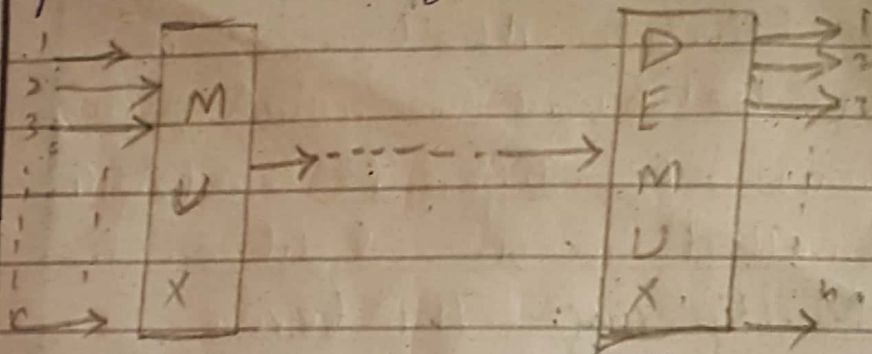


Q No 1  
★

What is Multiplexing, What are the types of Multiplexing. Explain in detail?

Ans  
★

Multiplexing is the process of combining multiple signal into one signal over a share medium. If analog signals are multiplexed. It is Analog Multiplexing and if digital signal are multiplexed that process is Digital Multiplexing.



The process of multiplexing divides a combination channel into several number of logical channels allotting each one for a different message signal or a data stream. to be transferred. The device that does multiplexing can be simple called as a MUX while the one that process reverses which is demultiplexing is called as DEMUX.

Type of Multiplexing:- There are mainly two types of multiplexer

namely analog and digital. They are further divided into FDM, WDM and TDM.

**Analog Multiplexing:** The analog multiplexing techniques involves signals which are analog in nature. The analog signals are multiplexed according to their frequency (FDM) or wavelength (WDM).

**Wavelength Division Multiplexing (WDM)**

Wavelength Division Multiplexing is an analog technique in which many data streams of different wavelengths are transmitted in the light spectrum.

**Digital Multiplexing:** The term digital represents the discrete bits of information. Hence the available data is the form of frames or packets which are discrete.

**Time Division Multiplexing (TDM):**

In TDM, the time frame is divided into slots. This technique is used to transmit a signal. This technique with allotting one slot for each message of all the time of TDM. The main ones are Synchronous and Asynchronous TDM.

3

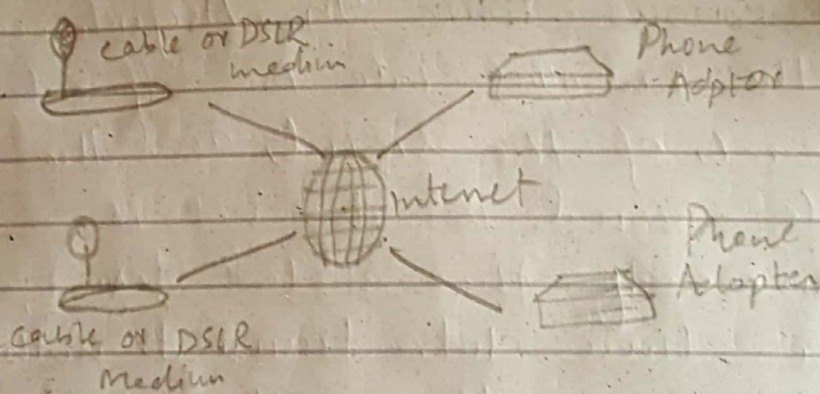
Synchronous TDM: In Synchronous TDM, the input is connected to a frame. If there are "n" number of connections, then the frame is divided into "n" time slots. One slot is allocated for each input line. In this technique, the sampling rate is common to all signals and hence same clock input is given.

Asynchronous TDM: In Asynchronous TDM, the sampling rate is different for each of the signals and the clock signal is also not common. If the allotted device, for a time slot, transmits nothing and sits idle, then that slot is allotted to another device unlike Synchronous.

Q No. 2  
Q2  
VOIP. Explain w.r.t basic function VOIP components? Also explain how to overcome the challenges. What is the role of FXO and FXS in VOIP?

Ans. VOIP stand for Voice over Internet Protocol.

Voice over IP include technology allow telephones calls to be made over digital computer networks including the internet



Function of VOIP:- Using VOIP application we take advantages of several calling functions take.

- Call Recording
- Call Analytics
- Voice mail
- Use phone number
- IVR.

Components of VOIP:-

User Agent:- An a VOIP network any devices that can make

5

RJ11 port that connects internally to an analog office phone or fax machine. Think of the S as meaning of a station of cubicle

FXO:-

FXO stand for foreign exchange office. An FXO port is an interfacing port that connects your plain old Telephone Service (POTS) line to a VoIP adapter. It designate a telephone signalling interface that receives POTS (plain old telephone service).

Q → 03 What is PDH? Name some of the its limitations, and advantages of SDH/SONET Show the path section designation of SDH. Also show the SDH frame and calculate its basic capacity for a byte and frame.

