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Semester 4th

Subject Data Communication and network

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Q No 1

Part (b)

Solution:

In case $r = 4$

$S = 3000$

and N is unknown

lets find the value of N from below formula.

$$S = N \times \frac{1}{r} \text{ or } N = S \times r$$

$$N = 3000 \times 4 = 12000 \text{ bps}$$

Q1 No

Part (E)

The three different techniques in Serial transmission are:

① Asynchronous:-

In this we send 1 start bit at the beginining and 1 or more Stop bits are the end of each byte irregular intervals.

② Synchronous:-

in this we Send bits in a Serial order with out any gaps i.e. regular intervals.

③. isynchroumous:-

it Sends a block of data asynchonously. with out of any gaps and now with Him.

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① NO 1

Part 'D"

- Link refers to the physical paths while channel refers to the portion of a link that Carries a transmission between a given pair of lines.
- one link can have many (n) channels.

To mu ① NO 1

Part (a)

To multiplex 10 voice channels we need guard bands. The required bandwith it then

$B = (4\,kHz) \times 10 + (500\,Hz) \times 9$

$= 44.5\,kHz$

Q No 1(c)

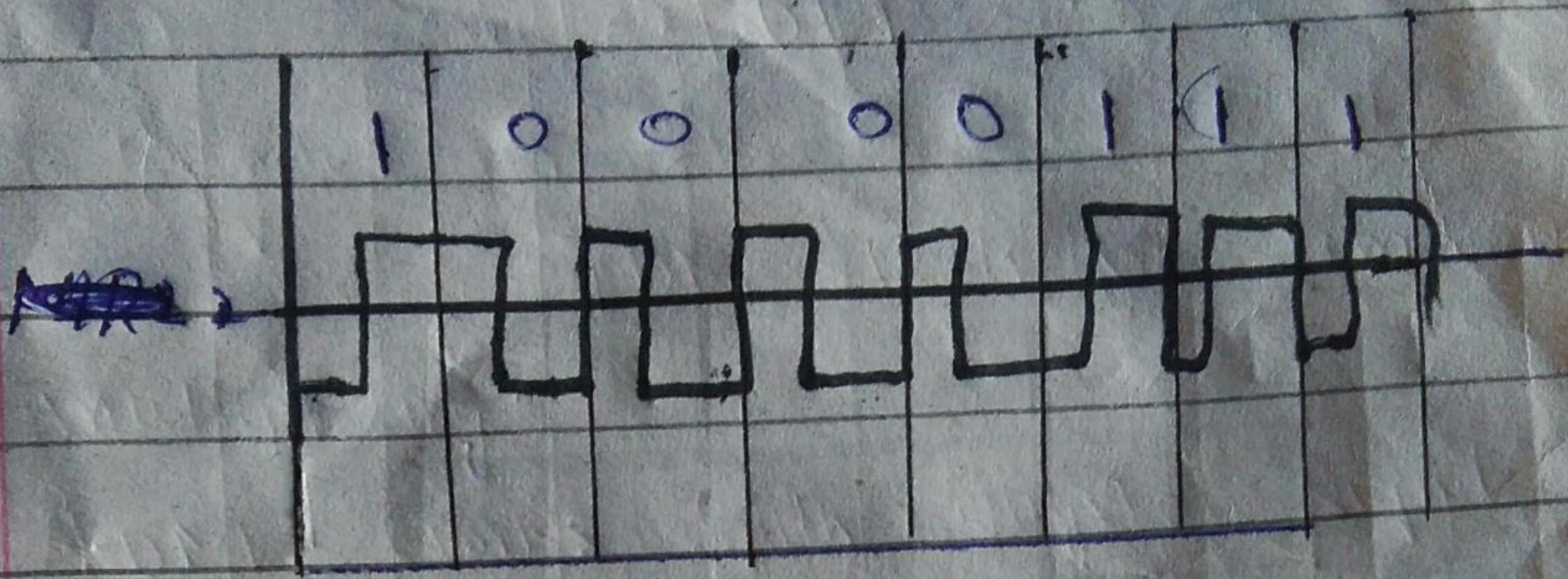
Signal element :-

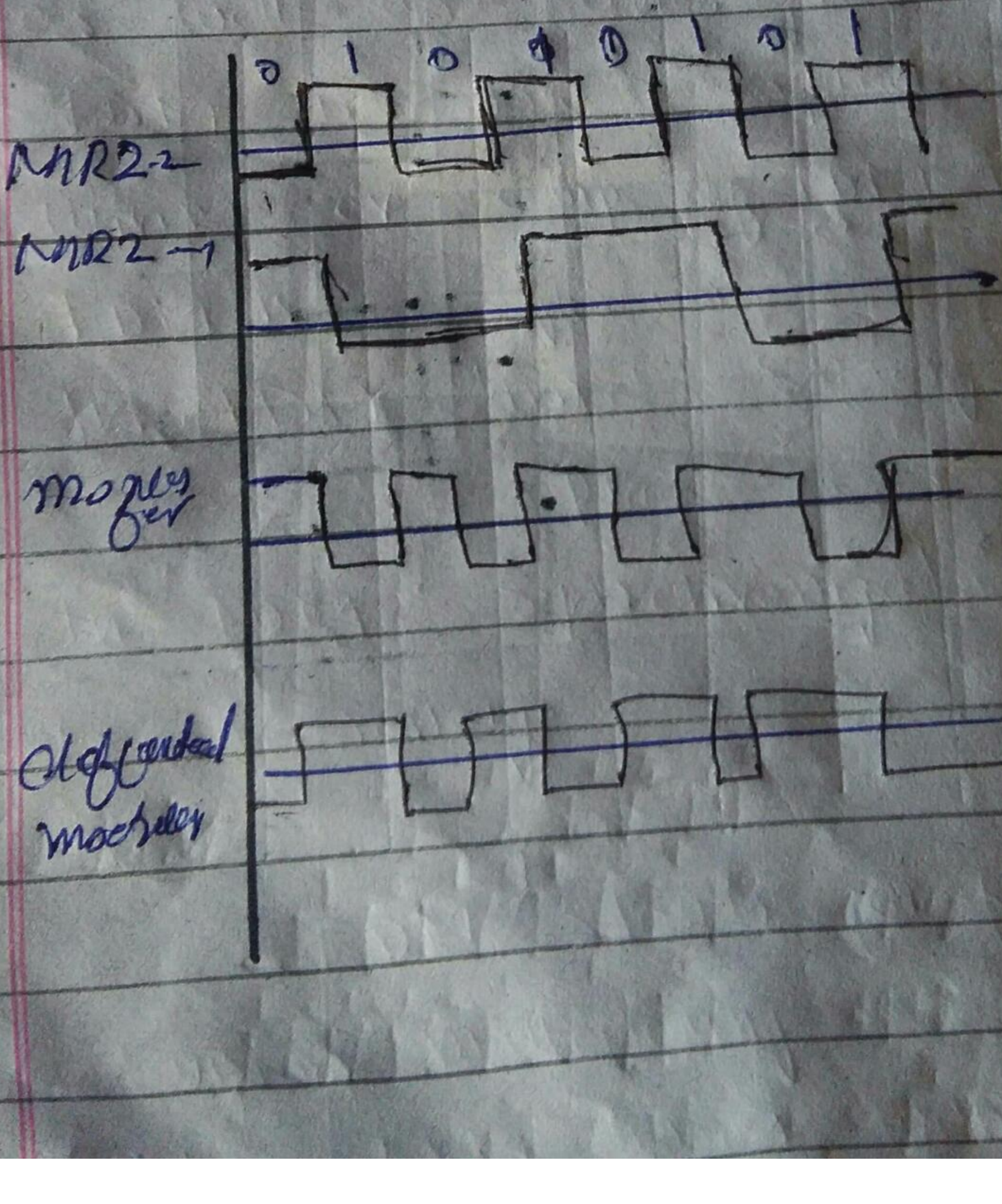
A signal element is the shortest unit of a digital signal we can send. Signal elements are the carries.

