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Course Name: Data Communication

Section: D

Theory Assignment: 01

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Here, my id is: 20-42195-1

$A=2, B=0, C=4, D=2, E=1, F=9, G=5, H=1$

4-bit binary data units:

$$A = (0101)_B$$

$$F = (1001)_B$$

$$B = (0000)_B$$

$$C = (0100)_B$$

$$D = (0010)_B$$

$$E = (0001)_B$$

Bit stream:

24-bit binary bit stream is:

0 1 0 1 0 0 0 0 0 0 1 0 1 0 0 1 0 1 0 0 0 0 0 1

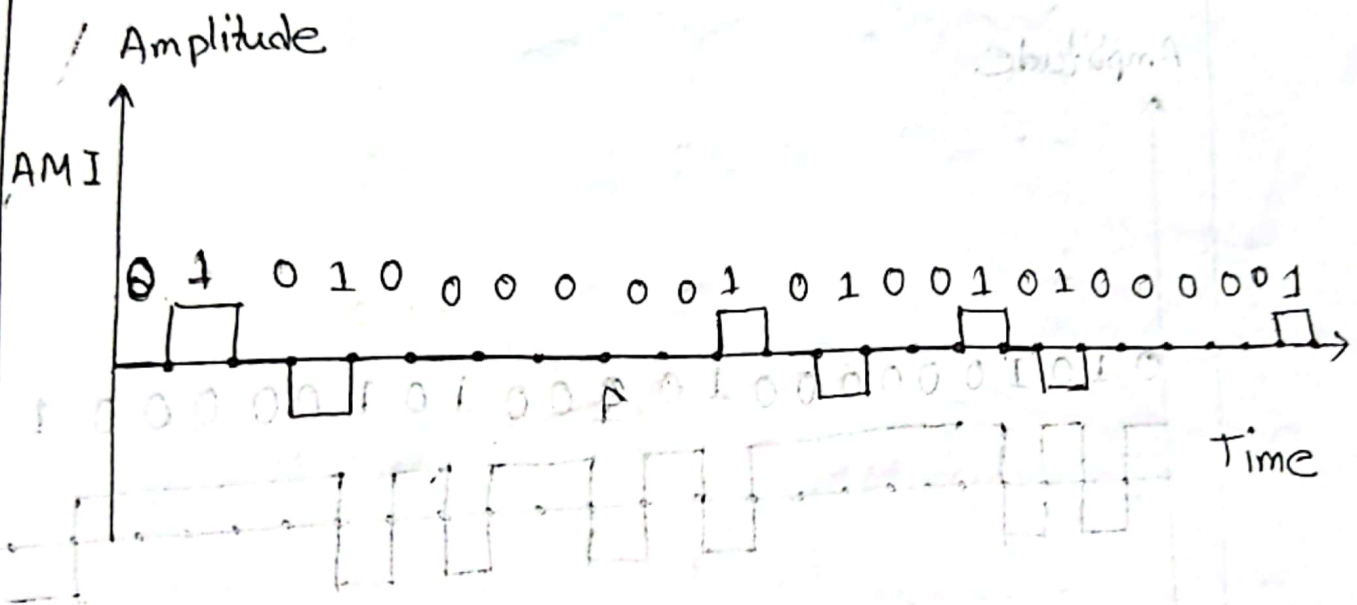
$$\text{Data Rate: } N = (E + F + G + H) \times 100 \text{ bps}$$

$$= (1 + 9 + 5 + 1) \times 100 \text{ bps}$$

$$= 16 \times 100 \text{ bps}$$

$$= 1600 \text{ bps}$$

a) Bipolar AMI:



$$\text{Bandwidth (average)} = \frac{N}{2} = \frac{1600}{2} = 800$$

It has no baseline wandering problem.

