Digital Communication (ETEC-303)

DATE : 20-10-2021

TEST-1

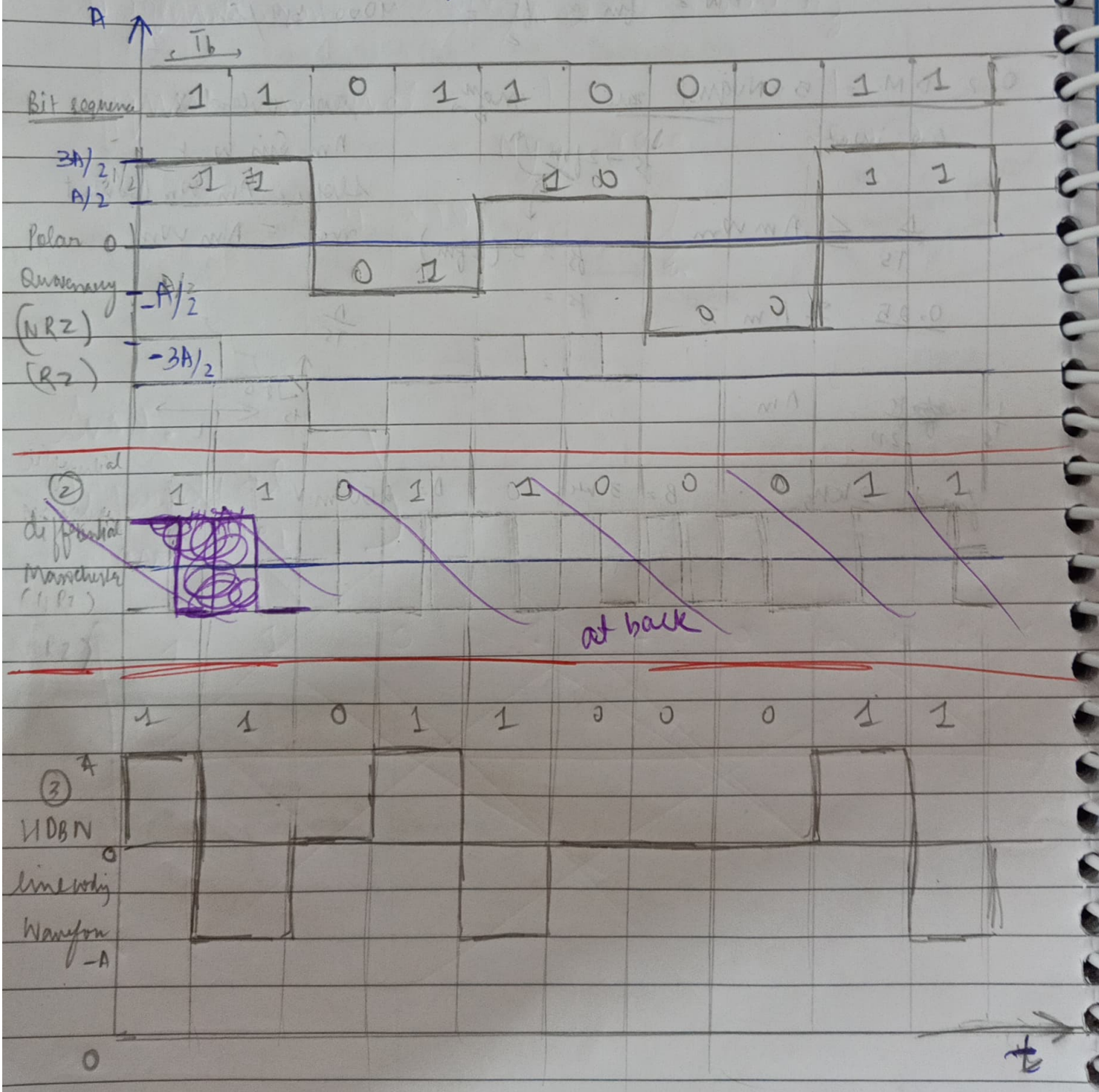
Ans 1.

Binary data 1101100011

→ Polar Quaternary → 00 → -3A/2 10 → A/2
01 → -A/2 11 → 3A/2

→ Differential Manchester 0 → ⌐¬ 1 ← ¬⌐ Inverse

→ HDBN line code waveform



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Ans 2.

