

## Question Part

1. a) What is switching? Briefly describe. 7  
b) How time division switching works? 5  
c) Write down the features of trunk switches. 2
  
2. a) How does switching techniques work? 8  
b) Differentiate voice & data traffic? 6  
c) What are the key tasks of node processor?
  
3. a) Write down the PDU of different OSI layers. 5  
b) Draw the diagram of Routing strategies? 5  
c) What are tasks of node processor? 4
  
4. a) Draw ISO-OSI diagram. 7  
b) Write down the features of ISO-OSI? 5  
c) What is data communication architecture? 2

3. a) Briefly describe public switched telephone networks with diagram. 6

b) List down routing algorithm - features. 6

c) What is transport layer? 2

6. a) What is telecommunication? 2

b) Write down the connection types in telecommunication. 5

c) Describe crossbar switching. 7

7. a) How does telecommunication network working? 6

b) For  $10^8$  numbers of phones covering total area of  $147570 \text{ km}^2$ , the wire radius is 2mm. Find out the length of wiring. 8

8. a) what is definition of software? 2+4  
Importance of software engineering.

b) Describe SPC software architecture. 6

c) Write a short note about transport layer. 2

### Answer to the Question No: 1(a)

Switching : In large network, there can be multipaths from sender to receiver. Switching techniques decide the best route for data transmission. Switching techniques is used to connect the systems for making one-to-one communication.

There are 3 types of switching :

#### 1. Circuit switching :

- A path is established between the caller and destination.
- Real-time connection formed.
- Example : PSTN

#### 2. Message switching :

- Also called store & forward
- A message is first stored in a buffer and then sent on in its entirety step by step as

(c) Resources become available.

→ No real-time connection.

→ Example : E-mail.

### 3. Packet Switching:

→ A message is broken down into parts and each part is sent separately.

→ Example : Internet UDP protocol.

### Answer to the Question No: 1(b)

The switching scheme used by the electronic switching system may be "Time Division Switching". In time division switching sampled values of speech signals are transferred at fixed intervals.

3

Time division switching comes under digital switching techniques, where the Pulse Code Modulated signals are mostly present at the input and the output ports.

A digital switching system is one, where the inputs of any PCM highway can be connected to the outputs of any PCM highway to establish a call.

### Answer to the Question No : 1(c)

Trunk switch features :

1. One-to-one connection
2. One specific inlet must connect to one specific outlet.

### Answer to the question No: 2(a)

Switching techniques basically designed for carrying voice traffic & there are some significant differences in the nature of voice & data traffic. Voice-traffic is always continuous but when a user sits at a terminal and works with a computer, interactively, he has spends

time thinking, keying in the query or command to the computer & waiting for a response from the computer before proceeding further. During the waiting time the computer is busy processing the user command.

In order to have a low waiting time, the user must be transmitted to the system expeditiously soon after

5  
the keying-in is over, similar things happen in the response part.

While voice traffic is half-duplex, data traffic may be half or full duplex.

Another important difference lies in acceptable errors and loss rates. No errors or losses are acceptable in data transmission whereas a small amount of speech loss is often not noticeable.

While the speech traffic always takes place in real time, the data traffic may or may not occur in real time.

### Answers to the Question No: 2 (b)

The differences between Voice & Data traffic is as follows:

Voice traffic	Data traffic
1. Continuous	1. Bursty
2. Low bandwidth for long duration.	2. High bandwidth for short duration.
3. Half duplex	3. Half or full duplex.
4. Real time	4. Near real-time.
5. Loss acceptable.	5. Loss unacceptable
6. Errors tolerable	6. Errors unacceptable.
7. Typical line 85-95%.	7. Typical line 5-15%.

