

1. (a) Explain different switching mechanisms. compare them with each other. - 08
(b) what are different features common to manual switching and electronic switching? list and explain in brief. 06
2. (a) classify the switching system? - 04
(b) Element of switching system and describe it brief. 10.
3. (a) Differentiate between crossbar switching and multistage. 07.
(b) Differentiate between store-and-forward and cut-through switching. - 07
4. (a) write down the advantage and disadvantage of crossbar switching? - 05
(b) How many types of Blocking modes? Describe it broadly. 07
(c) Comparison between time congestion and cell congestion. - 02

5. (a) Define various Telephone System? - 09
(b) Draw the simplified circuit model '5
(c) Write down the mechanism a call. 09

Ans: to the Ques no: 01 (a)

There are basically, three types of switching methods are made available. Out of three methods, circuit switching and packet switching are commonly used but message switching has been opposed out in the general communication procedure but is still used in the networking application.

1. Circuit switching.
2. Packet switching.
3. Message switching.

Circuit switching :-

Circuit switching is generally used in public networks. It came into existence for handling voice traffic in

addition to digital data.

↳ Hence the network connection allows the electrical current and the association voice with it to flow in between the two respective users. The end to end communication was established during the duration of call.

↳ In circuit switching the routing decision is made when the path is set up across the given network. After the link has been set in between the sender and the receiver then the information is forwarded continuously over the provided link.

↳ In circuit Switching a dedicated link path is established across the sender and the receiver which is maintained for the entire duration of conversation.

Packet Switching :-

In packet Switching, message are broken up into packets and each of which includes a header with source, destination and intermediate node address information. Individual packets in packet switching technique take different routes to reach their respective destination. Independent routing of packet is done in this case -

1. Bandwidth is reduced by the splitting of data onto different routers for a busy circuit.

Q. For a certain link in the network if the link goes down during transmission the remaining packet can be sent through the another route.

↳ the major advantage of packet switching is that they are used for performing data rate conversion.

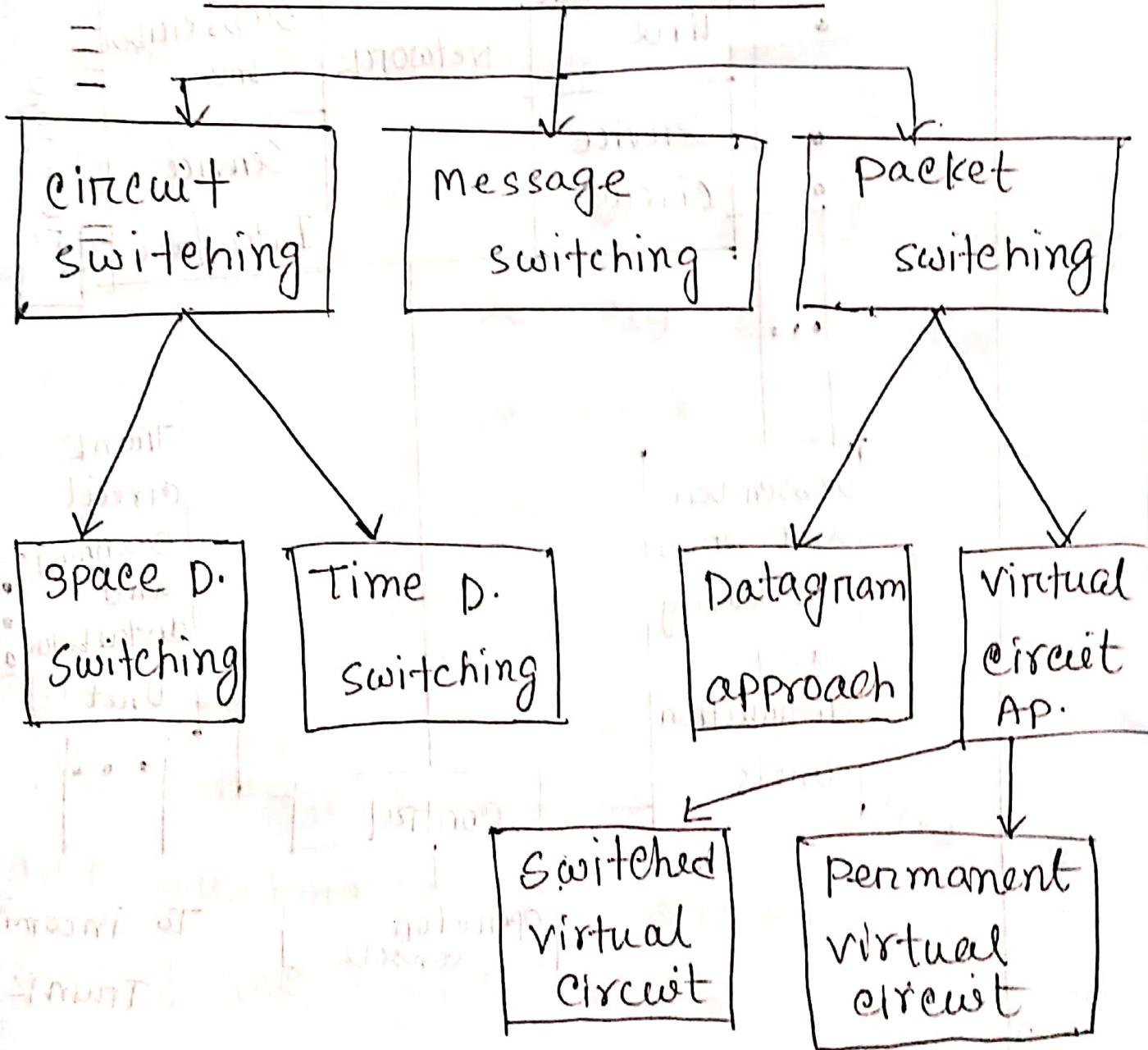
↳ when transmitting the network switching routers or the other network nodes then the packets are buffered in the queue, resulting in variable delay and throughput depending on the network's capacity and the traffic load on network.