Data element :-

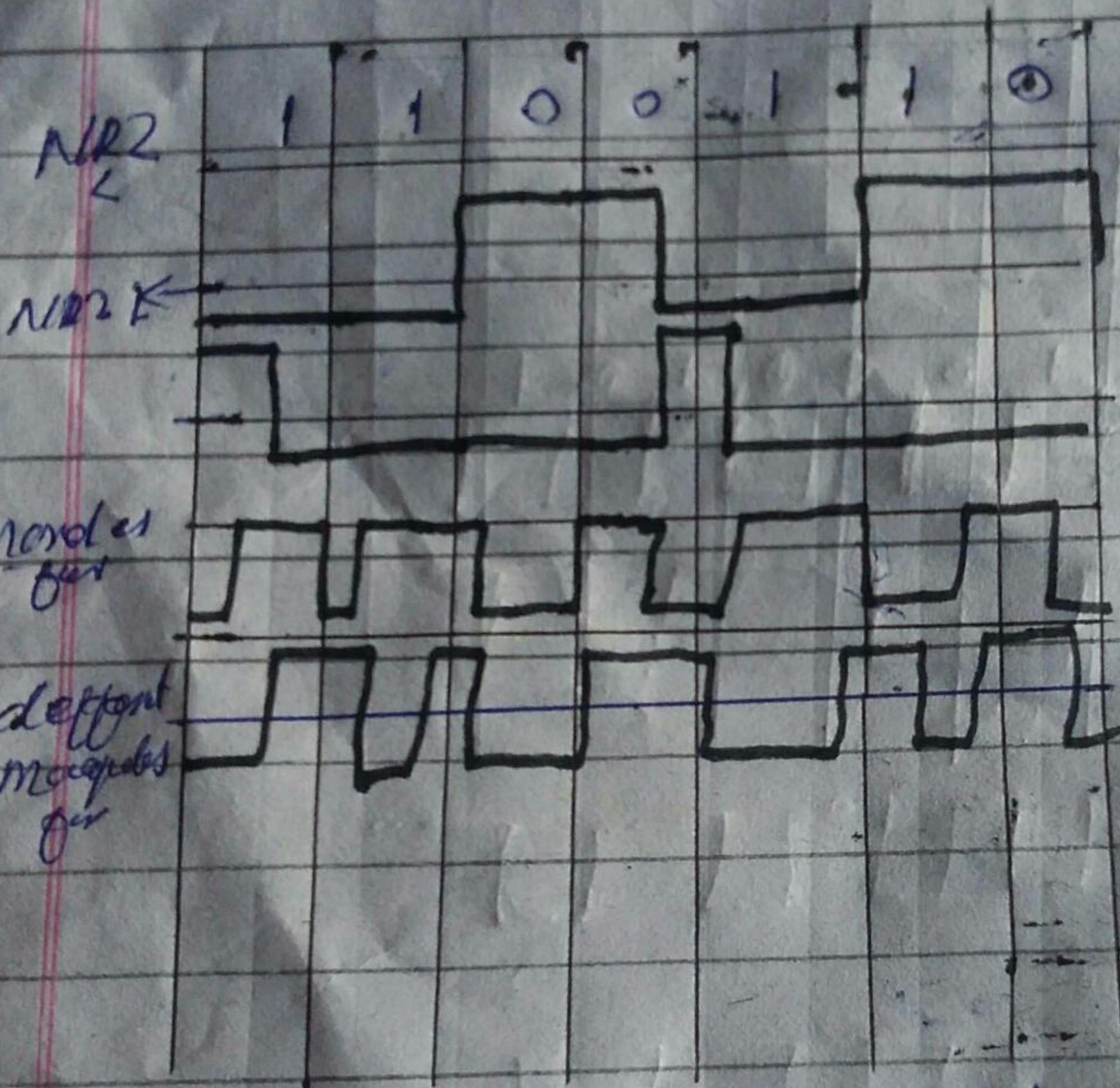
A data element is the smallest entity can represent a information a bit data element are what we need to send, Data elements are being carried.

Our part ⓐ





Q.No 2 (b)



