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Assignment no: 01

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### Answer to the question no 1(a)

Q: What is Telecommunication?

③

Answer:

Telecommunications, also known as telcom, is the exchange of information over significant distances by electronic means, referring to all types of voice, data and video transmission. This is a broad term that includes a wide range of information-transmitting technologies.

②

data and video transmission. This is a broad term that includes a wide range of information-transmitting technologies and communications infrastructures, such as wired phones; mobile devices, such as cellphones; microwave communications; fiber optics; satellites; radio and television broadcasting; the internet, and telegraphs.

(a) OR Explain any two of the following:

Social significance of it today? (Q)  
Answer to the question no 1(b)

④

Q: Define Telecommunication network. What are the types of telecommunication network

⑥

Answer: Telecommunication Network:

Electronic system of links and switches and the controls that govern their operation, that allows for data transfer and exchange among multiple users.

When several users of telecommunications media wish to communicate with one another, they must be organized into some form of network. In theory, each user can be given a direct point-to-point link to all the other users in what known as a fully connected topology.

### Types of Networks:

#### i) Switched communications network:

A switched communications network transfer data from source to destination through a series of network nodes. Switching can be done in one of two ways: In a circuit-switched network and in a connection-oriented transmission scheme.

#### ii) Broadcast network:

A broadcast network avoids the complex routing procedures of a switched

network by ensuring that each node's transmissions are received by all other nodes in the network. Therefore, a broadcast network has only one single communications channel.

Answer to the question no 1(c)

Q: Describe switching system in telecommunication. (5)

Answer:

Switching is the method that is used to establish connections between nodes within a network. Once a connection has been made, information can be sent. Telephone switching usually refers to the switching of voice channels.

There are a number of different types of switches including local switches, tandem switches and transit switches and any of them can play a

part in creating connection.

### Local switch:

This provides switching for a specific area. Subscriber Loops connect to the local switch in that area.

### Tandem switch:

This is used to interconnect switches at various sites within the network.

### Transit switch:

This is very similar to a tandem switch, except it is used for long-distance connections.

In order to carry out functions, switches need computing power. In the past this was a manual process which involved a human operator who would physically switch a call. In modern switching systems, integrated software has a wide-range of capabilities and services they can provide without the need for human interaction.

Answer to the question no 2(a)

Q; What do you mean by folded network (8)

Answer:

### Folded Network:

When the number of inlets is equal to the number of outlets for a switching network, such a network is called the Symmetric network. A network where the outlets are connected to the inlets, is called the Folded Network.

In a Folded Network, the  $N$  number of inlets come as outlets are again folded back to the inlets. Nevertheless, the switching network provides connections to the inlets and outlets as per the requirement.

Answer the question no 2(b)

Q: Explain differences between folded and non-folded network?

Answer:

Folded network?

- i Local call connection among two subscribers in the system.
- ii Outgoing call connection among a subscriber and an outgoing trunk.
- iii Incoming call connection among an incoming trunk and a local subscriber.
- iv Transit calls connection among an incoming trunk and outgoing trunk.

Non-Folded Network:

In a switching network, every inlet/outlet connection may be utilized for inter exchange transmission. In this case, the exchange does not assist local subscribers.

(8)

and is termed as a transit exchange. A switching network of this type is demonstrated in figure and is termed as a non-folded network. In non-folded network along with  $N$  inlets and  $N$  outlets,  $N$  simultaneous information transfers are possible. Therefore, for a non-folded network to be non-blocking, the network must support  $N$  simultaneous switching paths.

Answer to the question no 2(c)

Q: What is the functions of blocking networks?

Answer:

- (i) A network that has fewer transmission paths than could be required if all users were to communicate simultaneously.

- ii) It is used to reduce equipment requirements,
  - iii) It is used because not all users require service simultaneously, and
  - iv) Blocking network makes use of certain statistical distributions that apply to the patterns of user communications demand.
- Therefore, certain events that encourage simultaneous use often cause blocking networks to become saturated. The high traffic capacity of fibre optic transmission systems tends to eliminate blocking networks.

## Answer to the question no 3(a)

Q: What do you mean by switching system? What are the classification of switching system? (7)

Answer:

### switching system:

Switching is the method that is used to establish connections between nodes within a network. Once a connection has been made, information can be sent. Telephone switching usually refers to the switching of voice channels.

### Classification of switching system:

In the early stages of telecommunication systems, the process and stages of switching, played an important role to make or break connections. At the initial

stages; the switching systems were operated manually. These systems were later automated. The flowing flowchart shows how the switching systems were classified.

