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SUBJECT	CCN
DATE	22-06-20

QUESTION#01.

Given data

Data rate $N = 100$ kbps

Now first calculate

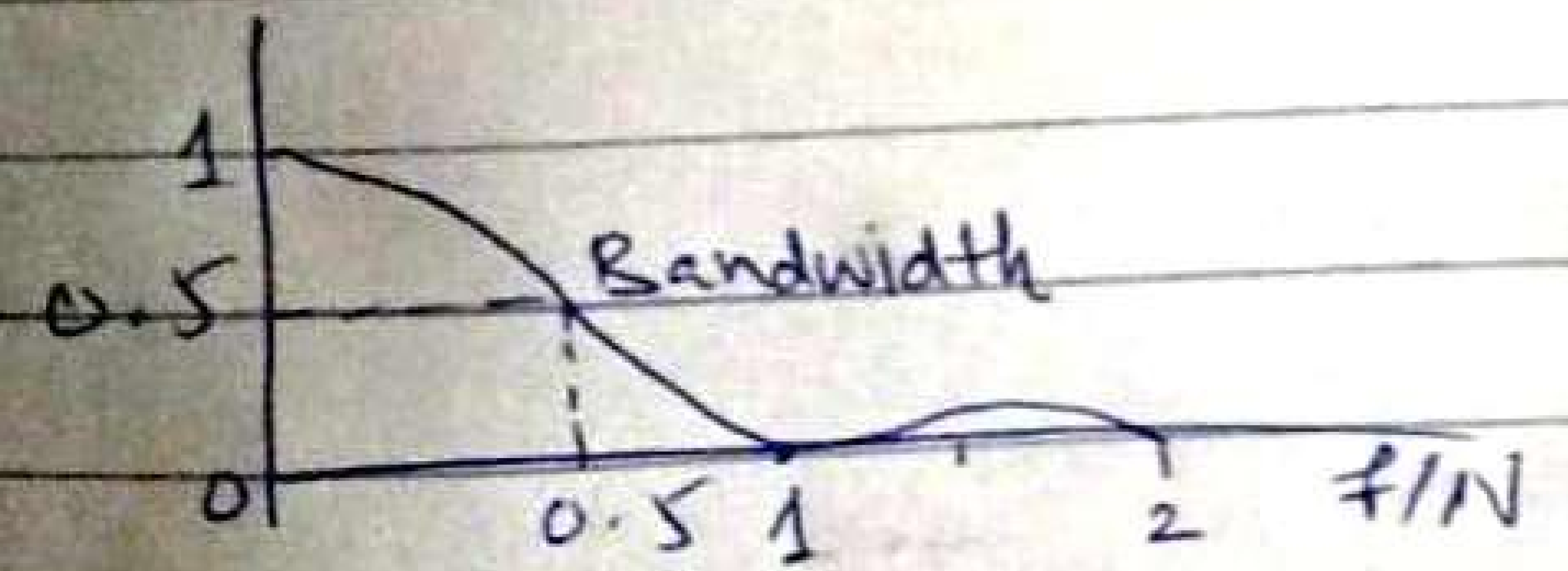
$\frac{f}{N}$ value then after find energy P value by using the given figure

f = frequency

N = data rate

P = energy per Hz

The given figure is



Case 1: $f = 0$ Hz then $\frac{f}{N} = \frac{0}{100} = 0$

$\frac{f}{N} = 0$, So $P = 1$

Case 2: $f = 50$ kHz then $\frac{f}{N} = \frac{50}{100} = 0.5$

$\frac{f}{N} = 0.5$, So,

Q# 1 (2)

