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Subject " Data Communication
Degree " BS(CS) 4th Semester
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Question N (1) (a)

Ans (a) For 10 voice channel, we need a gaurd bands So the requited bandwidth is

$10 \times 4 + 9 \times 0.5$
$40 + 4.5$
44.5 KHz.

Question No (1) (b)

Ans (b) Solution:

In Case $n=4$, $S = 300$ and N is unknown lets find the value of N from below formula

(2):

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$S = N \times \frac{1}{4}$ or $N = S \times 4$

$N = 3000 \times 4 = 12000$ bps.

Question No (1) (C)

Ans (C).

- A data element is the smallest piece of information to be exchanged, the bit.
- A Signal element is the smallest unit of a signal that is constant.

Question No (1) (d)

Ans (d)

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

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Question No (1) (e)

Ans (e)

The three different techniques in Serial transmission are:

(1) Asynchronous :-

In this, we send 1 Start bit at the beginning and 1 or more Stop bits at the end of each byte i-e irregular intervals

(2) Synchronous :-

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

(3) Isynchronous :-

It sends a block of data asynchronously.

(4)

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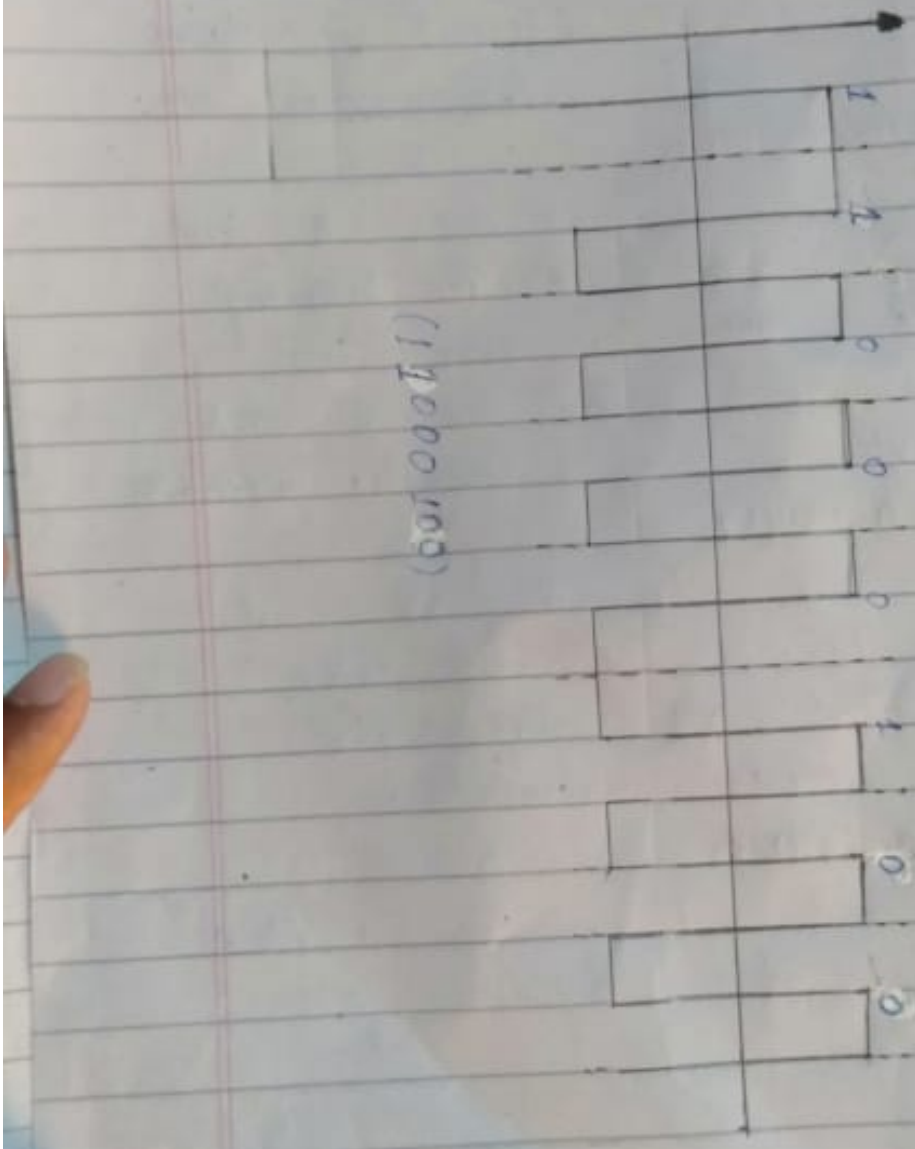
Question (2) (a)

