Questions:

01) ⓐ Define private Branch exchange or PBX. List the parts of a PBX? — 5

ⓑ What is dial-up modern technology? List some of the common modern standards discussed in this chapter and give their data rates. — 3

ⓒ List seven steps to successful Analog to digital signal conversion? — 6

02) ⓐ List five types of topology in computer networks. Describe the mesh topology? — 5

ⓑ What do you mean by Geostationary satellite system? — 4

ⓒ Differentiate between terrestial microwave and sattlite microwave transmission system? — 5

03) ⓐ What is direct control switching system and what are the benefits of automatic switch? — 5

ⓑ What are the differences between circuit switching and packet switching? — 5

ⓒ List four types of connection in a telecommunication network? — 4

04. ⓐ What are the two approaches packet switching?   — 2

ⓑ What are the difference between circuit switching and message switching?   — 6

ⓒ List the three traditional switching methods. What are the most common today?   — 2

ⓓ Describe the need for switching and Define switch?   — 4

05. ⓐ What are the draw backs of circuit switching?   — 4

ⓑ What are the advantages of packet switching over circuit switching?   — 6

ⓒ List four major components of a packet switch and their functions?   — 4.

06. ⓐ What are the determing the design of a switching system?   — 5

ⓑ How to use a rotary dial phone for implenting ol pulse dialing?   — 6

ⓒ What is LATA? what are intra-LATA and intra-LATA services?   — 3

07.

(a) Define circuit switching. what are the benefits circuit switching?

(b) What are the features of crossbar switch?

(c) Define electro mechanical Crosspoint technology what are the challenges for the crosspoint technology?

08) ⓐ Difference between cable modem (CM) and Cable modem transmission system (CMTS) —

ⓑ Write short notes : (Any four)

① Out-band signaling

② Ring topology

③ Bus Topology

④ E-mail

⑤ LAN

<u>PBX:</u> Private Branch Exchange is a tele communi cation system within a local area that switches calls between those users on local lines while allowing all users to share a sertain number of external phone lines.

The parts of a PBX include:

① A telephone trunk that contains many phone lines, which are telecommunicated at PBX.

② A computer that handles the incoming and outgoing calls, of PBX alongs with switching between different calls within the local loop.

③ The networks of lines within the PBX.

④ A human operator console which is optional.

<u>Ans to the Question no - 01 (a)</u>

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(III) The networks of lines within the PBX.

(IV) A human operator console which is optional.

<u>Ans to the Question no— 01 (6)</u>

<u>Dial-up modem Technology:</u>

Dial up modem technology use part of the bandwidth of the local loop to transfer data.

<u>Common modem standards:</u>

The latest <u>dial-up modems</u> us the v-series standards such as V.32 and V-32 bis (9600 bps), V.34 bis (28.800 or 33,660 bps), V.90 (560 kbps for downloading and 33.6 kbps for uploading), and V-92 (56 kbps for downloading and 48 kbps for uploading).

Ans to the Question no-01(c)

Follow these seven steps when designing an analog front end:

① Describe the electrical output of the sensor or section preceding the gain block.

② Calculate the ADC's requirements.

③ Find the optimal ADC voltage reference for the signal conversion.

④ Find the maximum gain and define search criteria for the op amp.

⑤ Find the optimal amplifier and design for gain block.

⑥ Check the total solution noice against the design target.

⑦ Run simulation and validate.

Ans to the Question no - 2(a)

There are five types of topology in computer networks:

  ① Mesh Topology.

  ② Star Topology.

  ③ Bus Topology.

  ④ Ring Topology.

  ⑤ Hybrid Topology.

Pitfalls of Mesh Topology:

① Amount of wires required to connected each system is tedious and headache.

② Since each device needs to be connected with other devices, number of I/O ports required must be huge.

③ Scalability issues because a device can not be connected with large number of device with dedicated point to point link.
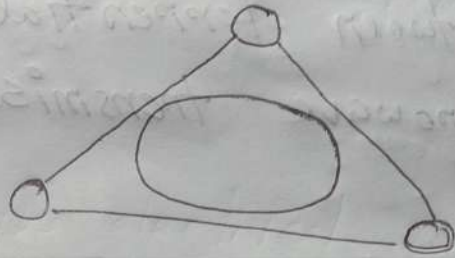
Geostationary Satelite System

Geostationary Satelite system:

The satellite were placed in low earth orbit. as a result the result the satellite at a such high speed that it visible to the ground only for a short time. at each day. the satellite appeared below the horizon and dies appear below the opposite horizon, the ground station was cut off on long time in a day, to maintain the communication link another station had to be activated.

