

Question no: 01

1. (a) What is PSTN?
- (b) Classified Telecommunication network system.
- (c) Describe subscriber Loop System.

Question no: 02

2. Define
(a) Describe Trunk Lines and Trunk Groups.
(b) Describe Mesh Topology.
(c) Describe Hierarchical topology with figure.

Question no : 03

3. a) What are the methods of routing on particular connection?
- b) Explain Transmission Systems.
- c) Describe types of numbering plans.

Question no : 04

4. a) What are the forms of signaling in telecommunication network?
- b) Describes types of signaling Techniques.
- c) What are the parts of private branch exchange (PBX) ?

Question no: 05

5. a) What is Telecommunication?
- b) What are the basic principles of various topics in telecom engineering?
- c) Describe some of future hold of telecom engineering.

Question no: 06

6. a) Define C/I ratio.
- b) Describe fading.
- c) Explain cellular structure.

Question no: 7

7. a) Define Registration.

b) Describe types of Registration.

c) Explain Roaming.

Question no: 08

8. a) Define Hand-off.

b) Explain Multi access method.

c) What are the steps process of call initiation from mobile?

Ans to the question no: 1(a)

The public switched Telephone network is understood as an aggregate of world's circuit switched telephone networks, used for providing public telecommunication. The PSTN networks are called Pots (Plain old Telephone Systems).

Ans to the question no: 1(b)

Classification of telecommunication network:-

Any telecommunication network may be viewed as consisting of the following major systems,

1. subscriber end instruments or equipments
2. Subscriber Loop systems.
3. Switching system.
4. Transmission system
5. signaling system.

Ans to the question no: 1(c)

Subscriber Loop Systems

In a general telephone network, every subscriber has two dedicated lines connecting to the nearest switching exchange which is called the loop lines of the subscriber. The laying lines to the subscriber premises from the exchange office is called cabling. As it is difficult to run cables from each subscriber's premises to the exchange which the drop wires are taken to a distribution point. The drop wires are connected to wire pairs from group to station.

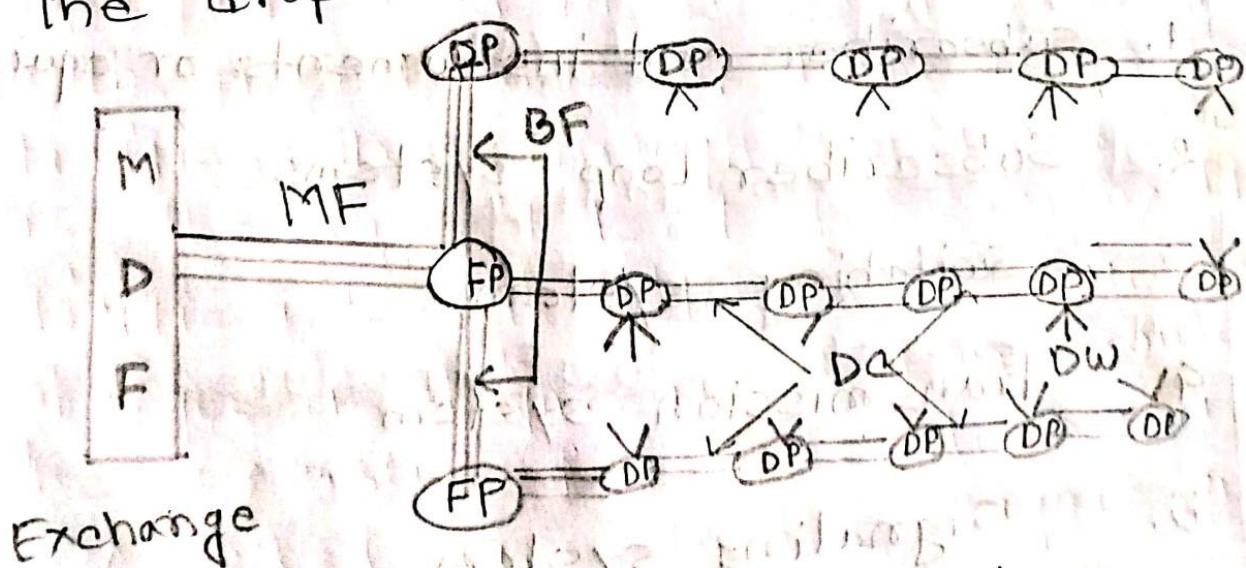


fig: Subscriber loop System

Ans to the question no: 2(a)

Trunk Lines:

The interconnectivity of calls between different areas having different exchanges is done with whom is called Trunk Lines between the exchange.

Trunk Groups:

The group of trunk lines that are used to interconnect different exchanges are called the trunk groups.

