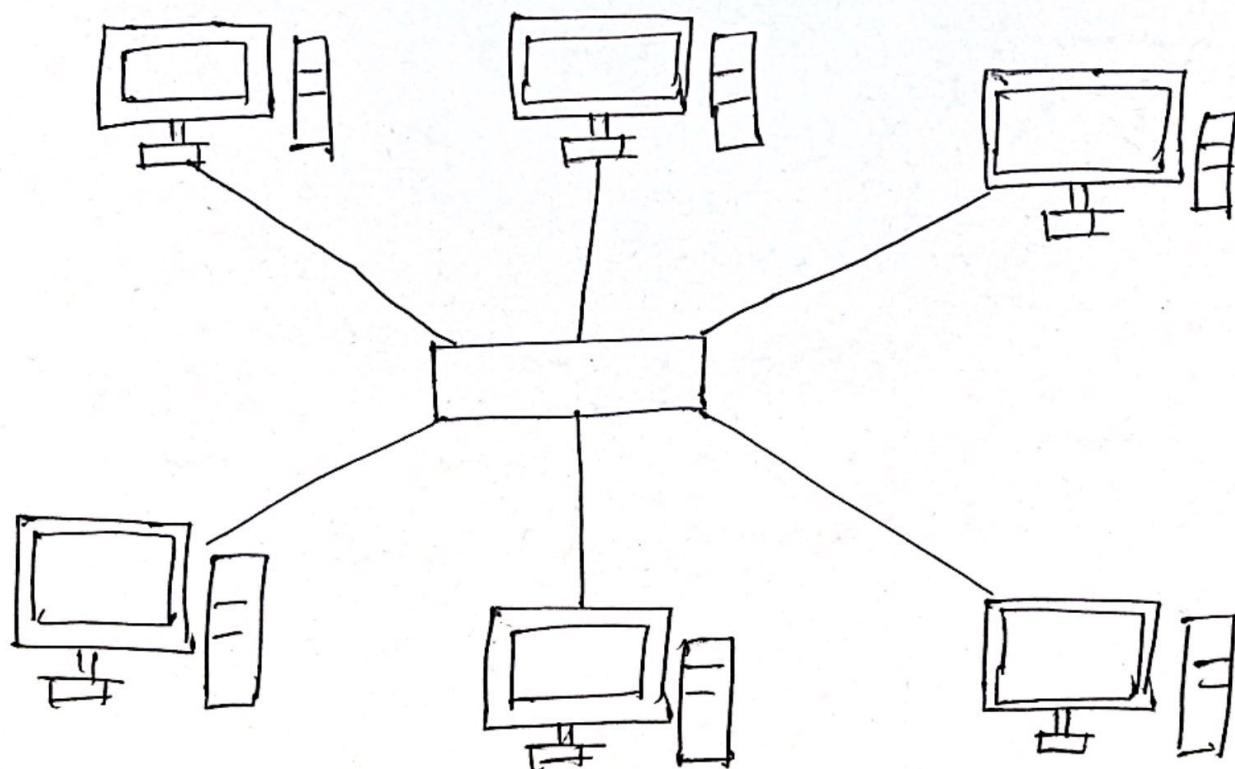
Fast-Ethernet: To encompass need of fast emerging software and hardware technologies. Ethernet extends itself as fast-Ethernet. It can run on UTP, Optical fiber and wirelessly too.

Giga-Ethernet: First-Ethernet could enjoy its high speed status only for 3 years till Giga-Ethernet was introduced. Giga-Ethernet provides speed up to 1000 mbits/seconds.

Ans to the Ques No. 7 (b)

VLAN: Define virtual LAN. Write a Diagram to describe work system of 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 switch to Ethernet has removed single collision domain. But even switch 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 VLAN cannot speak to a host in another. By default all hosts are placed into the same VLAN.