Given data

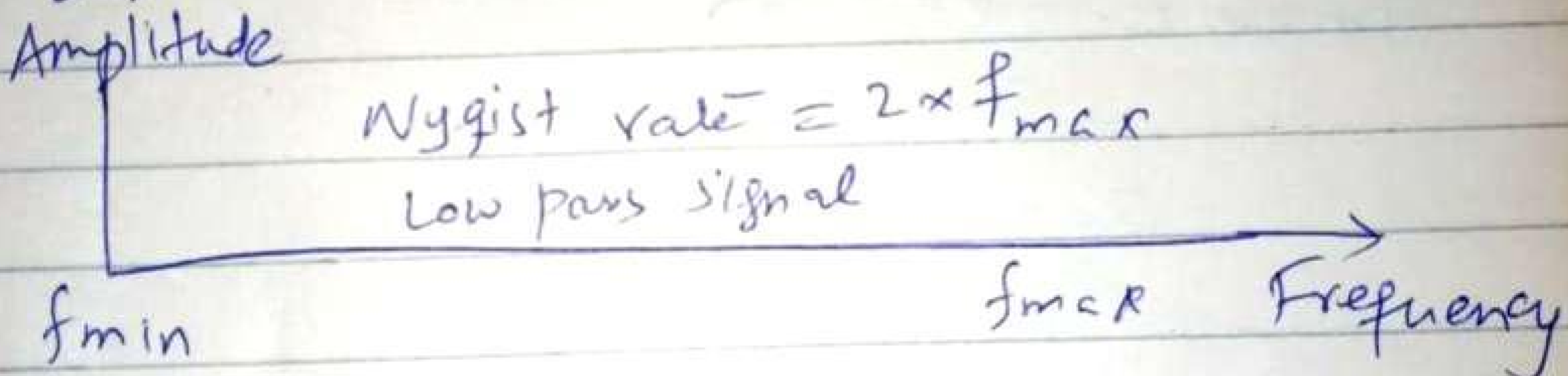
A low pass signal with

bandwidth = 200 KHz

$= 200 \times 10^3$ Hz

= 200,00 0Hz

Nyquist Rate



In a low pass signal, the minimum frequency $f_{min} = 0$

Therefore the Nyquist rate $= 2 \times f_{max}$

$= 2 \times 2,00,000$

$= 400,000$ sample/s.

b)

Given data

In a band pass signal the minimum frequency is equal to bandwidth plus minimum frequency.

$f_{max} = 200 + 100$

$= 300\ kHz$

$= 300 \times 10^3\ Hz$

$= 3,00,000\ Hz.$

Therefore

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

$= 2 \times 300000$

$= 6,00,000$ sample/s

(3).

~~a) The bit rate of the di~~

a)

Bit rate = sampling rate × number of bits per sample

$= f_s \times n_b$

$n_b = \log_2 1024 = 10$ bits.

$f_s = 2 \times 200\,kHz = 400\,kHz$

Bit rate $= f_s \times n_b$

$= 400 \times 10$

$= 4$ Mbps

b) $SNR_{db} = 6.02 n_b + 1.76\,dB$

$= (6.02 \times 10) + 1.76$

$= 60.2 + 1.76$

SNR = 61.96.

c) $B_{min} = n_b \times B_{analog}$

B_{analog} represent the bandwidth of analog signal.

