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SUBJECT:DATA COMMUNICATION AND NETWORKS

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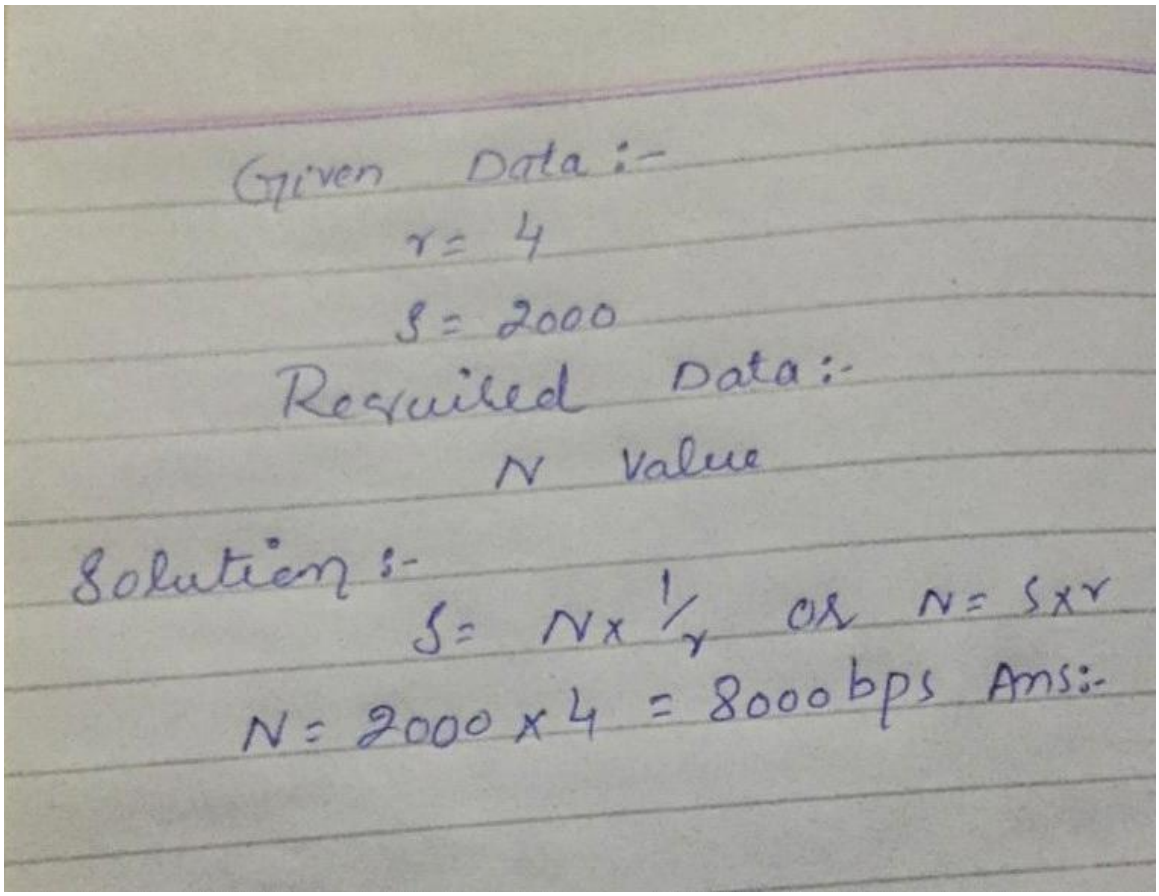
ANS 1: PART 1: A data element is the smallest entity that can represent a piece ofinformation (a bit). A signal element is the shortest unit of a digitalsignal. Data elements are what we need to send; signal elementsare what we can send. Data elements are being carried; signalelements are the carriers.

PART 2: In decoding a digital signal, the incoming signal power is evaluated against the baseline (a running average of the received signal power). A long string of 0s or 1s can cause baseline wandering (a drift in the baseline) and make it difficult for the receiver to decode correctly.

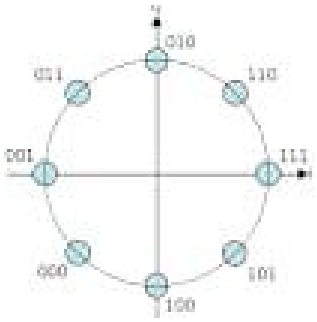
PART 3: We mentioned synchronous, asynchronous, and isochronous. In both synchronous and asynchronous transmissions, a bit stream is divided into independent frames. In synchronous transmission, the bytes inside each frame are synchronized; in asynchronous transmission, the bytes inside each frame are also independent. In isochronous transmission, there is no independency at all. All bits in the whole stream must be synchronized.