Ans (a)



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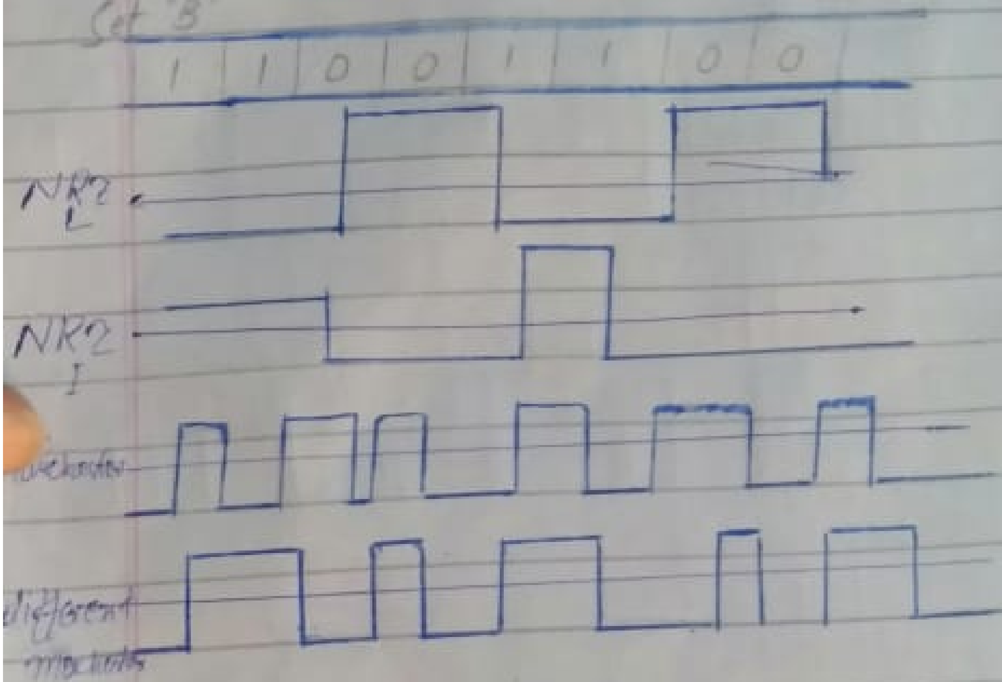
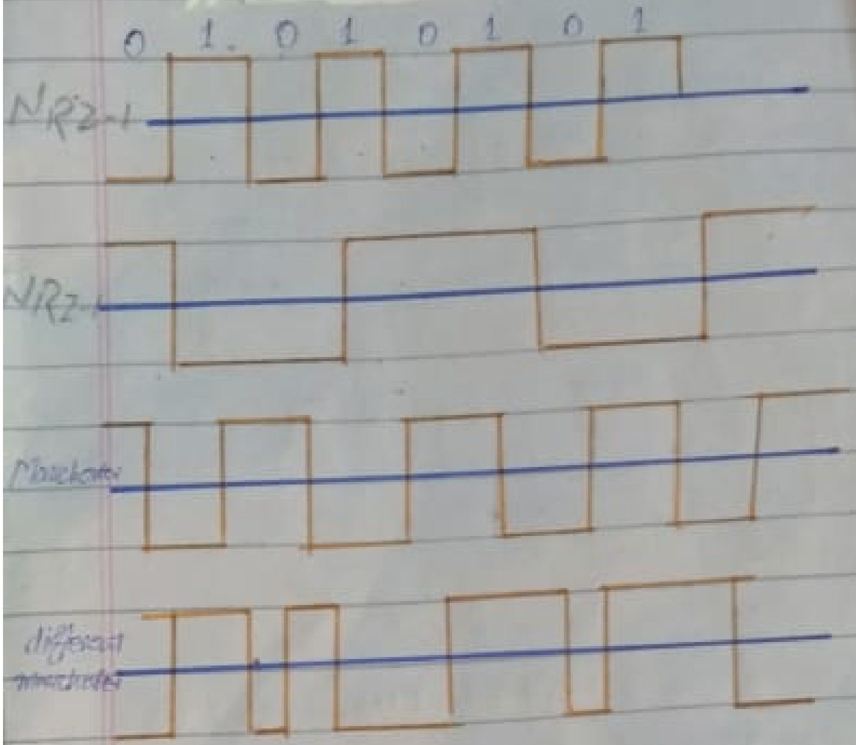
Q NO 2:-