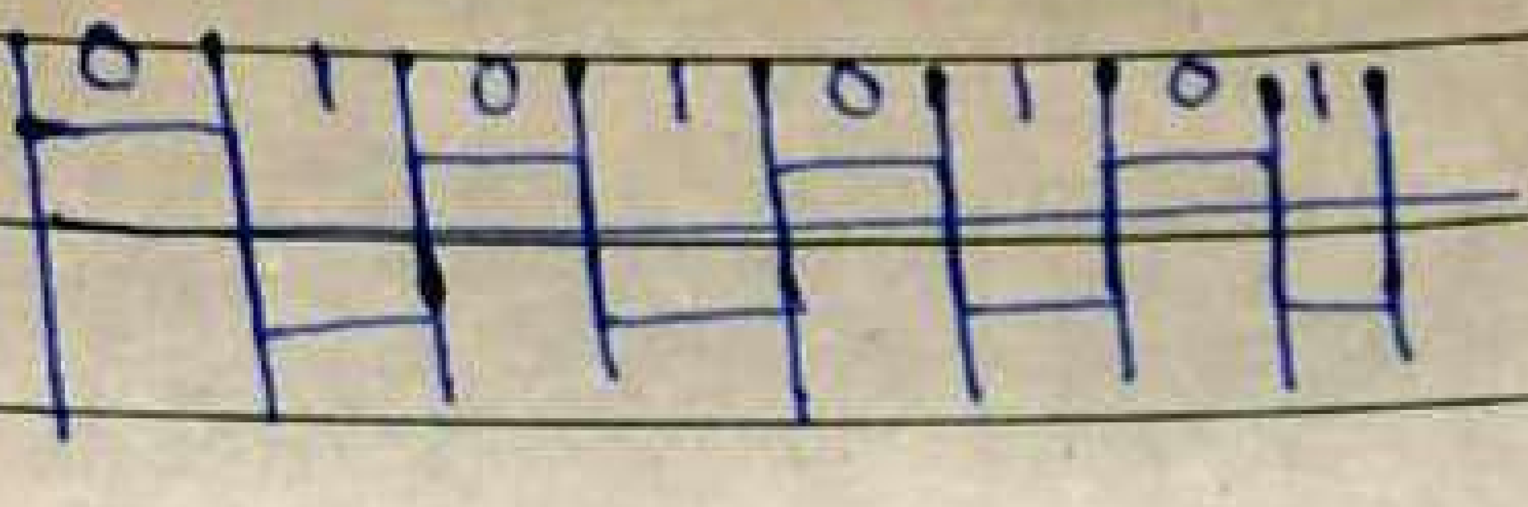
$B_{min} = 10 \times 200$ kHz

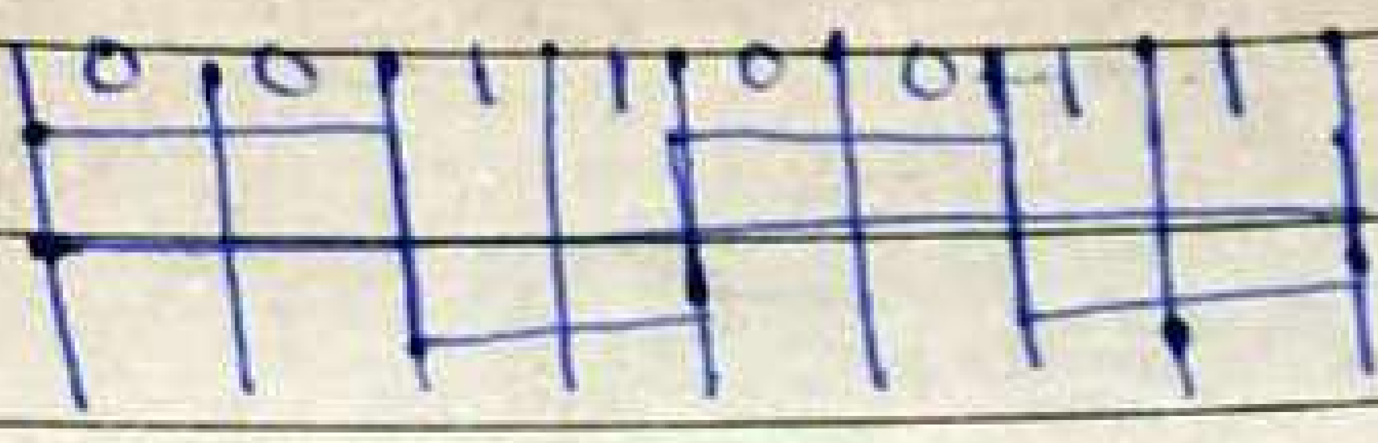
$= 2000$ kHz

Date:

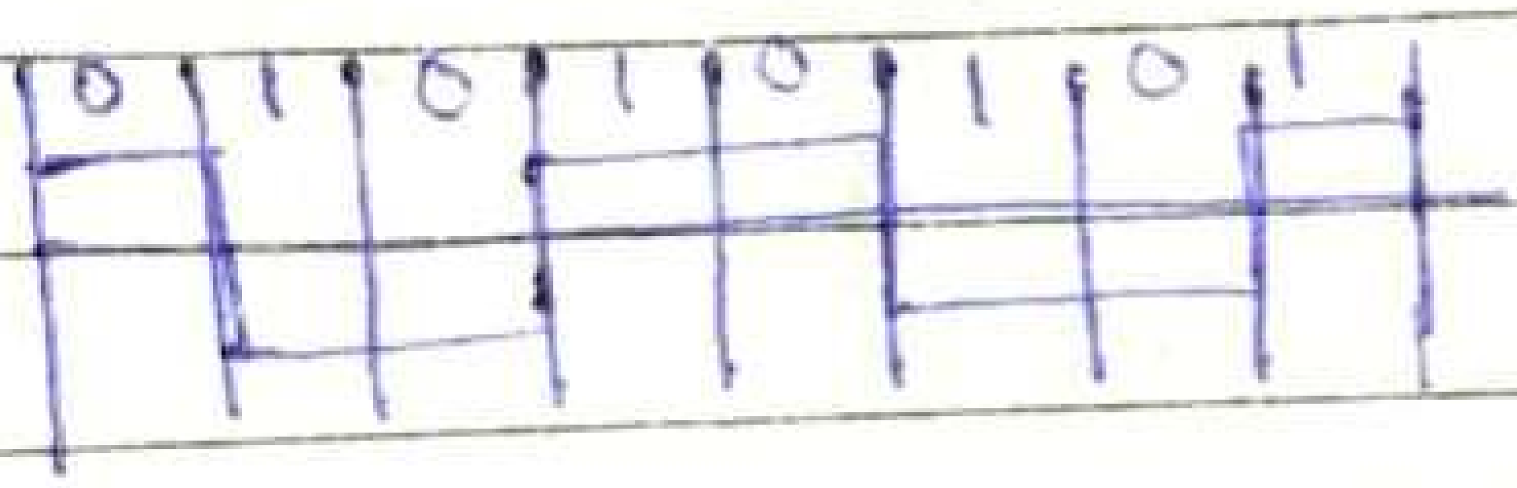
Question 2

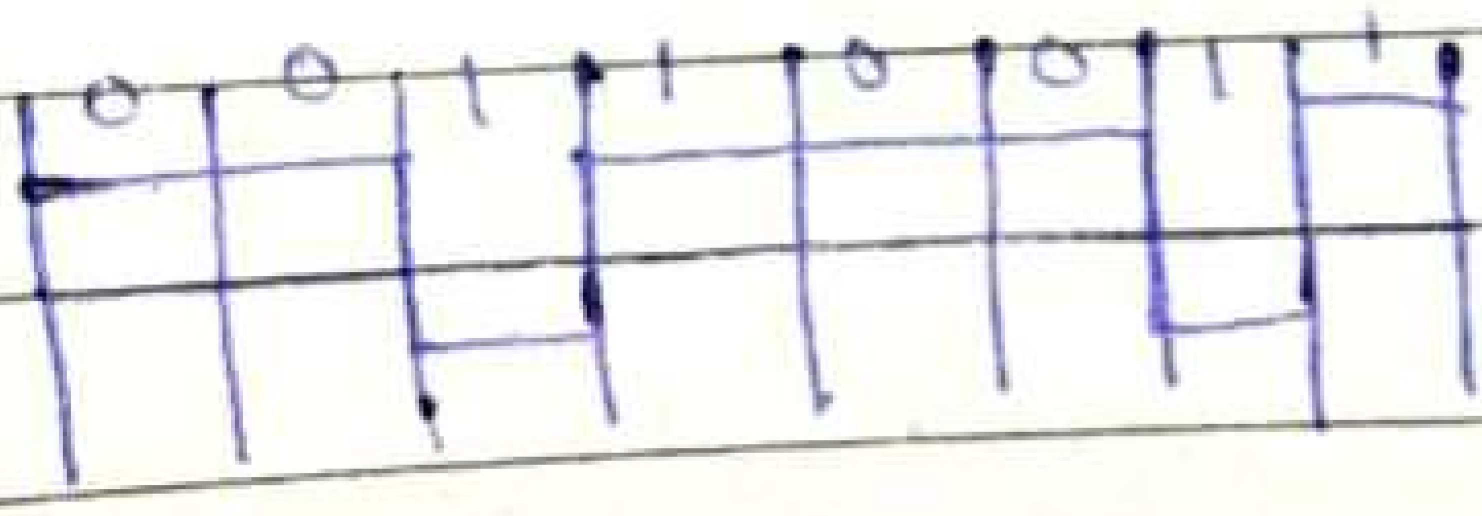