PART 4: In this case, r = 4, S = 2000, and N is unknown. We can find the value of N from


Given Data :-
r = 4
S = 2000
Required Data :-
N Value
Solution :-
S = N x 1/r or N = S x r
N = 2000 x 4 = 8000 bps Ans:-

PART 5:

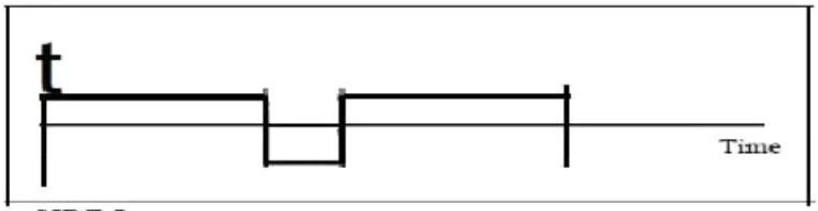
A **constellation diagram** is a representation of a signal modulated by a digital modulation scheme such as quadrature amplitude modulation or phase-shift keying.[1] It displays the signal as a two-dimensional *xy*-plane scatter diagram in the complex plane at symbol sampling instants. The angle of a point, measured counterclockwise from the horizontal axis, represents the phase shift of the carrier wave from a reference phase. The distance of a point from the origin represents a measure of the amplitude or power of the signal.



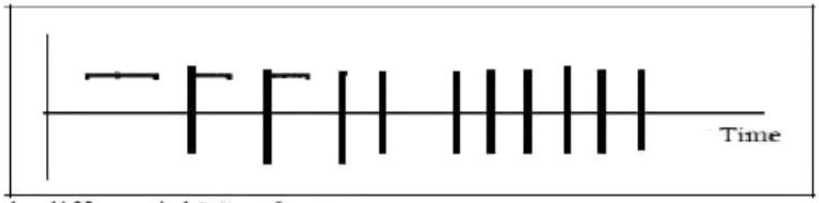
ANS 2: PART A:

21. Find the 8-bit data stream for each case depicted in Figure 4.36.

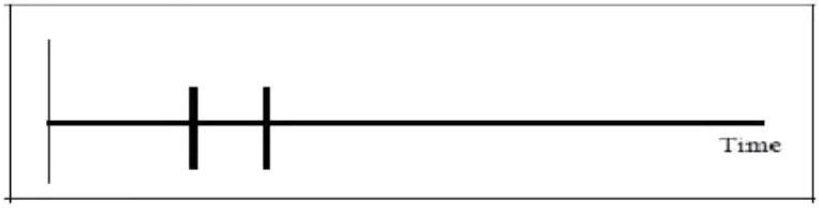
Figure 4.36



a. NRZ-I



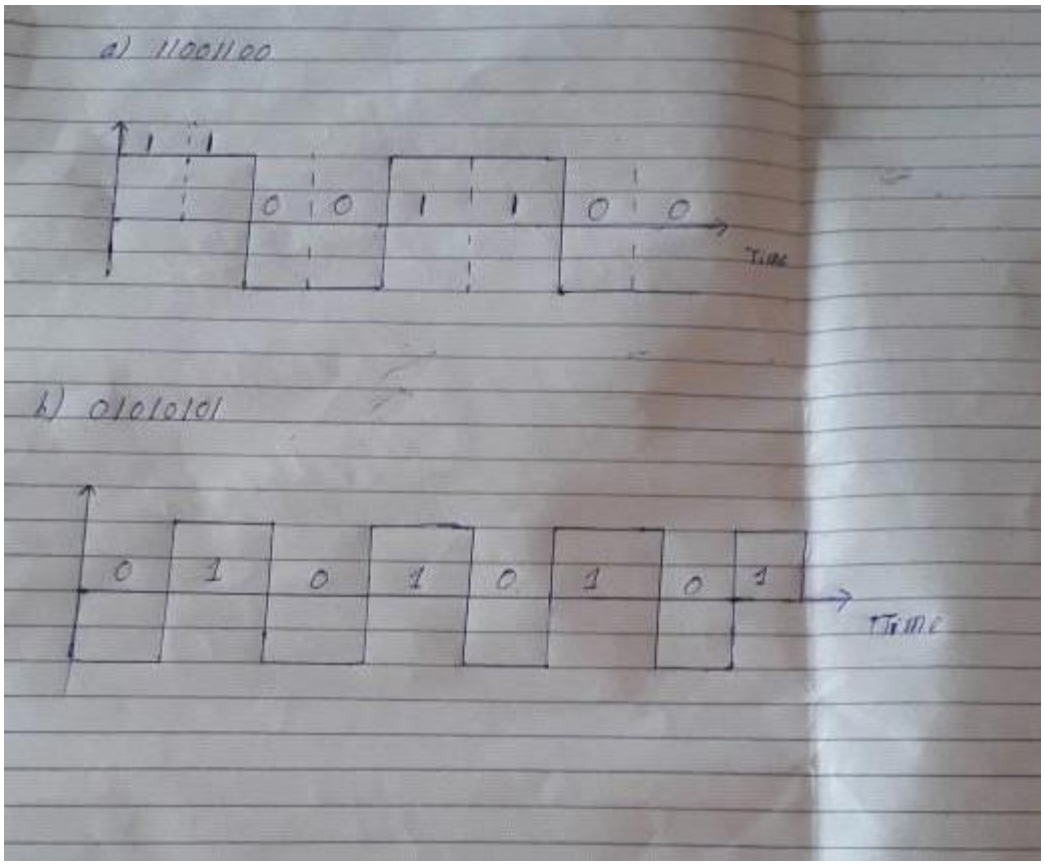
b. differential Manchester



c.AMI

Ans: The 8 bit data stream can be found as
a. NRZ-I: 10011001.
b. Differential Manchester: 11000100.
c. AMI: 01110001.

PART B:

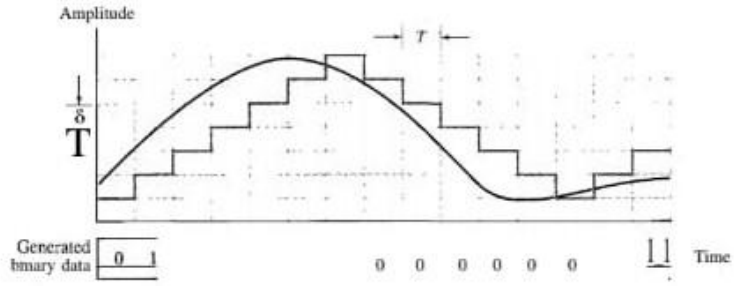


PART C:

Delta Modulation (DM)

PCM is a very complex technique. Other techniques have been developed to reduce the complexity of PCM. The simplest is *delta modulation.* PCM finds the value of the signal amplitude for each sample; DM finds the change from the previous sample. Figure 4.28 shows the process. Note that there are no code words here; bits are sent one after another.