Ans to the question no: 2(b)

Mesh Topology:

Mesh topology as the name implies is a fully connected network. The number of trunk groups in a mesh network is proportional to the exchanges being interconnected. Hence, these mesh topologies are widely used in metropolitan areas where there is heavy traffic.

The following figure shows how a mesh topology looks like.

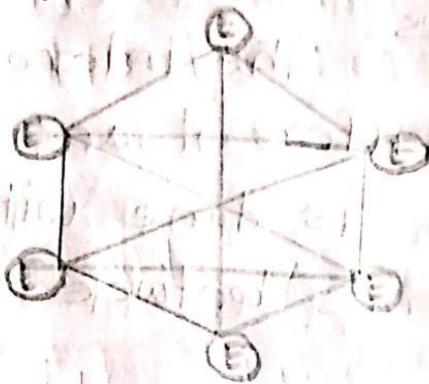
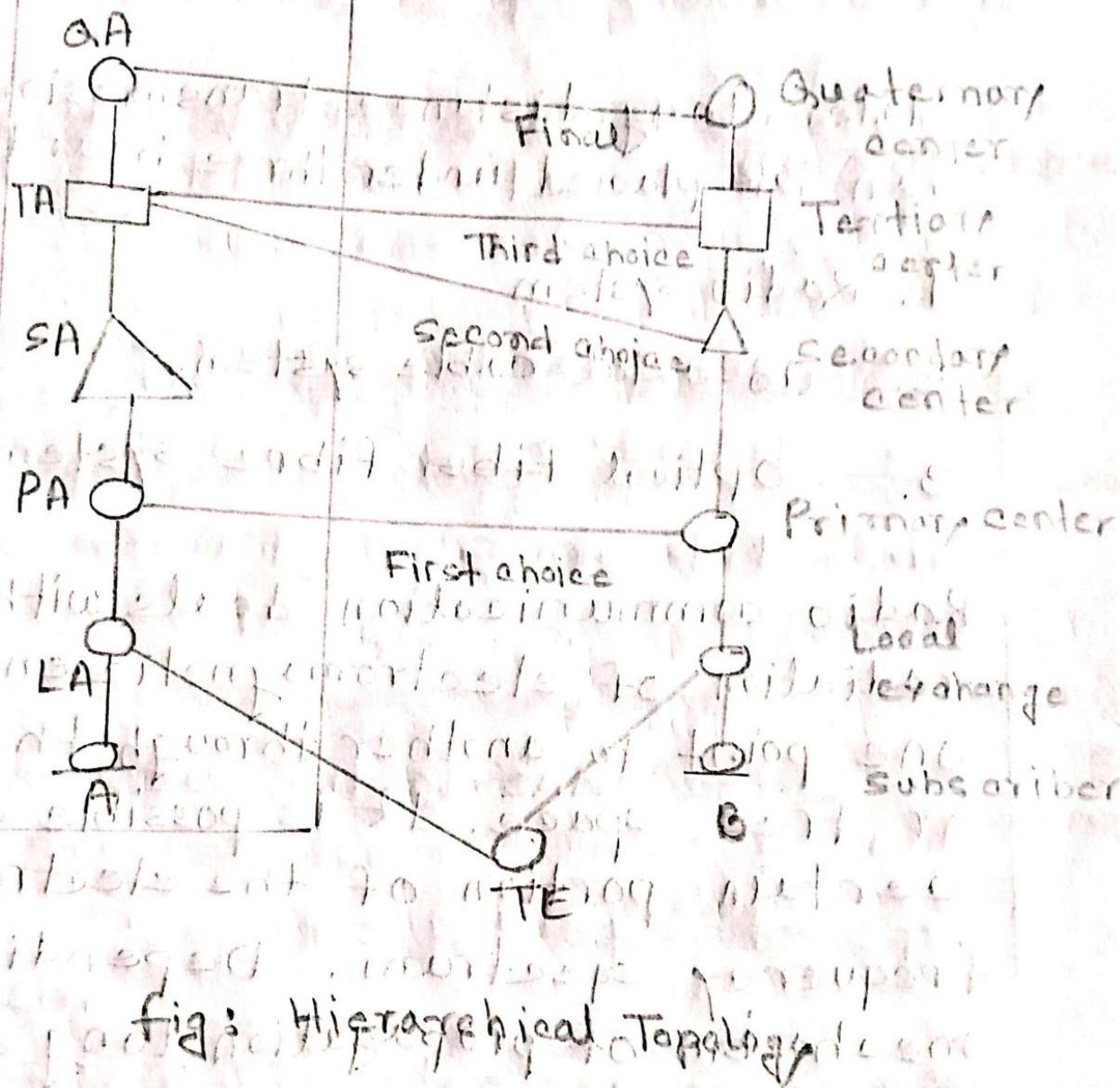


fig: Mesh Topology

Ans to the question no: 2(c)

Hierarchical Topology:

The hierarchical topology is used to handle heavy traffic with minimal number of trunk groups. The traffic follows through the final route which is the highest level of hierarchy. If the traffic intensity between any pair of end changes is high, direct trunk routes may be established between them as indicated by dashed lines in the figure given below,



Ans to the question no: 3(a)

To decide the routing on a particular connection, the following three methods are used

- (i) Right through routing.
- (ii) Own-exchange routing.
- (iii) Computer controlled routing.