Ans to the Question no _02 (c)

Difference between Terrestial microwave and satellite microwave transmission system is given below:

Terrestial Microwave	Satellite Microwave
① The frequency range needed is from 4GHz to 6GHz.	① The frequency range used in this system is between 11 GHz to 14 GHz.
⑪ In this system, attenuation is mainly depends on frequency and signal strength.	⑪ Attenuation is generally affected by the frequency and power.
⑪⑪ It requires focused signals and line of sight as physical path.	⑪⑪ It requires the proper allignment on cost of earth station antenas.
⑭ In these systems, short distance system can be expensive but long distance systems are most costly.	⑭ These systems are very expensive as cost of building and launching is very high.
⑮ Relay towers are used to extend the signals.	⑮ satellites are used to expansion of signals.

Ans to the Question no - 3(a)

Direct Control switching System:

The switching systems where the control sub-system from an integral part of the network are called the direct control switching system.

Benefits of automatic switching system:

→ Language barriers will not affect the request for connection.

→ Higher degree of privacy is maintained.

→ Faster Establishment and release of calls is done.

→ Number of calls made in a given period can be increased.

⇒ Calls can be made irrespective of the load on the system or the time of the day.

Ans to the Question no - 03 (b)

Defference between circuit switching and packet switching
is given below:

Feature	Circuit switching	Packet switching
Dedicated Path	Yes	No
Path Formation	Path dedicated for one conversation	Route is established on per packet switching basis of the conversation diagram.
Delay	Call setup delay	Packet transmission delay
Bandwidth type	Fixed Bandwidth	Dynamic Bandwidth
Overload effects	Stops call establishment	Increases packet delay.

Ans to the Question No-03(c)

There are four types of connections that can be established in telecommunication network. The connections are as follows:

① Local call connection between two subscriber in the system.

② Outgoing call connection between a subscriber and an outgoing trunk.

③ Incoming call connection between an incoming trunk and a local subscriber.

④ Transit call connection between an incoming trunk and an outgoing trunk.

Ans to the Question no-04(a)

Two Approaches of packet switching:

① Datagram approach and

⑪ Virtual circuit Approach.

Ans to the Question no-04(b)

Difference between circuit switching and message switching:

Circuit switching	message switching
① Data is not stored.	① Data is first stored, then forwarded to the next node.
② Needs dedicated physical path.	② Not need dedicated physical path
③ A Geographical addressing	③ A Hierarchical addressing
④ Costlier than message switching	④ The cost of message switching is less than circuit switching.
⑤ Routing is manual type routing.	⑤ Routing is not manual type routing.
⑥ charge depend on time and distance	⑥ charge is based on the number of bytes and distance.

Ans to the Question no-04(c)

There are three traditional switching methods. There are:
  (i) Circuit switching
  (ii) Packet switching
  (iii) Message switching.

Circuit switching and Packet switching are the most common today.

Ans to the Question no-04(d)

Need for swithing

(i) Switching provides a practical solution to the problem of connecting multiple devices in a network.

(ii) It is more practical than using a bus topology.

(iii) It is more efficient than using a star topology and a central hub.

Definition of switch:

Switch: Switches are devices capable of creating temporary connections between two or more devices linked to the switch.

<u>Ans to the Question no-05(a)</u>

<u>Drawbacks of circuit switching:</u>

→ Circuit switching establishs a dedicated connection between the end parties.

→ Bandwidth requirment is high even in cases of low data volume.

→ There is underutilization of system resources.

→ Time required to establish connection may be high.

<u>Ans to the Question no-05 (b)</u>

This switching offers various benefits compared to circuit switching and there are listed below:

→ It delivers the data to a destination by finding ~~there~~ their own paths. circuit switching has dedicated and predifined channel.

→ It is high reliable as missing packets are detected by destination. circuit switching does not have their option

→ It uses lesser bandwidth as packets are quickly routed towards the destination. circuit switching

Ans to the Question no-05 (a)

Drawbacks of circuit switching:

→ Circuit switching establishs a dedicated connection between the end parties.