Is packet switching contrasts with another principal networking paradigm, circuit switching, a method which sets up a limited ~~a~~ number of dedicated connections of constant bit rate and constant delay between nodes for exclusive during the communication session.

Ans: to the Qu: no: 02 (a)

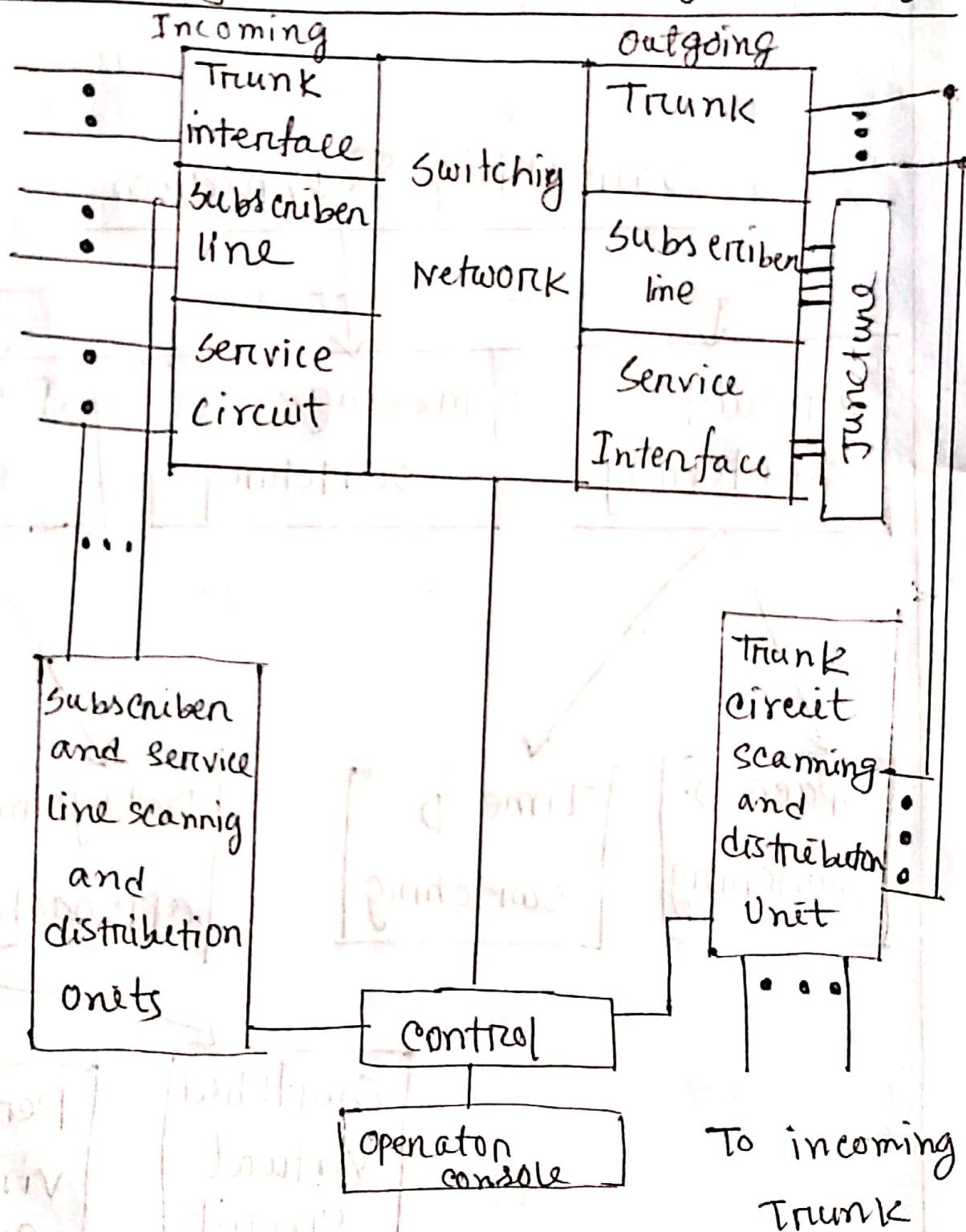
Classification of switching technique:-

Switching Techniques



Ans! to the que. no: 2 (b)

Block Diagram of switching technique:-



Switching network :-

It provide the network switching paths between the called subscribers and the calling subscribers.

control subsystem:-

This is critical part of the switching system, which actively establishes the switching path, by identifying the inlet and outlet lines and interpreting the signaling information received on these lines.

This control subsystem, controls the making and breaking of the connection by sensing the signal transfer on the lines.

the control sub system sends out signaling information to the subscriber and other exchanges connected to the outgoing trunks.

Signaling :-

The signaling formats and requirement for the subscriber, the trunk and the sub systems differ significantly. Accordingly, a switching sys. provides for three different forms of Signaling —

1. Subscriber loop signaling.

2. Interexchange signaling.

3. Intraexchange or register.

Trunk Interface:-

The trunk interface used for connection between the switching system, are terminated at this port.

Subscriber line Interface:-

The subscriber line interface used for connections between the subscribers and the switching systems are terminated at this port.

line Scanning Unit :-

The line scanning units are used for sense and obtains the signaling information from the respective lines.

Distributor Unit:-

The distributor units are used for distributing or sending out the signalling information on the respective lines.

Operator Console:-

The operator console permits interaction with the switching system for maintenance and administrative purposes.

