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Subject: CS
Exm: Summer final.

Question no 1.

Answer:

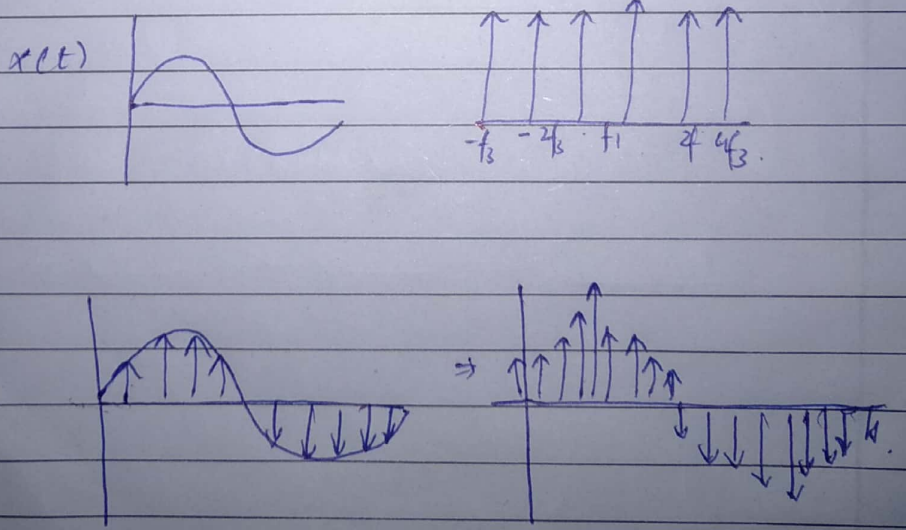
Signal = x(t).
fm = 250Hz.
angular frequency = fs.

Nyquist rate:

a) = NR = ?

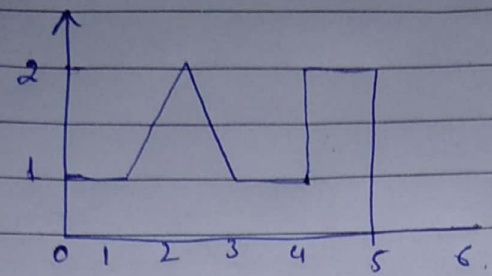
NR > 2fm
>: 2x250 = 500Hz

b).



b)

x(t).



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

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

$= 1 + 1 = 2$.

$x(5) = u(5) + r(4) - 2r(3) + r(2) + u(1) - 2u(0)$

$= -1 + 4 - 2 \cdot 3 + 2 + 2 + 1 - 2 \cdot 1$.

$= 3 \cdot 6$.

c) cutt off frequency.

$fc = \frac{1}{2\pi CR} = \frac{1}{2 \times 3.14 \times 5m} = \frac{1}{31m} = 3.2 \times 10^{-6}$ Hz.

Question NO2.

Solution:

according to problem There is time dome x. Signal with Nyquist rate is fs.
Now we determined NR for Ist signal,

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

$m(t) = x(t) + x(t-1) = NR = ?$

$x(t) \rightarrow NR \rightarrow fs$

So as $x(t) = NR$ is fs $x(t-1)$ have also NR equal to fs. why we are getting $x(t-1)$ after performing time shifting on $x(t)$. and we know there is no effect on time shift.

NR rate of $m(t)$ is the sum of of $x(t)$ and $x(t-1)$.. which is fs. Now we need to choose maximum; there two NR is same. So dirlly NR rate of $M(t)$. is fs.

2). $m(t) = \frac{dx(t)}{dt}$.

As we know differentiation will no effect on NR. than $x(t)$ and t have same NR1 which is given as fs.

$m(t) = \frac{dx(t)}{dt} \rightarrow fs$

$dt \rightarrow fs.$

b).

massage sample $m(t) = 10\sin 400\pi t$.

$fs = 300Hz$.

cut-off frequency = $150Hz$ = fc

The frequency frequencies present in the reconstructed signal is/are ?.

the reconstructed signal is $y(t)$.

Solution:

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

So $\omega_m = 400\pi$ rad/sec =

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

freq compontant of $y(t)$:

1st we calculate sample freqyy by formula.

$nfs \pm fm$.

put different value of n.

$n = 0$.

$\Rightarrow 0fs \pm fm = 0 \pm fm = \pm fm = \pm 200Hz$.

$n = 1$.

$\Rightarrow fs \pm fm = 1fs \pm fm =$ → $1fs + fm = 300 + 200 = 500H$; → $1fs - fm = 300 - 200 = 100Hz$

$n = -1$.

$= fs \pm fm =$ → $-1fs + fm = -300 + 200 = -100Hz$; → $-1fs - fm = -300 - 200 = -500Hz$.

the cut of freqeuny is 150 so the freqeuny reng from $-150Hz$ to $+150$ will pass into output.