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→ There is underutilization of system resources.

→ Time required to establish connection may be high.

Ans to the Question no-05 (b)

This switching offers various benefits compared to circuit switching and there are listed below:

→ It delivers the data to a destination by finding ~~there~~ their own paths, circuit switching han

should have dedicated bandwidth.

→ The channel in packet switching is available for other transmissions as soon as packets are routed, circuit switching occupies the channel till the voice communication is completed.

→ It is cost effective and easier to implement circuit switching is expensive.

Ans to the Question no - 05(c)

A packet switching has four components:

① **input ports :** An input ports performs the physical and data link functions of the packet switch.

② **output ports:** The output ports performs the same function as the input port, but in the reverse order.

③ **Routing processor:** The routing processor performs the function of table lookup in the network layer.

④ **Switching fabric:** The switching fabric is responsible for moving the packet from the input queue to the output queue.

Ans to the Question no - 06(a)

In order to determine the best design for a telephone switching system, a number of criteria must be determined and considered by the operator.

Traffic intensity of the busy - hour:

Perhaps the most important factor, traffic intensity of the busy hour is simply, the calling rate + (plus) the average holding time during the 60-minute period that the traffic intensity is at its highest.

Calling rate:

This is the average number of request for connection per unit of time.

Holding time:

This is the mean amount of time that a call lasts.

Building, maintaining and improving switch:

In order to build, maintain and improve a switch that will suply the highest quality of service to its subscribe network operators, must monitor their network hardwar constantly and efficiently and be ready to repair, replace or add any parts that are required.

Ans to the Question no-06(b)

A rotary dial phone uses the following for implementing pulse dialing:

① $ Finger plate and spring.

② shaft, gear and pinion wheel.

③ Pawl and ratchet mechanism.

④ Impulsing cam and suppression cam or a trigger mechanism.

⑤ Impulsing contact.

⑥ centrifugal governor and worm gear.

⑦ Transmitter, receiver and bell by pass circuit.

Ans to the Question no-06(c)

LATA:

A LATA is a small or large metrapoliton area that according to the divestiture of 1984 was under the control of a single telephone service provider.

Intra LATA and intra LATA services:

The services order offered by the common carriers

is inside the LATA are called intra LATA services. The services between LATAs are handled by inter exchange carriers (ixcs). These carriers, sometimes sometimes called long distance companies, provide communication services between two customers in different LATAs.

<u>Ans to the Question no-07(a)</u>

<u>circuit switching:</u> This method of switching establishes a dedicated communication path between the sender and receiver.

Some of the benefits of circuit switching are as follows—

(i) It uses a fixed bandwidth.

(ii) A dedicated communication channel increase the quality of communication.

(iii) Data is transmitted with a fixed data rate.

(iv) No waiting time at switches.

(v) suitable for long continuous communication.

Ans to the Question no - 07 (b)

In this section, we will discuss the different features of the crossbar switches.

① while processing a call, the common control system helps in the sharing of resources.

② The specific route functions of call processing are hand wired because of the wire logic computers.

③ The flexiable system design helps in the appropriate ratio selection is allowed for specific switch.

④ Fewer moving parts ease the maintainance of crossbar switching system.

Ans to the Question no - 07 (c)

Electromechanical Crosspoint Technology:

The Electromechanical Crosspoints Technology switches which are capable of making and breaking contacts in 1 - 10 ms of time duration for several million times without any wear and tear.

In this section, we will discuss the challenges

Ans to the Question no - 08 (a)

CM vs CMTS :

ⓐ The CM is installed on the subscriber premises.
   The CMTS is installed inside the distribution hub
   by the cable company.

ⓑ The CM receives data from the internet and
   passes them to the combiner, which sends them
   to the subscriber. The CMTS receives data
   from the subscriber and passen them to
   internet.

Ans to the Question no—08(b)

① <u>Out—band signaling:</u>

The out band signaling uses frequency which are above the voice band but below the upper limit of 4000 Hz of the nomical voice channel spacing. The signaling is done throughout the speech period and thus continuous supervision of the call is allowed. Extra circuit is needed to handle the extaremly narrow bandwidth of this signaling, due to which it is seldom used. Out band voice frequency signaling techniques have limited information transmission capacity.