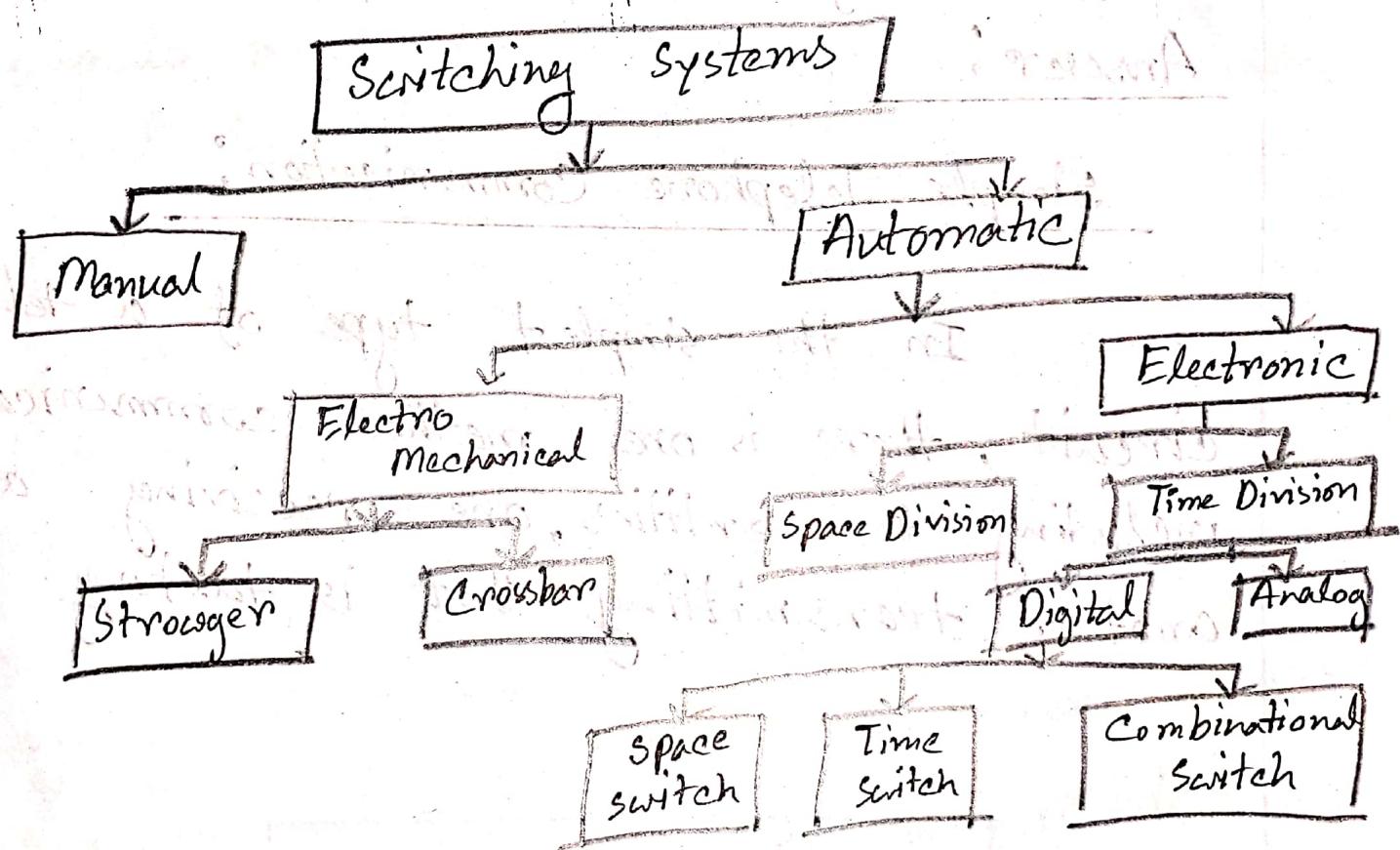


fig: Classification of switching System

The switching systems in the early stages were operated manually. To minimize the disadvantages of manual operation, automatic switching systems were introduced.

Answer to the question no 3(b)

Q: Explain simple telephone communication system & with circuit and equation of current flow in microphone?

Answer:

### Simple Telephone Communication:

In the simplest type of a telephone circuit, there is one method of communication including two entities, one receiving and another transmitting that is talking.

