Adnan Khan 14837

Q.1

Sec (a)

Answer:- To multiplex 10 voice channels, we need nine guard bands. The required bandwidth is then

$B = (4\text{kHz}) \times 10 + (500\text{Hz}) \times 9$

$= 44.5\text{KHz}$

Q.1

Sec(b)

Answer:- In this case

$x = 4$

$S = 3000$

$N = ?$

We can find the value of N from

$S = N * 1/x$ or $N = S * x = 3000 \times 4$

$N = 12000$ bps.

Q.1

Sec(c)

Answer:- Signal element:-

A signal element is the shortest unit of a digital signal. Signal elements are what we can send. Signal elements are the carriers.

Data Element:-

A data element is the smallest entity that can be represent a piece of information (a bit). Data elements are what we need to send. Data elements are being carried.

Q.1
Sec (d)
Answer:- In multiplexing, the word link refers to the physical path. The word channel refers to the portion of a link that carries a transmission between a given pair of lines. One link can have many (n) channels.

Q.1
Sec (e)
Answer:- Serial transmission plays a vital role in data transmission. It transfer bit-by-bit.

(i) Asynchronous:-

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

Synchronous:-

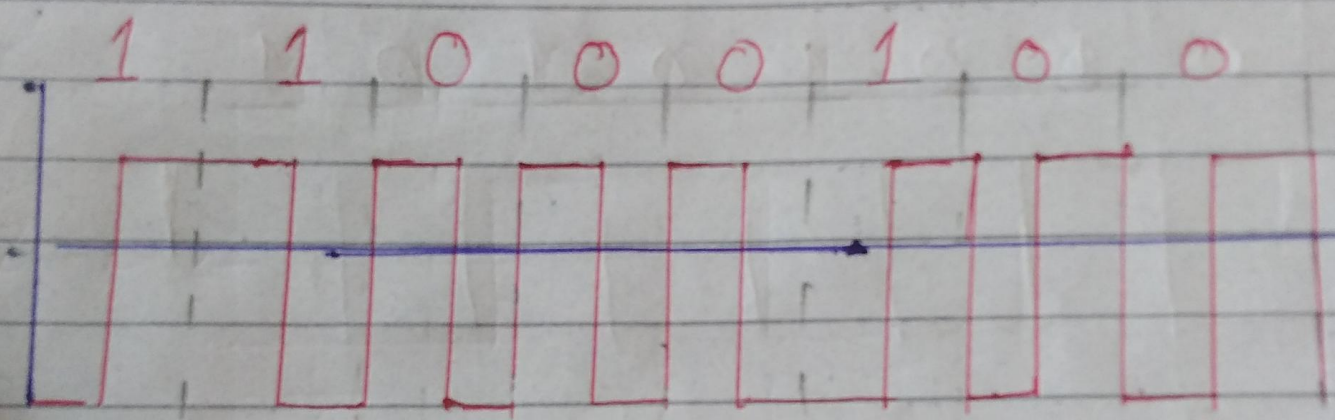
In this we send bits in a serial order without any gaps. i.e regular intervals

isynchronous:-

It sends a block of data asynchronously.

