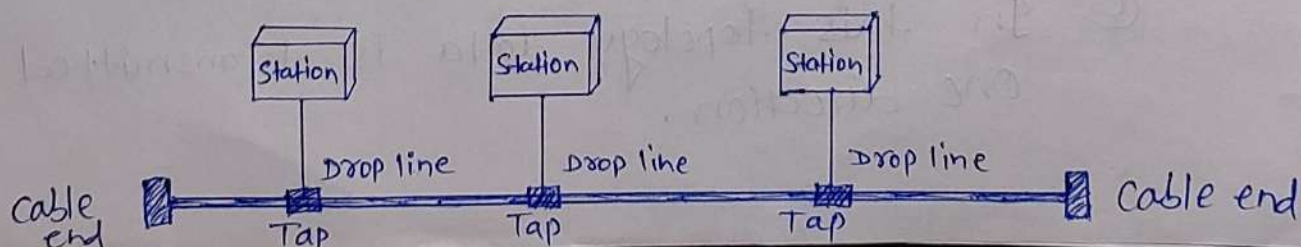① Explain four basic network topologies, and cite
Advantages and disadvantages of each type.
For each of the following four networks, discuss
the consequences if a connection fails.
  ⓐ Five devices arranged in a mesh topology
  ⓑ Five devices arranged in a star topology (not counting Hub)
  ⓒ Five devices arranged in a bus topology
  ⓓ Five devices arranged in a ring topology.

Ans:- The physical arrangement of the computer
System /node, which is connected to each
other via Communication medium is called
topology. The explanation of four basic network
and its adv. and disadvantages of each
are given below :-

(i) <u>Bus Topology</u> :- In Bus topology, one
long cable acts as a single communication
channel and all the devices are connected
to this cable.

Advantages :—

(a) Easy to add / Remove nodes in a network.

(b) Required only cable,

(c) It is less expensive.

(d) It broadcast the massages to each device which are connected through the cable.

(e) It is easy to maintain.

(f) In case of any device/computer failure, there will be no effect on other devices.

Disadvantages :—

(a) If cable is fail then entire network will be failed.

(b) The massages are broadcast so, we can't send private massages.

(c) It takes more time to pass the massages from one place to another place.

(d) The length of the cable limited.

(e) In this topology data is transmitted only one direction.

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(ii) <u>Ring topology</u> :— It is called ring topology because it forms a ring. In this topology each node is strongly connected with its adjacent node.
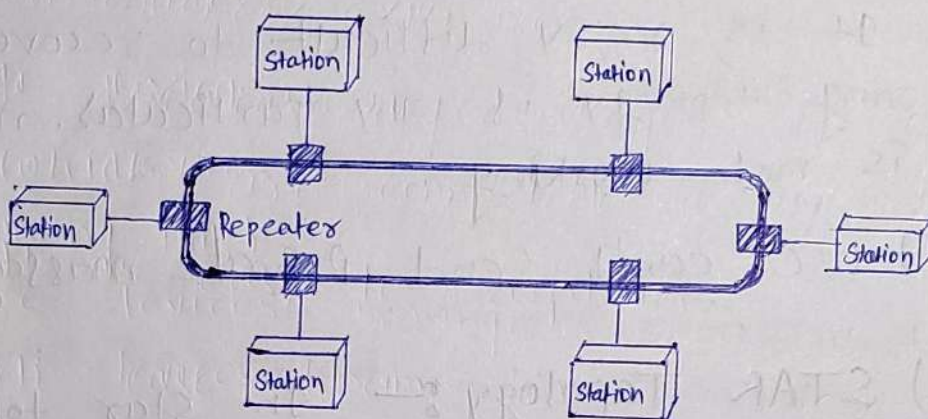
<u>Advantages</u> :—

(a) It forms strong network.

(b) Each and every node can share data with another node connected through a ring topology.

(C) Transmission rate of data is very speed.

(d) The data send ring topology will be broadcast.

<u>Disadvantages</u> :—

(a) It is very difficult task to add some new computer.

(b) If we want to send data from a source to ~~destributi~~ destination machine

then data will un-necessary passed to all nodes.

(c) single node point is failure that means all network system goes down.

(d) It is very difficult to recover the ring topology if any particular machine is not working.

(e) We can't send private massages.