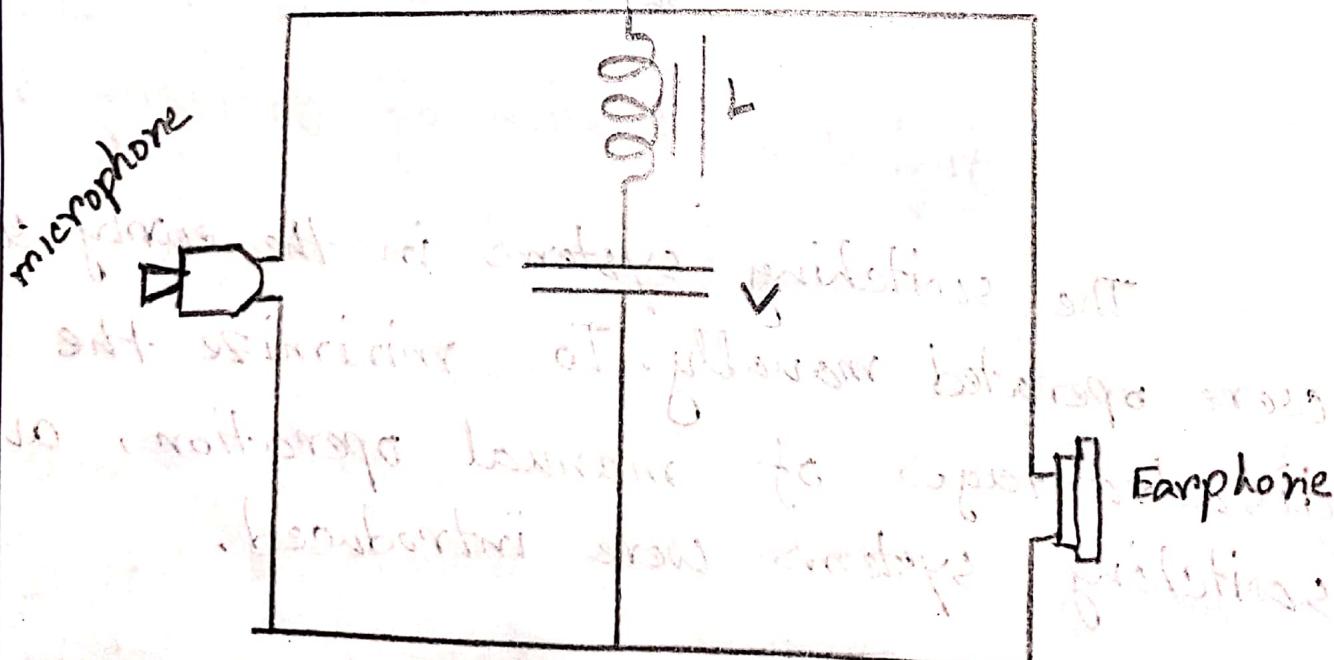


fig: A Simple telephone circuit

The earphone and microphone are the transducer components of the telephone communication system. The earphone converts the electrical signals in audio signals and microphone converts speech signals to electrical signals. Most usually used microphone is carbon microphone. Carbon microphones do not generate high fidelity signals, but provide out strong electrical signals for acceptable quality levels for telephone conversation. A certain quantity of small carbon granules is placed in a box, in carbon microphones. Carbon granules conduct electrically and the resistance offered through them is dependent on the density with that they are packed. The carbon granule microphone functions as a modulator of the direct current  $I$  that is analogous to the carrier wave in AM system.

Answer to the question no 5(a)

Q: Describe the internal mechanism of dial telephone? (6)

Answer:

A dial telephone was a popular type of phone design throughout the 20th century. This communication device dials numbers in a very different way to the more modern push-button system we're familiar with today.

The dial works on a pulse-based system. The frequency of pulses is determined by the number on the dial which the caller selects, with the user manually turning the dial to a fixed point with their finger before releasing it. This causes the dial to return to its

starting position. due to an internal recoil spring, while simultaneously generating a series of electrical pulses that interrupt the flow of current on the telephone's line. These pulses correspond to the digit selected, so if the user rotates the dial from, say, 57, then seven pulses will be sent down the line to the switching office.

Inside the body of the phone a centrifugal governor ensures that the dial's rotation is moderated to a constant rate, with a shaft on the governor turning a cam that opens and closes a switch contact. If the contact is open, the line's current is stopped from flowing, thereby creating a dial pulse, while when closed, there is a constant flow of current.

Answer to the question no 4(b).

