DC tut-6

19BCE245

1) We have a baseband channel with a 1 MHz bandwidth What is the data rate for this channel if we use one of the following line coding schemes?

→ 1. NRZ - L

$N = 2B$

$= 2 \times 1$

$= 2$ Mbps

2. Manchester

$N = 1 \times B$

$= 1 \times 1$

$= 1$ Mbps

3. MLT - 3

$N = 3 \times B$

$= 3 \times 1$

$= 3$ Mbps

4. 2B1Q

$N = 4 \times B$

$= 4 \times 1$

$= 4$ Mbps

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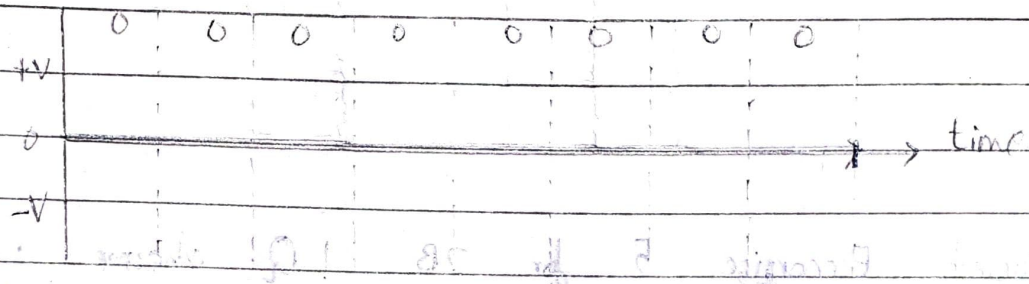
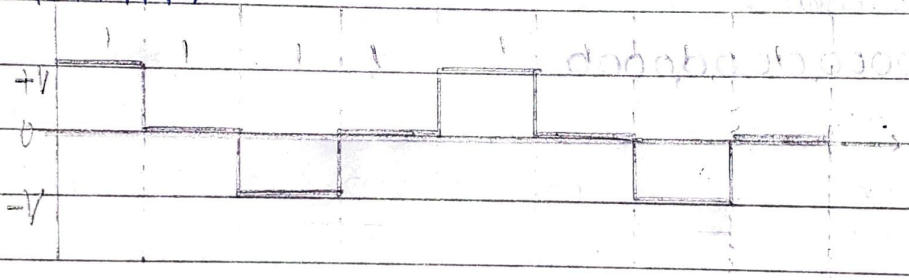
2.) Apply MLT-3 scheme on following data streams.