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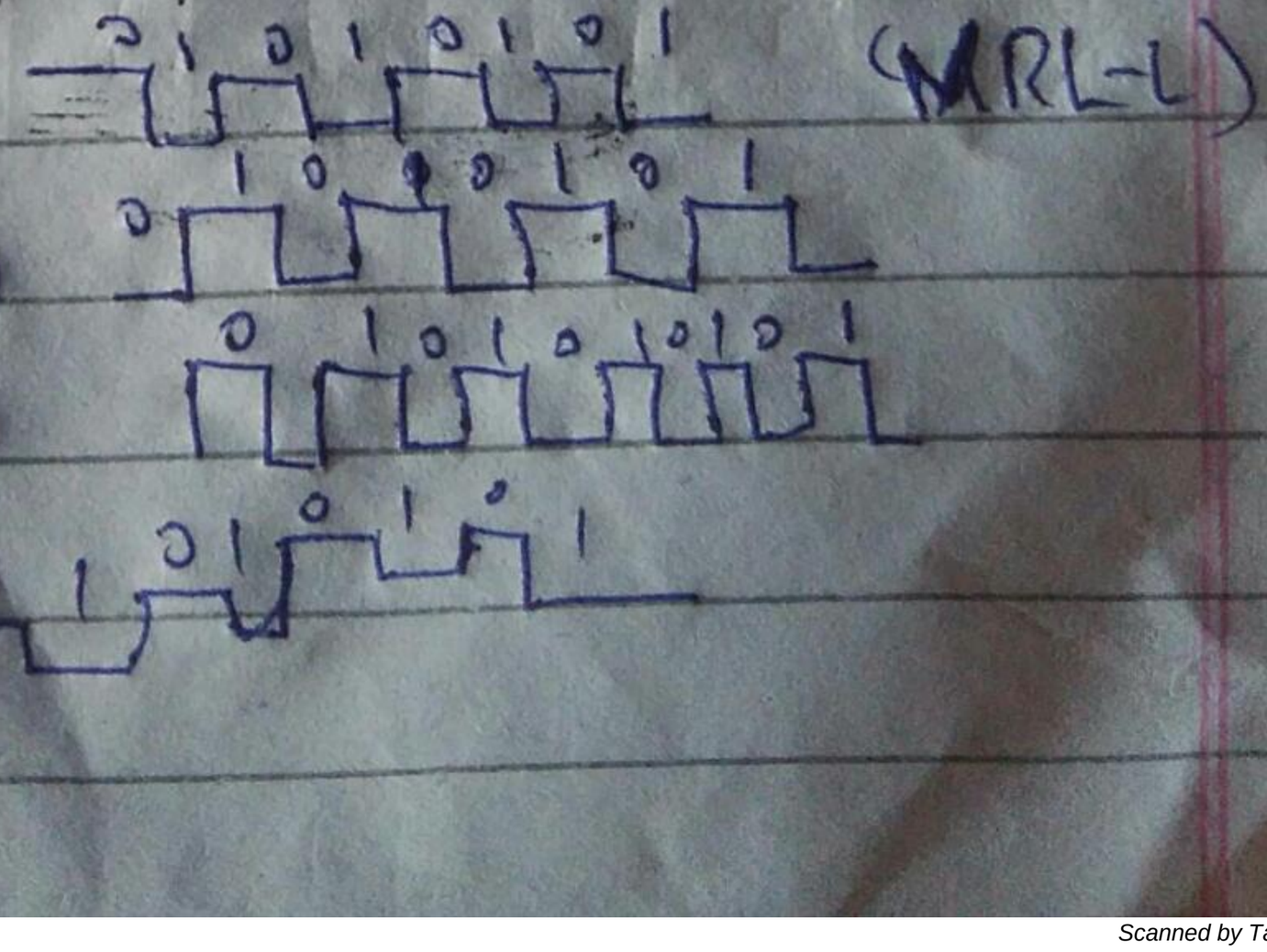


Q no 2

(c)

Bandwidth = Highest frequency - lowest frequency

950 KHz = x - 450 KHz

x = 950 + 450 = 1400 KHz

Nyquist Sampling Rate => should be at least twice the maximum frequency.

Hence,

Nyquist Sampling Rat = 2 x 1400 KHz

=> 2800 KHz

Q NP(3)

The middle of the Bandwidth is located at 60 kHz this is mean that at $f_c = 60$ kHz

we can use the formula for Band width to find the bit rate

with the 1-6 or

$B = 300$ kHz

500 to 800 kHz

$B = (1+d) \times S$

$B = 2S$

$B = 2\left(N \times \frac{1}{r}\right)$

$B = 2(N)$

$300 = 2N$ $N = 300/2$

$N = 150$ kbs

Q NP 3(b)

Binary Amplitude shift keying:

* Although we can have several levels of signal elements each with a different amplitude ASK is normally implemented using only two levels.

only two levles.

* This is referred to as binary amplitude shift keying or on-off keying (OOK)

* The peak amplitude of one Signal level is 0; The other is The same as the amplitude of the carrier frequency.

① No 4 (a)

difference between TDM and and FDM

TDM:

① TDM stands for Tim division multiplexing.

② TDM works with digital signal, as as well as analag.

③. TDM has low conflict.

④. Wiring or chip of TDM is simple.

⑤ TDM is efficient

⑥ In TDM time sharing takes Place.

⑦ In TDM Synchronization pulse is nesenary.

FDM:-

① FDM stands for frequency devision multiplexing

② While FDM works with only analog signals

③ While it has high conflict while it

④ ~~writhin~~ wiring or chip is complen rather than simple.