Set "B"



Salman Khan [illegible] Sir ghassan

Question (2) (b)



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Question No 2 (c)

(c)

We know that
if the analog signal is
bandpass than the
band width value
will be lower than
of maximum frequency

$f_{max} \geq 450kHz$

Nyquist Sampling rate $2f_{max}$

$f_{max} = 450 + 950KHz = 130 KHz$

Nyquist Sampling rate $= 2 \times 1300$

$KHz = 2600$ Sample per second

Submitted by: ID#14974 Sir ghassan

Question No 4(3) (a)

(a)

The middle of the bandwith is located at 650 KHz This means that our Carrier frequency can be at F_c = 650 KHz. we can use the formula for bandwidth to find the bit rate (with d = 1 and r = 1)

300 KHz

500 to 800 KHz

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

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

$B = 2S$

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

$B = 2(N)$

$300 = 2N$

$N = 150$ Kbs

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Question No 3 (b)

(b)

Amplitude shift techniques is used

It is normally two Levels

The peak amplitude of one signal level is 0 while the other is same as the amplitude of the carrier frequency.

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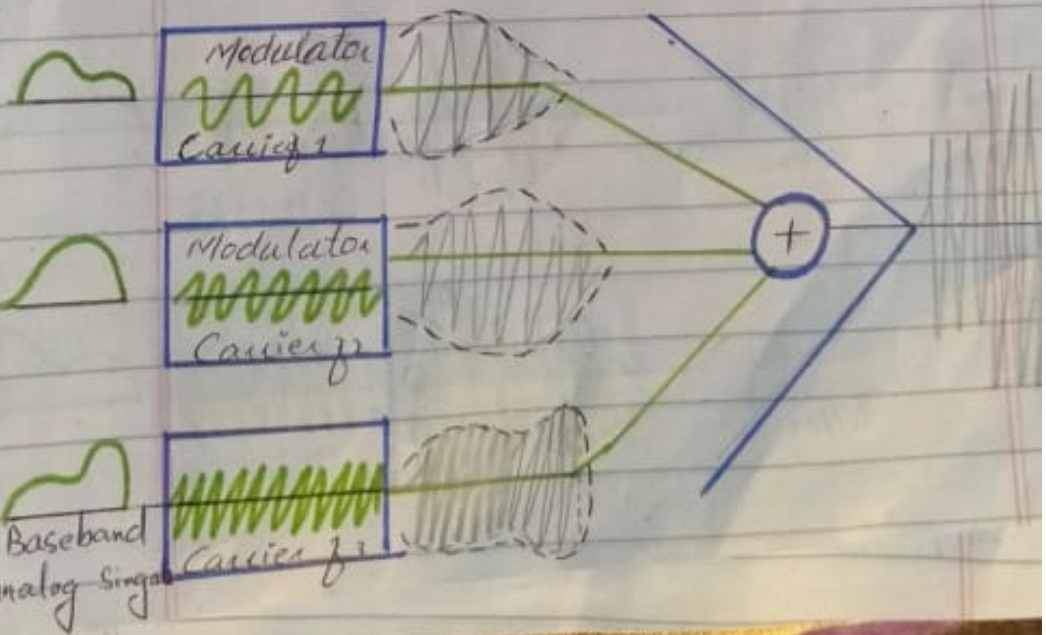
Question No 4 (a)

Ans (a) FDM :-

It is multiplexing techniques designed for analog signals. it is applied where the bandwidth of link is greater than the combined bandwiths of the signal to be transmitted.