Ans to the question no: 3(c)

Modern long distance transmission systems can be placed under three broad categories.

1. Radio system
2. Co-axial cable system.
3. Optical fibre systems.

Radio communication deals with electronic radiation of electromagnetic energy from one point to another through the atmosphere or free space. It is possible only in a certain portion of the electromagnetic frequency spectrum. Depending on the mechanism of propagation, long distance radio communication can be placed under four categories,

1. Sky wave or ionosphere communication
2. LOS microwave communication limited by horizon.
3. Tropospheric scatter communication.

Ans to the question no: 3(c)

Types of numbering plans:-

The plans are described in brief below,

- Open numbering plan :- This is also called the Non-Uniform Numbering plan and it permits wide variation in the number of digits.
- Semi-open numbering plan :- This plan permits number length to differ by almost one or two digits.
- Closed numbering plans :- This is also called the uniform Numbering plan where the number of digits in a subscriber number is fixed. This is also used in a few countries such as France, Belgium, Canada, Hawaii and in a few parts of USA.

Ans to the number: 4(a)

There are three forms of technique in signaling method involved in a telecommunication network,

- Subscriber Loop signaling
- Interexchange and register signaling
- Interchange and inter-register signalling.

Ans to the question no: 4(b)

Types of signaling Techniques

The signaling techniques are categorized into two, the In-channel signaling and common channel signaling. However, these are further divided into few types depending upon the frequencies and frequency techniques used.

The division as shown in the following figure.