⑤ while it is inefficient.

⑥ while in this frequency sharing takes place.

⑦ while in it Guard band is necessary.

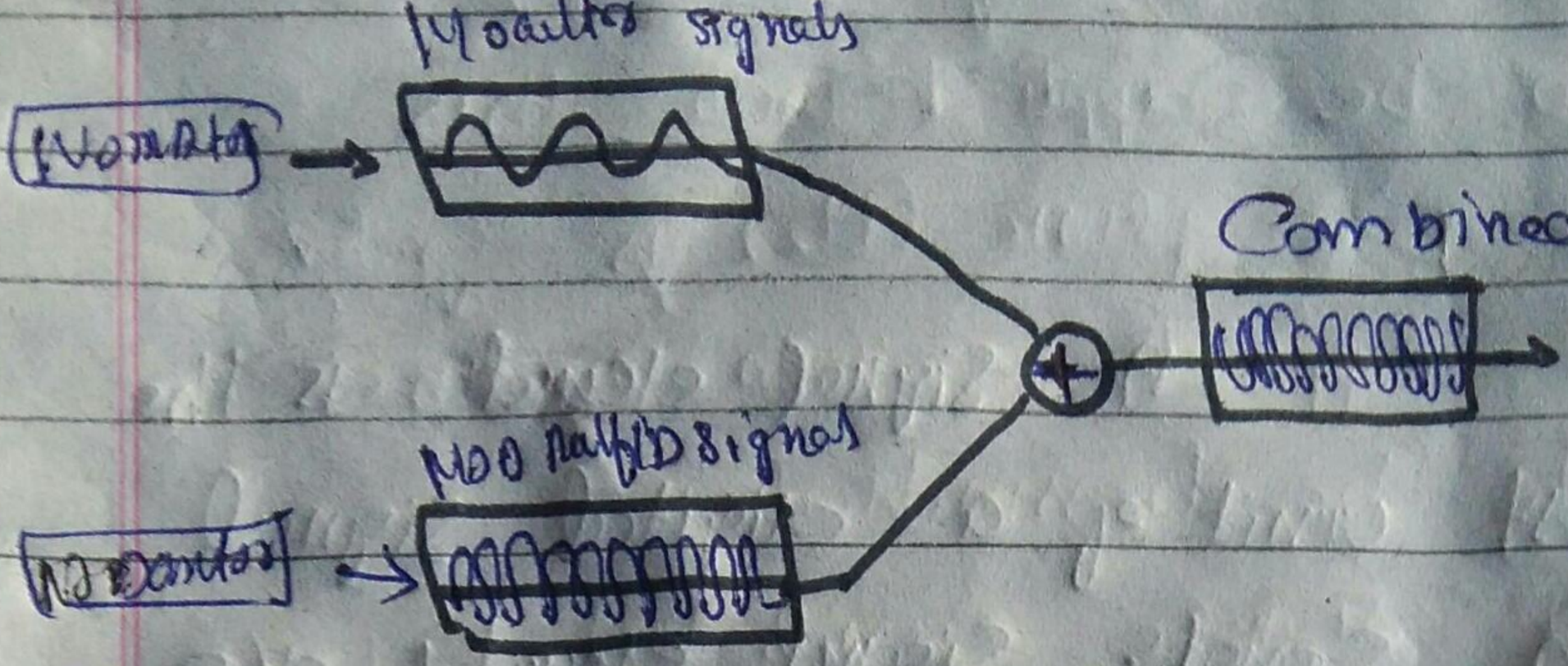
→ FDM Multiplexing & DEMULTIPLEXING:

→ FDM is an analog technique that can be applied with this bandwidth of a link (H_2) is greater than the applied bandwidth of the signals to be transmitted.

→ In FDM signals generated by each sending device modulate different carrier frequence.

→ These modulating signals are then combined into a signal compost signal that can be transported by the link.