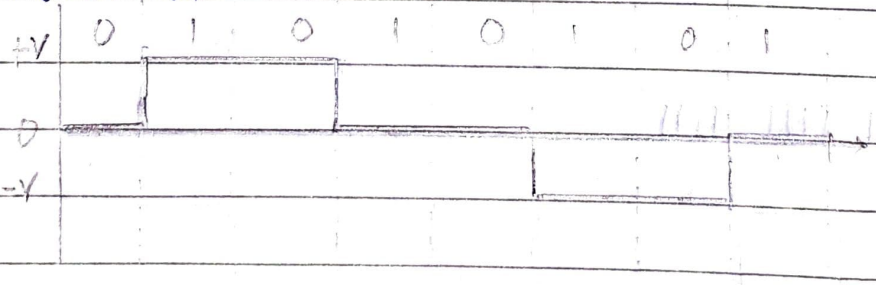
→ a.) 00000000



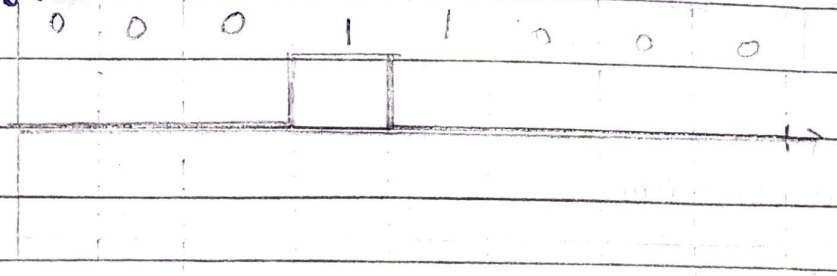
b.) 11111111



c.) 01010101



d.) 00011000

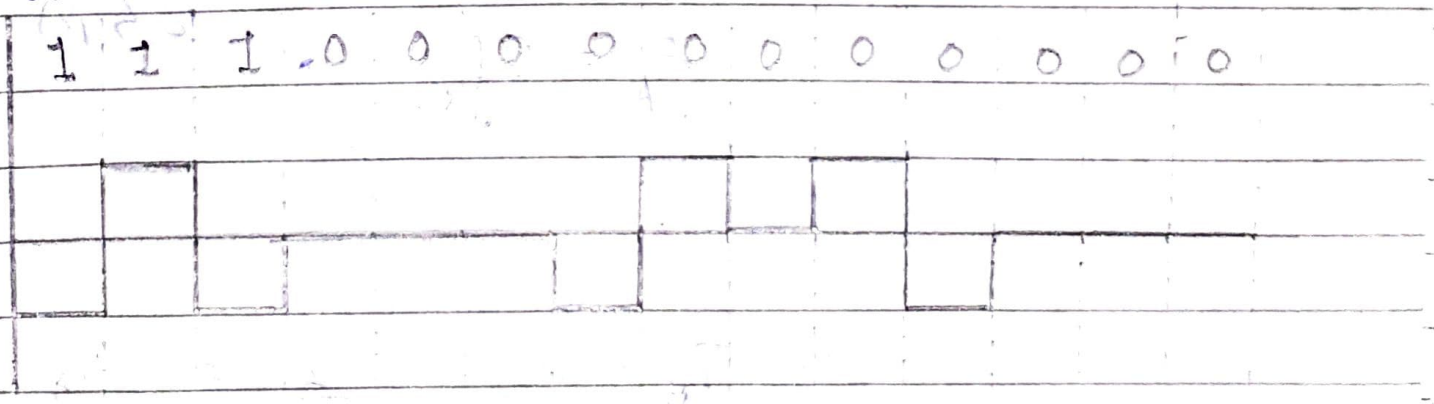


3:) What is the result of scrambling the sequence 111000 00000000 using one of the following scrambling techniques? Assume that the last non-zero signal level has been positive.

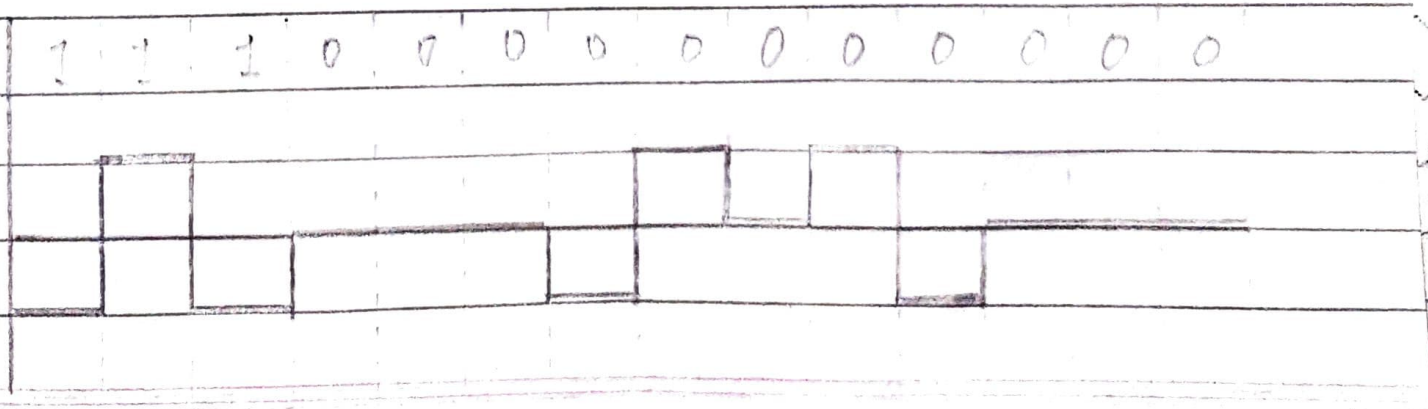
→ a. B8ZS and b. HDB3

[The number of nonzero pulses is odd after last substitution]