(iii) <u>STAR Topology</u> :— In star topology all the nodes are connected with central device called HUB. And sharing data is only possible through HUB.
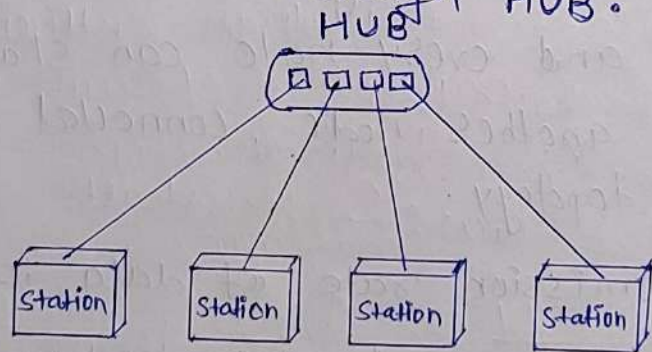
Advantages :-

(a) It broadcast the massages.

(b) It is less expensive due to less cable.

(c) Easy to connect new node/station without affecting rest of the network.
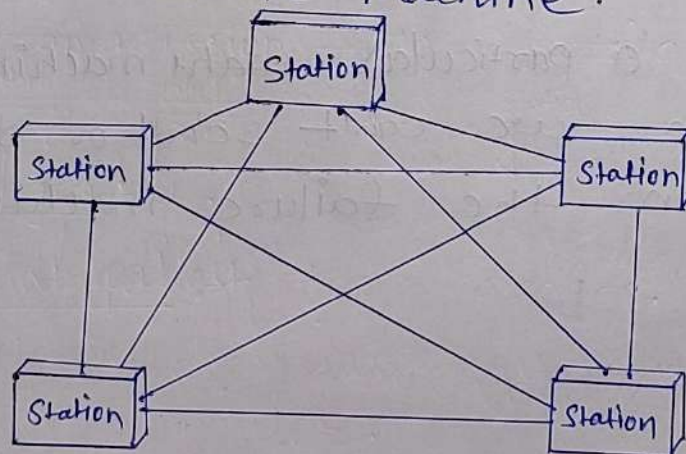
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(d) If one node/station is failed, then it
     coould not be failure of entire network.

Disadvantages :-

(a) In Star topology we must required
     a network devices like HUB, switch etc.

(b) If two nodes want to share the data,
     sharing is only possible through HUB.

(c) If HUB is failed the entire network
     will be failed.

(d) We can't send private data.

(iv) MESH Topology :- In this topology each an
      every computer is directly connected with
      each-other, so we directly send the data
      to the destination machine without going
      to intermediate machine.

Advantage :-

(a) It is very good topology to send the private messages.

(b) All nodes are directly ~~connected~~ associated with another node so, it provide point-to-point connection.

(c) Un-like ring topology, if a particular machine is failed then entire network will not fail.

(d) Miltiple devices can send or recieve data simultaneously.

Disadvantage :-

(a) It is very difficult to ~~each~~ add some new node because each ~~an~~ and every computer directly connected with another one.

(b) If a particular ~~mahu~~ machine not working then, we can't send or recieve data from the failure machine.