Figure 4.28 *The process of delta modulation*



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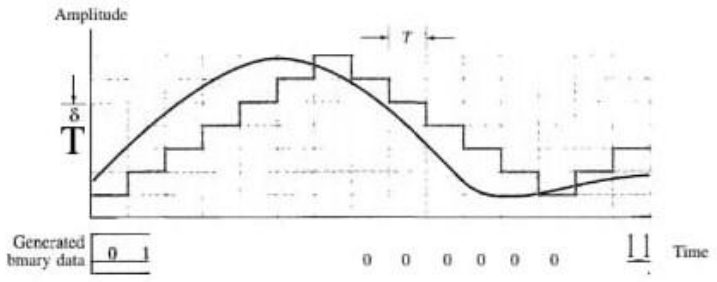
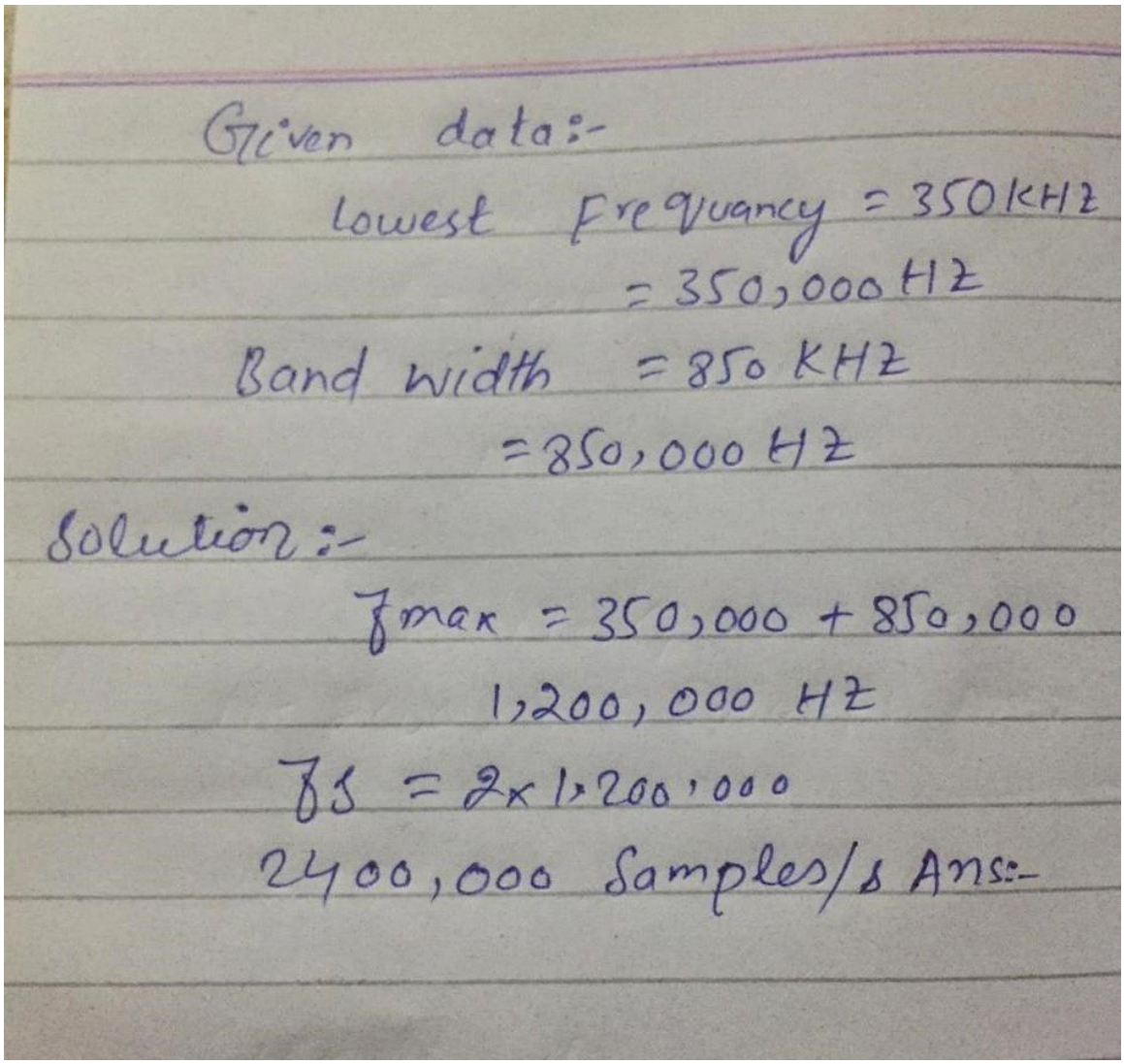


ANS 3 PART A:

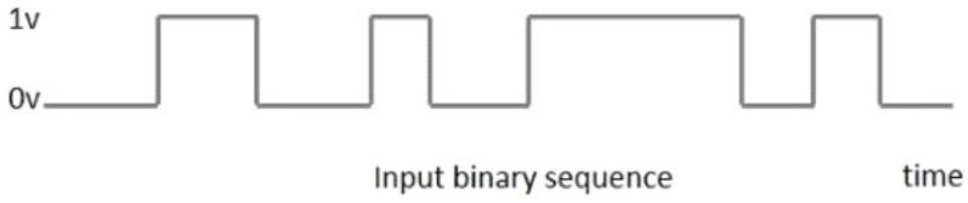

Given data:-
Lowest Frequency = 350KHz
= 350,000 Hz
Band width = 850 KHz
= 850,000 Hz
Solution:-
fmax = 350,000 + 850,000
1,200,000 Hz
fs = 2x 1,200,000
2400,000 Samples/s Ans:-