Q: Evaluate the features of crossbar switching.

Answer

The crossbar switching system uses the common control networks which enable the switching network to perform event monitoring, call processing, charging, operation and maintenance, as such as,

- i) While processing a call, the common control system helps in the sharing of resources,
- ii) the specific route functions of call processing are hardwired because of the wire logic computers.
- iii) The flexible system design helps in the appropriate ratio selection is allocated for a specific switch.

iv) Fewer moving parts ease the maintenance of crossbar switching systems.

Answer to the question no 5(a)

Q: Describe about transfer line support? (7)

Answer:

Both of the blocking and non-blocking type crossbar switches can support transfer lines. This is done by introducing additional vertical crossbars and crosspoint switches.

There are two methods to introduce additional vertical crossbars and crosspoint switches,

i) internal non-blocking and external blocking,

ii) Blocking both local and external.

The internal non-blocking and external blocking method is as shown in the figure below,

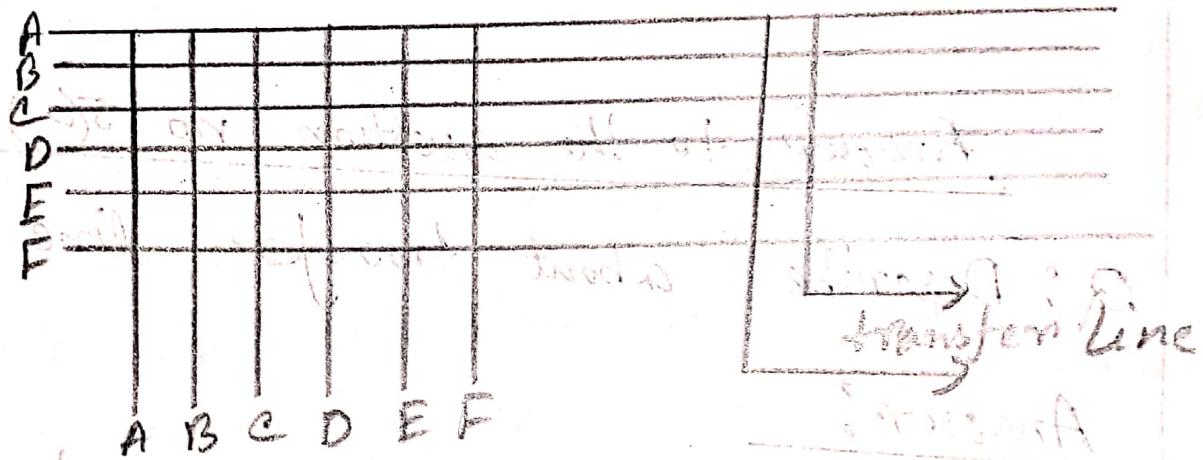


Fig: Internal Non-blocking

The switch shown in internal non-blocking has two transfer lines. The number of crosspoint switches in this case is  $N(N+L)$ , where  $N$  is  $N$  the number of subscribers,  $L$  is the number of transfer lines.

Answer to the question no: 5(b)

Q: Describe the external blocking method of transfer line support? (7)

Answer:

The method of blocking both local and external is as shown in the figure below,

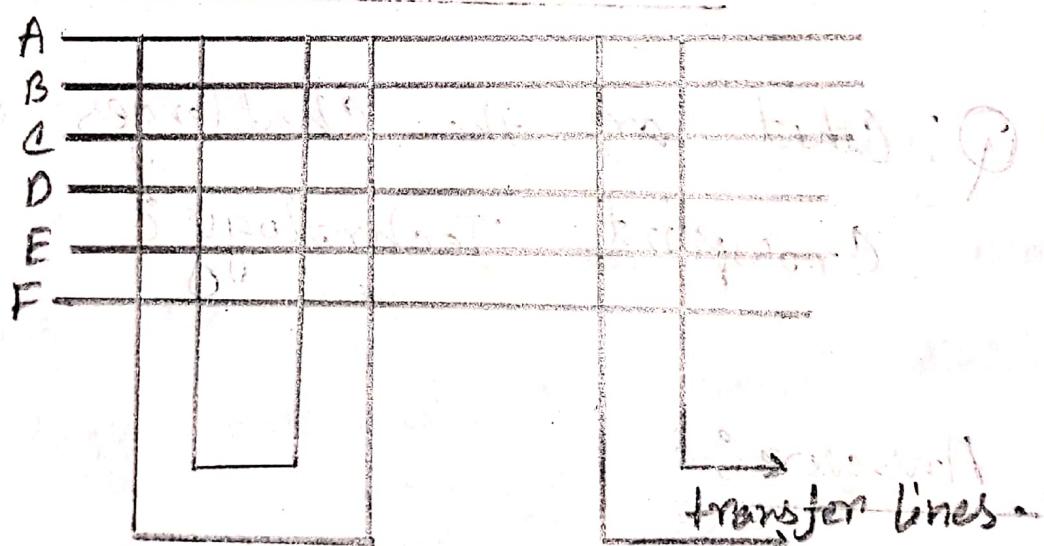


Fig: External blocking

The switch shown in the above figure is blocking both internally and externally with two simultaneous internal

and two simultaneous external calls. The number of crosspoint switches in this case is  $N(2K+L)$ , where  $N$  is the number of crosspoint switches,  $L$  is the number of transfer lines and  $K$  is the number of simultaneous calls that can be supported locally.

Answer to the question no: 6(a)

Q: What are the challenges of the crosspoint technology? ⑦

Answer:

The crossbar system mainly consists of crosspoint switches, which increases the cost of the system. The cost of the crossbar system increases

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in direct proportion to the number of crosspoint.

The challenges of crosspoint describe below,

- (i) Reduction in the size of a Crosspoint
- (ii) Reduction in the cost of a Crosspoint
- (iii) Improvisation of the switching

time.

In the process of finding solutions to the existing challenges, the crosspoint technology evolved. Crosspoint technology is an amalgamation of two related technologies. The technologies are -

=> Electro mechanical

=> Electronic.

Answer to the question no: 6(b).

Q: Describe about the call processing of a dial telephone. (3)

Answer:

A simplified organization of a Crossbar exchange is shown in the following figure.



fig: call processing

Answer to the question no: 6(c).

Q: Explain direct and indirect control switching systems.

Answer:

The switching systems are of the following two types.

### i) Direct Control:

The switching systems where the control sub-systems form an integral part of the network are called the direct control switching systems. For example the stronger switching systems.

### ii) Indirect Control:

The switching systems in which the control sub-system is present outside the switching network

is called the indirect control system.

For example, Crossbar switching system, Electronic switching system etc.

### Answer to the question no: 7(a)

Q: Write down the link-to-link layers.

Classify the routing algorithms using a diagram/flowchart. (5)

Answer: The layers are,

- i) Physical layer
- ii) Data link layer
- iii) Network layer
- iv) Transport layer
- v) Presentation layer
- vi) Application layer