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For each of the following four networks, discuss the consequences if a connection fails.
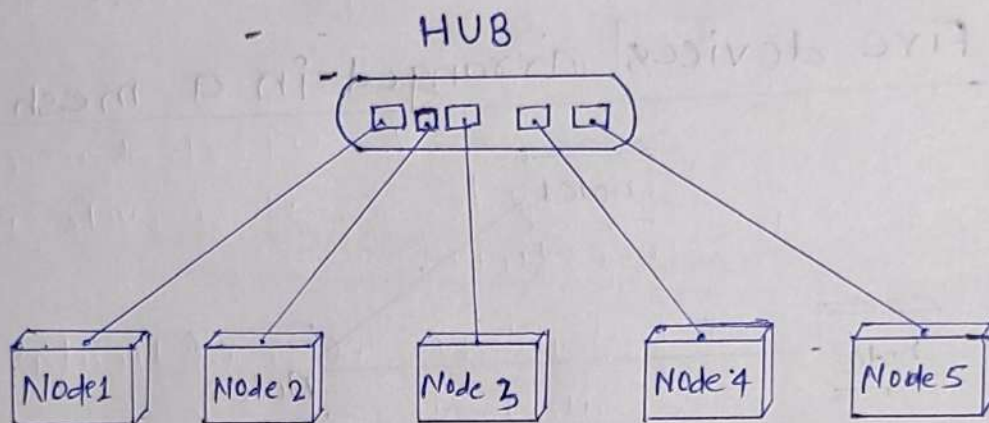
(a) <u>Five devices arranged in a mesh topology.</u>
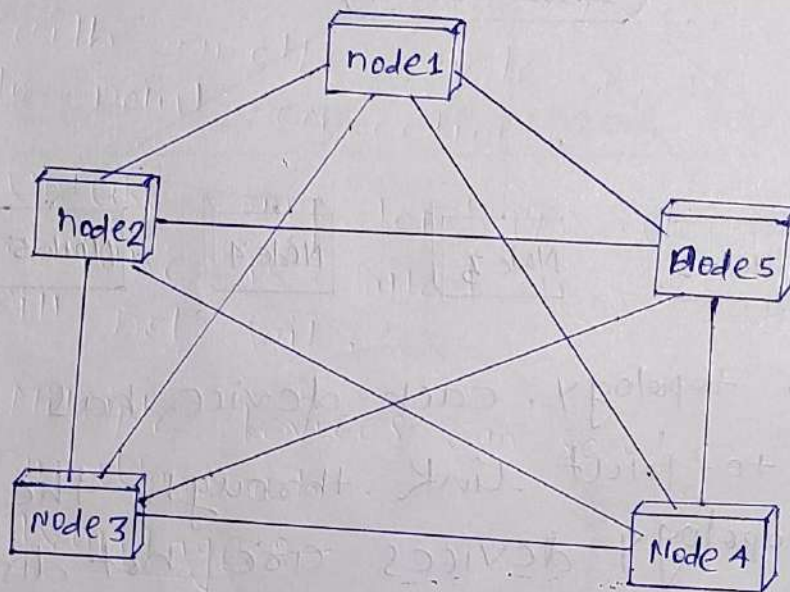
In mesh topology, Each and every node directly connected with another node so, if a connection is fails then entire network system will not be fail. for example node1 conneted to each of nodes so, if connection between node1 and node2 fail then entire network system will not be fails. Because nodes are conneted point-to-link.
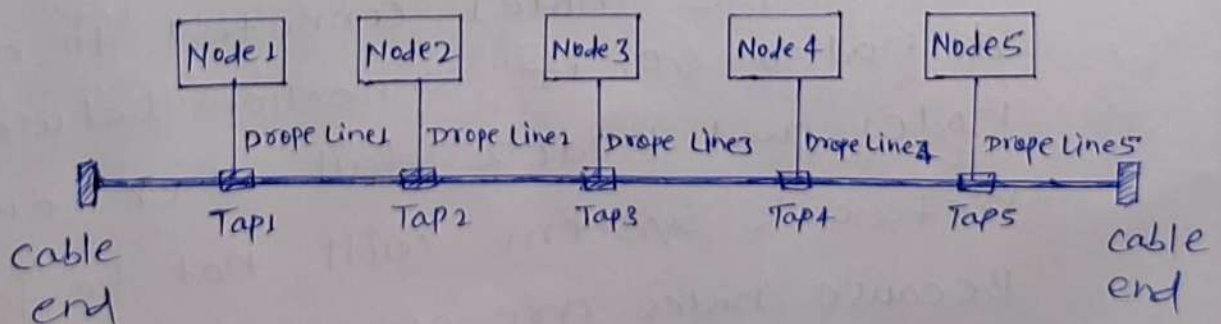
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ⓑ Five devices arranged in a star topology (not counting the HUB)

HUB

Node1 Node 2 Node 3 Node 4 Node 5

In star topology, each device has a dedicated point-to-point link through the HUB. In this topology devices are not diretly connected to one another. So, if a connection is fail then entire network will not be fails.

ⓒ Five devices arranged in a bus topology

Node 1   Node2   Node 3   Node 4   Node5

Drope Line1 Drope Line2 Drope Line3 Drope Line4 Drope Line5

Tap1   Tap 2   Tap3   Top4   Taps

cable end   cable end

In BUB Topology, one long cable acts as a
single communication channel and all the
devices are connected to this cable
through the drop line. So, if a connection
is fail then entire network is not
fails.