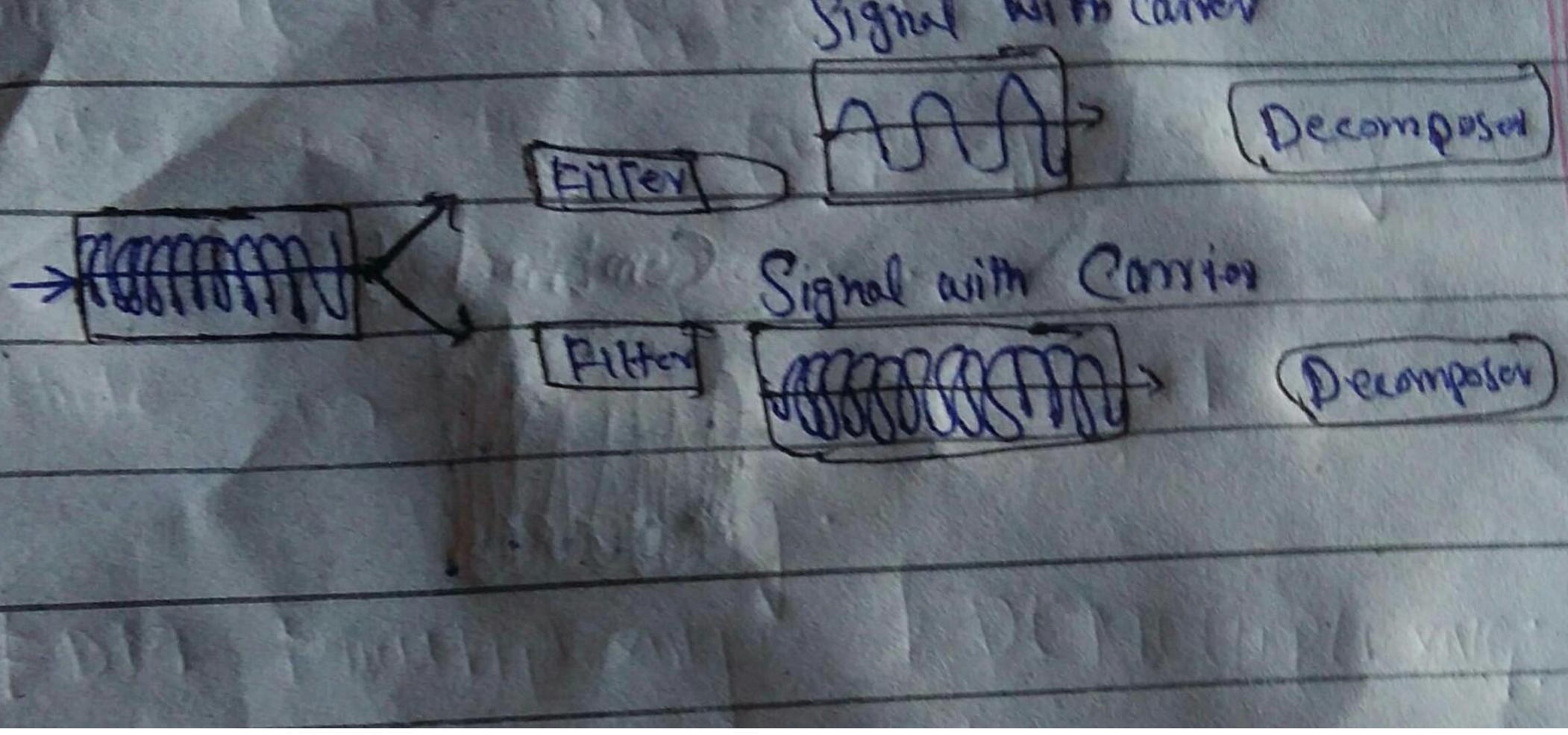
→ In FDM carrier signal is assigned a different enough to be different modulation and demodulation signals.



→ In the de multiplexing process we differ different kinds to decompose the multiprocessed signal into to its consistituent component signal.

→ Then each signal is parsed to an amplitude demodulation process to separate to reasing signal from the message signal.

→ The message signal is then sent to the receiver.



