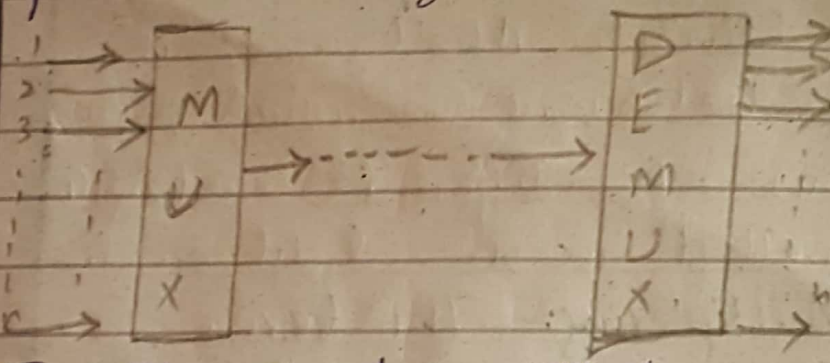
Q.No1 What is Multiplexing, What are the types of Multiplexing. Explain in detail?

Ans Multiplexing is the process of combing multiple signal into one signal over a shair medium if analog signals are multiplexed. it is Analog Multiplexing and. if digital signal are multiplexed that process in Digital Multiplexing.




The process of multiplexing divides a combination channel into several number of logical channels allotting each one for a different massage 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 wavelength 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 massage of all the time of TDM. the main ones are Synchronous and Asynchronous TDM.

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 is common. If the alloted device, for a time slot, transmits nothing and sits ideas. then that slot is allotted to another device unlike synchronous.

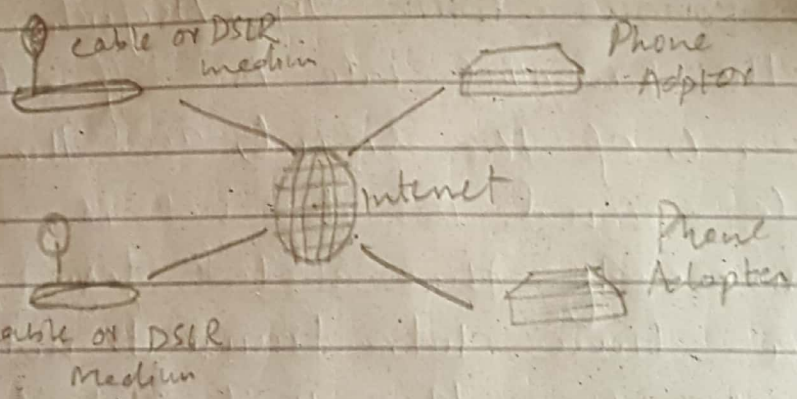
Q.NO 02

VOIP. Explain w.r.t basic function VOIP components? Also explain how to overcome the challanges. What is the role of FXO and FXC 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

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

**FXO:-**

FXO stand for foreig 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 disignation 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

