I begin with the name of Allah, Who is Most kind, Most Merciful.

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Course: Data Communication and Networks

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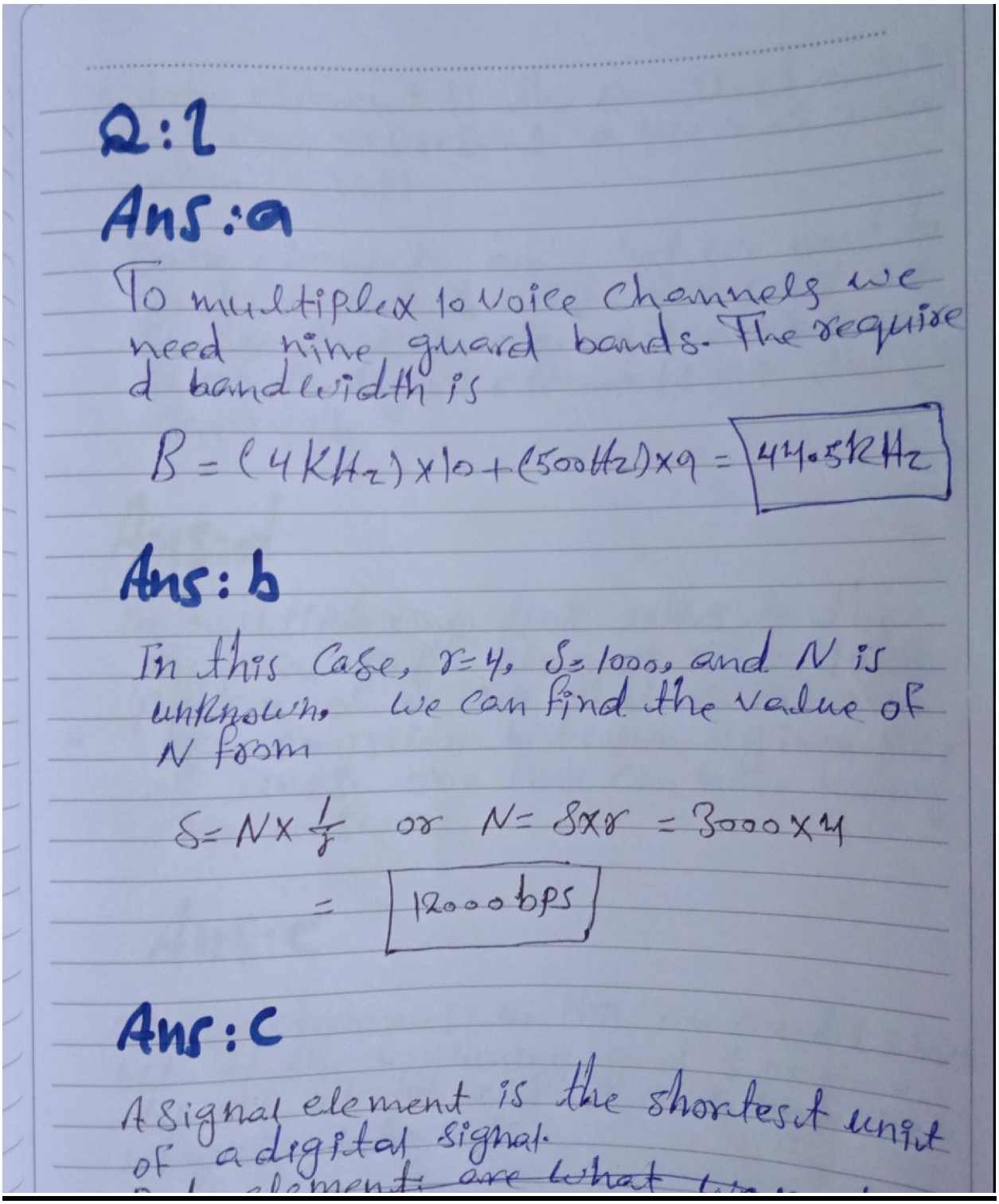
Program: BS(CS)