Q.2

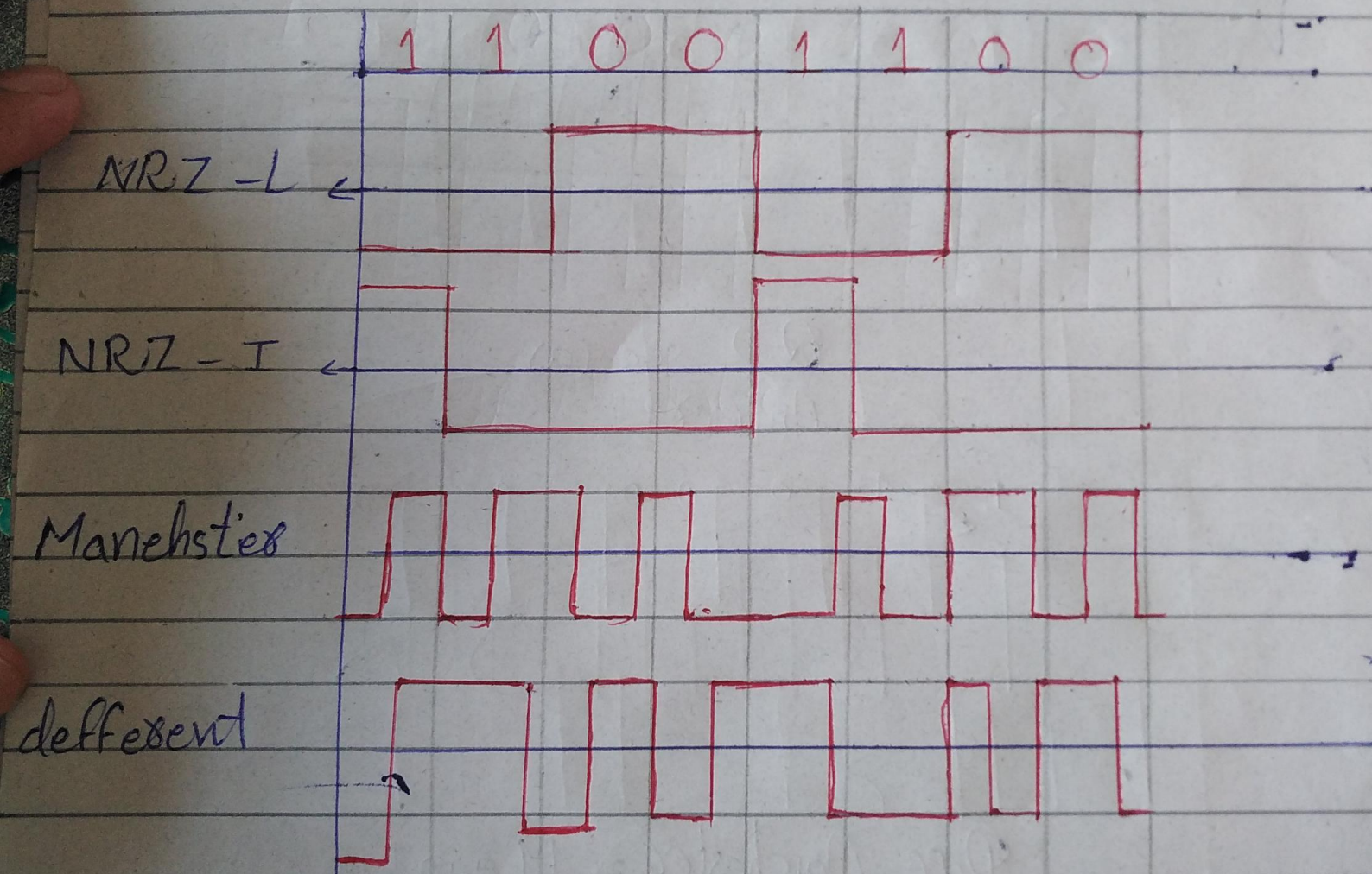
Sec (a)



