Date:

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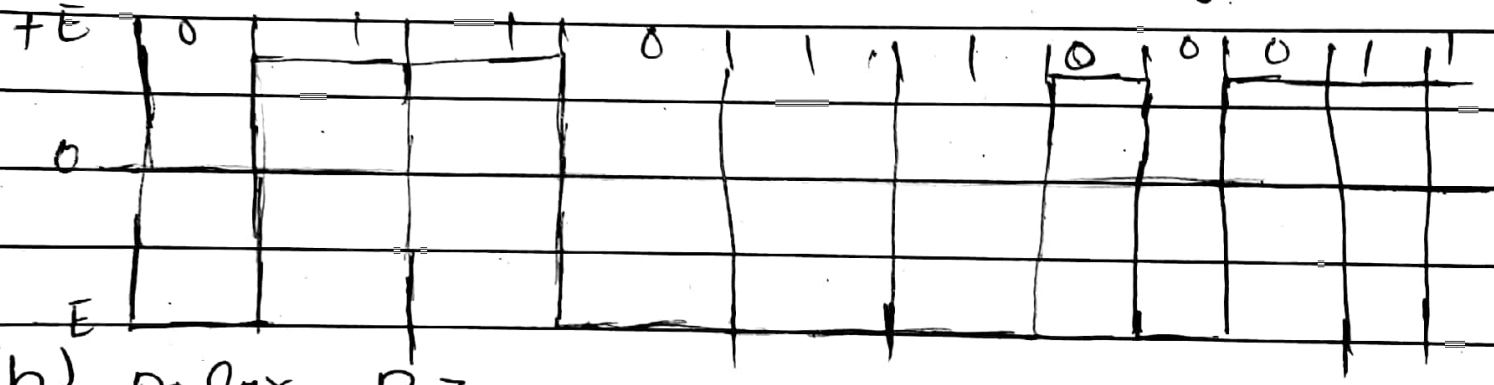
Subject : Communication Systems.

Q3 No # 03

Part (a):

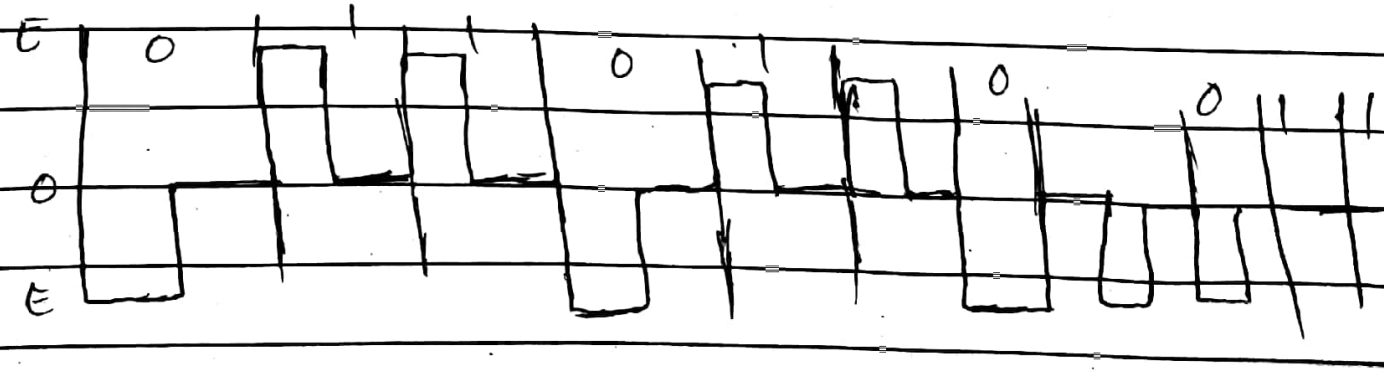
Code : (0 1 1 0 1 1 0 0 0 1 1) NRZ-S

One is represented by no changing in level 0 is represented by change in level



(b) Polar - RZ

One and zero are Representing by opposite level pulses that one half Bit in width.