Ans:- PDH stand for plesiochronous digital hierarchy (PDH) is a telecommunication network transmission technology designed for the transport of large data volumes across large scale digital networks

Advantages:-

- ★ Reduced network complexity and cost through SADM and SDXC capabilities

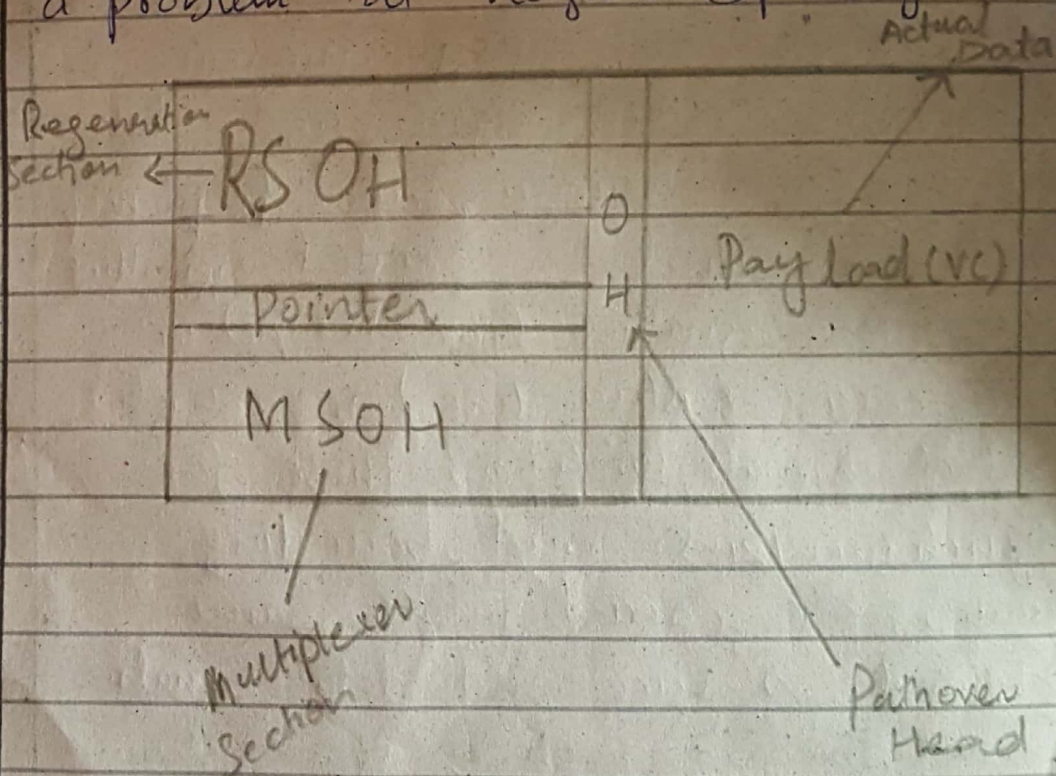
Ability to transport all forms of traffic voice, data (ATM, IP) and video.

Capability to build optical interconnects between carriers.

Efficient management of bandwidth at the physical layer.

### Limitation of SDH / SONET

low cost for low channel numbers  
SONET / SDH network management to handle the DWDM method and management. Bandwidth efficiency is a problem at higher capacity.



### Capacity of bytes

the basic structure transmission format for SDH (Synchronous Digital

Hierarchy). A STM-frame has a byte-oriented structure with 9 rows and 270 columns of bytes for a total of 2,430 bytes  
 $9 \text{ row} \times 270 \text{ columns} = 2430 \text{ bytes}$   
 Each bytes corresponds to a 64 kbits/s channel.

Q No 704 (A) Difference between in band and channel associated signalling.

Ans:- Signalling the data control signals are transmitted within the same channel or frequency the signal is said to be "in-band". For example an analog modem transmits control signals and data in the same human voice frequency band. Channel-associated signalling (CAS) is signalling (for example) in a T-carrier system line) in which control signals, such as those for synchronizing and bounding frames, are carried in the same channel as voice and data signals.

B) Q 4 Draw the SS7 protocol stack. Show and brief the signalling unit structure in a telephone signalling network SS7 show the step by step signalling.

or receiver telephone calls to is called a user agent (U.A). Each user agent contains a user agent Server (UAS) responsible for handling requests from another endpoint.

(for example inbound calls)

Gateways: An gateway is a device which acts as a bridge between VoIP and the PSTN network.

A gateway can take an incoming calls from a T1 interfacing and convert the signalling into SIP message exchange and convert the voice from TDM to RTP packets.

Proxy Server: In SIP system a proxy server (used with a register and a location server) can provide the following services:

Call Routing including URI translator

Registration

Access (authentication) to a SIP network.

FXC:

FXC stand for foreign stand for center. An FXC port is an interface that connects station devices such as your phones of PBX to VoIP adapter. FXC is an



Ans. The message signal unit (MSU) is used to carry the signalling information between user parts. The signal unit is distinguished by the value of the length indicator (LI). All signal units with  $LI > 2$  are MSUs.

Layer 7	TCAP				
Layer 9.5.6	ASP	U	S		
Layer 3	SCCP	P	P		
Layer 2	Datalink Network				
Layer 1	Physical				

Q-04 Message in order to establish a particular PSTN call.

Ans. SSP information a A formula initial address message forward. Callen goes off hook dial calls SSP. A decides to route call via SSP. Assigns idle trunk A-B. SSP. A receiver ACM connect subscriber line to allocated A-B trunk. (caller hear ringing).