Question 1:

Answer



Q:1

Ans:a

To multiplex 10 voice channels we need nine guard bands. The required bandwidth is

$B = (4\,KHz) \times 10 + (500\,Hz) \times 9 = \boxed{44.5\,KHz}$

Ans:b

In this case, $r = 4$, $S = 1000$, and N is unknown. We can find the value of N from

$S = N \times \frac{1}{r}$ or $N = S \times r = 3000 \times 4$

$= \boxed{12000\,bps}$

Ans:c

A signal element is the shortest unit of a digital signal.

A data element is the smallest entity that can represent a piece of information (a bit).

Data elements are what we need to send; signal elements are what we can send. Data elements are being carried; signal elements are the carriers.

Ans:d

In multiplexing, link refers to the physical path. Channel refers to the portion of a link that carries a transmission between a given pair of lines. One link can have many channels.

Ans:e

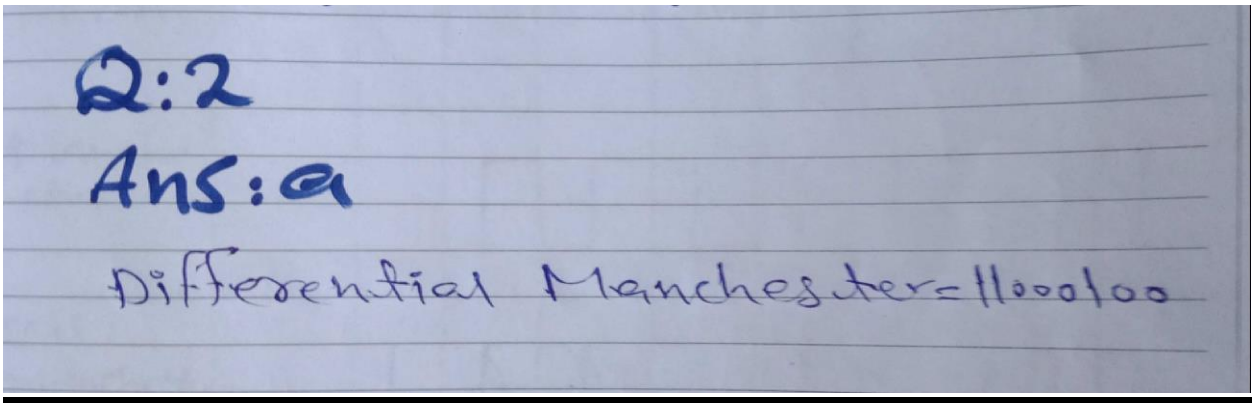
(1) Asynchronous: In this, we send 1 start bit at the beginning and 1 or more stop bit at the end of each byte. i.e irregular intervals.