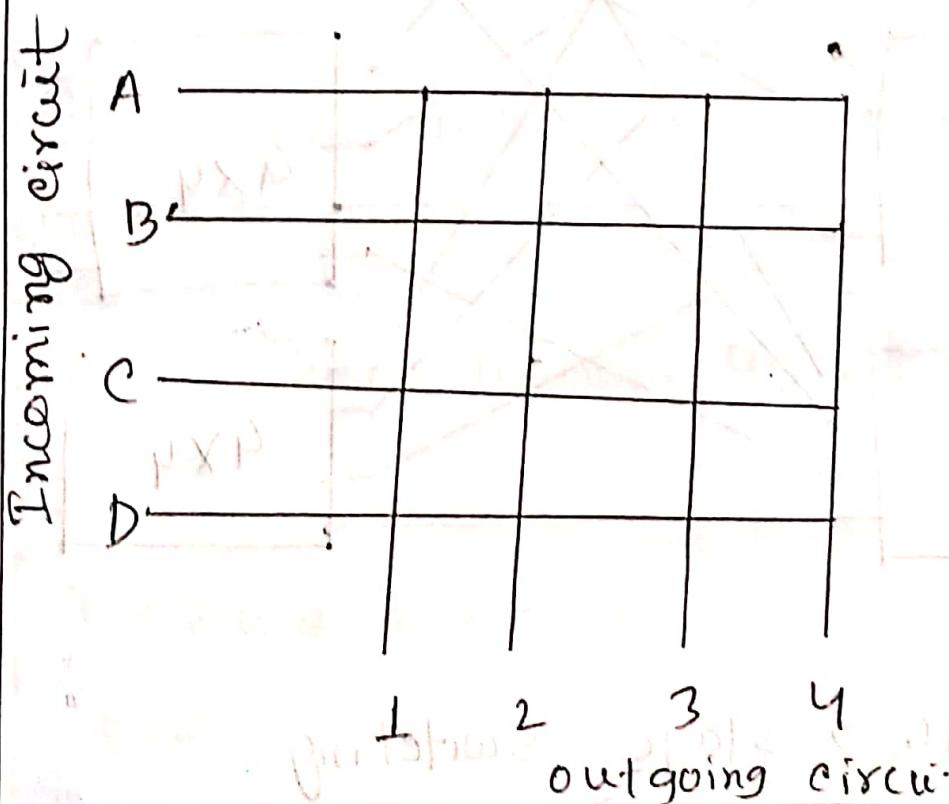
Service Circuit Interface:-

The service circuit interface provides interaction between circuit for maintenance and testing purpose.

Ans: to the Que: no: 03(a)

Crossbar switching :-

- ↳ Crossbar switching became popular in the 1940's and is still used in some places today.
- ↳ Uses a simple rectangular matrix. Actuators are operated at incoming circuit and outgoing circuits to make metallic contact and form the desired connection.