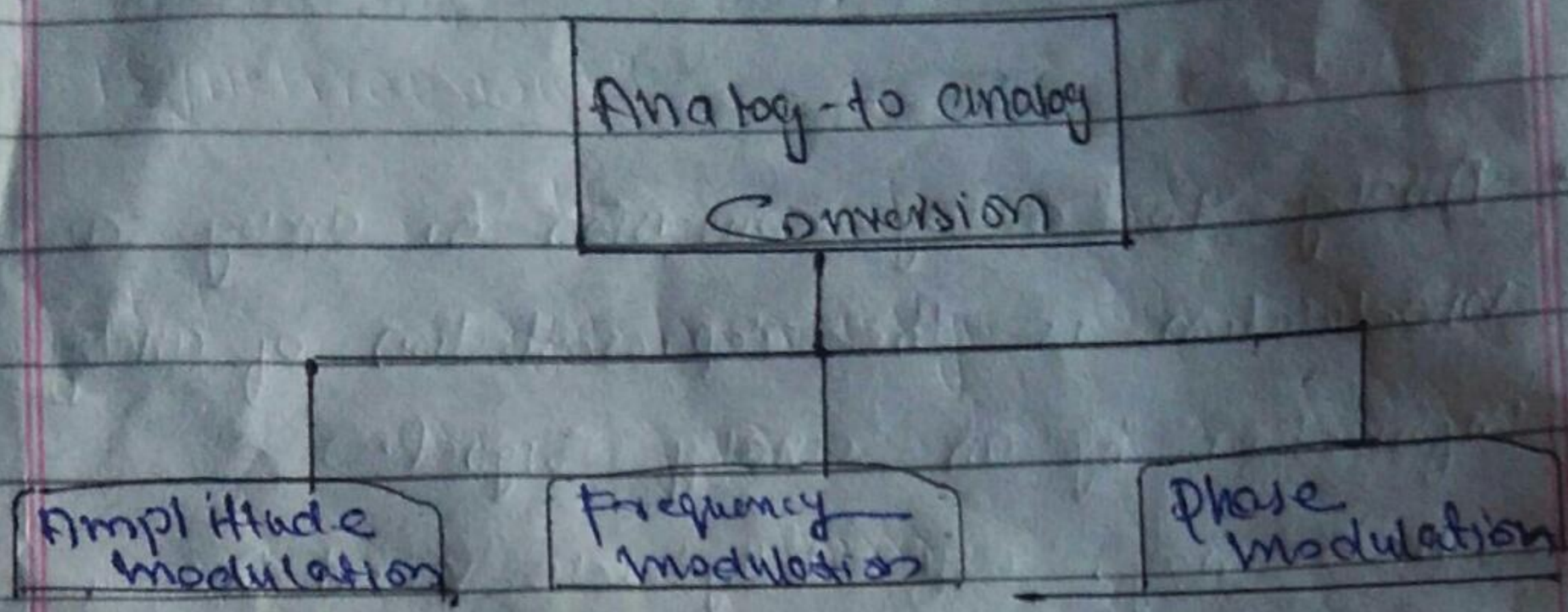
Q NO 4

part :b:

Analog to Analog Conversion Techniques

- Analog - to - Analog Conversion or analog a modulation is the representation of analog information by an analog signal.
- one may ask why we need to a modulate an analog signal ; it is already analog.
- The analog signal produced by each station is a low - pass signal all in the same range.
- To be able to listen to different are Stations , the below are low - pass signals need to be shifted , each to a different range.
- The government assigns a narrow band with to each radio station.
- Analog - to analog conversion can be are accomplished in three ways
- Amplitude modulation (AM)

- Frequency modulation (FM)
- phase modulation (PM)

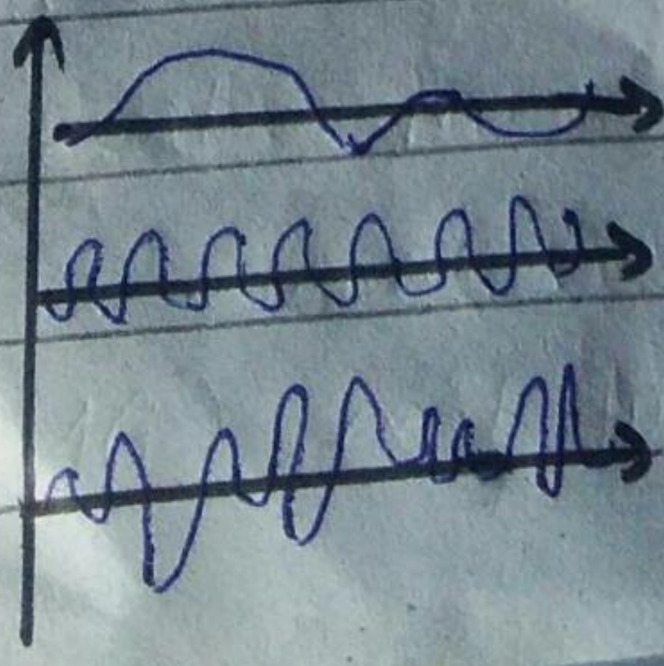


(diagrams)

① Amplitude Modulation : (AM)

→ In AM transmitting the carrier Signal is modulated so its amplitude varies with the changing amps of the modulating Signals

→ The frequency and phase of the carrier remain the same only amplitude change to follow variation of information.