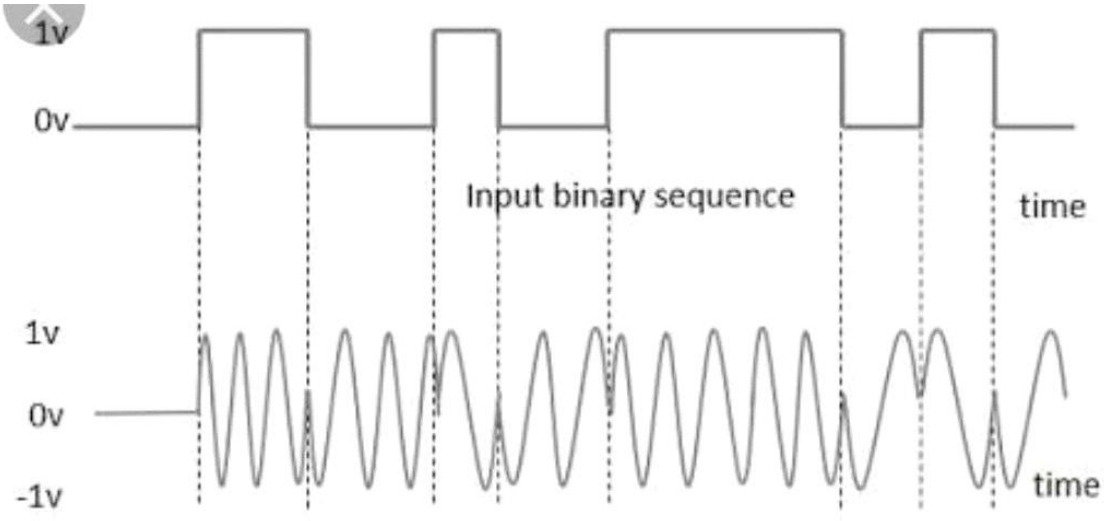
PART B: FSK:

Frequency Shift Keying FSK is the digital modulation technique in which the frequency of the carrier signal varies according to the digital signal changes. FSK is a scheme of frequency modulation.

The output of a FSK modulated wave is high in frequency for a binary High input and is low in frequency for a binary Low input. The binary **1s** and **0s** are called Mark and Space frequencies.

The following image is the diagrammatic representation of FSK modulated waveform along with its input.