NRZ-L Scheme :-

1) 

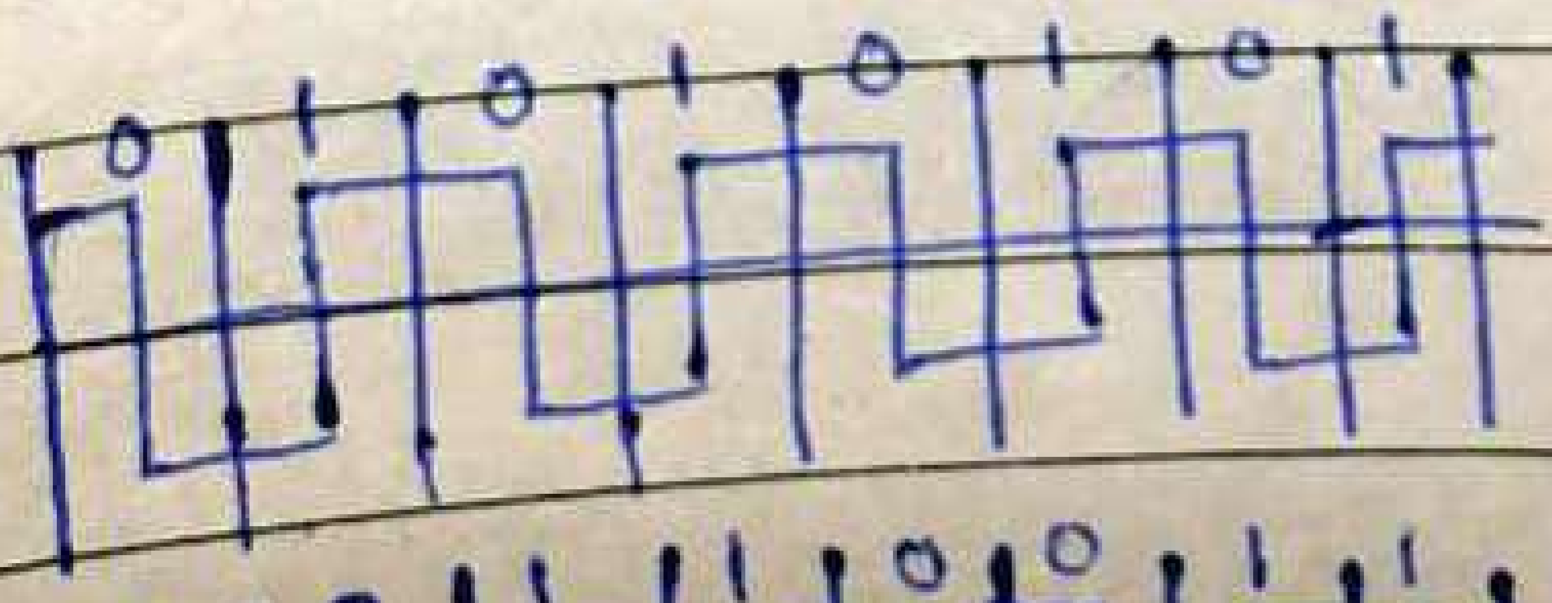
2) 