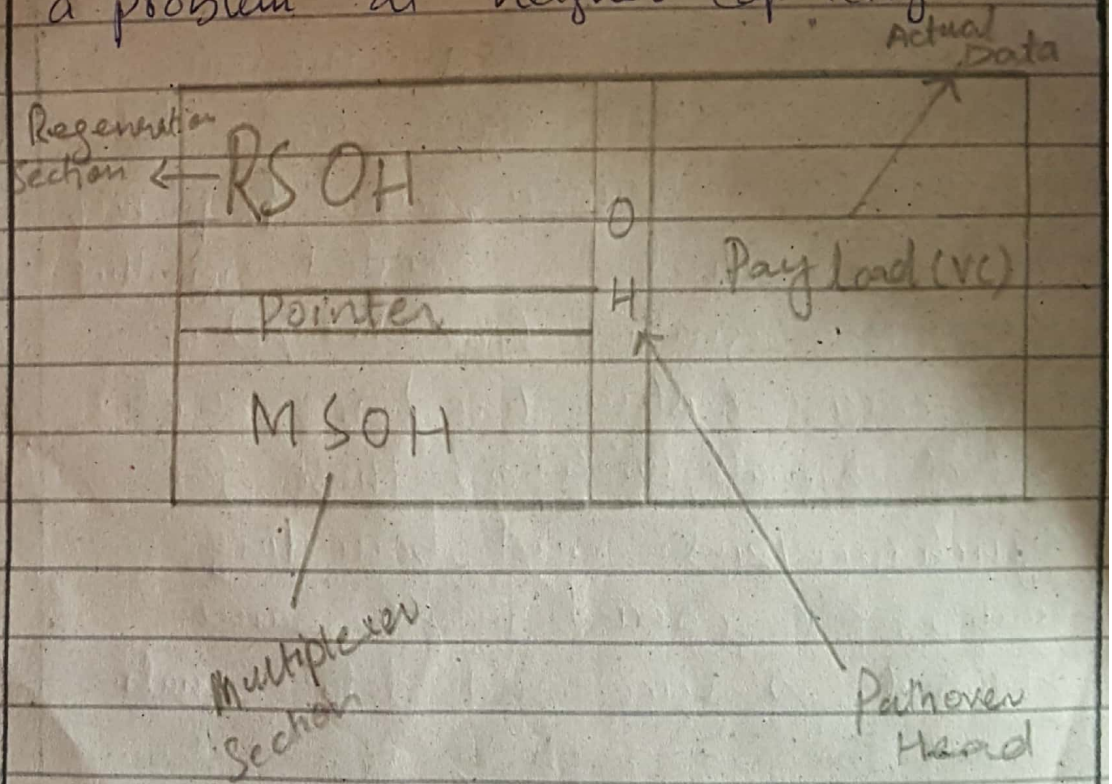
Ability to transport all form of traffic voice, data (ATM, IP) and video.

Capability to build optical interconnects between carriers.

Efficient managment of bandwidth at the physical layer.

Limitation of SDH / SONET

low cost for low channel number SONET/SDH network managment to handle the DWDM method and managment. Bandwidth efficiency is a problem at heigher capacity.




Capacity of byte:-

the basic structure transmission formate 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 row * 270 columns = 2430 bytes Each bytes corresponds to a 64 kbits/s channel.

Q No 04 (A) Ans:- Difference between in band and channel associated signalling. 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 form another endpoint (for example inbound calls)

**Gateways:-** An gateway is a devices which acts as a bridge between VOIP and the PSTN network A gateway can take an incoming calls form a T1 interfacing and convert the signalling into SIP massage exchange and convert the voice from TDM to RTP packets.

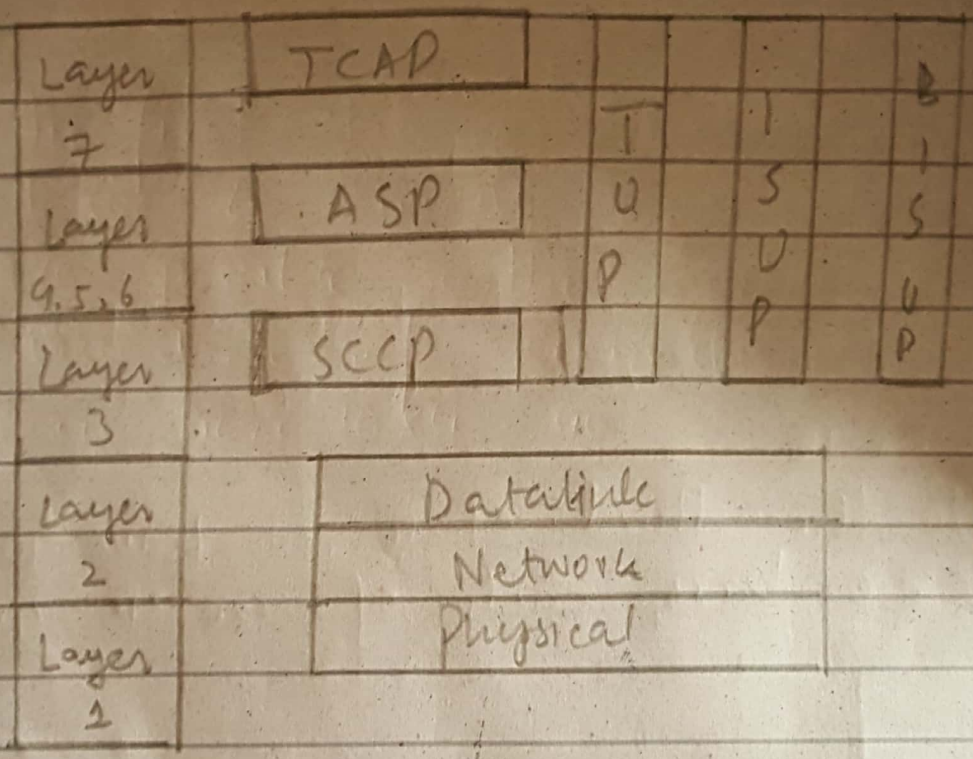
**Proxy Server:-** In SIP system a proxy server (used with a register and a location server) can provide the following services:

Call Routing including URI translator
Registration
Acess (authentication) to a SIP network.

**FXC:-**

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

Ans. I 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.




Q⇒04 C Ans. Massage in order to establishe a particular PSTN call.
SSP information a A formula initial address massag forward Callen goes off hoole dial calls SSP A decides to router call via SSP Assigns idle trunk A-B SSP, A receiver ACM connect Subscriber line to allocated A-B trunk (caller hear ringing.

A receiver ANDN checades called is connected in both direction to trunk calls its connected.

Q No 5(A) Show configuration diagram.

Given data

N = 100

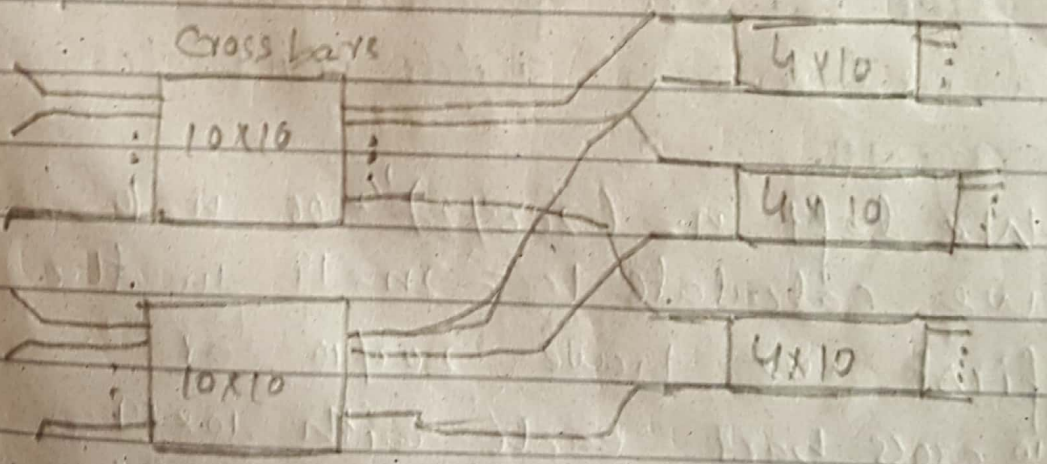
n = 10

k = 4

In the first stage we have N/n = 100/10 = 10 cross bars each of size is 10×4

In the second stage we have 4 cross bars each size is 10 x 10

In the third stage, we have 10 cross bars, each of size is 4×10




Q No 5 (B) Calculate the total number of cross point.

Ans:- $2kn + k(N/n)^2$

In first stage we have 10 crossbars each of size 10 x 4
In the middle stages we have cross bar each of size 10 x 10
the number of cross point is $2kn + k(N/n)^2 = 1200$ cross point.

Q→05 (C) Find the possible number of simultaneous connections.

Ans In first stage each crossbars have 4 simultaneous connections are possible so the Possible number of simultaneous connection $10 \times 4 = 40$

Q→05 D If we increase number of input and outputs to 1000, calculate the total number of cross-point using a multistages switch using clos criteria.

Ans We left $n = (200/2)^{1/2}$ or $n = 10$
we calculate $k = 2n = 19$ in the first we have 200/10 or 10 cross bars each with 10 x 19 cross point in the second stage we have 19 cross point each with 10 x 10 cross point. The total number of cross point

12

$10(10\times19)+19(10\times10)+10(19\times10)$

$= 9500$ Ans.