

MODEL TEST PAPER

SUBJECT CODE - EL-308

BRANCH: ELECTRONICS

YEAR: III

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Ques. 1

Write a short note on PSTN.

Ans. 1

PSTN stands for Public Switched Telephone Network. It is also referred to as Plain Old Telephone System (POTS). The switching technique used in PSTN is circuit switching.

In a cellular system, a cell is a local area of coverage served by a base station. These base stations are connected to an MSC.

∴ communication may occur over multiple such MSCs, the MSCs provide connectivity between the PSTN and multiple base stations.

PSTN forms the global telecommunications grid which connects conventional (landline) telephone switching centres (called central offices or exchanges) with MSCs throughout the world.

A typical MSC is responsible for connecting around 100 base stations to the PSTN. The information transfer in PSTN takes place over landline trunked lines (trunks) comprised of fiber optic cables, microwave links and satellite links.

In PSTN, each city or a geographical grouping of towns is called a local access and transport area (LATA). The various nearby LATAs are connected by a local exchange carrier (LEC).

PSTN consists of the following hierarchy:
Local networks, which connect subscribers and local exchanges. Function Networks, which connect a group

of local exchanges serving an area and a trunk exchange.
Trunk network, which provides long distance connections nation and internationally.

A PSTN number comprises of;

- ↳ An international access code / exit code (IAC)
- ↳ A country code (CC)
- ↳ A national destination code also known as an areacode (NDC/AC)
- ↳ A subscriber number (SN)

$$\boxed{\text{IAC}} + \boxed{\text{CC}} + \boxed{\text{NDC}} + \boxed{\text{SN}}$$

Maximum length of a number is 15 digits.

Ques. 2 With the help of suitable diagrams, explain different LAN topologies.

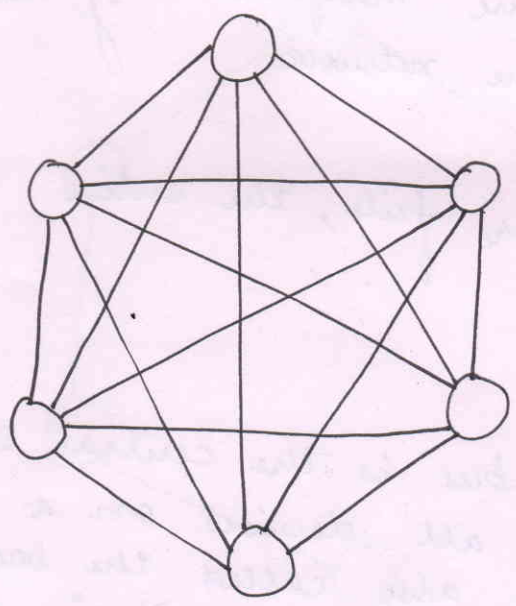
Ans. 2 Network Topology refers to the layout of a network and how different nodes in a network are connected to each other and how they communicate. Topologies are either physical or logical (the way that the data passes through the network from one device to the next).

Following are the five most common LAN topologies:

- a) Mesh Topology
- b) Star Topology
- c) Bus Topology
- d) Ring Topology
- e) Tree Topology

(a) Mesh Topology:

In a Mesh network, devices are connected with many redundant interconnections between network nodes. In a mesh topology, every node has a connection to every other node in the network.

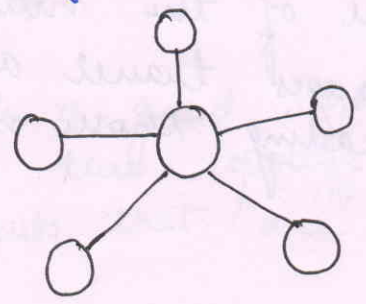


Two types of Mesh Topologies are there:

(i) Full Mesh Topology: It occurs when every node has a circuit connecting it to every other node in a network. It yields the greatest amount of redundancy, so in the event of failure of any one of the nodes, network traffic can be directed to any of the other nodes. Full mesh is usually reserved for backbone networks.

(ii) Partial Mesh Topology: With partial mesh, some nodes are organized in a full mesh scheme but others are only connected to one or two in the network. It is less expensive and has less redundancy.

(b) Star Topology: In a star network devices are connected to a central computer called a hub. Nodes communicate across the network by passing data through the hub.



Main advantage:

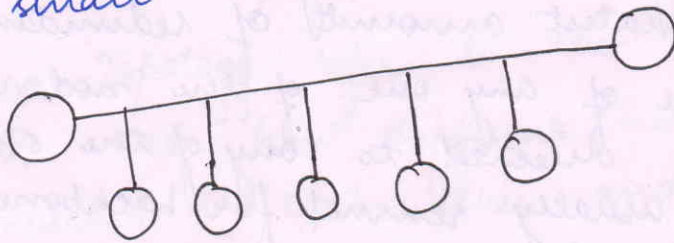
In a star network, one malfunctioning node doesn't affect the rest of the network.