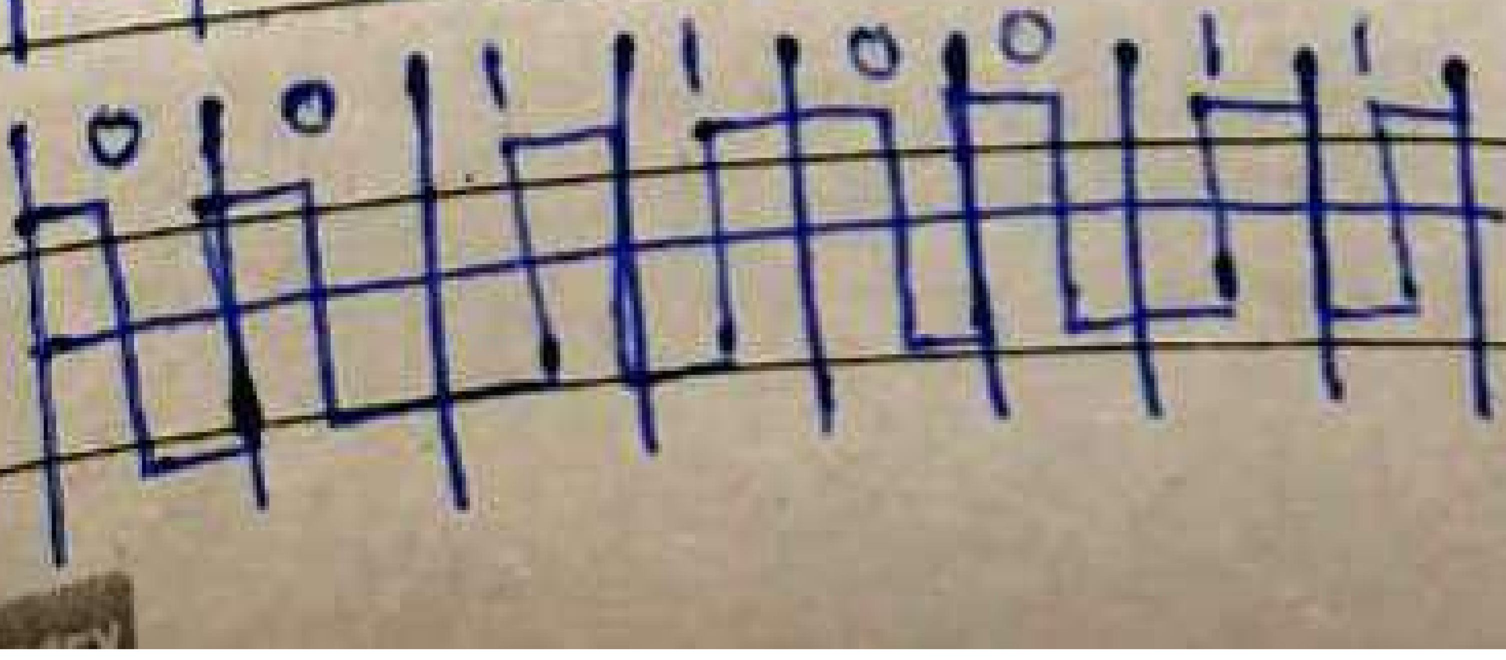
NRZ-I Scheme

1) 