So freqeuny $100Hz$ and $-100Hz$ is an reng reng. So $100Hz$ will be component of output.

Question No3.

Ans:

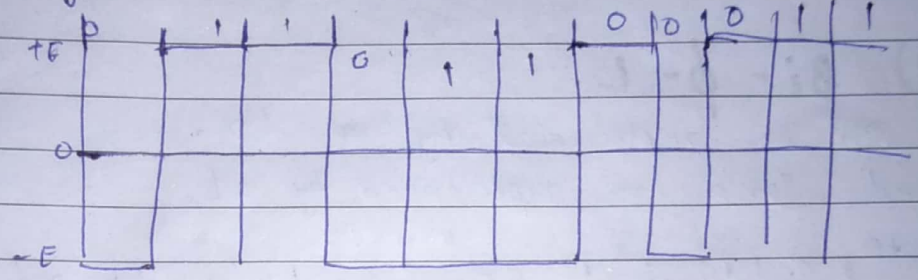
Code:

0 1 1 0 1 1 0 0 0 1 1

(a) NRZ-s

⇒ "one" is represented by No change in level.

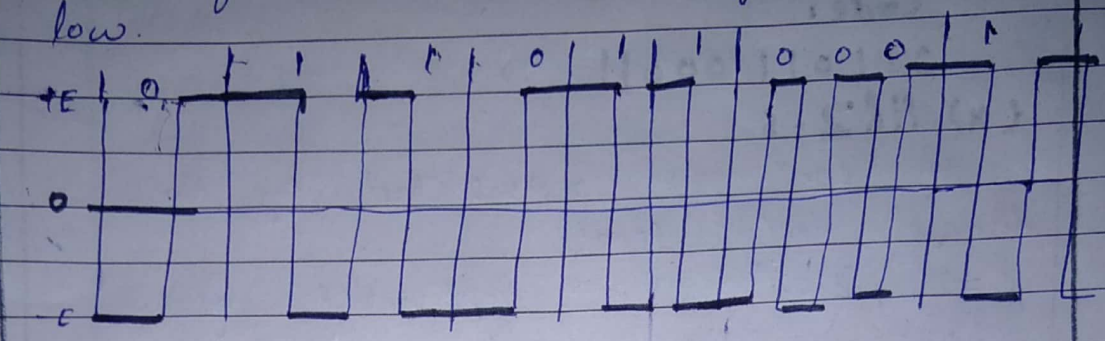
⇒ "Zero" is represented by change in level.



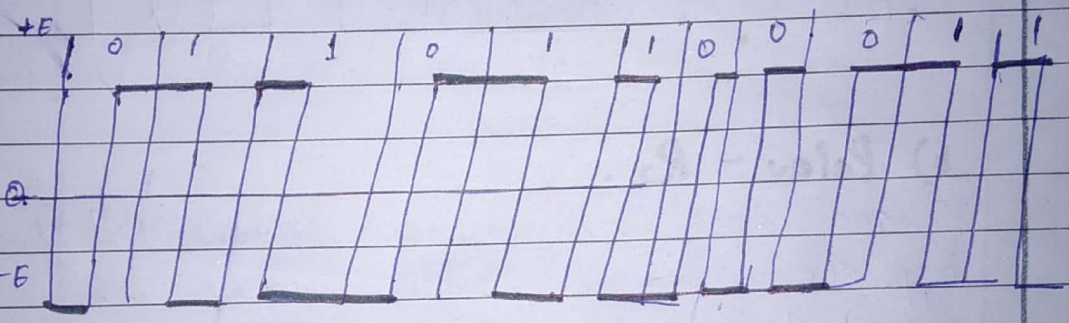
b) Polar - R_2.

One and Zero are represented by opposite level pulses that are one half bit in width.

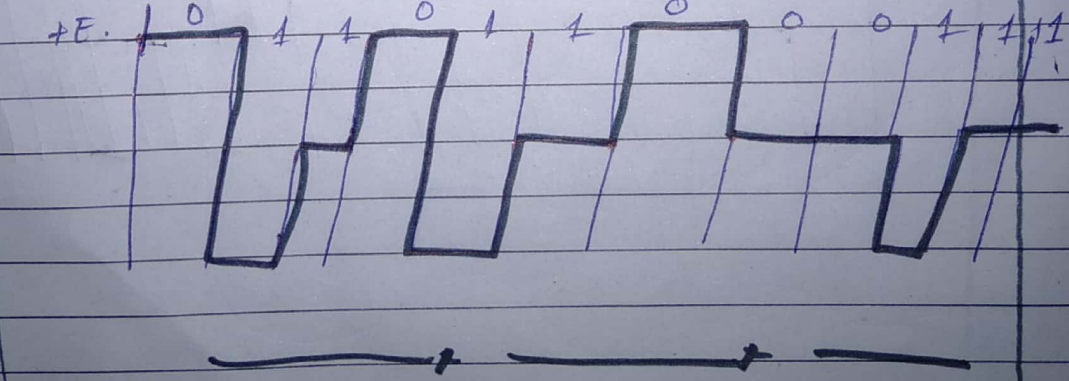
c) Split phase Manchester.
'0' for low to high 1 for high to low.