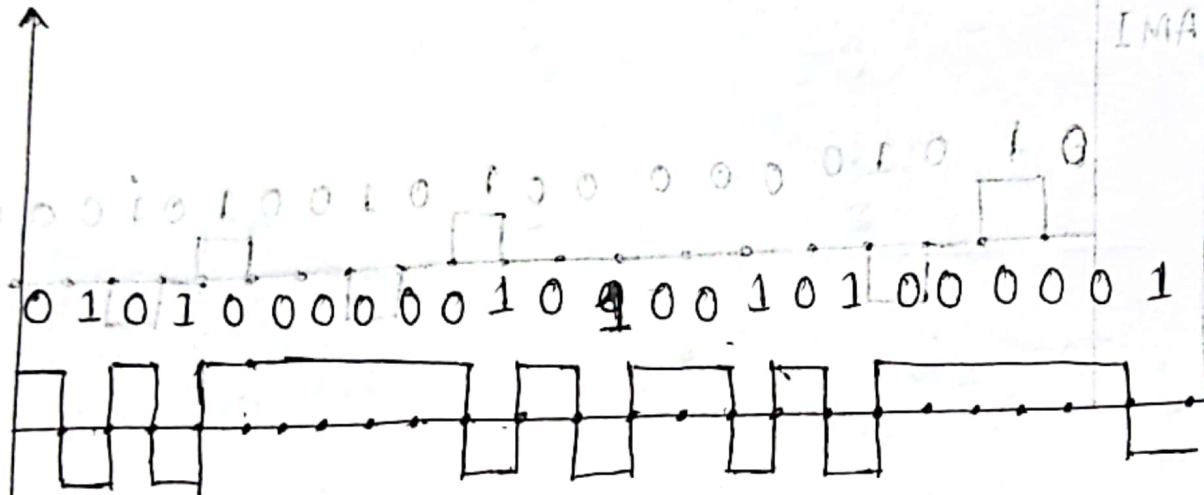
It has no dc component problem.

It can't provide auto synchronization.

b) Polar NRZ-L:

IMA analog (0)

Amplitude



Time

$$\text{Bandwidth (average)} = \frac{N}{2} = \frac{1600}{2} = 800$$

$$\text{Bandwidth (average)} = \frac{N}{2} = \frac{1600}{2} = 800$$

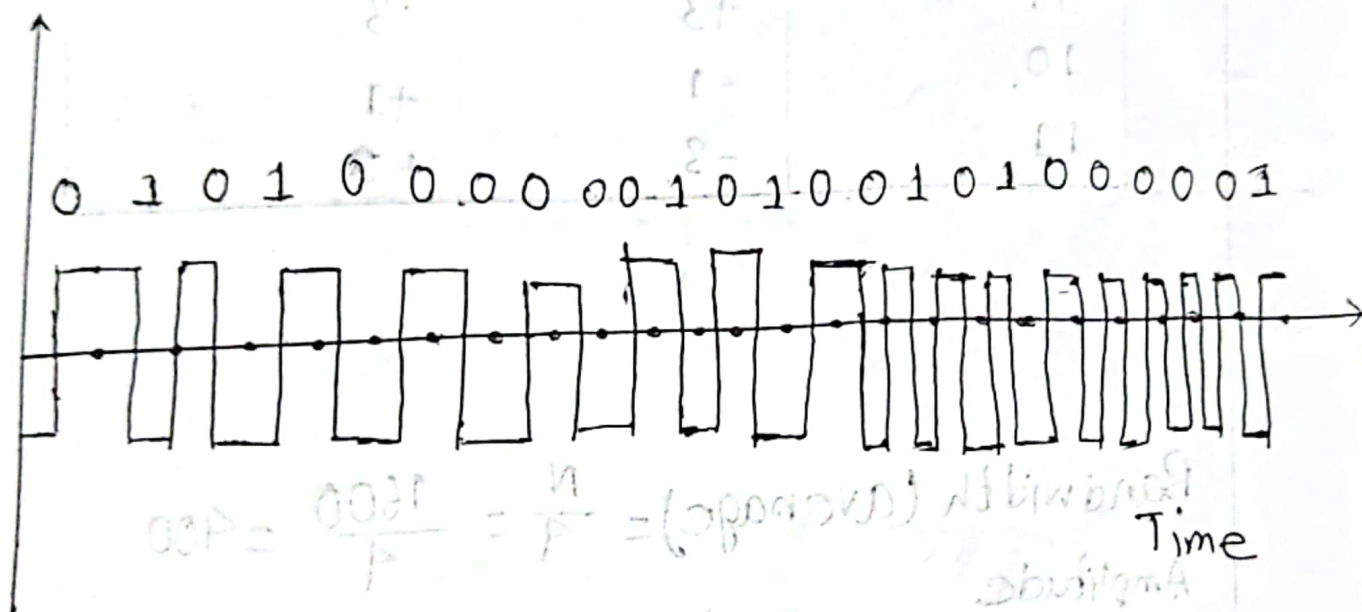
It has baseline wandering problem.