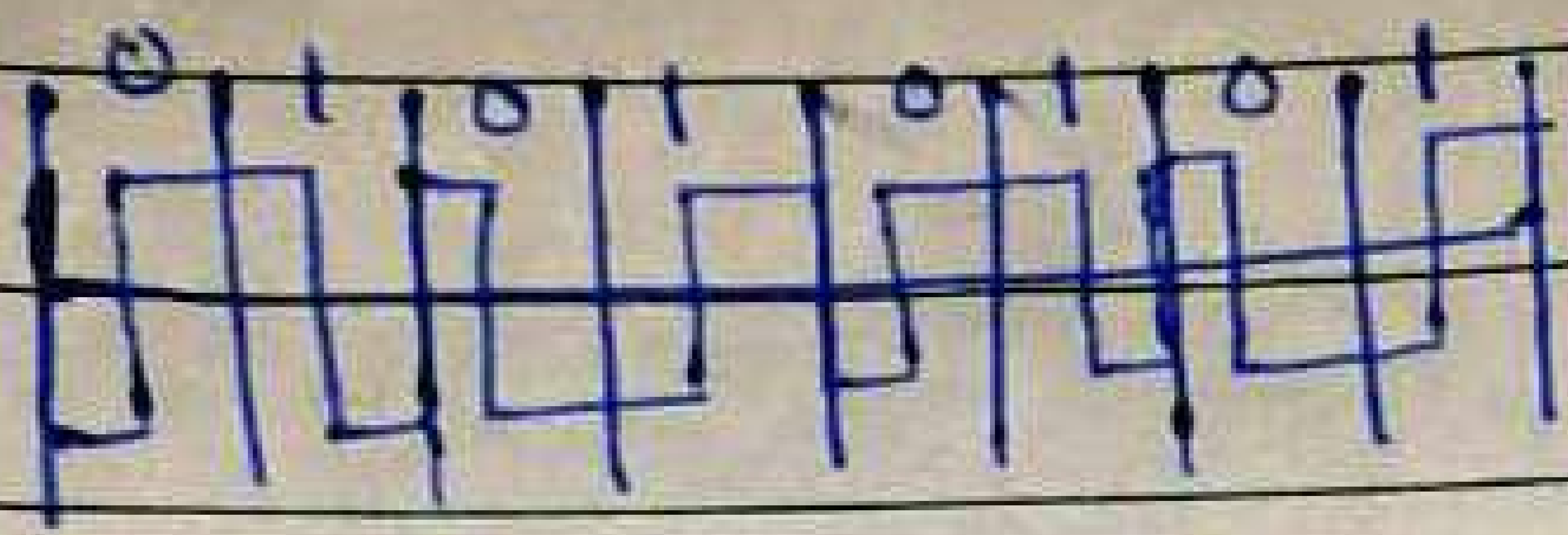
2) 

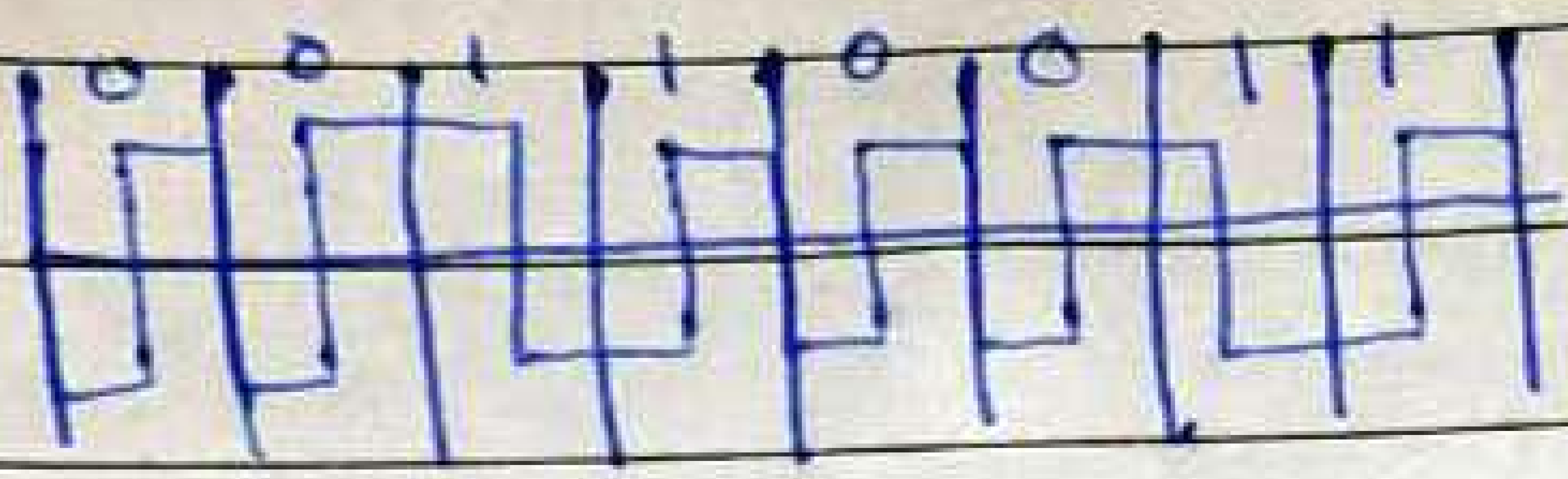
Manchester Scheme :-

1) 