The flowchart for classifying of routing algorithms is given below,

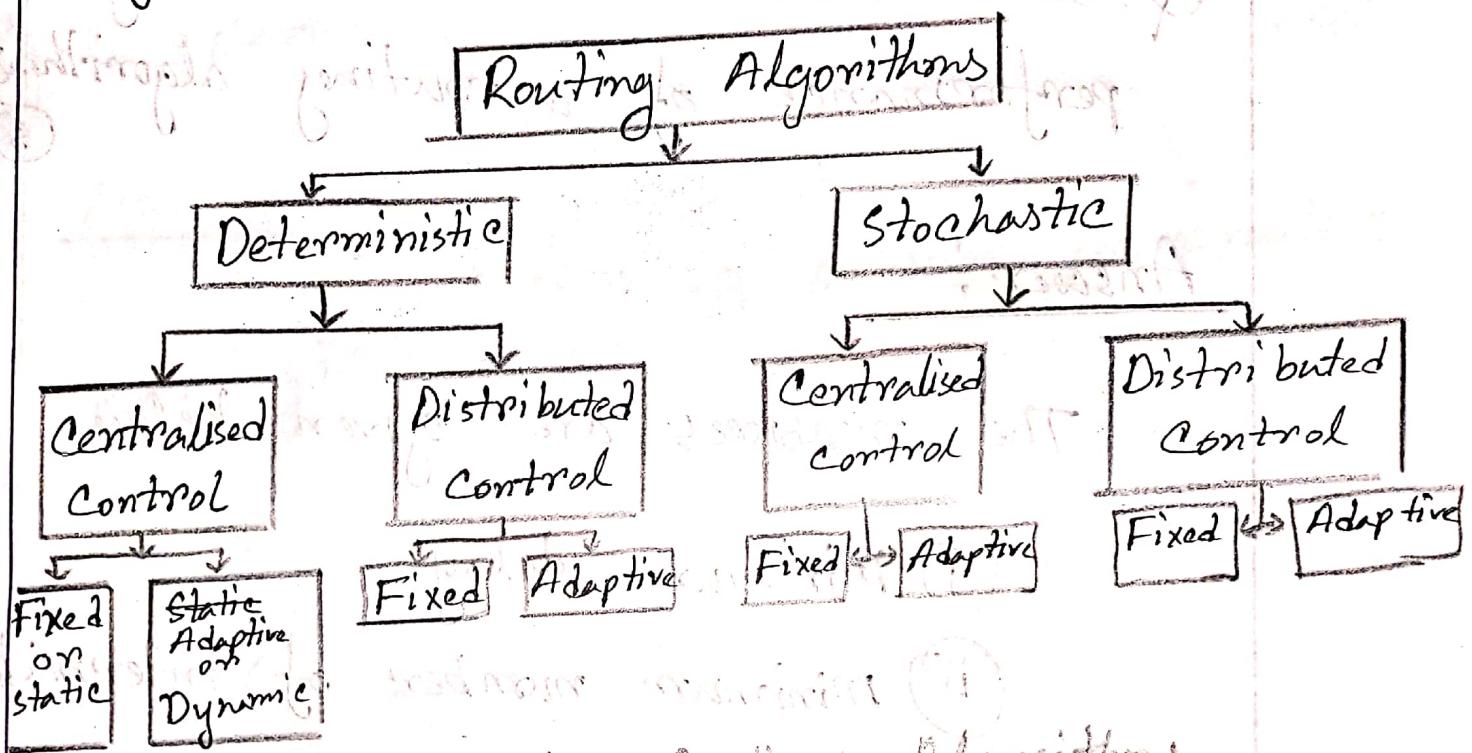


Fig : Routing Algorithms

Answer to the question no. 7(b)

Q: What measures used in assessing the performance of a routing algorithm? (5)

Answer:

The measures are given below,

- i) Minimum delay.
- ii) minimum number of intermediate nodes or hops.
- iii) Processing complexity.
- iv) Signalling capacity required on the network.
- v) The rate of adaption in the case of adaptive algorithms.
- vi) Fairness to all types of traffic.
- vii) Robustness.
- viii) stability.

Answer to the question no: 7(c)

Q: Q. Write down the Quality of service(QoS) parameters? (9)

Answer:

The quality of service parameters are given below:

- i) Transit delay,
- ii) Residual error rate,
- iii) Protection,
- iv) Transfer failure probability
- v) Priority
- vi) Throughput

Answer to the question no. 8(a)

Q: Explain the multi-exchange network. (4)

Answer:

When a subscriber belonging to a particular network has to be contacted, a number of ways can help you contact the particular exchange; also there is not one but any exchanges present in the route.

In a multi-exchange network, the routes used to establish connection with a particular subscriber differs from time to time. In the stronger exchange following the multi-exchange network, the subscriber has to be more concerned with the routing. A subscriber should have the details of

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all the numbers of exchanges present in the route. There may arise situations where a subscriber may be required to establish a connection on other routes; this becomes cumbersome at times.

Answer to the question no: 8(b)

Q: Write down the disadvantages of implementing Multi-Exchange network in switching. What is the solution? How does it solves?

Answer:

Disadvantages of Multi-Exchange Network:

- i) The subscriber identity number is changed depending on the calling route,
- ii) The user must have knowledge on the topology of the network and the numbers of the exchange present on it.

iii) The number and size of the called subscriber varies depending upon the exchange form where the call originates.

In order to overcome these problems, the common control sub-system is used,

i) The routing of the call should be done by the exchange, but not by the numbers dialed.

ii) An unique identification number should be allotted to the subscriber. The UN contains the number of the exchange of the subscriber and the number indicating the line of subscriber.

## Answer to the question no: 8(c)

Q: Write down the operation and maintenance of switching network. (4)

Answer:

The control and operation of the switching network with two main techniques known as Map-in-memory and Map-in-network.

### i) Map-in-memory:

The path in this technique is determined by marking the switching elements at different stages in accordance with a set of binary data defining the path, whereas the control unit supplies the data. At this stage, the command for the actual connection of the

path is given. This Map-in-memory technique is present in program control.

## (ii) Map-in-network:

In this technique, the path finding may be carried out at the level of common control unit, where it marks the inlet and outlet to be connected and the actual path is determined by the switching network. This Map-in-network technique is common in Crossbar exchanges using markers, for control.