→ B8ZS



→ HDB3



4.) What is the number of bauds bits per baud for the following techniques?

→ a.) ASK with four different amplitudes.

⇒ $\log_2 4 = 2$ → Ans.

b.) FSK with 8 different frequencies

⇒ $\log_2 8 = 3$ → Ans.

c.) PSK with 4 different phases

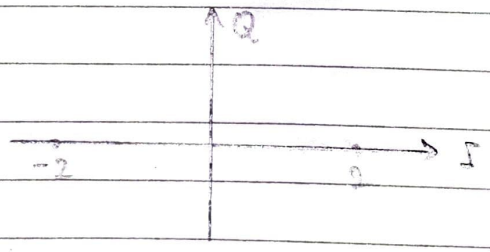
⇒ $\log_2 4 = 2$ → Ans.

d.) QAM with a constellation of 128 points.

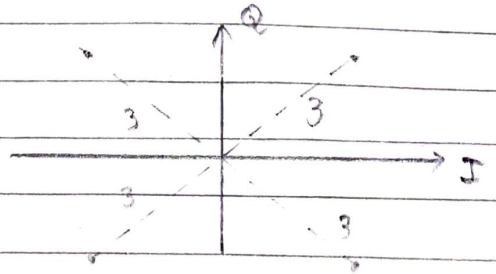
⇒ $\log_2 128 = 7$ → Ans.

5) Draw constellation diagram for following:

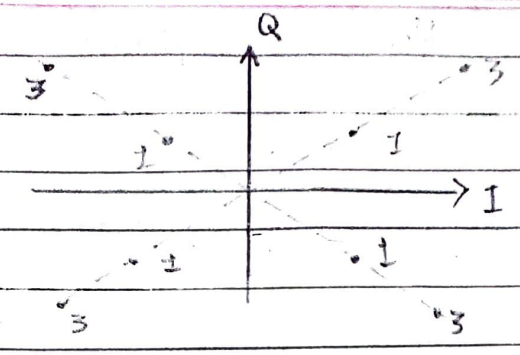
→ a. BPSK, with a peak amplitude value of 2.



b. QPSK, with peak amplitude value of 3



c.) 8-QPM, with two different peak amplitude values, 1 and 3, and four different phases.



6) Assume that sampled signal consists of the amplitudes ranging from -20 V to +20 V if 8 quantization levels are used. find out normalized PAM values, quantized error and quantized code for given samples.

→

Time	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8
Amplitudes	-6.2	6.1	14.2	18.3	10.0	-5.4	-7.6	-8.2