2) 

Differential Manchester Scheme.

1) 

2) 

Q#03 (1)

Given data

TV chanel bandwidth (B) = 6 MHz

Using the first harmonic

$$\text{Bandwidth}(B) = \frac{\text{data rate (bit rate)}}{2}$$

$$\text{Data rate} = 2 \times B$$

$$= 2 \times 6$$

Therefore **data rate = 12 Mbps**

Using the first and three harmonics

A better result can be achieved by using the first and the third harmonics with the required

$$\text{bandwidth}(B) = 3 \times \frac{\text{data rate}}{2}$$

$$\text{Data rate} = \frac{2 \times B}{3}$$

$$= \frac{2 \times 6}{3}$$

$$= 4 \text{ Mbps}$$

Using the 1st and 5th harmonics

$$\text{Bandwidth} = \frac{5 \times \text{datarate}}{2}$$

$$= \frac{2 \times B}{5}$$

$$= \frac{2 \times 6}{5}$$

Data rate = 2.4 Mbps

Q#03 (2)

$$\text{The attanention (dB)} = 10 \log_{10} \frac{B}{A}$$

$$= 10 \log_{10} \left(\frac{90}{100}\right)$$

$$= 10 \log_{10} (0.9)$$

$= 10(-0.046)$ since ~~log~~

$\log_{10}(0.9) = -0.046$

Attanention (dB) = -0.46 dB

③

Attemeution is the reduction of stregth in the power of a signal due to external factors.

The extent of reduction is measured in decibels.

Given

$P_s = 5\,W$

Attaneuation = $-10\,db$

Therefore

$-10 = 10 \log_{10} (Pd/5)$

$Pd = 10^{-1} \times 5$

$\boxed{Pd = 0.5\,W}$

(4)

A signal has passed through 3 cascaded amplifiers, each with a 4dB gain.

Total gain (P_{db}) = $3 \times 4 dB$

$P_{db} = 12 dB$

The signal is amplified then

$$P_{db} = 10 \log_{10} P$$

$$P = 10^{\frac{P_{db}}{10}}$$

$$= 10^{\frac{12}{10}}$$

$$P = 15.85$$

(5).

Bandwidth = 5 Kbps
= 5000 bps
(1 kbps = 1000 kbps)

It takes time to send a frame of 100,000 bits out of this device. $T = \frac{100,000}{5000}$

$\boxed{T = 20 s}$

(6).

The light of sun takes time to reach earth = 8 min

That is

$8 \text{ mins} = 8 \times 60 s$

$= 480 s.$

Convert miles per second to km/s

$= \frac{186000 \text{ miles}}{\text{sec}} \times \frac{1 \text{ km}}{0.621 \text{ miles}}$

$= 3,00,000 \text{ km/s}$

Therefore the distance b/w sun and earth is $= 480 \times 300000$

$= 144,000,000 \text{ km/s}$

Q#03 (b)

Pulse rate $= \frac{1}{2ms} = 500$ pulse/sec

Bit rate = Pulse rate $\times \log_2 L$

$= 500 \times \log_2 8$

$= 1500$

$P = 2$

Case 2

$f = 50 KHz$

then

$$\frac{f}{N} = \frac{50}{100} = 0.5$$

$\frac{f}{N} = 0.5$, so $P = 0.5$

Case 3 : $f = 100 KHz$

then $\frac{f}{N} = \frac{100}{100} = 1$

$\frac{f}{N} = 1$ so $P = 0$