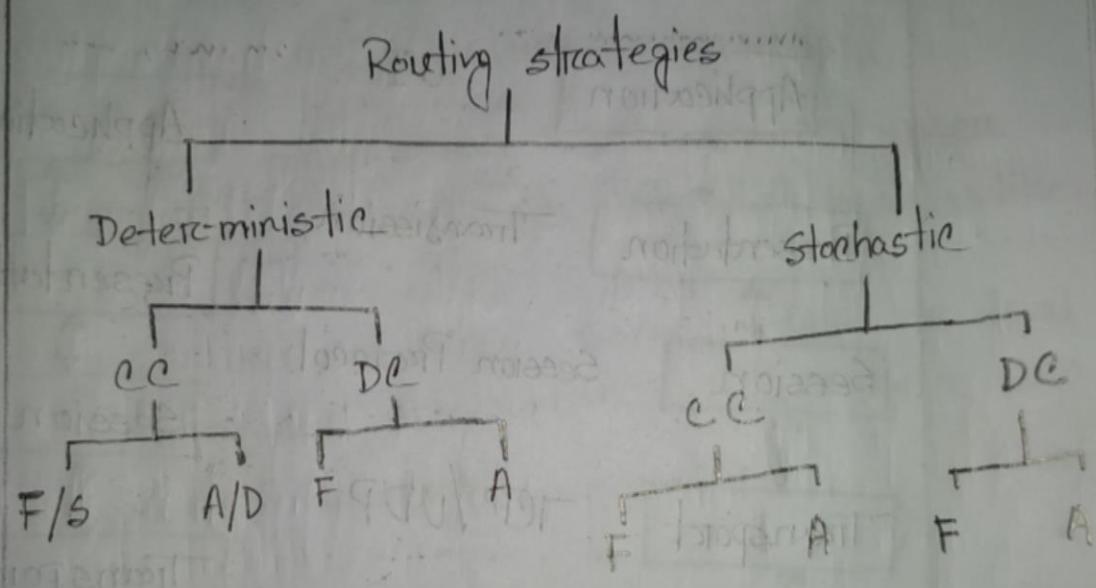
(Q) Answer to the Question No: 3 (a)

PDU of different layers given below:

Layer Name	PDU type
1. Application layer	Data
2. Presentation layer	Data
3. Session layer	Data
4. Transport layer	Segments
5. Network layer	Packets
6. Data-link layer	Frames
7. Physical layer	Bits.

Answer to the Question No: 3(b)

### Routing Strategies Diagram:



CC = Centralised control

DC = Distributed control

F = Fixed

S = Static

A = Adaptive

D = Dynamic

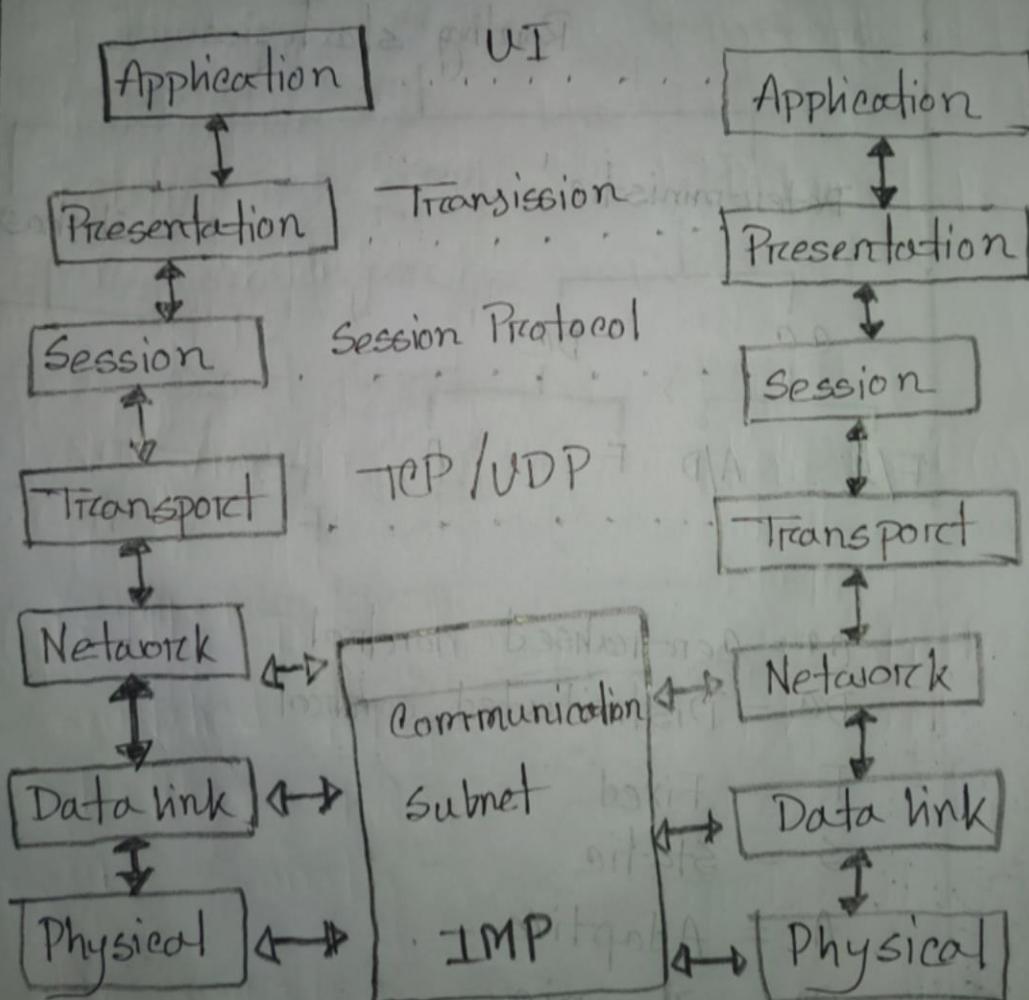
Answer to the Question No : 3(c)