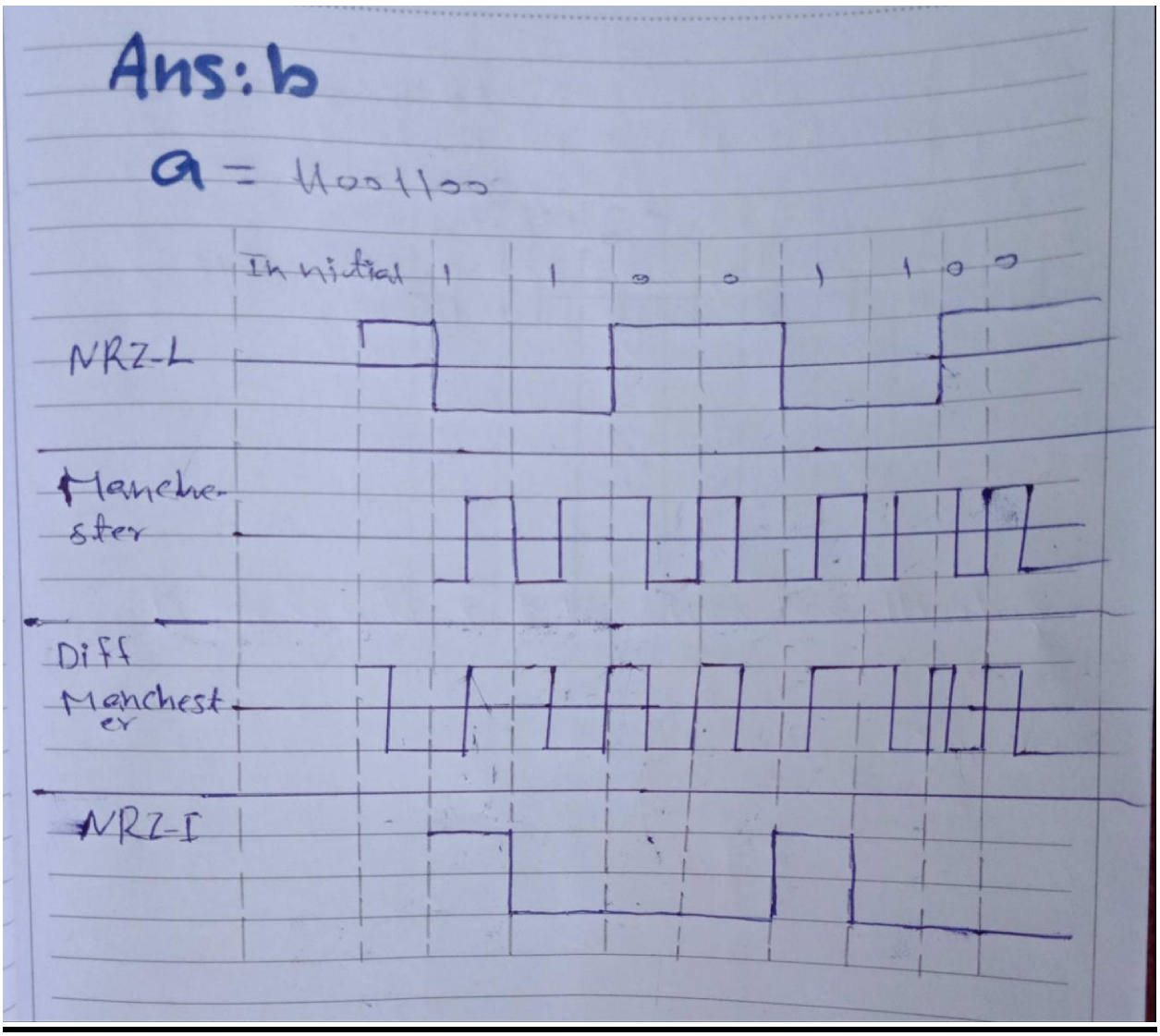
2) Synchronous - In this, we send bits in a serial order without any gaps. i.e regular intervals.

3) isynchrounous: It sends a block of data asynchronously.