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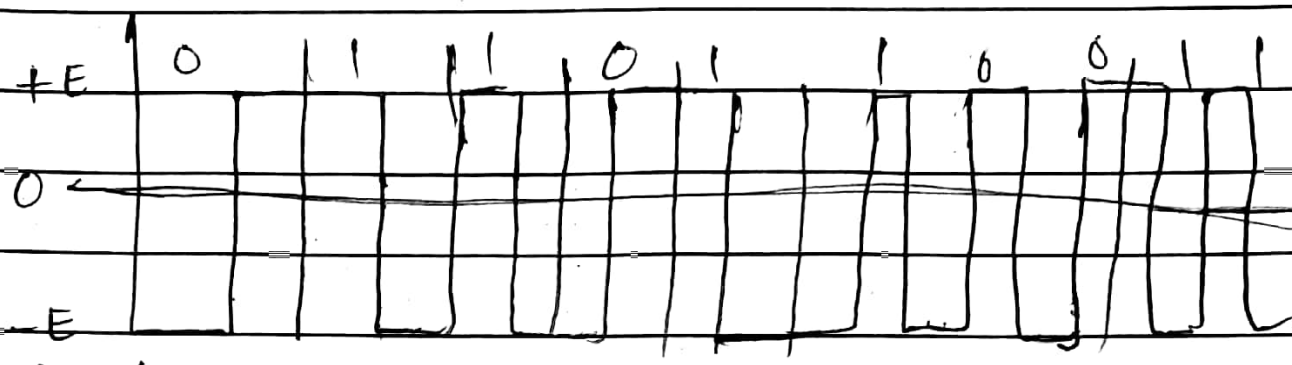
(c)

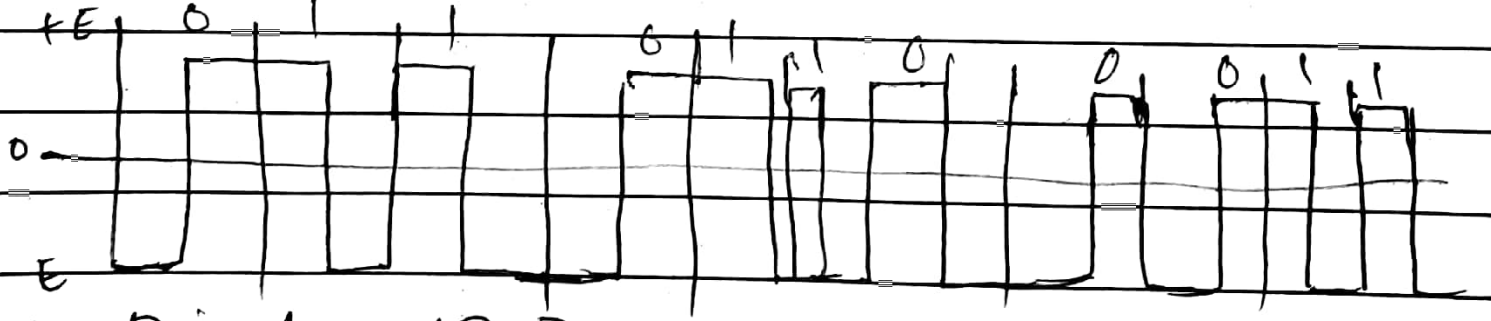
Split phase manchester "0" for high low
To high 1 for high to low.