Task of node processor:

1. Receive the full user message & store the same.
2. Check the message for data transmission errors & perform error recovery.
3. Determine the destination address from the user message.
4. Choose an appropriate link towards destination based on certain routing criteria.
5. Forward the message to the next node on the chosen link.

Answer to the Question No: 4 (a)

Diagram of OSI-ISO reference model:



Answer to the Question NO: 4(b)

ISO-OI features:

1. A three layers structure is used in this communication process.
2. The conversation between an upper & lower level is strictly business like.
3. Entities in the same level or level exchange information using their own private protocols.
4. A layer acts as a service provider as well as a user.
5. There are fairly well defined functions to be performed by each layer.
6. It is immaterial as to how functions to be performed by each layer.

### Answer To the Question No: 4(c)

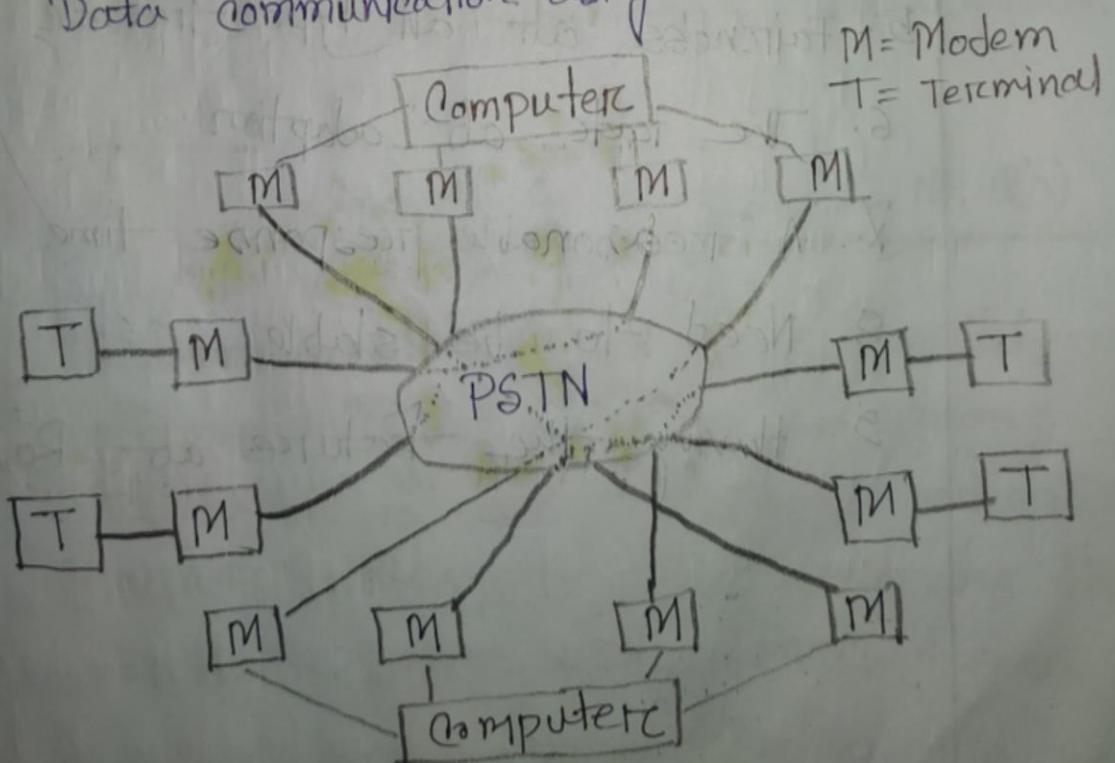
Data communication architecture: Computer involves a number of function among data communication such as physical transmission of bits, error control, routing and session establishment those are holding this words.