Question :2

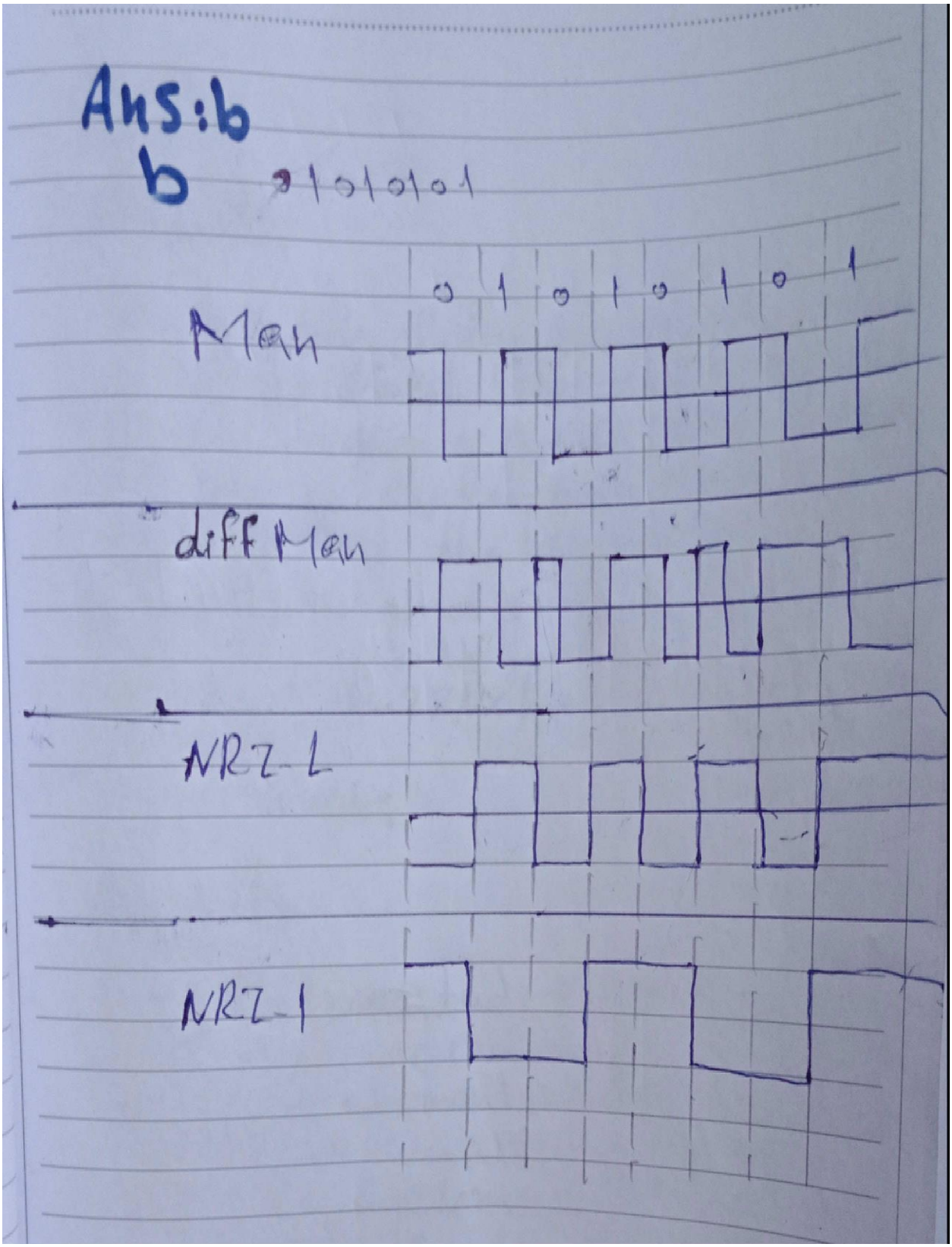
Answer





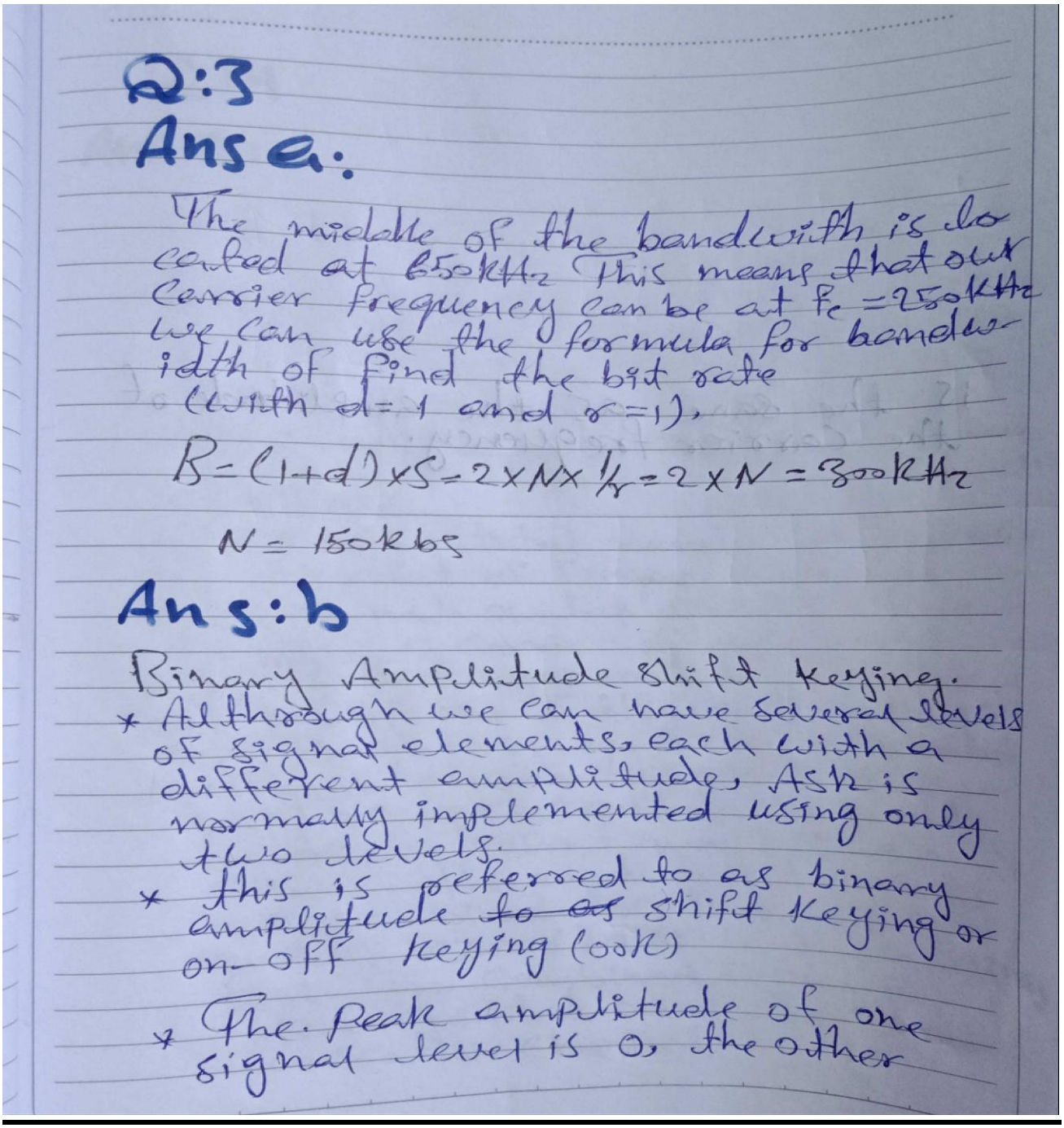
Ans: b

b 0 1 0 1 0 1 0 1



Question :3

Answer



Q:3

Ans a:

The middle of the bandwidth is located at 650kHz This means that our carrier frequency can be at $F_c = 250kHz$ we can use the formula for bandwidth of find the bit rate (with d = 1 and r = 1).

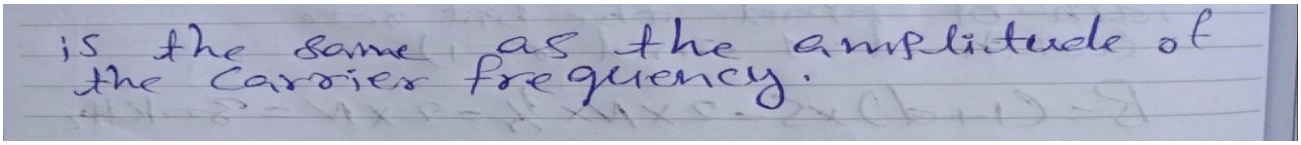
$$B = (1+d) \times S = 2 \times N \times \frac{1}{r} = 2 \times N = 300kHz$$

$$N = 150kbs$$

Ans: b

Binary Amplitude Shift keying.