It has dc component problem.

It can't provide auto synchronization.

C) Polar Differential Manchester:

Amplitude



$$BWP = \frac{1600}{P} = \frac{N}{P} = (1600000) \text{ Hz}$$

Bandwidth (average) = $N = 1600$

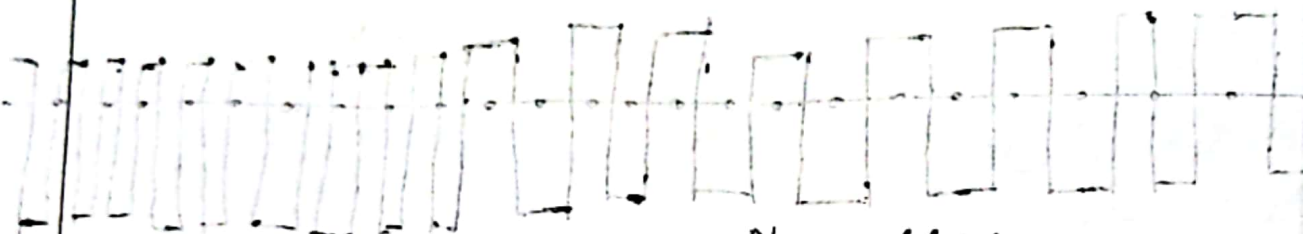
It has no baseline wandering problem.

It has no dc component problem.

It can provide auto synchronization.

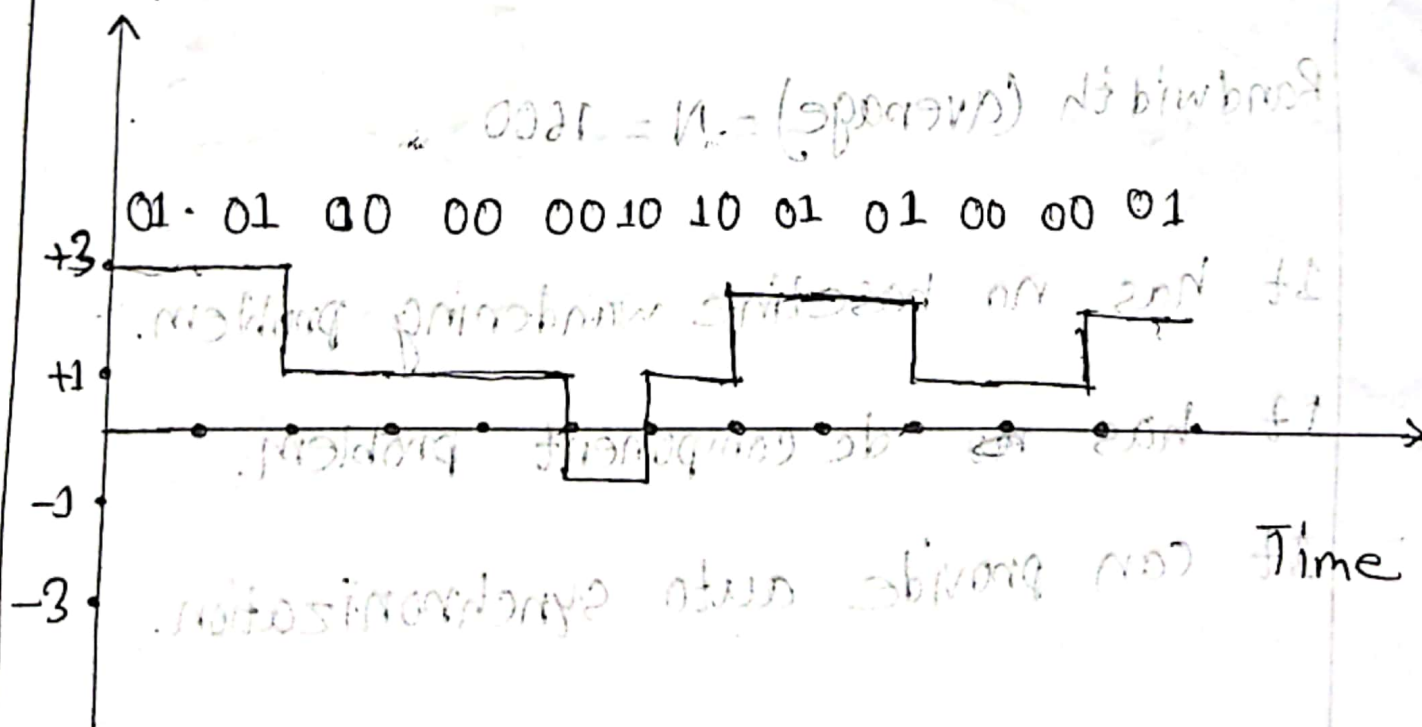
2) Multilevel 2B1Q:

Next bits	Next level	Next level
00	+1	-1
01	+3	-3
10	-1	+1
11	-3	+3



$$\text{Bandwidth (average)} = \frac{N}{4} = \frac{1600}{4} = 400$$

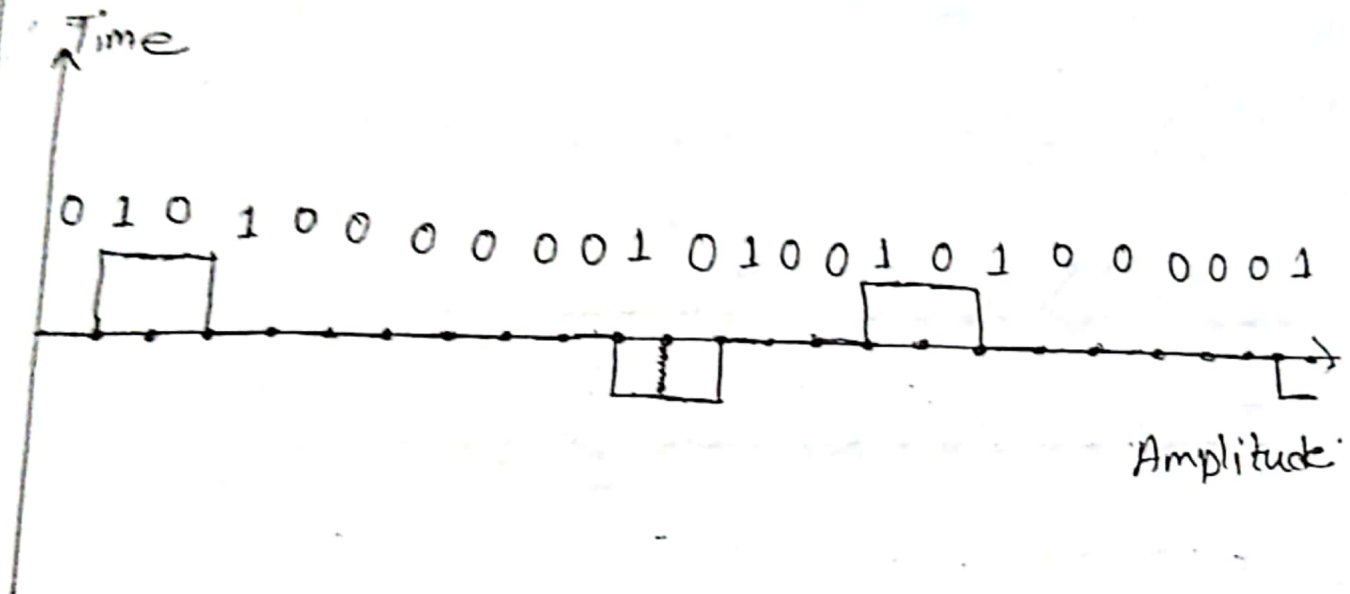
Amplitude



It has baseline wandering problem. It can't provide auto synchronization.

~~MLT~~

e) MLT-3:



$$\text{Bandwidth (average)} = \frac{N}{3} = \frac{1600}{3} = 533.33$$

It has dc component problem

It has baseline wandering problem.

It can't provide auto synchronization.