Manchester, Bipolar, Polar Quaternary

DISADVANTAGES

Bipolar

→ No clock signal is present for use.
→ long string of binary data with continuous 1's and 0's cause loss of synchronization

MANCHESTER

→ The fact that a manchester encoded signal required that more bits be transmitted than there is the original signal.

POLAR QUATENARY

→ Greater complexity than polar NRZ-L or Polar NRZ-I
→ Required twice as much bandwidth than polar NRZ-L or polar NRZ-I

Bipolar < Polar Quaternary < Manchester

[order of line coding techniques as per increasing bandwidth]

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Ans 3. $g(t) = 1000 \sin(2500\pi t)$

$W = 2500\pi$ rad/sec

$\therefore f = \frac{W}{2\pi} = 1250$ Hz

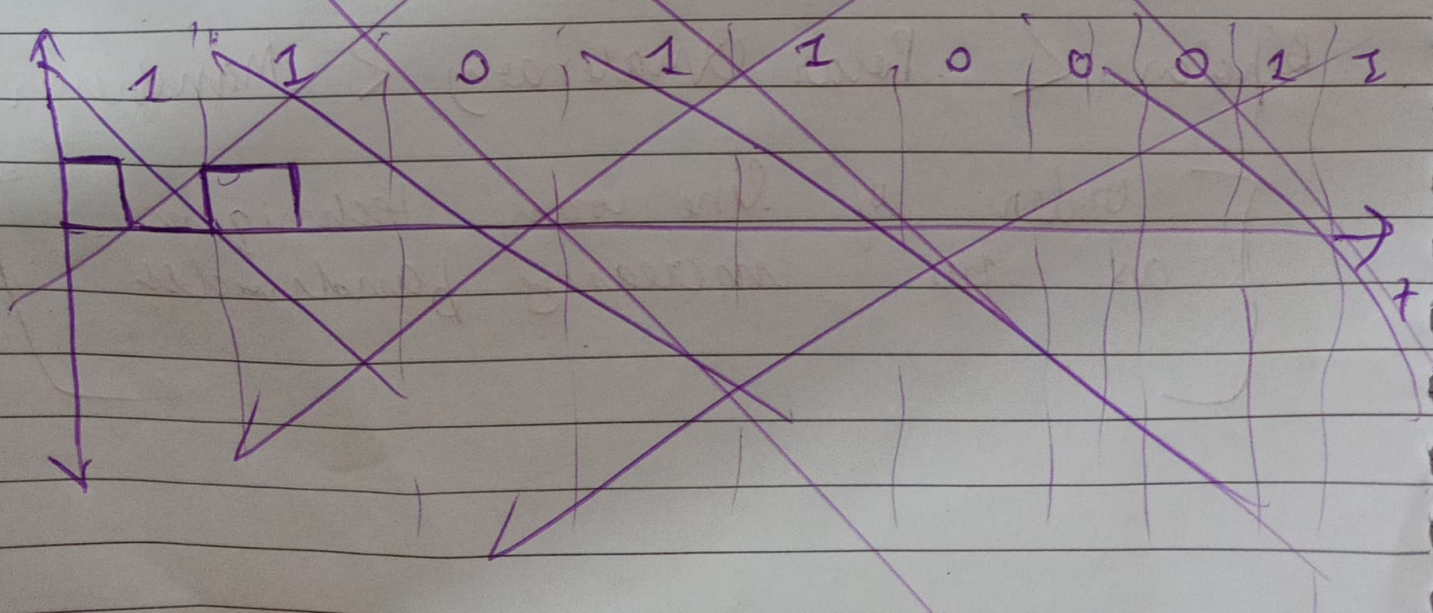
Nyquist rate $= 2 \times f_{max} = 2500$ Hz

Nyquist interval $= \frac{1}{\text{Nyq. rate}} = \frac{1}{2500}$

$= 4 \times 10^{-4}$ ms

Ans 4.