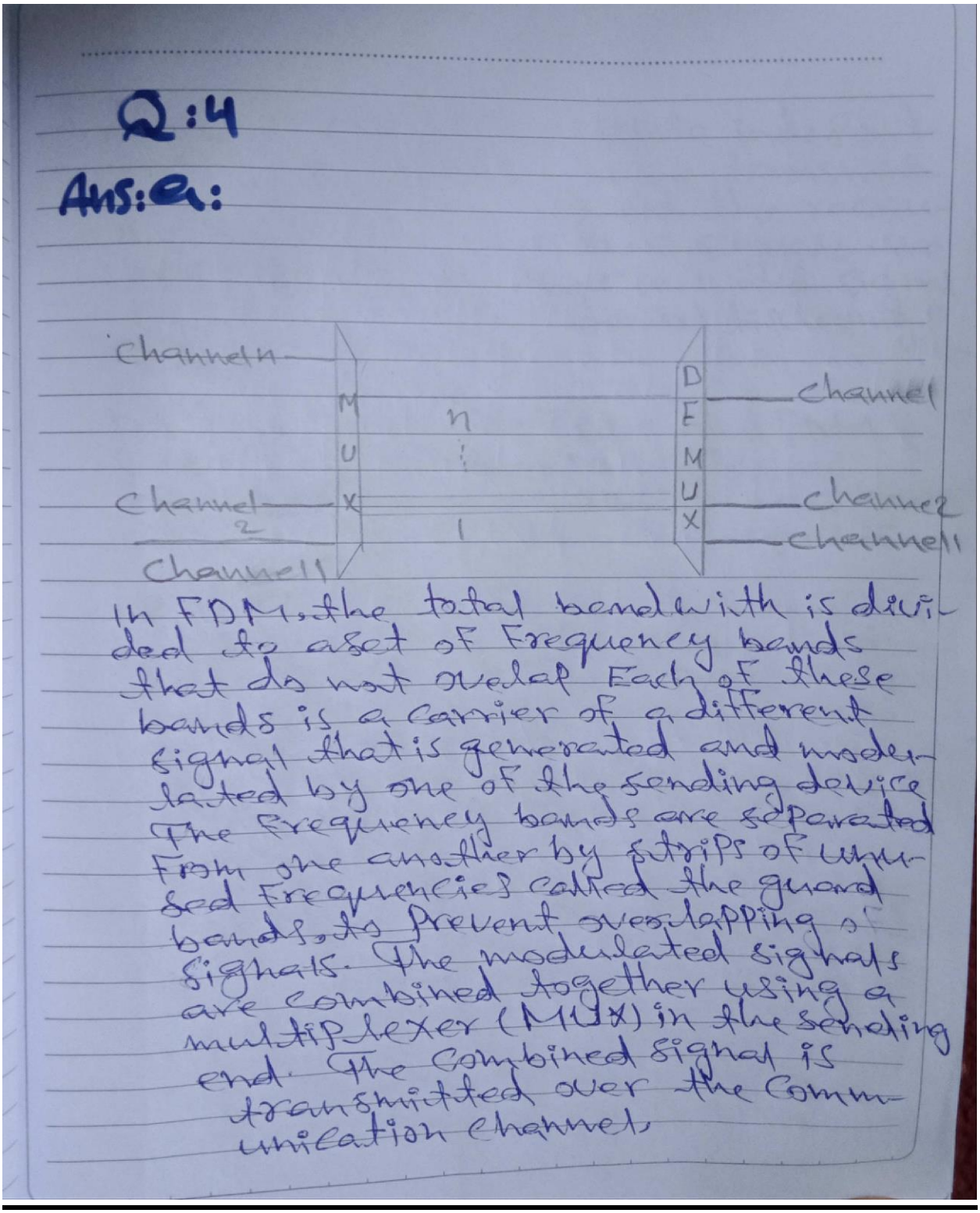
* Although we can have several levels of signal elements, each with a different amplitude, ASK is normally implemented using only two levels.
* this is referred to as binary amplitude ~~to as~~ shift keying or on-off keying (OOK)
* The peak amplitude of one signal level is 0, the other



is the same as the amplitude of the carrier frequency.