Diff Manchester

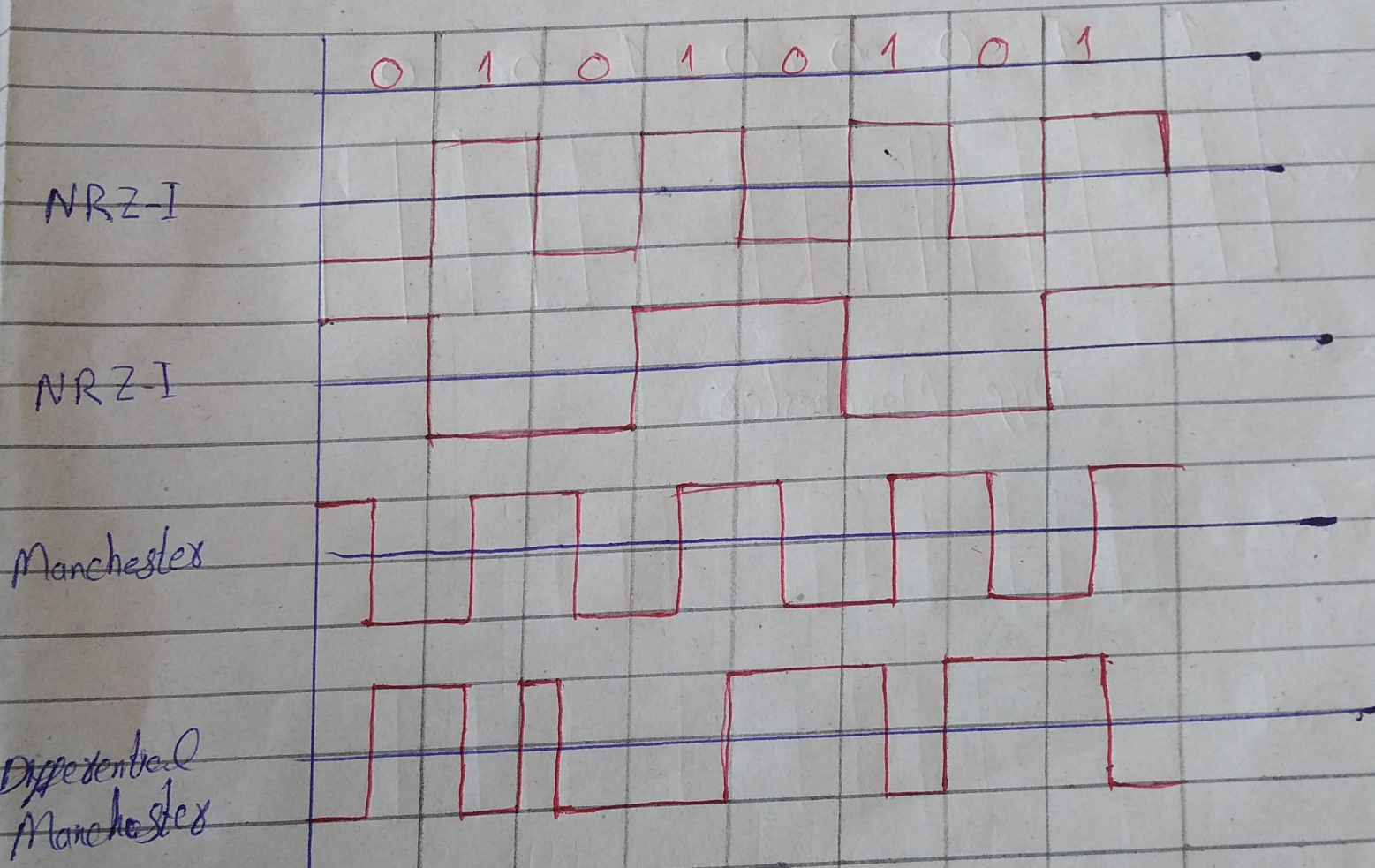
Q.2 Sec (b)

(a) 1100 1100



Q.2 Sec (b)

(b) 01010101



Misbah Jabeen

page #7

Q.2

Sec (c)

Answer:-

Bandwidth = Highest frequency - Lowest frequency

$950\ KHz = x - 450\ KHz$

$x = 950 + 450 = 1400\ KHz$

Nyquist Sampling Rate => shoulb be at least twice the maximum frequency

Hence,

Nyquist Sampling Rate = $2 * 1400\ KHz$

$= 2800\ KHz.$

Q.3

Sec (a)

Answer:- The middle of the bandwidth is located at 650 KHz. This mean our carries frequency can be at $fc = 650$ KHz

We can use the formula for bandwidth to find the bit rate with

$d = 1$

$R = 300$ KHz

500 to 800 KHz

$B = (1 + d) \times S$

$B = 2S$

$B = 2\left(N \times \frac{1}{8}\right)$

$B = 2(N)$

$300 = 2N$

$N = 2/300$

$N = 150$ kbs

Q.3
Sec(b)
Answer:

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 shift keying or non-off keying.

* The peak amplitude of one signal level is 0, the other is the same as the amplitude of the carrier frequency.

Q NO 4.

(a)

→ FOM MULTIPLEXING & DEMULTIPLEXING:-

→ FDM is an analauge technique that can be applied with the bandwidth of a link (Hz) is greater than the appalied bandwith of the signal to be transmitted.