* In this signals generated by each sender device modulate different carrier frequencies.
* Then those modulated signals are formed into one composite signal which can be transmitted through link.

D



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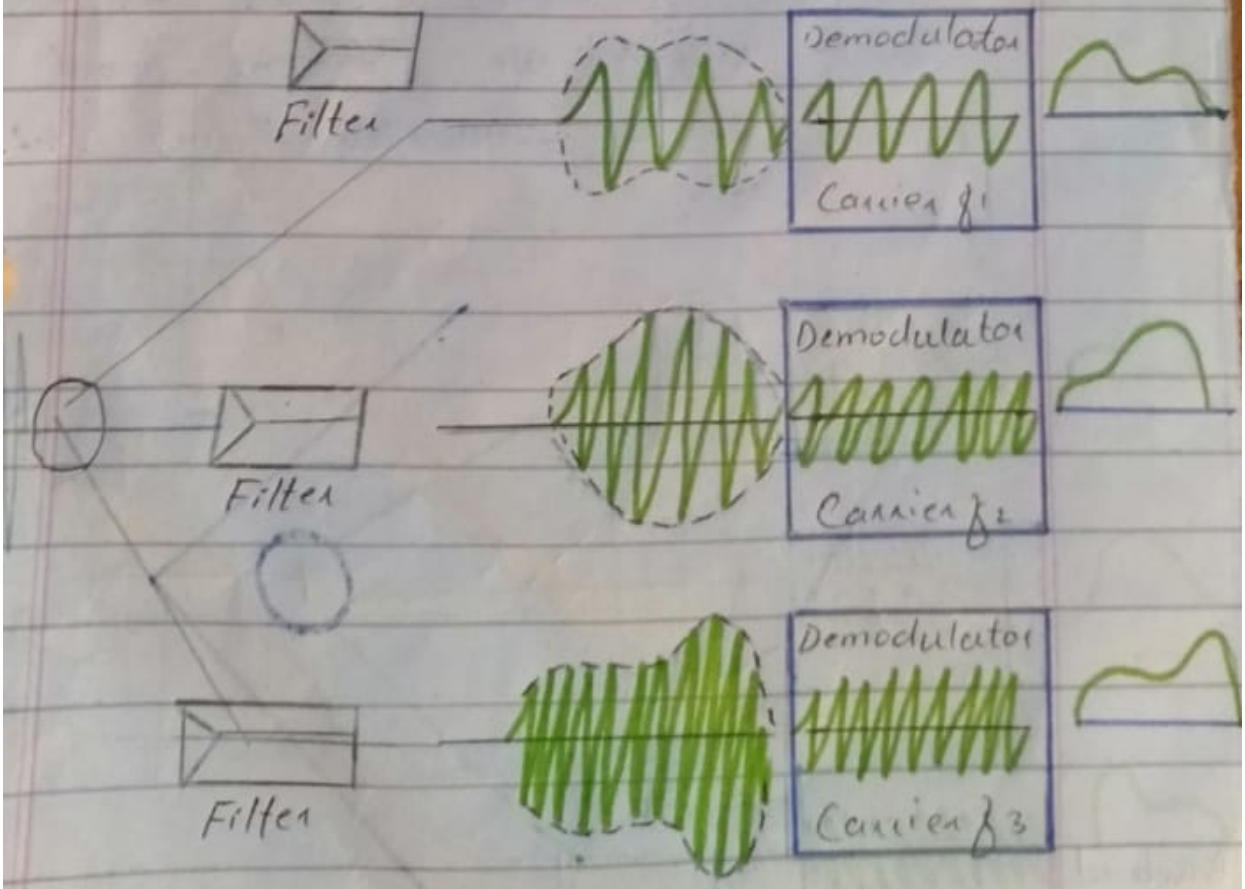
De-Multiplexing Process:

It use a series of filters that decompose the multiplex signal into its signal components signals. Each signal are passed to a demodulator which apart it from carriers and passes them to output liner.