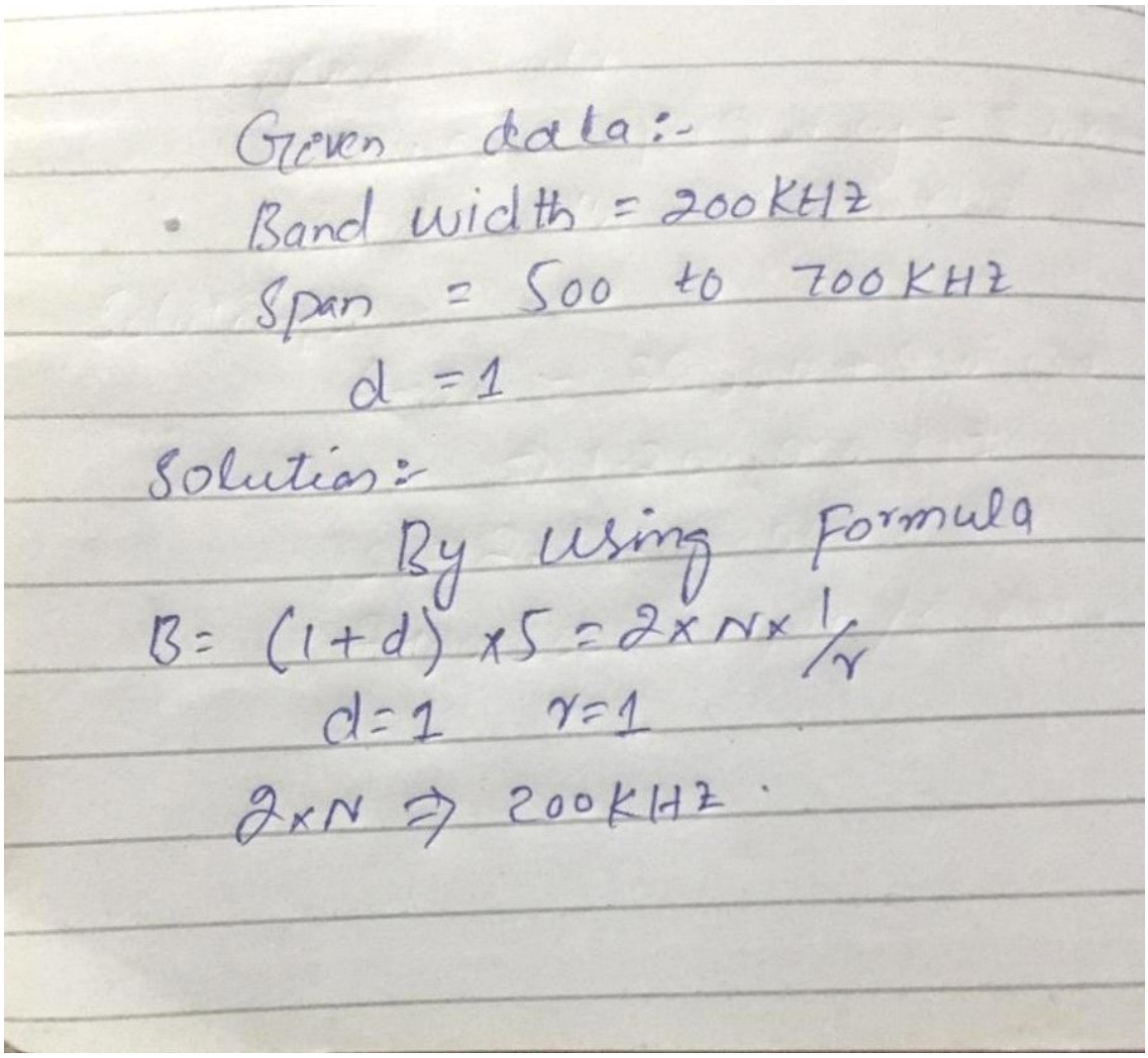


BPSK Modulated output wave

Phase Shift Keying ***PSK*** is the digital modulation technique in which the phase of the carrier signal is changed by varying the sine and cosine inputs at a particular time. PSK technique is widely used for wireless LANs, bio-metric, contactless operations, along with RFID and Bluetooth communications.

PSK is of two types, depending upon the phases the signal gets shifted. They are –

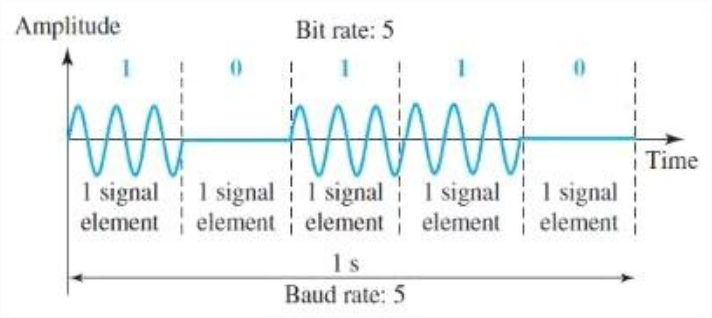
PART C:


Given data:-
Band width = 200KHZ
Span = 500 to 700KHZ
d = 1
Solution:-
By using Formula
B = (1+d) x5 = 2xNx 1/r
d=1 r=1
2xN ⇒ 200KHZ.

ANS 4 PART A:

Binary Amplitude shift keying

- Although we can have several levels (kinds) of signal elements, each with a different amplitude, ASK is normally implemented using only two levels.
- This is referred to as *binary amplitude shift keying* or *on-off keying* (OOK).
- The peak amplitude of one signal level is 0; the other is the same as the amplitude of the carrier frequency.



PART B:

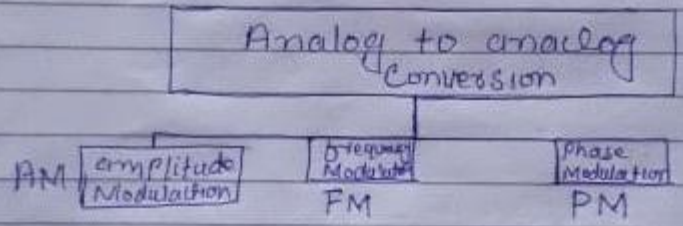
ANSY. Sec(b)

Analog to analog Conversion, or analog Modulation is the Representation of analog information by an analog Signal

The analog Signal produced by each Station is a Low pass Signal all in the Same range

Analog to analog Conversion can be accomplished in the following way

These are Amplitude Modulation (AM), frequency Modulation (FM) AND phase Modulation (PM)



The frequency and phase of the Carrier remain the Same only the amplitude changes to follow variation in the information Amplitude Modulation is Normally implemented by using a Simple Multiplier because the amplitude of the Carrier Signal needs to be Changed according to the amplitude of the modulating Signal