Graph:-



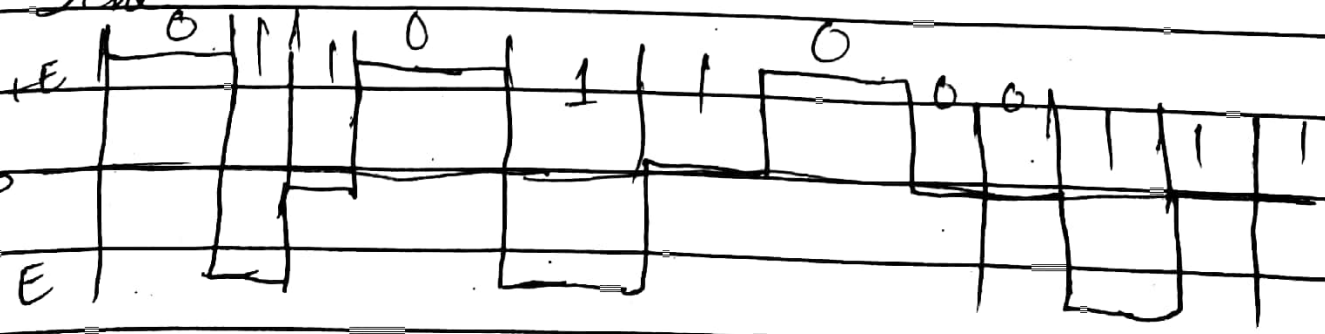
(d) Bi-ϕ-l

One is represented by a 1 0 and zero is represented by 01



(e) Dicode NR-Z.

A "one" to zero or zero to one change polarity otherwise a zero is Sent



Date:

Q no # 02

part (A)

i) $x(t) + x(t-1)$

Sol:-

Nyquist rate = 2x maximum Signal frequency

⇒ Sampling rate unit exceed Nyquist rate in order to be able to fully Reconstruct the Signals.

(a) $y(t) = x(t) + x(t-1)$

fourier transform → $y(jw) = jwX(jw)$

Since the max frequency for $y(jw)$

Since the max frequency for $y(jw)$ is same as $X(jw)$ then $y(t)$ Nyquist.

ii) $y(t) = x^2(t)$

we can rewrite the above fourier transform — $y(jw) = jwX(jw)$

Since the maximum freiquency for $y(jw)$ is the same as $X(jw)$ then $y(t)$ Nyquist rate is also w_0.

part (b):-

massege Sample $m(t) = 10\sin 400\pi t$

$f_s = 300Hz$

cut off freqvency = 150 Hz = f_c

The freqveney (freqvenies present in the

(04) Date:

Reconstructed Signal is Carre
The reconstructed Signals is y(t)

Sol:-

$m(t) = \cos 400\pi t$

So $\omega_m = 900\pi$ rad/sec

$f_m = \frac{\omega_m}{2\pi} = \frac{400\pi}{2\pi} = 200$ Hz

freq Componstant of y(t)

1st we calculate Sample freqvency by formula

$nf_s + f_m$

put deffoerent value of n

$n = 0$

$\Rightarrow f_s \mp f_m = 0 \mp f_m = \mp f_m = \mp 200$ Hz

$n = 1$

$\Rightarrow f_s + f_m = 1f_s \mp f_m \Rightarrow$ [$1f_s + f_m = 300 + 200 = 500$ Hz ; $1f_s - f_m = 300 - 200 = \pm 100$ Hz]

$n = -1$

$f_s + f_m =$ [$f_s + f_m = 300 + 200 = 100$ Hz ; $f_s - f_m = 300 - 200 = 500$ Hz]

The cut of freqvency is 150 So the freqvency is Reng from -150 Hz to +150 will pass into out put.

So freqvency 100 Hz and -100 Hz is an rang so 100 Hz will be component of out put.

MCH Haroon Notes

Q # 04

part (a).