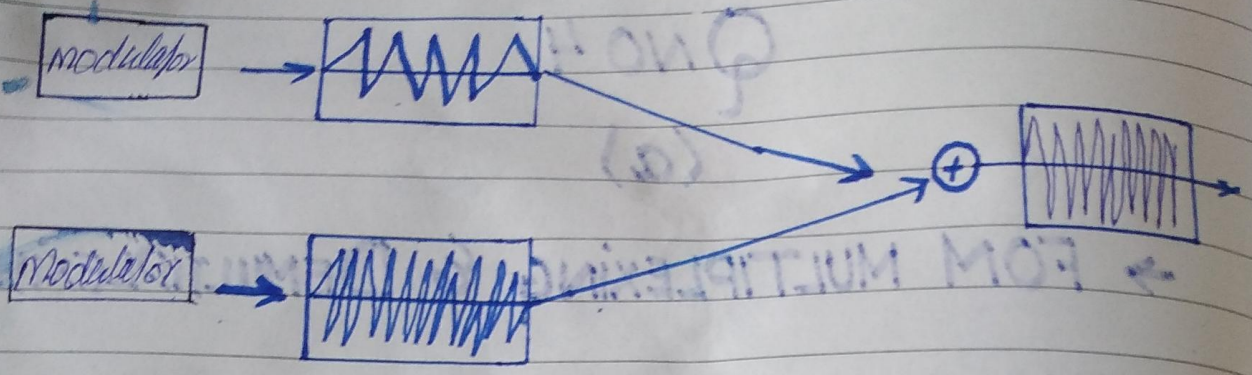
→ In FDM, signal genrated by vach sending devise modulates d/f carrier frequencies

→ These modulating signal are combined into a single composit signal that can be transposted by link.

→ In FDM vach signal is assigned a diffrent frequency.

→ The carrier frequency how to be diffrent enough.. to accomodates to modolation and modulation signals.

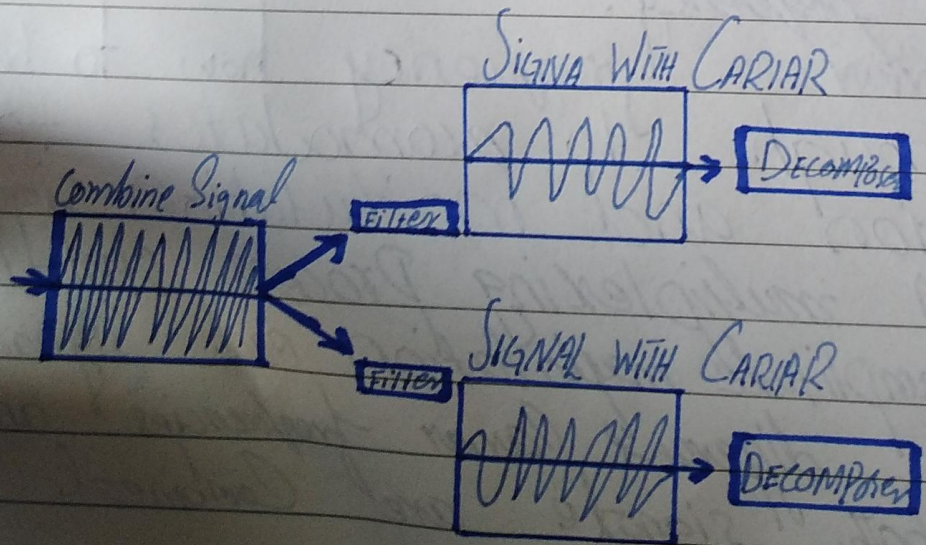
→ The FDM multiplexing process start by applaying amplitude modolation each signal by using diffrent carrier frequencies and if them both signals are combined.



→ In the demotolating process, we use filter of diffrent kinds to decompose multiplexed signal into its Constituent Componanet signal

→ Then each signal is passed to an amplitude demodulation process to repeat the carrier signal from the massege signal

→ The massage signal is then sent to the reciver.



→ DIFF B/W FDM & TDM :-

→ Both FDM & TDM are multiplexing techniques.
→ The main different b/w FDM & TDM is that FDM indestrial signal are are given different frequency with in a common bond-width
→ Whare as in TDM the multiple Signals are transmitted in diffrent time slots on a single Chanel
→ And FDM is used for analouge transmittion of Signal Adio analouge at radio is achived by FDM.
→ Whare as TDM can be used for both analouge and digital Signal.

Q No 4

(b)

→ ANALOG TO ANALOG CONVERSION:.