Question:4

Answer



thus allowing multiple independent data stream to be transmitted simultaneously. At the receiving end, the individual signals are extracted from the combined signal by the process of demultiplexing (DEMUX).

Different between TDM and FDM

TDM (Time Division Multiplexing) and FDM (Frequency Division Multiplexing) are the two techniques of multiplexing.

The common difference between TDM and FDM is that TDM share the timescale for the different signals, whereas FDM shares the frequency scale for the different signals.

TDM used with digital signals and analog signals. FDM is used with Analog signals.

For TDM necessary requirement sync pulse. For FDM is Guared Band.

Ans.b

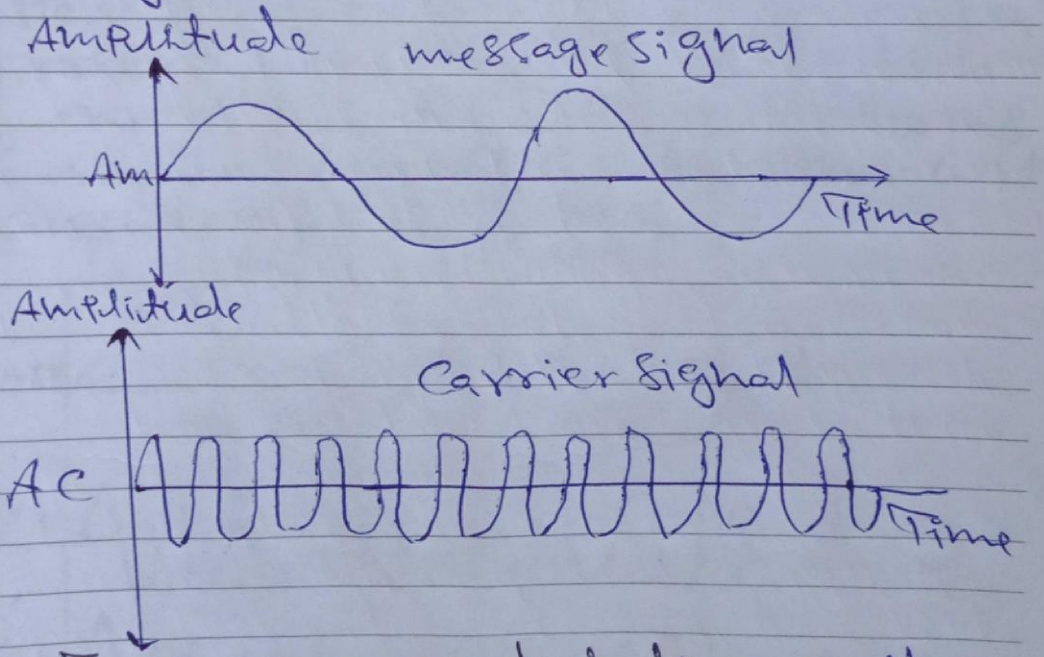
Analog-to-analog conversion.

* Analog-to-analog conversion, or analog modulation is the representation of analog information by an analog signal.
* One may ask why we need to modulate an analog signal; it is already analog.
* Modulation is needed if the medium is band-pass in nature or if only a band-pass channel is available to us.
* An example is radio
* The government assigns a narrow bandwidth to each radio station.
* The analog signal produced by each station is a low-pass signal, all in the same range.
* To be able to listen to different stations, the low-pass signals need to be shifted, each to a different rang.