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TDM	FDM
→ It is a digital techniques	→ it is an analog techniques
→ Synchronization pulse is important	→ Guard band is required
→ Share high band width	→ Share the portion of the band width

Question No 4 (b)

Ans (b)

The following are analog-to-analog conversion techniques

(1) Amplitude modulation
(2) Frequency modulation
(3) Phase modulation

(1) Amplitude modulation:-

The Carrier Signal is modulated, it amplitude vary with the changing amplitude of modulating Signal while frequency and phase of the Carrier remain Constant

→ it is implemented by a Simple multiplier.

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(2) Frequency modulation :-

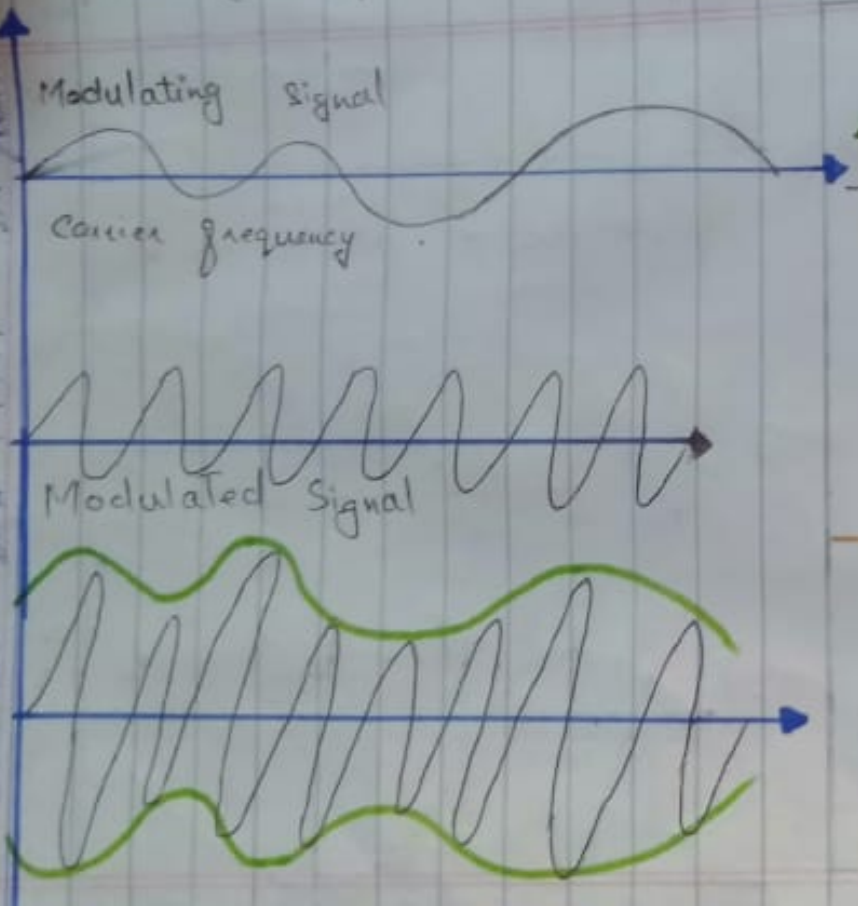
The frequency of the carrier signal is modulated to the follow changing voltage level which the peak amplitude and phase of the carrier remain constant

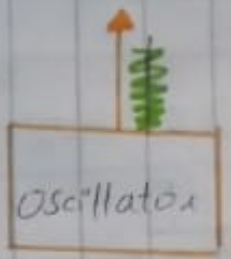
→ it is normally implemented by using voltage - controller and oscillator.

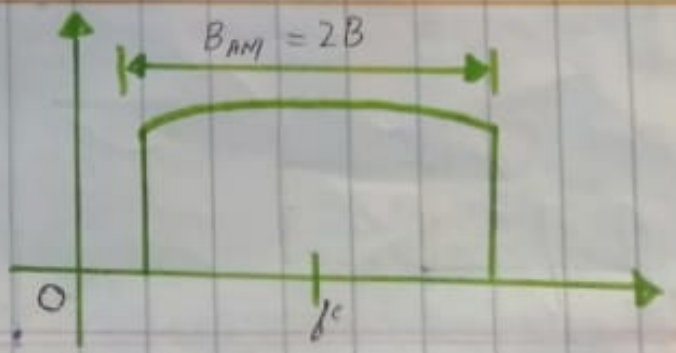
3) Phase modulation :-

The phase of the carrier signal is modulated to follow the changing voltage level. while peak amplitude and frequency of the carrier signal remain constan.