Multi Stage switching

16x16 2-stage switch using 4x4 non-blocks
full matrices

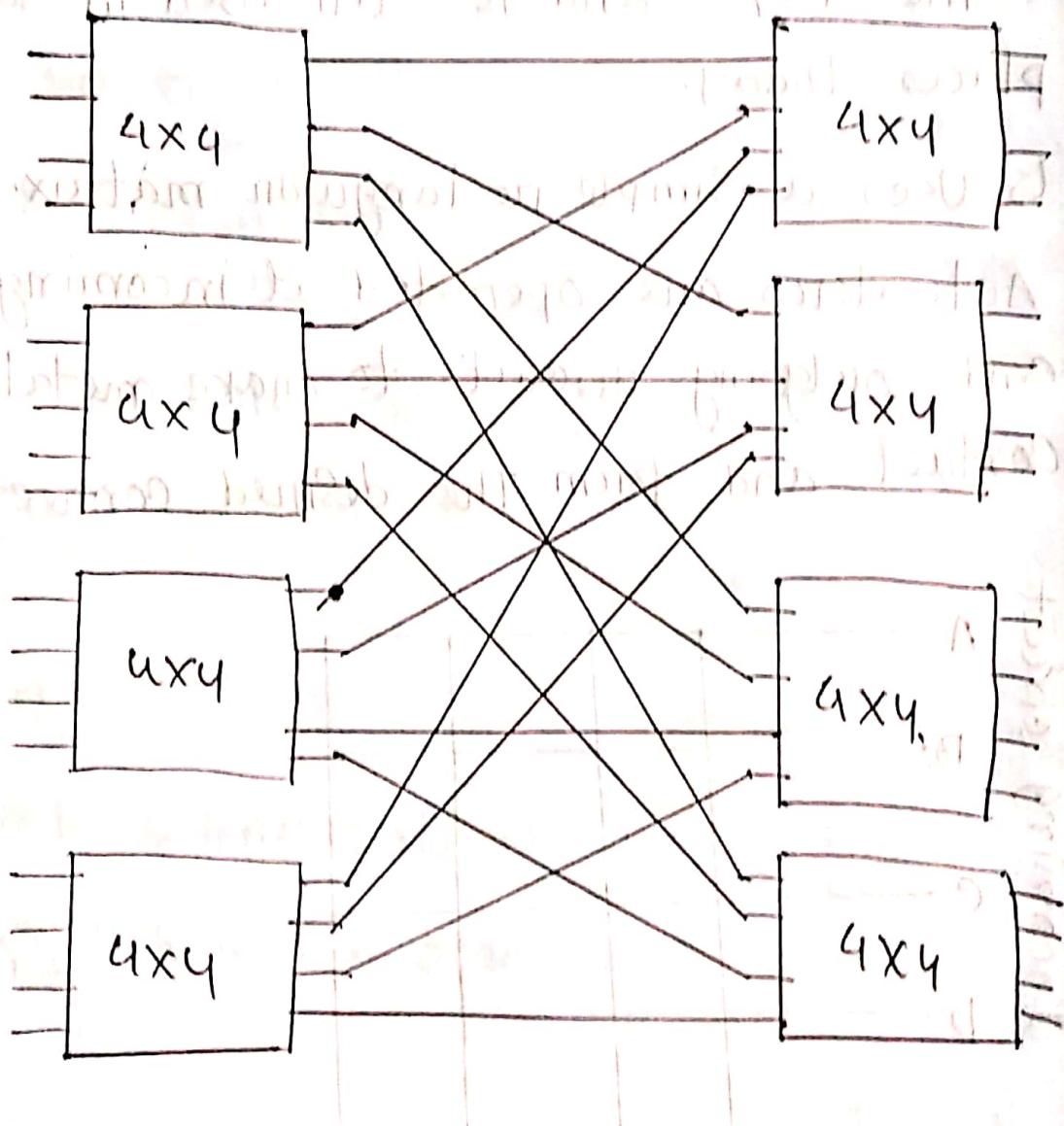


fig: 16x16, 2-stage Switching.

Ans: to the Ques no: 03(b)

Differences b/w store-and-forward and cut-through switching.

store-and-forward

1) It is a technique that waits until the entire frame is received.

2) It performs error checking functionality.

3) It has high latency rate.

4) It is highly reliable.

5) It has a high wait time.

Cut-through Switching.

1) It checks the 6 bytes following the preamble to identify the destination address.

2) It does not perform error checking.

3) It has low latency rate.

4) It is less reliable.

5) It has low wait time as cut-through switching.

Ans: to the Ques no: 04(a)

The crossbar switch is a switch that has n input lines and n output lines. The crossbar switch has n^2 intersection points known as cross points.

Disadvantages:

The number of cross points increases as the number of stations is increased, therefore, it becomes very expensive for a large number switch.

The solution to this is to use a multistage switch.

Aim: to the Qn no: 04 (b)

There are 3 types of blocking models:

1. Blocked calls Cleared (BCC).
2. Blocked calls Held (BCH).
3. Blocked calls wait (BCW).

BCC :

- ↳ Blocked calls leave system and do not return.
- ↳ Good approximation for call in 1st choice trunk group.

BCH :

- ↳ Blocked calls remain in the system for the amount of time it would have normally stayed for.

- ↳ If a server free up, the call picks up in the middle and continuous.
- ↳ Not a good model of real world behaviour.
- ↳ Tries to approximate call reattempt efforts.

BCW% -

- ↳ Blocked calls enter a queue until a server is available.
- ↳ When a server becomes available, the call's holding time begins.