Analog-to-analog conversion can be accomplished in three ways:

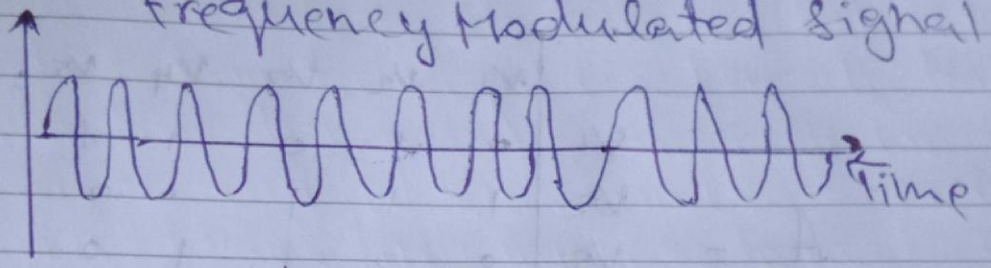
1- Amplitud modulation (AM)
2- Frequency modulation (FM).
3- Phase modulation (PM)

1: Amplitude modulation (AM) is a modulation technique used in electronic communication most commonly for transmiting information via a radio carrier wave in amplitude modulation, the amplitude (signal strength) of the carrier wave is varied in proportion to that of the message signal being transmitted.

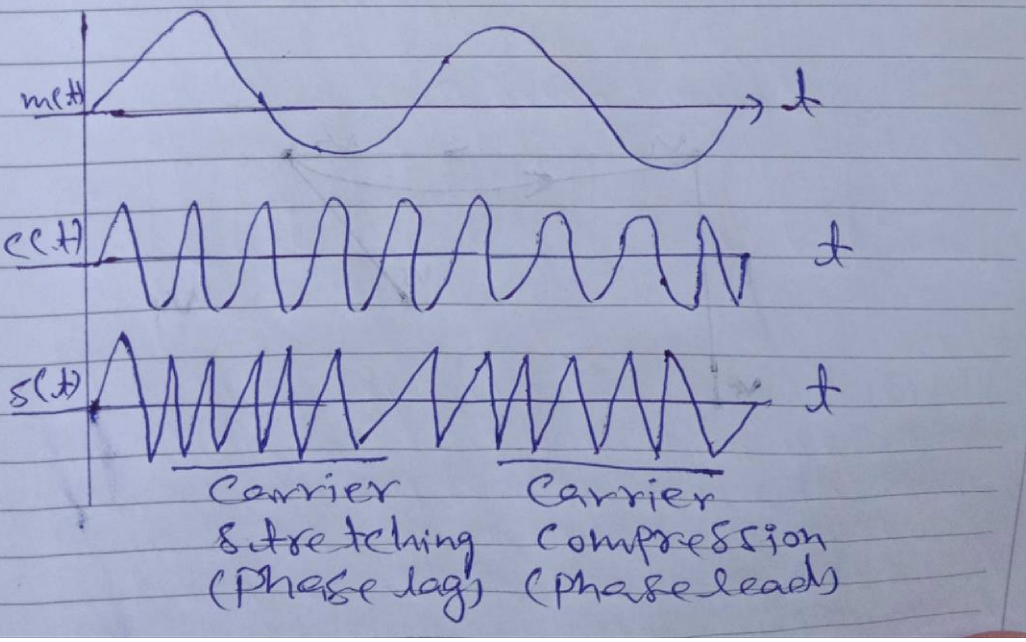


2: Frequency modulation: is the encoding of information in a carrier wave by varying the instantaneous frequency of the wave the term and technology are used in computing, signal processing and tele communications.

Frequency modulated signal



3- Phase modulation (PM) is a modulation pattern for conditioning communication signals for transmission. It encodes a message signal as variations in the instantaneous phase of a carrier wave. phase modulation is one of the two principle forms of angle modulation. together with Frequency modulation.



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