differential manchester



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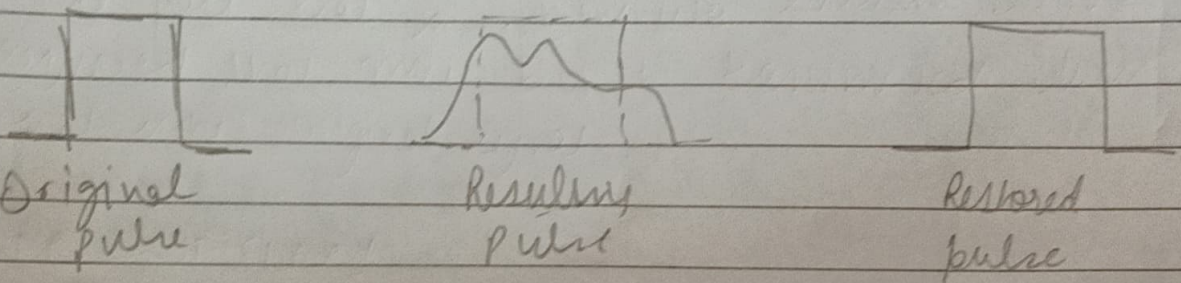
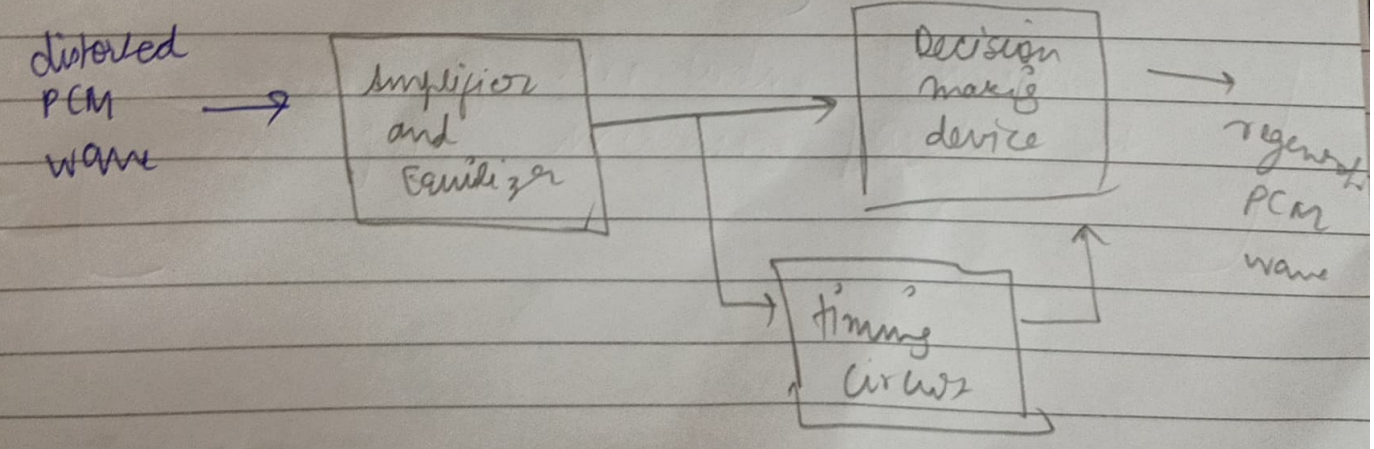
Ans 4. **REGENERATIVE REPEATER**

for any communication system to be reliable it should transmit and receive signal effectively, without any loss.

A PCM wave after transmitting through a channel gets distorted due to noise introduced by the channel.



for better reproduction of signal circuit is called as regenerative repeater and is employed in path before receiver.
This helps in restoring the signal from losses occured



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Ans 6. $g(t) = 10 \sin(200\pi t)$