Sol: $m = 0.5$ $E_c = 7.5$ $E_c = 7.5$ volts

let ecs Consider Em form E_c Since

$$m = \frac{E_m}{E_c}$$

Therefore

$$E_m = m \times E_c$$

$$= 0.5 \times 7.5$$

$$= 3.75 \text{ volt}$$

$$E_{max} = E_c + E_m$$

$$= 7.5 + 3.75$$

$$= 11.2508 \text{ Hz}$$

$$E_{min} = E_c - 4_m$$

$$7.5 - 3.75$$

$$= 3.75 \text{ volt}$$

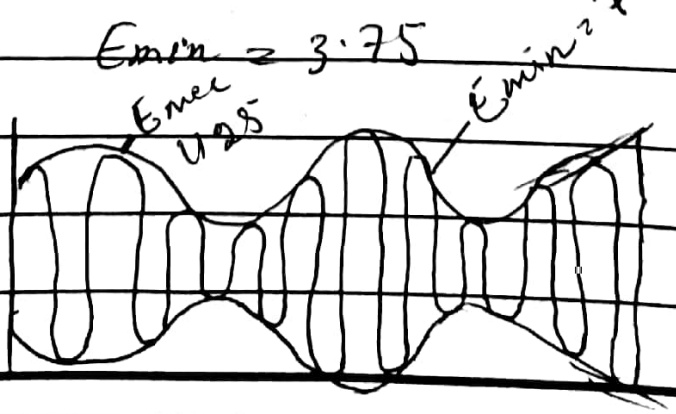
modulated wave form

So. AS we know that

$$n = 0.5$$

$$E_{mc} = 11.25$$

$$E_{min} = 3.75$$



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part (B)

(a) Depth of modulation.

$$m = \frac{E_m}{E_c}$$

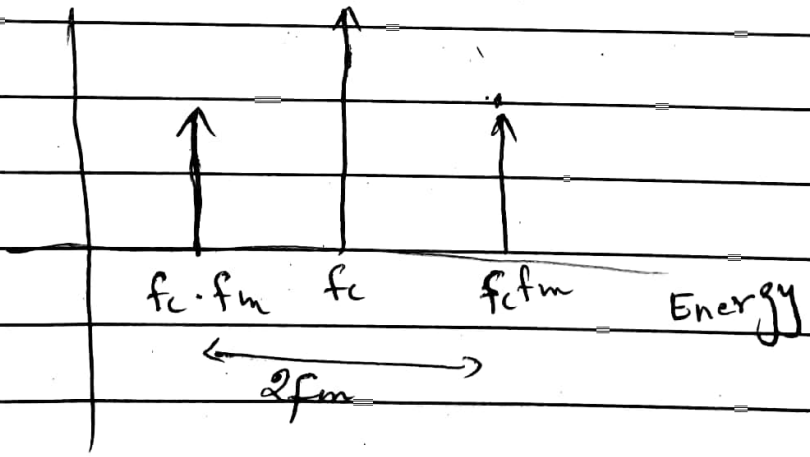
$$m = \frac{10V}{5V} = 2V$$

Transmission Effeciency =

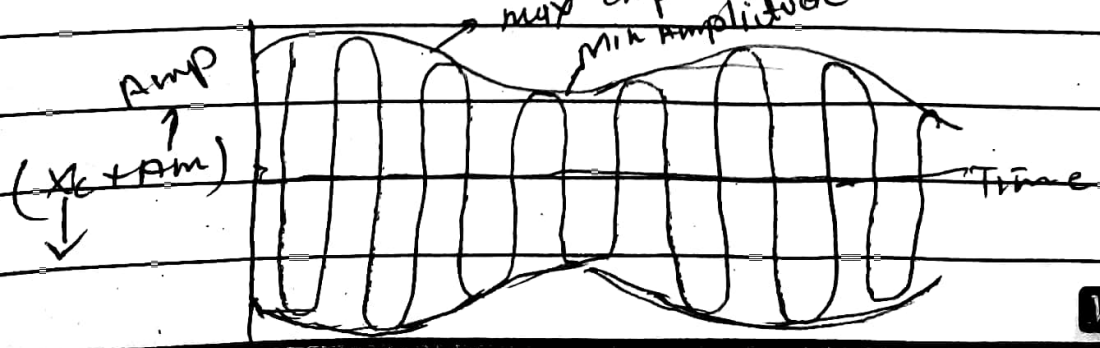
$$t_f = \frac{m^2}{2+m^2}$$

$$t_f = \frac{(2)^2}{2+(2)^2}$$

$$\eta_f = \frac{4}{2+4} = \frac{4}{6} = \frac{2}{3}$$



Amplide frequency. amplitude.