### Answer To the Question No: 5(a)

PSTN: Data transmission in "Public switched telephone networks and electronic PABXs. are designed to carry analog voice signals, hence data rates are usually limited to a maximum of 64 kbps.

(d) Terrestrial data networks and the integrated services digital networks however data rates at 1.544 or 2.048 Mbps & modulator translates the data pulse into voice band analog signals at the transmitting end.

Data communication using PSTN:



## Answer to the Question No: 5(b)

Routing algorithm features:

1. Minimum Delay
2. Minimum number of intermediate nodes or hops.
3. Processing Complexity
4. signalling capacity required on the network.
5. Fairness at all type traffic
6. The rate of adoption
7. A reasonable response time
8. Need to be stable
9. Having the feature of Robustness.

### Answers to the Question NO: 5 (i)

Transport layers: It is the first end-to-end layer in the OSI architecture. It is responsible for matching user message characteristics and service requirements with that of the network capabilities. For a user it is transport network that abstracts transport services request less of the underlying subnetwork.

### Answers to the Question NO: 6(a)

Telecommunication: The exchange of information between two or many individuals is called communication. Hence telecommunication means the exchange of information between two distant places.

Answer to the Question No: 6(b)

There are 4 types of connection in telecommunication is as follows:

1. Local call connection between two subscribers in the system.
2. Outgoing call connection between a subscriber and an outgoing trunk.
3. Incoming call connection between an incoming trunk & a local subscriber.
4. Transit call connection between an incoming trunk & an outgoing trunk.

Answer to the Question No: 6(c)

Crossbar Switching: It was developed in 1940s. They achieve full access & non blocking capabilities with the

(c) Crossbar switches & common control equipment, used in the Crossbar exchanges. The active elements called Crosspoints are placed between the input & output lines.

### Crossbar switch features:

1. While processing a call, the common control system helps in the sharing of sources.
2. The specific route functions of call processing are hardwired because of the wire logic computers.
3. The flexible system design helps in the appropriate ratio selection is allowed for a specific switch.
4. Fewer moving parts ease the maintenance of crossbar switching system.

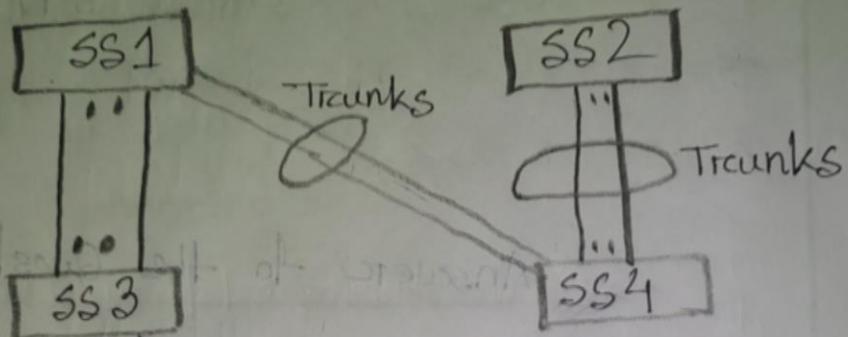
Answer to the Question No: 7 (a)

The Telecommunication Network: It is a group of systems that establishes a distant call. The switching systems are part of a telecommunication network.