a) $(SNR)_{dB} = 6.02n + 1.76$

n = bits quantization

$n = 10$

$(SNR)_{dB} = 6.02 \times 10 + 1.76$

$= 60.2 + 1.76$

$= 61.96 \text{ dB}$ Ans

b) $SNR = (1.8 + 6n) \times B$

$40 = 1.8 + 6n$

$40 - 1.8 = 6n$

$6n = 38.2$

$n = \frac{38.2}{6} = 6.366$

$n \approx 6$ Ans

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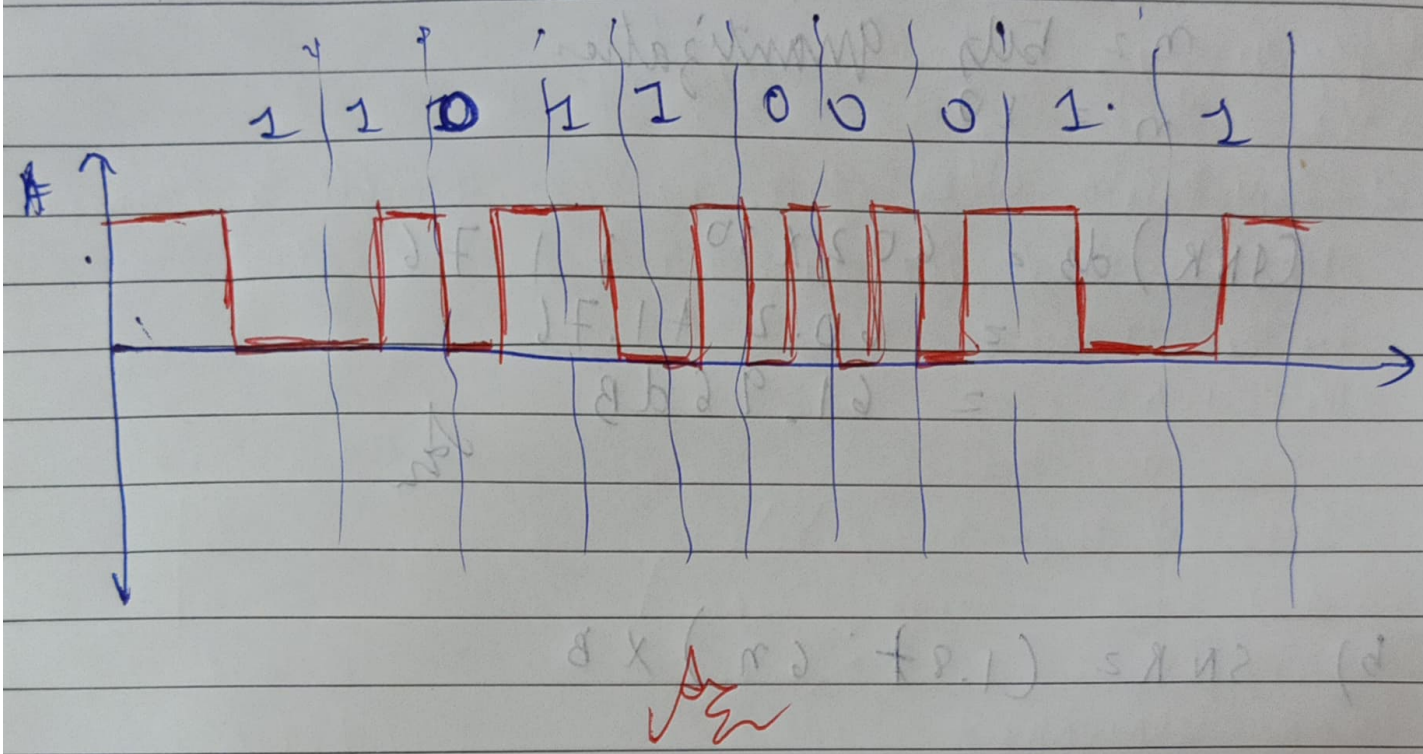
Ans 1.

differential manchester



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Ans 5. $B_W = 20kHz$

Sampled + quantized → encoded PCM

Sampled at Nyquist rate
encoded to 128 levels

a) Minimum sampling rate = bits × sampling rate

b) Signaling rate $R_b = nf_s$
Bit rate

=

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Ans 5. $B_W = 20kHz$

Sampled + quantized → encoded PCM

Sampled at Nyquist rate.
encoded to 128 levels

as minimum sampling rate = bits × signals / rate

level $= 2^n$

$n = \log_2 L$

$n = \log_2 128$

$n = 7$

$= 7 \times 28000$

$= 196000$ Hz

or

$= \frac{7}{R_b}$

$= \frac{7}{280000}$

1960 kHz

$= 2.5 \times 10^{-5}$ sec

b) Signaling rate $R_b = nfs$
Bit rate

$= 7 \times 2fm$

$= 7 \times 2 \times 20000$

$= 280000$ bits/sec

or 280 K bits/sec