Diagram:



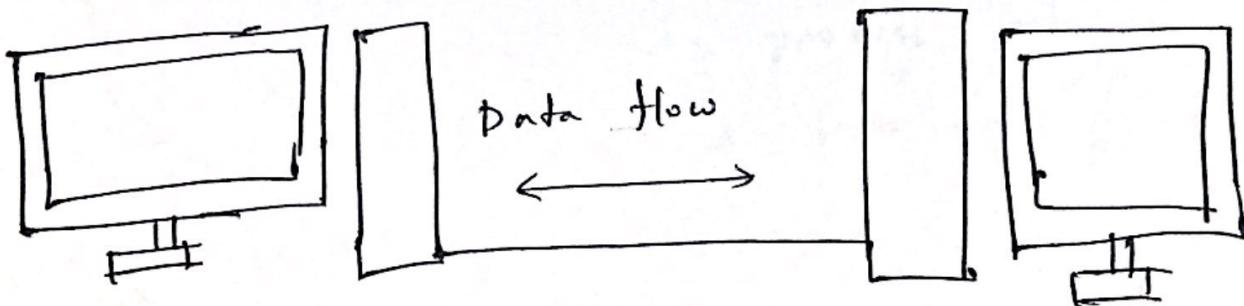
In this diagram, the difference for VLANs are depicted in different codes. Hosts in one VLAN, even if connected on the same switch cannot see or speak to other hosts in different VLANs.

(a) 8 bits will left at 2MA

question 21 truth? allowing it think

Ans to the Ques No 7(c) II network
structure is

Define point-to-point network. Describe it briefly
Point-to-Point: Point-to-Point networks exactly two hosts such as computer, switch or routers, serve connected 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 device. But the end

in which hosts are unaware of underlying hardware or other as if they are connected directly. traffic to one host is not affected by traffic to another.

Ans to the Qn No. 8 (a)

What is firewalls? What is gateway?

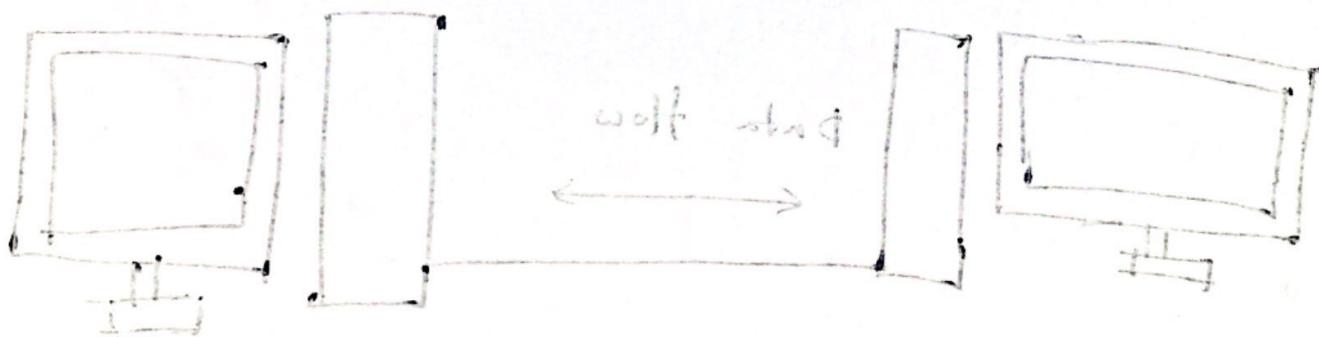
Firewalls: It is an electronic device which is used to enhance the security of a network.

It's configuration includes two components.

① Two routers.

② Application gateway.

Gateway: It is a protocol converter. It operates on all the seven layers of OSI model.



Answer to the Ques No. 8 (b)

Described Data Communication and Computer Network

It is any device that is source of or destination for binary digital data. At physical layer it can be a terminal computer.

→ What do you mean by Data terminal Equipment?

Ans to the Ques No. 8 (c)

Briefly describe client-server model

Two remote application processes can communicate mainly in two different fashions:

- Peer-to-peer: Both remote processes are executing at same level and they exchange data using some shared resource.
- client-server: One remote process acts as a client and requests some resource from another appi application process acting as server.

In client-server model, any process can act as server or client. It is not the type of machine, size of

which makes the machine or its computing power available for serving request if it's server. It is the ability of a machine to work as a server.

that makes a machine a server.

Communication:

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

- Sockets.
- Remote Procedure calls (RPC)

When server takes address of client and sends message to client. Client sends back message to server. This is a two way communication between client and server.

HTTP protocol works on port 80. It is a two way communication between client and server. It is used to transfer files from server to client.