Ans: to the Qu: no: 04(c)

Time Congestions :-

- ↳ proportion of time a system is congested.
- ↳ probability of blocking from point of view of servers.

$$P(B) = P(K > N)$$

Call congestion:-

- ↳ probability that an arriving call is blocked.
- ↳ probability of blocking from point of view of calls.

$$P(B) = (R > N)$$

Ans: to the Qu: no: 05(a)

1. Early telephone system:-

- ↳ powered by self-contained local battery.
- ↳ Ringing created by cranking generator

2. Today's telephone system:-

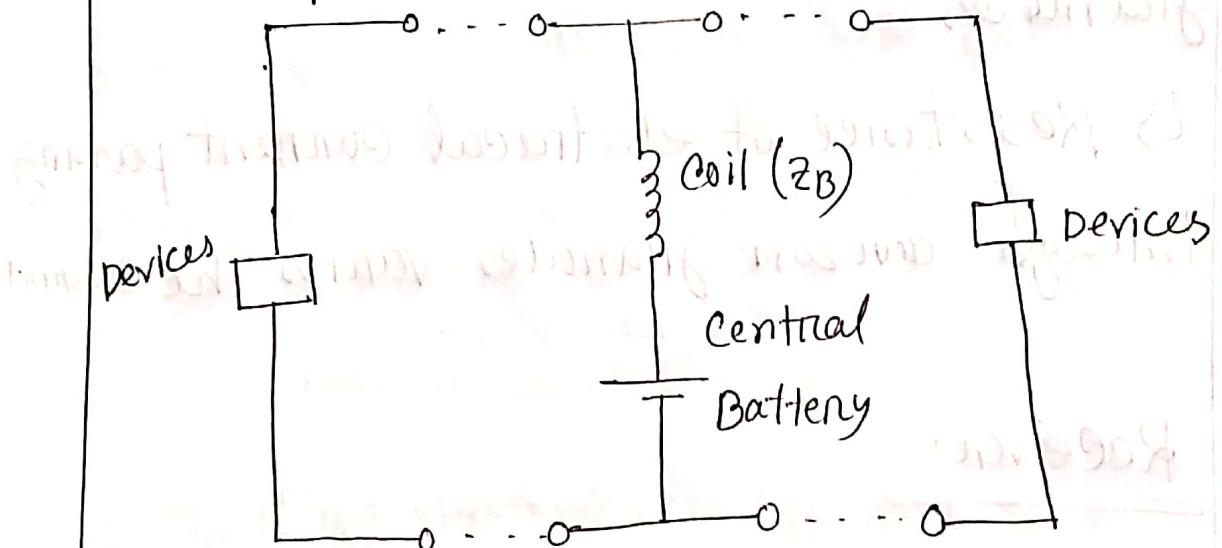
- ↳ powered through the line by battery at the central office (-48V)
- ↳ circuit is closed when handset is lifted from the cradle ("off hook").

$$(n < R) = (d) 4$$

Ans: to the Qu: no: 05 (b)

~~Circuit model of any connection:~~

Speech current



The coil is a "transmission bridge coil" with a high impedance (Z_B) preventing the speech current from shorting out at the central battery.

Transmitter: Carbon granule microphone:

↳ Air pressure of sound waves impact on diagram, varying pressure on carbon granules.

↳ Resistance of electrical current passing through carbon granules varies the current.

Receiver:

↳ Varying electrical current passing through winding on magnet, moves a diaphragm same as in a music loudspeaker.

Ans: to the Ques No: 05 (c)

Establishing A call :-

- 1.) Calling Customer takes phone off hook which closes the circuit to the C.O. ("Looping the circuit").
- 2.) C.O. detects the "Loop" and indicates readiness with dial tone.
- 3.) Calling Customer hears dial tone and dials number. ↳ The network converts ("translates") the phone number to a physical equipment address.
- 4.) The network checks on the called party status and decides on a routing for the connection.

5) If connection possible, the called party is alerted.

↳ Large 20Hz alternating current is applied to line. (Ringing current).

6.) "Ring tone" is returned to the caller.

7.) The called party picks up the handset and closes his/her loop.

8.) Exchange detects second loop and ("trips" or stops) ringing, then establishes call.

9.) One party opens loop by hanging up, and exchange clears connection.