(d) **Five devices arranged in a ring topology.**
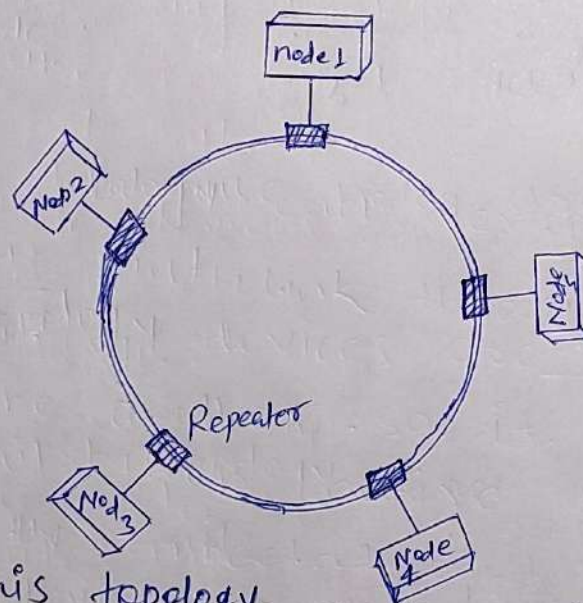
In this topology each node is strongly
conneted with it adjacent node and
making ring so, if a connection is
fail then entire network of ring
topology is fail.

(2) How does information get passed from one layer to the next layer in Internet model? What are headers and trailers, and how do they get added and removed? With the help of examples explain the connection concerns of the physical layer, data link layer, network layer, transport layer and application layers in the Internet model.?

Ans:-

~~In Internet model only Application layer supports~~

This defines Internet Model which contains four layered architecture. OSI model is genal 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:—
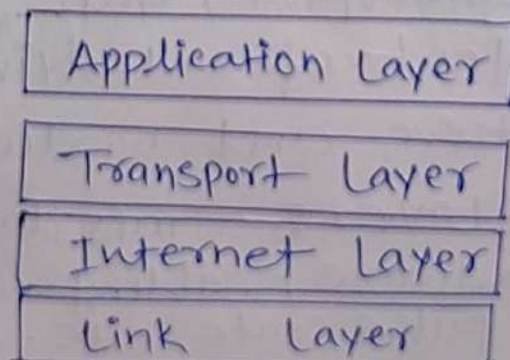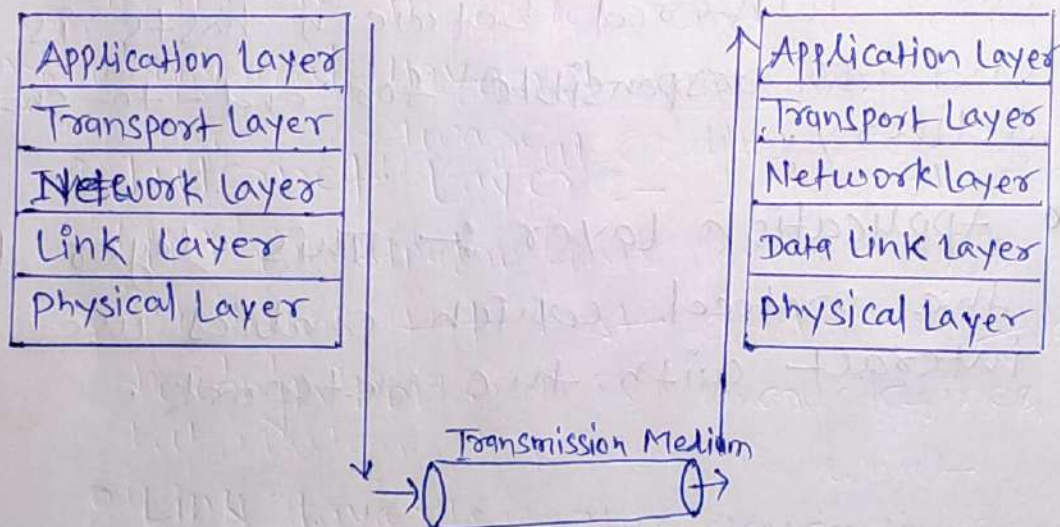
Application Layer

Transport Layer

Internet Layer

Link   Layer

physical layer

- **Application Layer :-** This layer defines the protocol which eanables user to interact with the network. For example, FTP, HTTP etc.

- **Tranport 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.

- **Internet Layer :-** Internet protocol (IP) works on this layer. This layer facilities host addressing and recongnition. This layer defines routing.

- **Link Layer :-** This layer provides mechanism of sending and receiving actul data. Unlike its OS model counterpart, this layer is independent of underlying network architecture and hardware.

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

Additional information wrapped with the
data unit at each layer. Usually, a trailer
is added at data link layer. Header
and trailer contain information such as
Source / destination address, control bits,
error correction bits etc. These extra
bits are added at the layer at sender's
side, and removed at the corresponding
layer at receive's side.