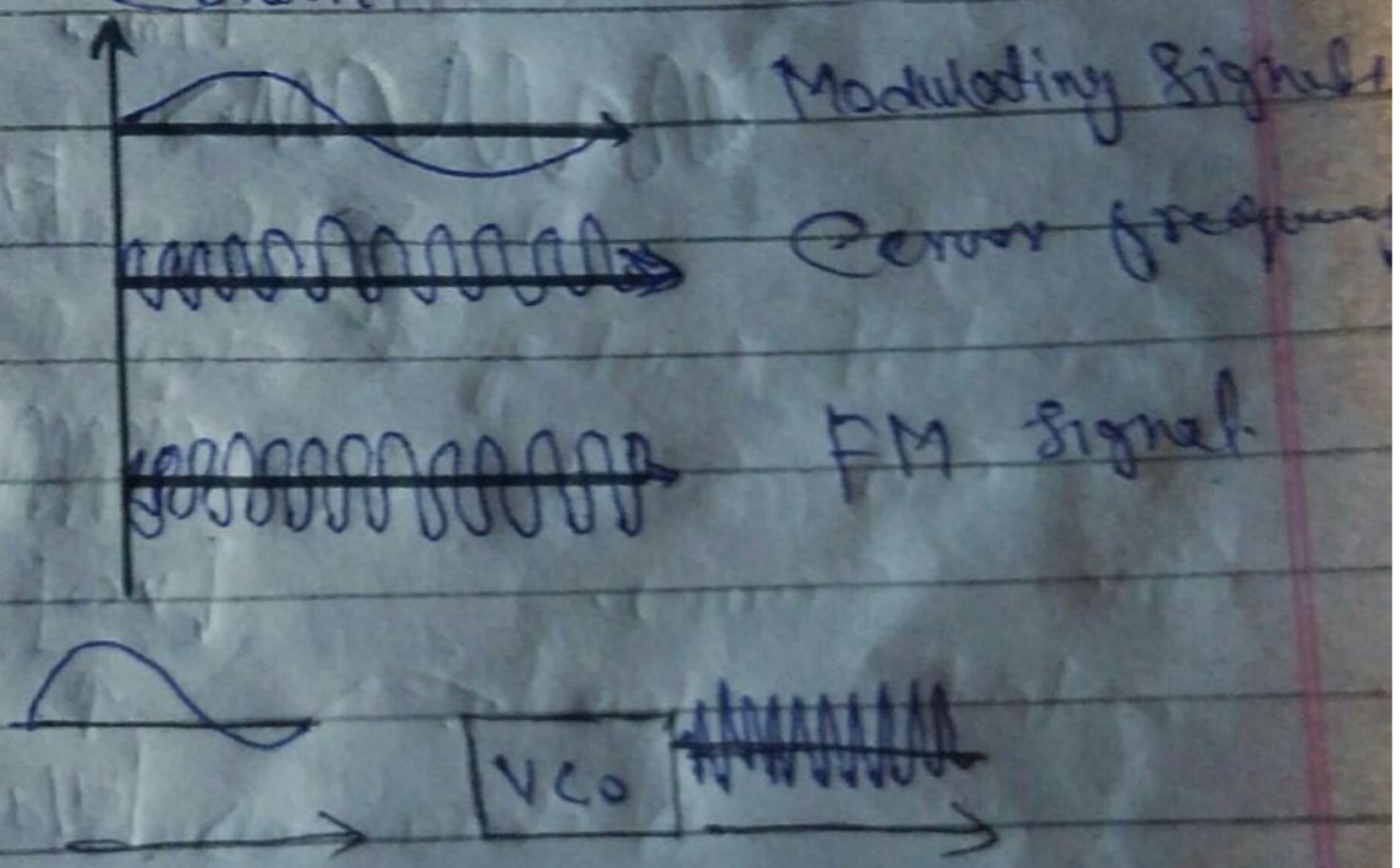


Voltage

② Frequency Modulation (FM)

→ In FM transmision the frequency of the Sarver Signal is modulated to follow the changing Voltage level (amplitude) of the modulating Signal.

→ The peak amplitude and place of the Seroen Signal remain Contont.



③ PHASE Modulation (PM)

→ In PM transmition the place of the Seroen Signal is mudulated to follow the chaging Voltage that of the modulating Signal

→ The PM is the Same

--> Is the same as FM with one difference.

--> In FM peak amplitude and frequency of Carrier Signal remain constant.