d) Bi-ϕ-L.
One is represented by a 10.
and zero is represented by 01.



e). Dicode NRZ.
A 'one' to zero or zero to one changes polarity otherwise a zero is set.



Question no 4.

Ans:

Sol:→

$m = 0.5$ $\quad E_c = 7.5$ $\quad E_c = 7.5$ volts.

let us consider E_m from E_c Since

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

therefore.

$$E_m = m \times E_c$$
$$= 0.5 \times 7.5$$
$$= 3.75 \text{ volt}$$

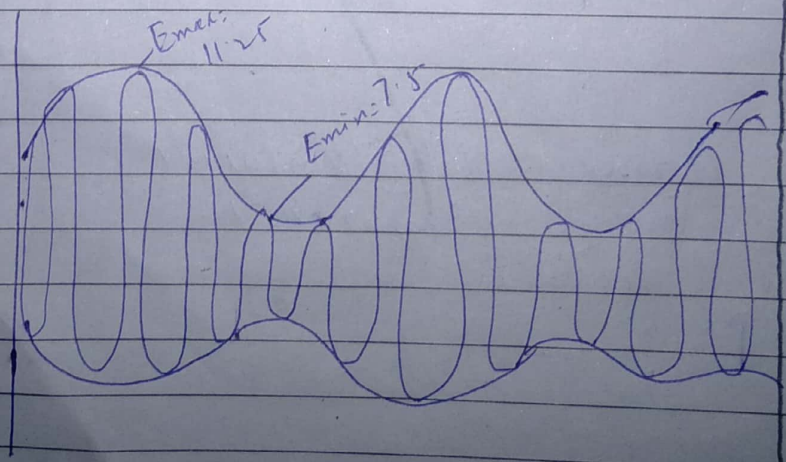
$$E_{max} = E_c + E_m$$
$$= 7.5 + 3.75$$
$$= 11.250 \text{ lts}$$

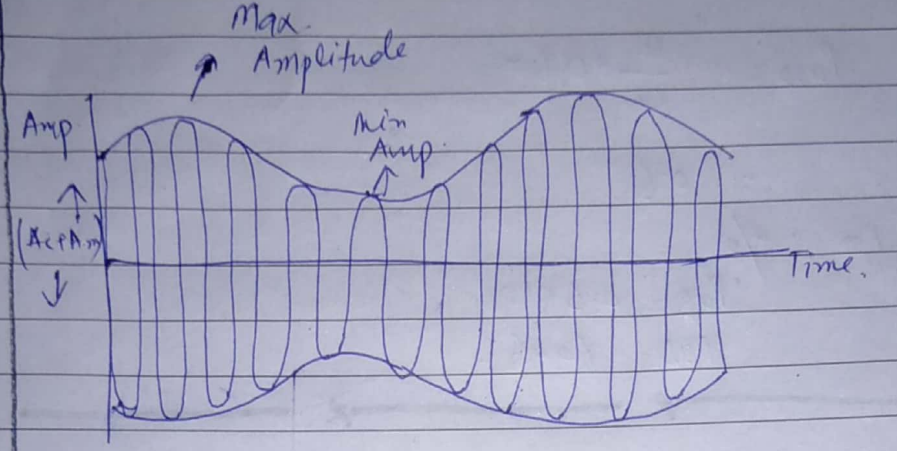
$$E_{min} = E_c - E_m$$
$$7.5 - 3.75$$
$$= 3.75 \text{ volt}$$

Modulated waveform.

Sol. As we know

$$m = 0.5$$
$$E_{max} = 11.25$$
$$E_{min} = 3.75$$





c) .

power in Sopectrum:→

$$P_c = \frac{E_c^2}{2R} = \frac{(5)^2}{2 \times 50} = \frac{25}{100_4} = \frac{1}{4}.$$

and total Power: $P_t \left(1 + \frac{m^2}{2}\right) P_c$.

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

$$P_t = \left[1 + \frac{4^2}{2}\right] \times 0.2.$$

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

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

d) Percentage Power in USB.

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

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

$P_{usD} = \frac{4}{4} \times 0.6$

$= 0.6$

in %:

$P_{uB} = 0.6 \times 100$

$P_{UD} = 60\%$