Main disadvantage:

If the central computer fails, the entire network becomes unusable.

(C) Bus Topology

In networking a bus is the central cable, the main wire, that connects all devices on a local area network (LAN). It is also called the backbone. This is often used to describe the main network connections composing the internet. Bus networks are relatively inexpensive and easy to install for small networks.



Main advantage:

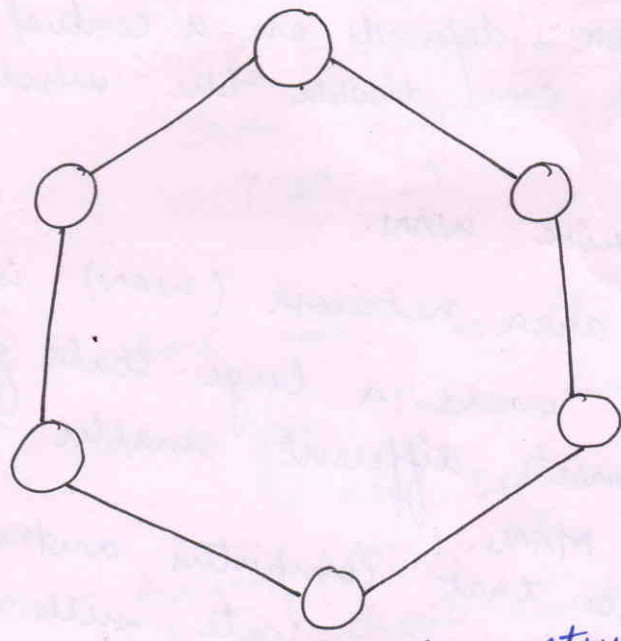
It's easy to connect a computer or device and typically it requires less cable than a star topology.

Main disadvantage:

The entire network shuts down if there is a break in the main wire and it can be difficult to identify the problem if the network shuts down.

(d) Ring Topology:

In ring topology, all of the nodes are connected in a closed loop. Messages travel around the ring, with each node reading those messages addressed to it.

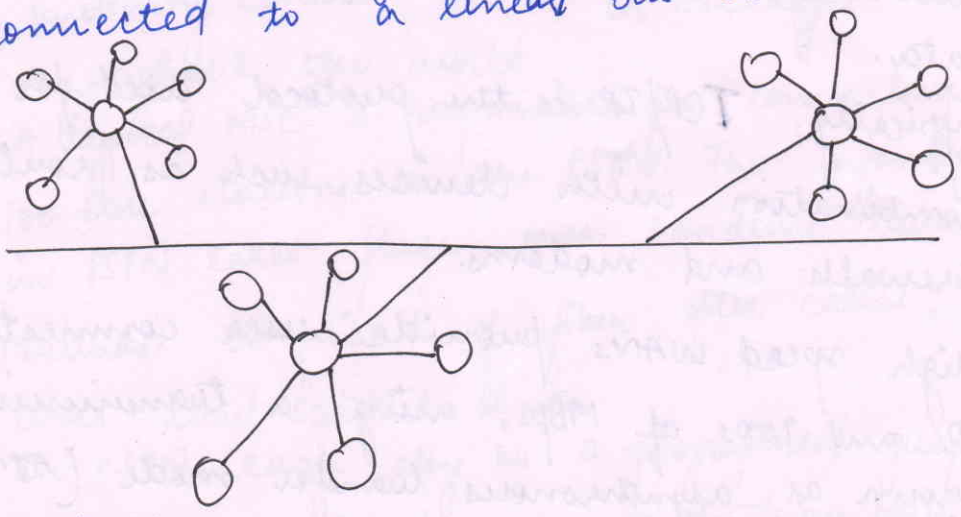


One main advantage to a ring network is that it can span larger distances than other type of networks, such as bus networks, because each node regenerates messages as they pass through it.

(e) Tree Topology

This is a hybrid topology that combines characteristics of linear bus and star topologies.

In a tree network, groups of star configured networks are connected to a linear bus backbone cable.



Main advantage:

A tree topology is a good choice for large computer networks as the tree topology divides the whole network into parts that are more easily manageable.

Main disadvantage:

The entire network depends on a central hub and a failure of the central hub can disable the whole network.

Ques. 3 Briefly describe WAN.

Ans. 3 A wide area network (WAN) is a network that exists over a large-scale geographical area. A WAN connects different smaller networks, including LANs and MANs.

This ensures that computers and users in one location can communicate with computers and users in other locations.

WAN implementation can be done either with the help of the public transmission system or a private network.

A WAN connects more than one LAN and is used for large geographical areas.

WANs are similar to a banking system, where hundreds of branches in different cities are connected with each other in order to share their official data.

Typically, TCP/IP is the protocol used for a WAN in combination with devices such as routers, switches, firewalls and modems.

High speed WANs provide user connections in the 10s and 100s of Mbps, using a transmission technique known as asynchronous transfer mode (ATM).