Application Layer
Transport Layer
Network layer
Link Layer
Physical Layer

Application Layer
Transport Layer
Network layer
Data Link Layer
Physical Layer

Transmission Medium

→◯────────◯→

• Application layer :- This layer defines
   the protocol which take the packet
   and send data link layer.

• Data Link Layer :- This layer provides
   ~~Sending the packet~~ receiving packet
   and sending to the Network layer

- **Internet Layer :-** In this layer, IP protocol work on the packet and host addressing and recognition the on the packet and sent to the Transport Layer.

- **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 responsible for end-to-end delivery.

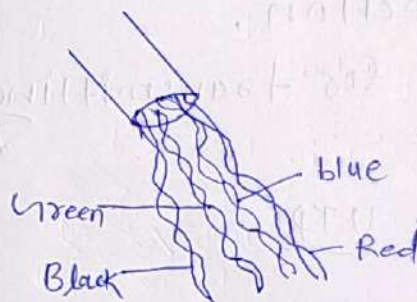- **Application layer :-** This layer defined the protocol which enables user to interact with the network.

③ Explain working of the following networking medium / devices with the help of supporting diagrams.

    (a) UTP cable

    (b) Router

Ans:- (a) UTP cable

UTP cable

UTP stand for unshielded Twisted Pair cable. It used in computer and telecommunications medius. Its frequency range is suitable for transmitting both data voice via a UTP cable. Therefore, it is widely used in the telephone, computers etc. It is a pair of insulated copper wires twisted together to reduce noise generated by external interference. It is a wire with no additional shielding, like aluminium foil, to protect its data from the exterior.
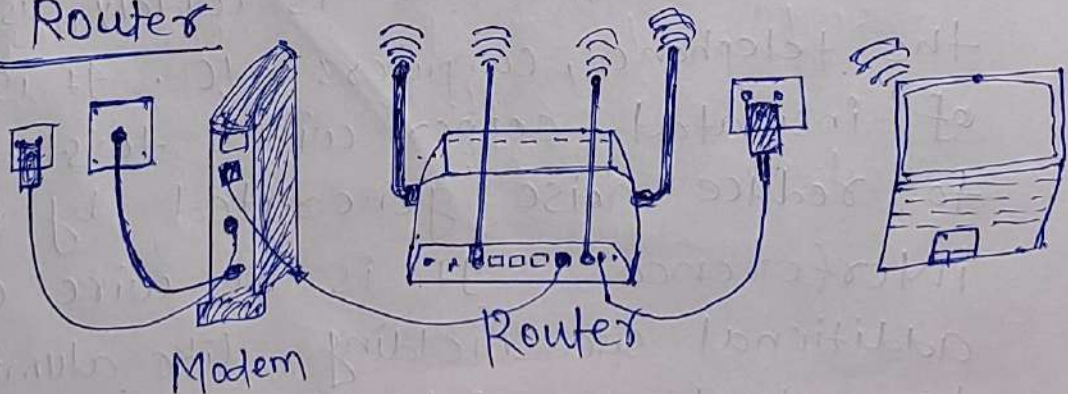
Advantages of the UTP

(1) It is less expensive.

(2) It is desinged to reduce noise.

(3) Its size is small and hence installation is easier.

(4) It is mostly useful for short distance network connection.

(5) It is suitable for transmitting data and voice.

Disadvantages of UTP

(1) Maximum length segment up to 100 meters.

(2) It has limited bandwith bandwith for transmission the data.

(3) It does not provide private a secure connetion for data transmitting over the network.

(b) **Router**

Modem   Router

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Router is physical internetworking device that is designed to recive, analyze and forward data packets between computer networks. A router examines a destination IP address of given packet, and it uses the headers and forwarding tables to decide the best way to transfer the packets.

Routers use a modem such as a cable, fiber, to allow communication between Other devices and the Internet. Most of the routers have several ports to connect different devices to the internet at the same time. it uses the routing tables to determine where to send data and from where the traffing is coming. A routing table mainly defines the default path used the router.

Advantage of Router

① It provides connetion between differat network architecture such as Ethernet

② It can Choose best path using dynamic algorithm.

③ It can reduce network traffic.

④ It provides sophisticated routing, flow control and traffic Isolation.

⑤ They are configurable which allows the network managers to make policies.

Disadvantage

① They operate based routable network protocols

② They are expensive.

③ Less bandwith for user data.

④ They are slower as they need analyze data from layer-1 through layer-3.