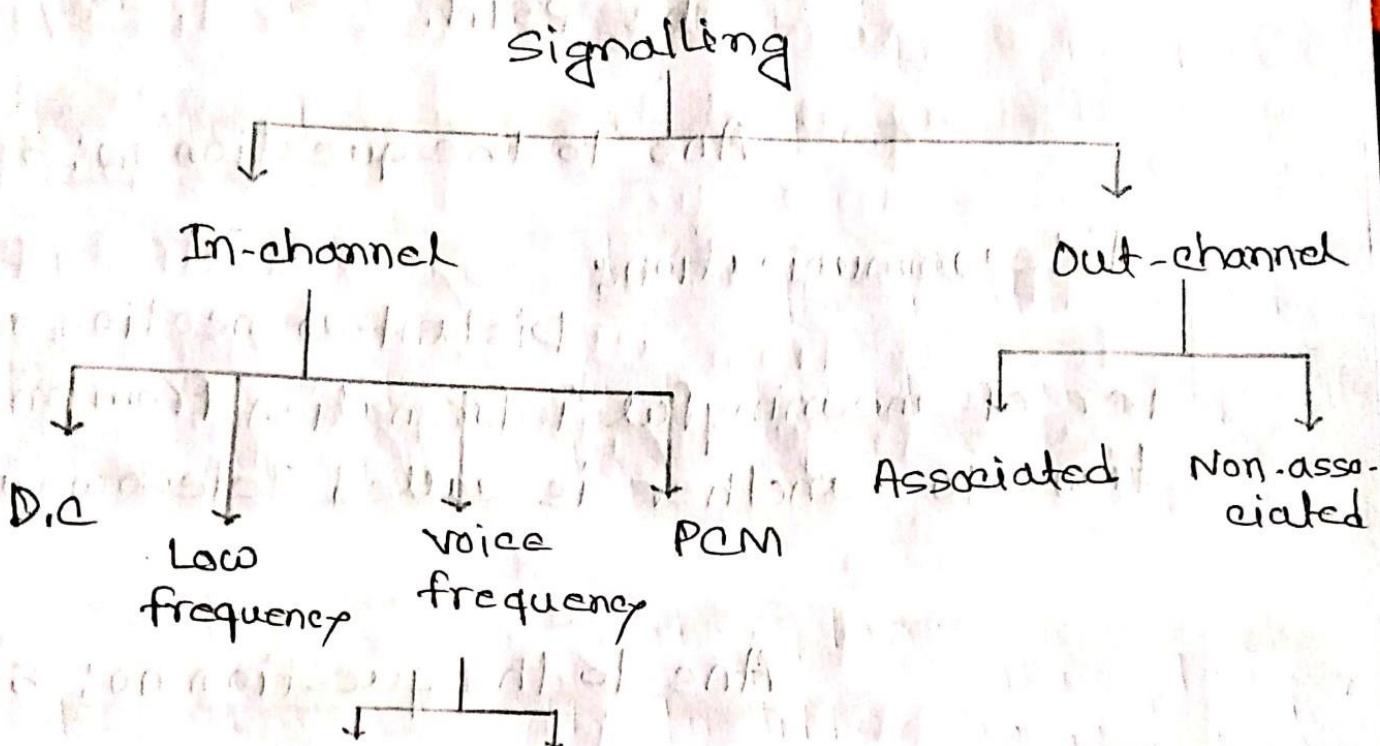


fig: Signaling Types Techniques

Ans to the question no: 4(c)

PBX: A PBX generally includes,

- A box, cabinet or closet that serves as a housing for the internal parts.
- Switchboard, console for operators to connect incoming and outgoing calls.

- Controller/computers for data processing
- Trunks or lines to connect the PBX with the PSTN.

Ans to the question no: 5(a)

Telecommunication:

Distant connection or transfer of meaningful information from one location to another is called Telecommunication.

Ans to the question no: 5(b)

P&F Principles of various topics in telecom,

- Optical networking
- Traffic engineering
- Telephony principles, digital coding of speech.
- Wireless, cellular
- Transmission system design, fiber optics
- Switching system
- Internet

Ans to the question no: 5(c)

Future holds of telecom,

- ① Expansion to the developing world.
- ② Machine to machine communication.
 - More machines than human.
 - Can exchange data more quickly.
 - Pervasive computing
 - Seamless human machine interface.
 - wearable computers
 - virtual reality
- ③ Convergence of telephone, TV, movies, Internet, storage and so on.
- ④ Future application such as Virtual reality, 3D holography, web agents, robots, weather prediction, telepresence and so on

Ans to the question no; 6(a)

The carrier to interference ratio, C/I of the signal at the mobile from the transmitter in a given cell, can be found in an approximate manner by summation of interference from all base stations using the same frequency, usually expressed in dB

$$\frac{C}{I} = \frac{R^{-n}}{\sum_{i=1}^m b_i^{-n}}$$

Ans to the question no; 6(b)

Fading:

During transmission from the base station to the mobile, the received power fluctuates. These factors are generalized into 3 main groups.

- Path loss (does not change in time)
 - it changes only with distance from transmitter.
 - there are also losses associated with frequency/size/height, etc.
- Long-term fading or shadowing
 - changes with mobile position.
- Short term fading (or small scale fading)
 - due to multiple paths of transmission arriving at the mobile at the same time.
 - If there are other paths that arrive with some delay, it is called multi path fading.

Ans to the question no; 6(c)

Cellular structure: Two parts as,

- MSC - mobile switching center (also called MTSO - mobile telephone switching office)
- PSTN - public switched telephone network



fig: cellular structure.

Ans to the question no: 7(a)

Registration:

Registration is the process of notifying the network that a phone is active on the system.

- When a phone is switched on, it registers by calling or signalling to the MSC via the base station on a set up or control channel.

Ans to the question no: 7(b)

There are two types of Registration as,

- Periodic registration - is when the phone announces itself on a regular basis.
- Forced registration - is when the phone monitors a control channel which provides information including the cell identification (i.e which cell are you in?).

- If the channel length fades below a threshold, the phone selects another channel.
- If the new channel has a new cell ID then the phone ~~reg~~ reregisters.

Ans to the question no: 7(c)

Roaming:

Roaming is when a phone is outside its home area or local region.

- If the phone registers outside its home area, the MSC contacts the phone's home area and confirms that the phone is okay.
- MSC then notifies home area of the phone's current location and provides instructions for routing incoming calls to the phone (and billing information, etc.)

Ans to the question no: 8(a)

Hand-off:

- (hard) as a mobile moves into a new cell, transmission to and from the current base station ceases, and communication with the new base station.

Ans to the question no: 8(b)

Multi access method:-

The manner in which radio resources are allocated into voice channels.

- FDMA (frequency division) - each voice channel is assigned a separate frequency.
- TDMA (time division) - each voice channel is assigned segments of time (slots). Mobile are commonly served in a round robin fashion.

- CDMA (code division) - each voice channel is assigned a specific code. At the receiver, the voice channels can be separated with minimal interference.

Ans. to the question no; 8(c)

Call initiation:

- mobile sends MIN and ESN
- BS passes to MSC; MSC verifies ESN and MIN pair.
- MSC tell BS to select used voice channel pair.
- BS selects voice channel pair; pages mobile and informs to move to those channels.
- Mobile receive page, verifies MIN and moves to specified channels.
- MSC connects PSTN with mobile (through BS).