The switching sections provide connection between different subscribers. The switching systems are connected by using lines called the "trunks".

The lines that run to the subscriber premises are called the "subscriber lines."

The following figure shows a telecommunication network.



When a person needed to make a distant call, the call was first routed to the operator at the nearest switching center & then the number & location of called subscriber was noted down. That's how it works.

### Answer to the Question No: 7(b)

Hence  $n = 10^8$  connection area  $= 2 \times 10^3$  km<sup>3</sup>

&  $r = 2 \text{ m.m} = 2 \times 10^{-3}$  m Total area  $= 147570$  km<sup>2</sup>

Fully connected  $= \frac{n(n-1)}{2}$

$$\approx \frac{n^2}{2}$$

$$\approx \frac{n^2}{2} = \frac{(10^8)^2}{2} = \frac{10^{16}}{2}$$

$= 5 \times 10^{15}$  pairs

Avg qudratice pair at cross section

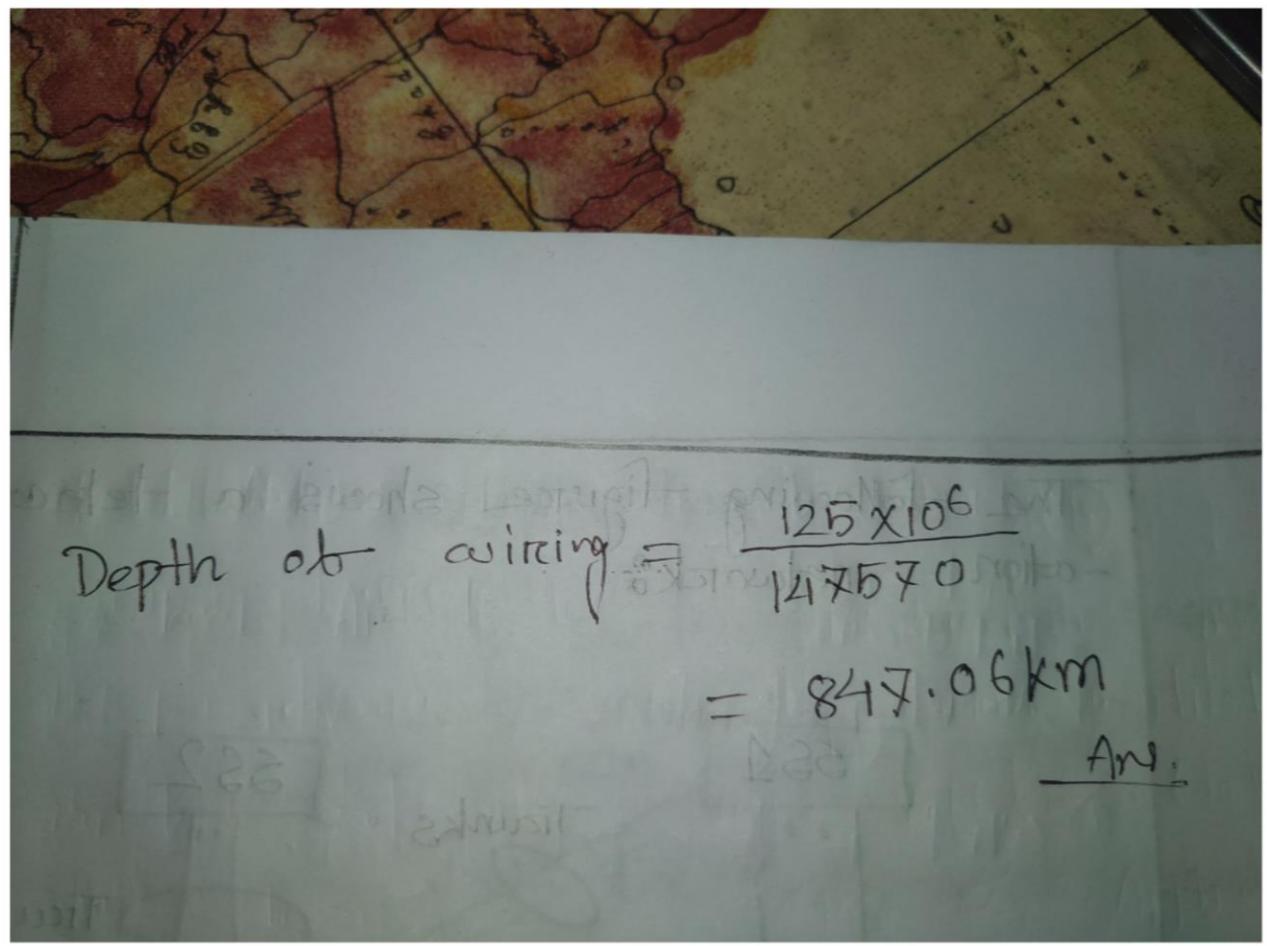
$$= \pi r^2$$

$$= \pi (2 \times 10^{-3})^2$$

$$= 12.5 \times 10^{-12} \text{ km}^2$$

$$\text{Therefore } \text{wiring volume} = 5 \times 10^{15} \times 12.5 \times 10^{-12} \times 2 \times 10^3 \\ = 125 \times 10^6 \text{ km}^3$$

$$\therefore \text{Dept of wiring} = \frac{\text{wiring volume}}{\text{Total area}}$$



### Answer to the Question No: 8 (a)

**Software:** Computer programs, data structure & associated documentation. Software products - may be developed for a particular customer or - may be developed for general market.

**Importance of software engineering:**

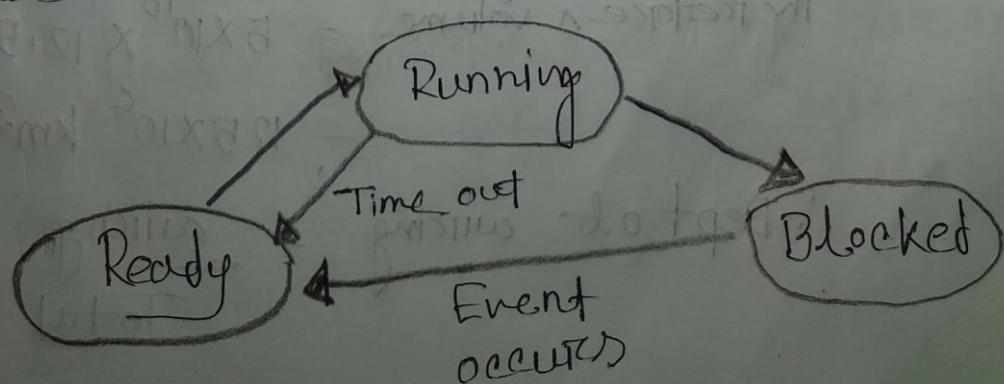
Software doesn't wear out but it deteriorates. Hardware has bathtub curve of failure rate. Nowadays, more & more, individuals & society rely on advanced software systems. We need to able to reliable & trustworthy systems economically & quickly. Precisely, it is usually cheaper than any other thing in the long run & can be modified with the progress of time. Conclusively it can be protected properly.

### Answer to the Question No: 8(b)

Software Architecture of SPC system: - The software of "stored program control" can be categorized into two broad ways 1. System software & 2. Application software.

The software architecture deals with the system software environment of SPC including the language processors. Many features along with the call processing part of the OS under which operation & management functions are carried out. The entire calling process handled by a separate process.

Process architecture:



(H) Answer to the Question NO: 8 (c)

Transport layers It is the first end-to-end layer in the OSI architecture. It is responsible for matching user message characteristics and service requirements with that of the network capabilities. For a user it is transport network that offers transport services report less about the underlying subnetwork.