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(37)

C)

power in Spectrum:

$$P_c = \frac{E_c^2}{2\pi R} = \frac{(5)^2}{2\times 50} = \frac{25}{100} = 1/4$$

and total power $= P_t\left(1+\frac{m^2}{2}\right) P_c$

$$P_t = \left(1+\frac{(2)^2}{2}\right)\times 0.2$$

$$P_t = \left(1+\frac{4}{2}\right)\times 0.2$$

$$P_t = (1+2)\times 0.2$$

$$P_t = 3\times 0.2 = 0.6$$

D)

percentage power in USB

$$P_{USB} = \frac{m^2 E_c^2}{8} = \frac{m^2}{4} P_c$$

$$= \frac{(2)^2}{4}\times 0.6$$

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(08)

Q # (01)

Part (a)

NR = ?

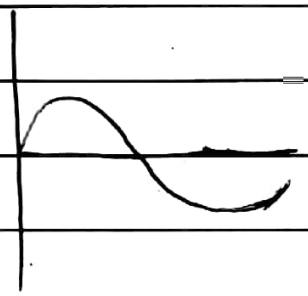
NR > 2fm

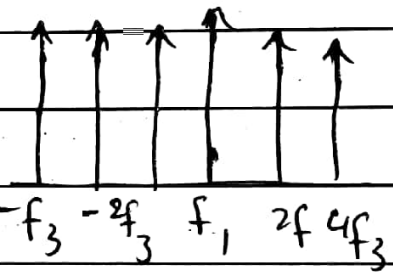
> = 2 x 250 = 5

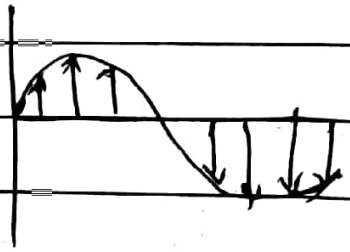
= 500 Hz

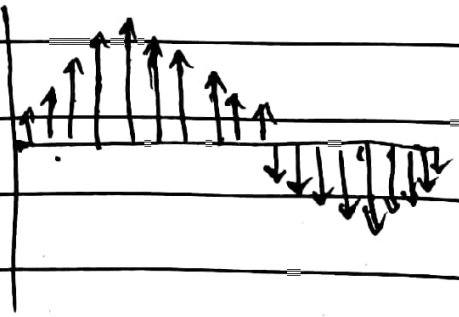
(b)

x(t)

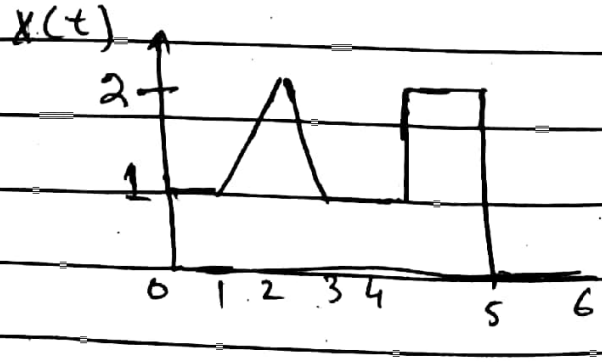








(c)



$x(t) = u(t) + r(t-1) - 2r(t-2) + r(t-3) + 4(t-4) - 2u(t-5$

$x(2) = 4(2)r(1) - 2r(0) + r(-1) + 4(-2) - 2u(-3)$

$= 1 + 1 = 2$

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109)

c) Cutt off frequency

$f_c = \frac{1}{2\pi CR} = \frac{1}{2 \times 3.14 \times 500^2} \quad \frac{1}{3100} = 302 \times 10^{-6}$ Hz

d)

$f_m = 250$ Hz

$f_s = 800$ Hz

As we know that

$f_s = 2f_m$

So $800 = 2(250)$

$800 = 500$

So

$f_s > f_m$

-250 0 +250

The resulting Sampled Signal is