Here, $L = 8$

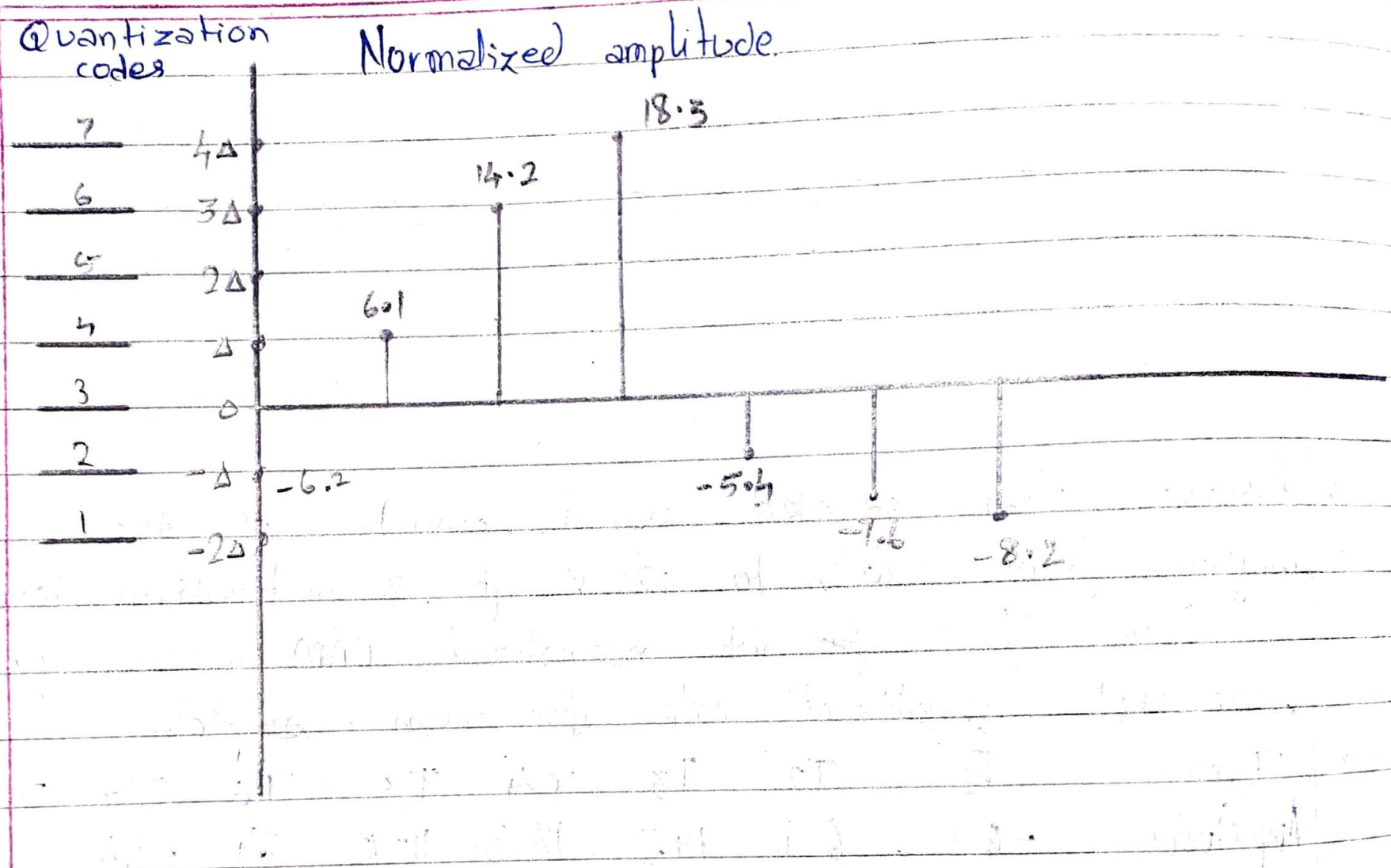
$V_{max} = 20\ V$

$V_{min} = -20\ V$

$\therefore \Delta = \frac{V_{max} - V_{min}}{L}$

$= \frac{20 - (-20)}{8} = 5\ V$

Time	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8
Amplitude	-6.2	6.1	14.2	18.3	10	-5.4	-7.6	-8.2
Normalized PAM values	-1.24	1.22	2.84	3.66	2	-1.08	-1.52	-1.64
Normalized quantum values	-1.50	1	3	3.5	2	-1	-1.5	-1.5
Quantized errors	-0.26	-0.22	0.16	-0.16	0	0.08	0.02	0.14
Quantized code	2	4	6	7	5	3	2	2


Quantization codes
Normalized amplitude
7
6
5
4
3
2
1
4Δ
3Δ
2Δ
Δ
0
-Δ
-2Δ
18.5
14.2
6.1
-6.2
-5.4
-7.6
-8.2