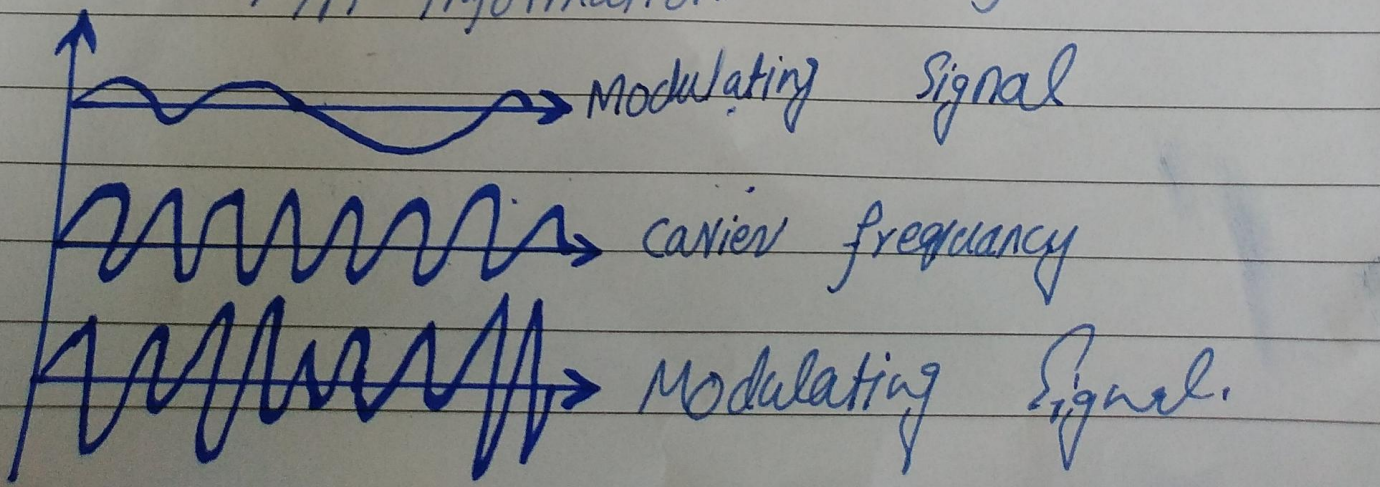
→ Analog to Analog Conversion is the representation of analog information by analog signals
eg:. Radio

→ These are three ways to acomplish analog to analog Conversion.

1. AMPLITUDE MODULATION :.

→ In AM transmition the carrier signal is modulated so its amplitude varies with the changing amps of the modulating signals.

→ the frequency and Phase and Phase of the carrier remain the same Only amplitude changes to follow variation in information.

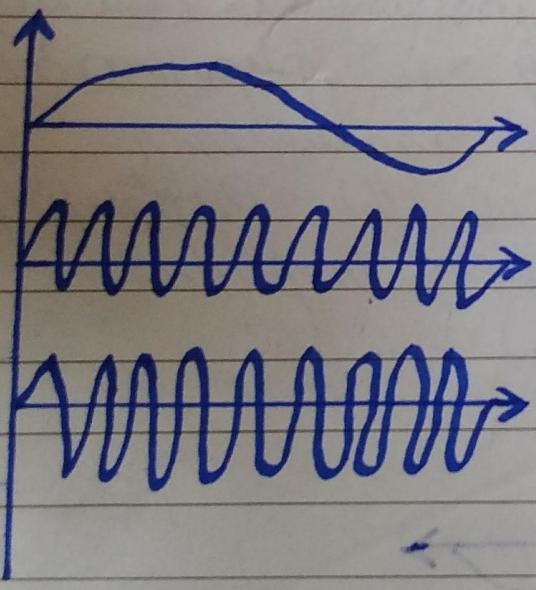


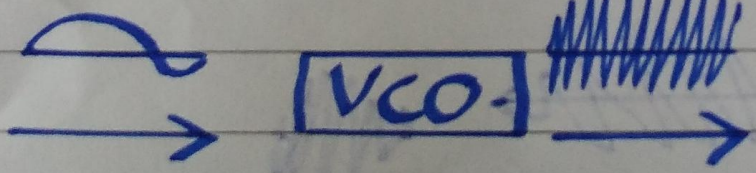
2. FREQUENCY MODULATION (FM):-

→ In FM transmission, the frequency of the carries signal is modulated to follow the changing voltage level of the modulating signal.

→ The peak amplitude and phase of the carries signal remain constant.

→ But as the amplitude of the information signal changes, the frequency of the carries changes corresponding.





3. PHASE MODULATION :-

→ In PM transmission the phase of the carrier signal is modulated to follow the changing voltage level of the modulating signals.

→ The peak amplitude and frequency of carrier signal remain constant

→ The PM is the same as FM with one difference.

→ In FM the instrument change in the carrier frequency is dispertional to the amplitude of the modulating signal where a PM is the dispertional to the disnective of the amplitude of the modulating signal.