⑪ <u>Ring Topology:</u>

In ring topology each device is connected with the two devices on either side of it. There are two dedicated point to point links a device has with the deviced on the either side of it. This

structure forms a ring thus it is know as Ring Topology.

structure of Ring Topology:

Ring Topology
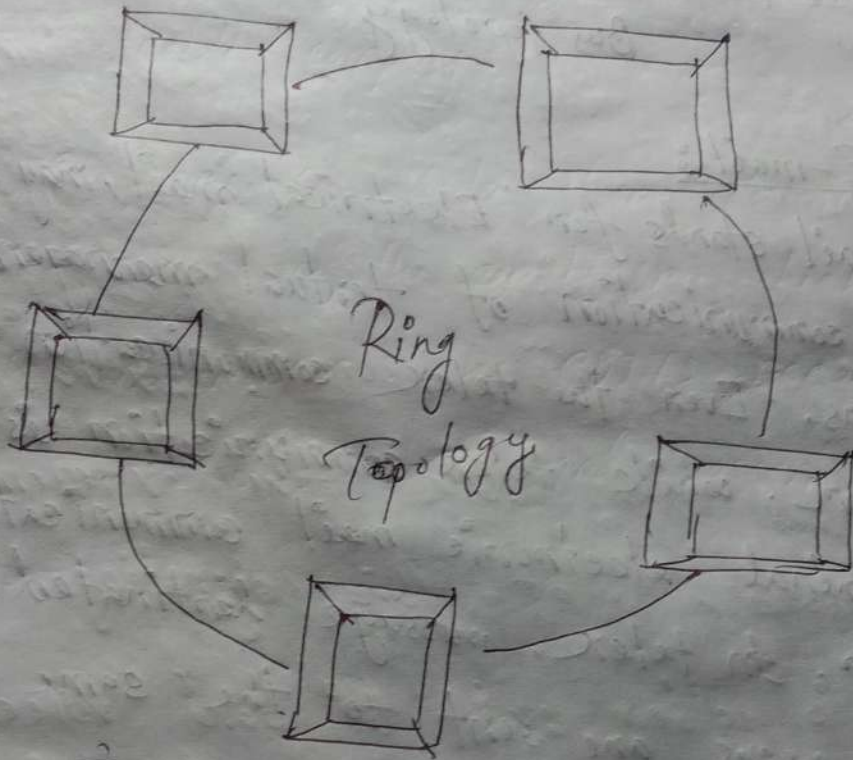
(III) Bus Topology:

In Bus Topology There is a main cable and all the devices are connected to this main cable through drop lines. There is a device called tap that connects to the drop line to the main cable. Since all the data transmitted over the main cable there is a limit of drop lines and the distance a main cable can have.

Structure of Bus topology:

Bus topology

Drop line

Cable
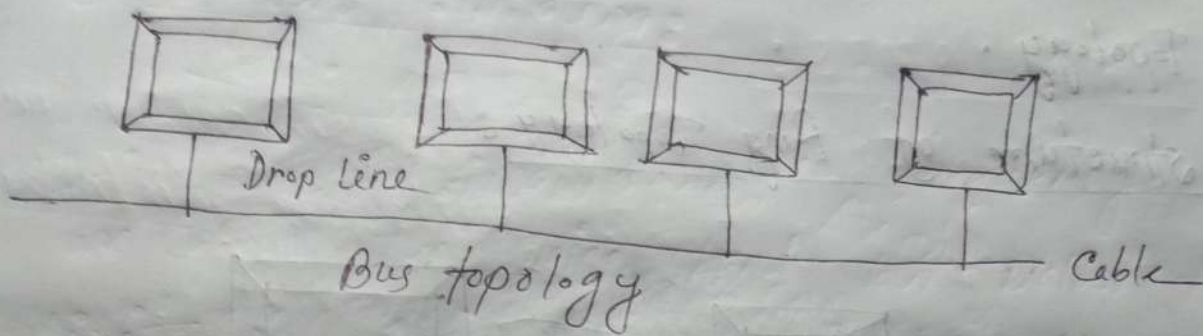
(IV) E-mail:

E-mail stands for Electrical mail, may be defined as the communication of textual messages via electronic means. Even the telex communication is electronic nature. While telex communication is terminal to terminal, electronic mail communication is user to user. In telex, message destinated to a number of users are sent to the same terminal from value where it is divered by an operator or a messenger. On the other hand, Electronic mail is delivered to the mail boxes individuals.