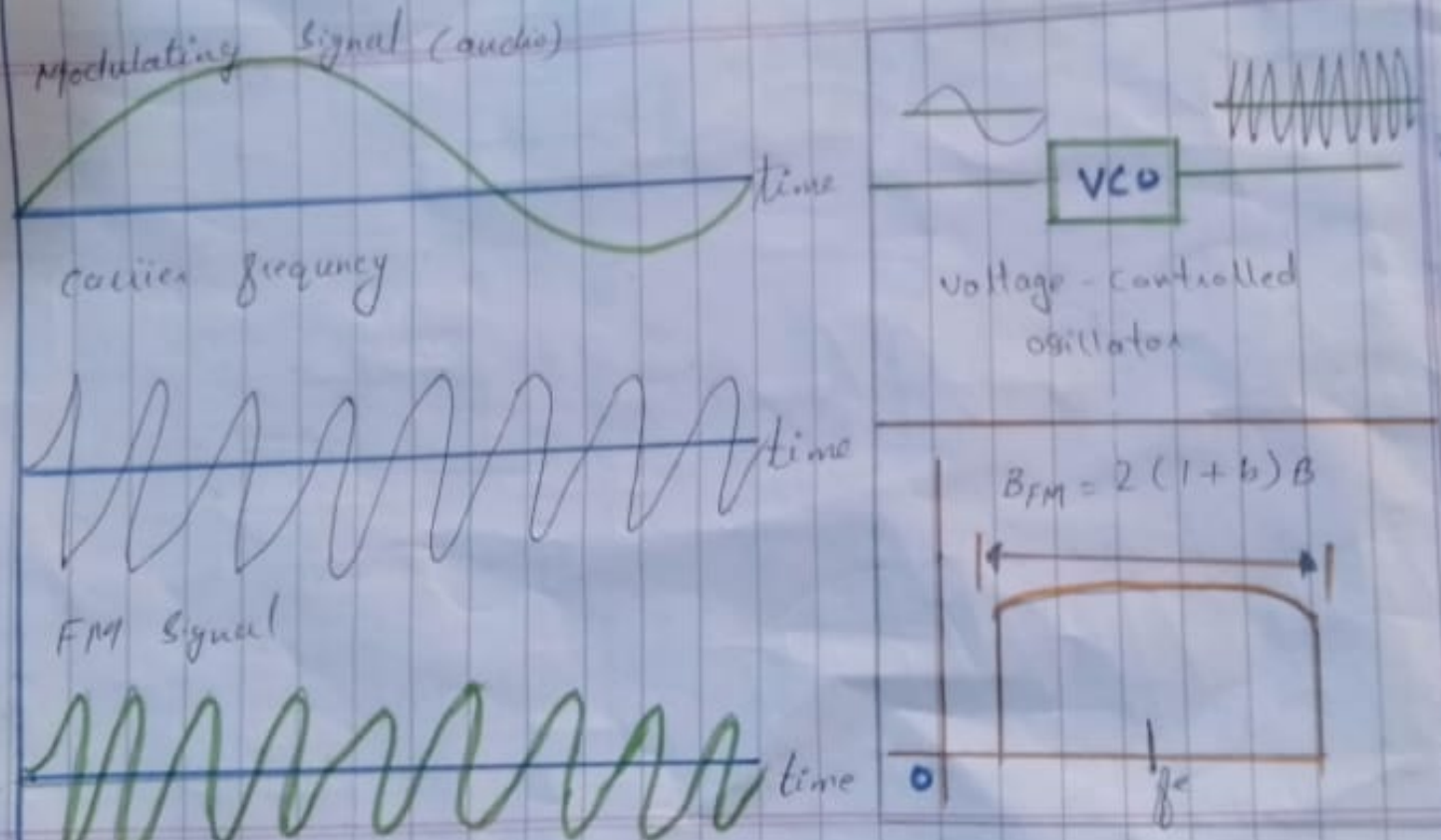
AM (Amplitude Modulation)

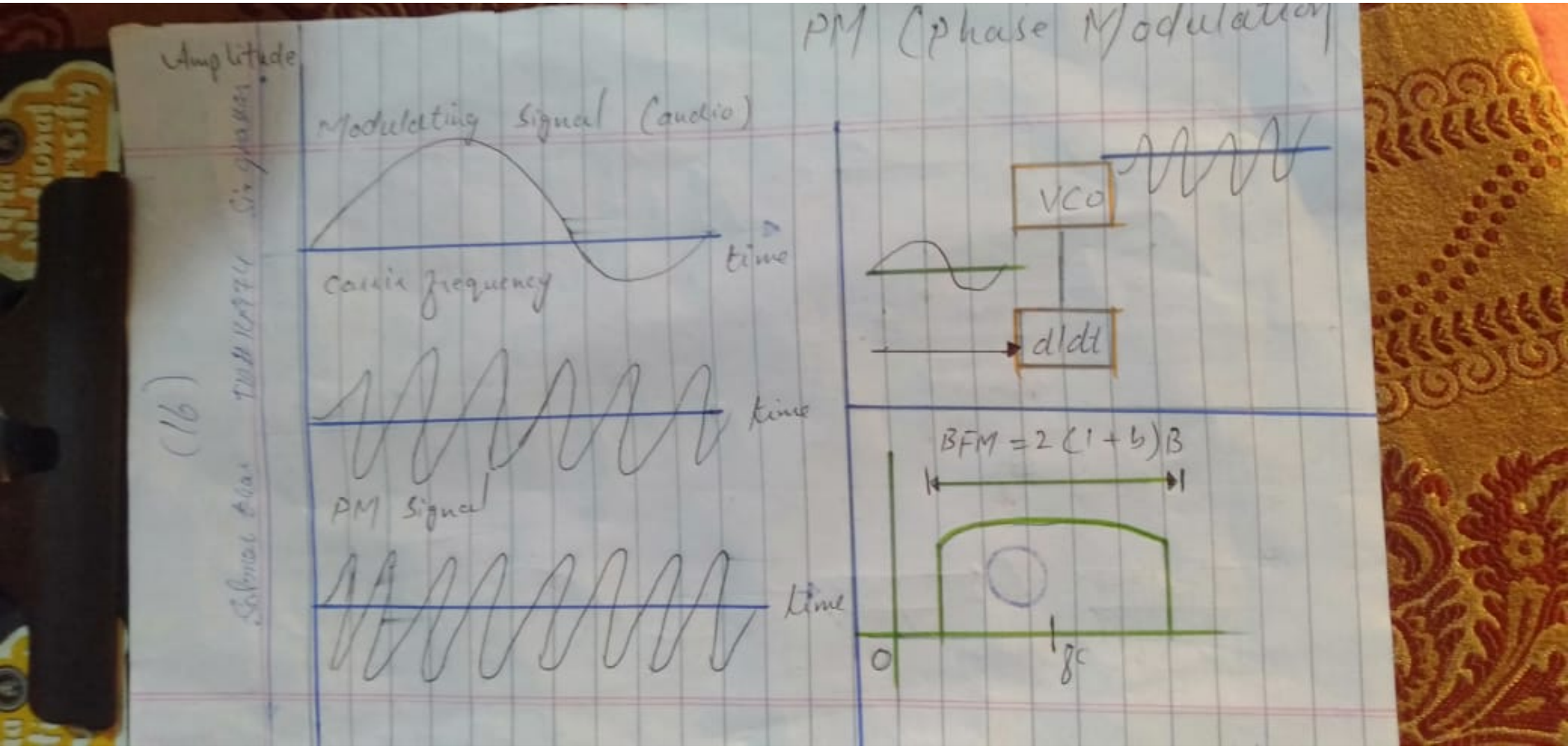






FM (Frequency Modulation)




Amplitude
Modulating Signal (audio)
time
Carrier frequency
time
PM Signal
time
PM (Phase Modulation
VCO
d/dt
BFM = 2 (1 + b) B
0
fc