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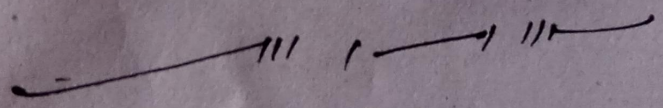
Semister :: 4th

Subject :: Data Communication & Network

Teacher :: Sir Ghassan Hassan



(Q:NO:1. Section a)

To multiplex 10 voice channels, we need nine (9) guard bands. The required bandwidth is then B.

$B = 4 \times 10 + (500) \times 9 =$

44.5 KHZ

(Q:NO:1. Section c)

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

(QNO: 1. Section. b)

$N = S * r$

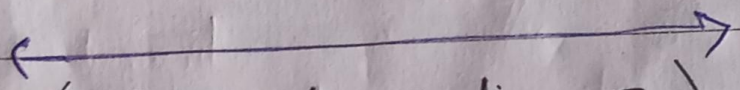
$= 3000 \times 4 = 12000$

$N = 12000$ bps

Ans.

(Q:NO: 1: section d)

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.



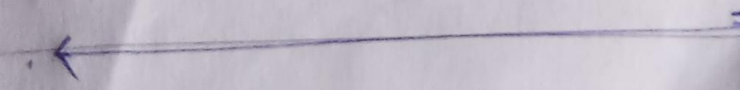
(Q:NO: 1 section e)

The three different techniques in Serial transmission are.

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

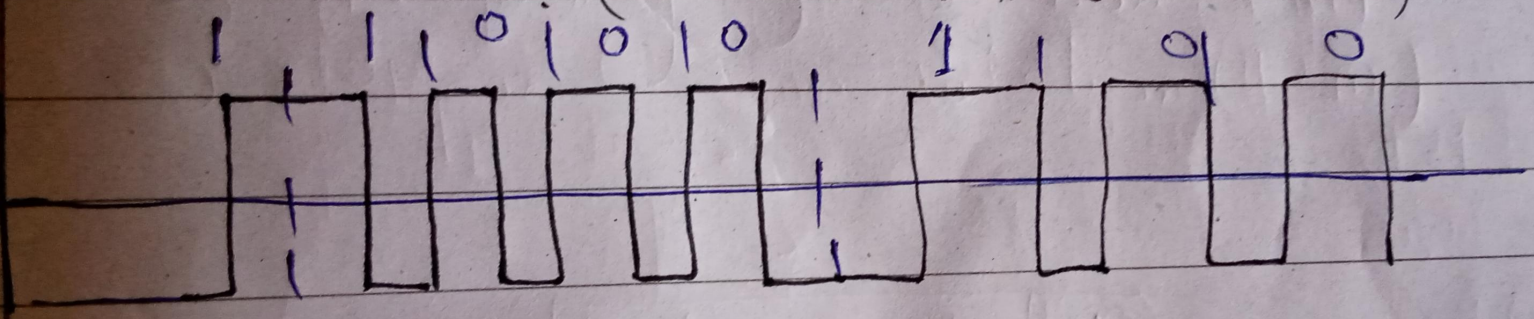
ii) Synchronous :- In this we send bits in a serial order with out any gaps: i.e regular intervals.

iii) Isynchronous:- It sends a block of data asynchronously.



(3)

(Q:NO: 2, Section A)

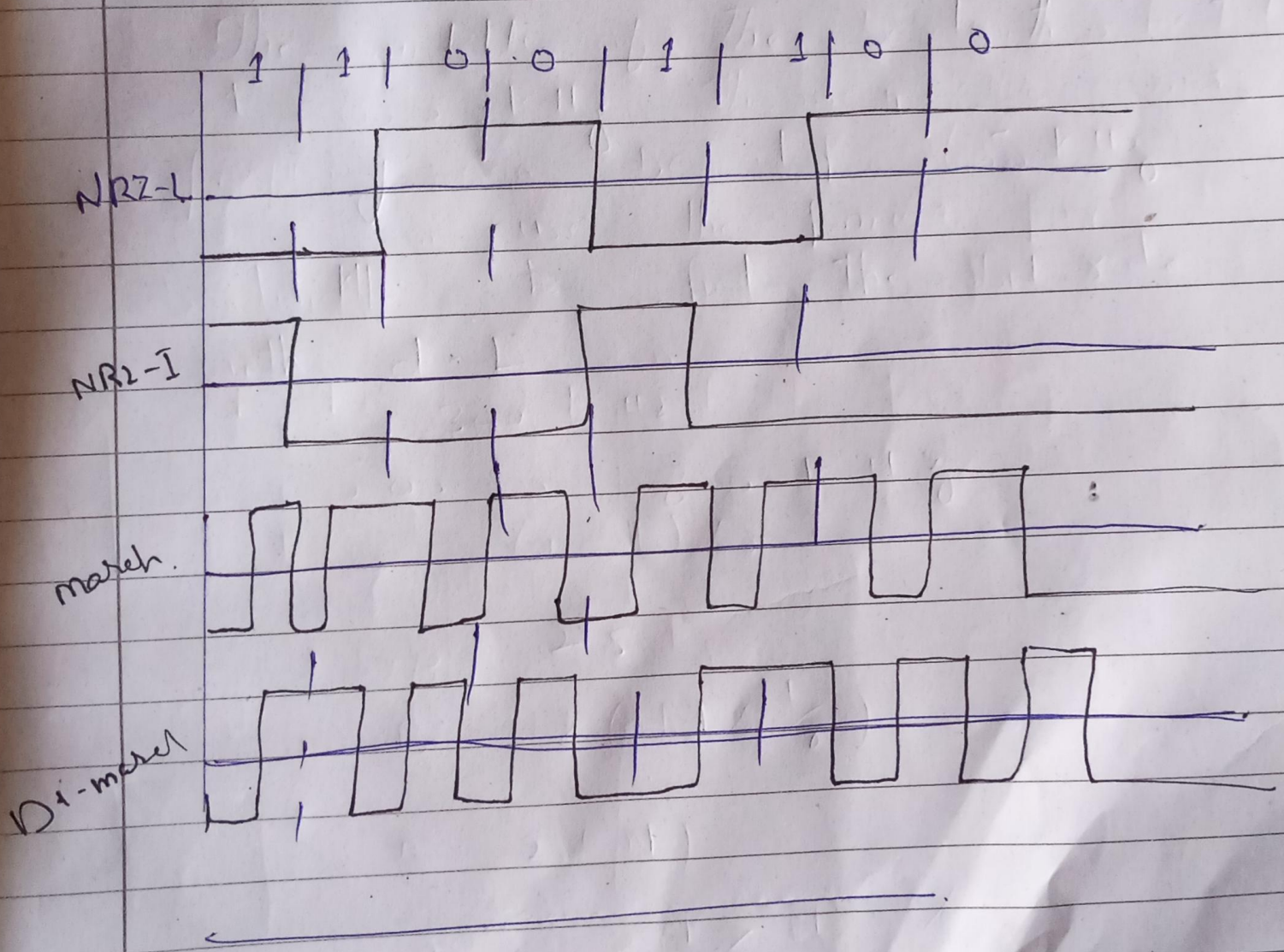


Diff manchester

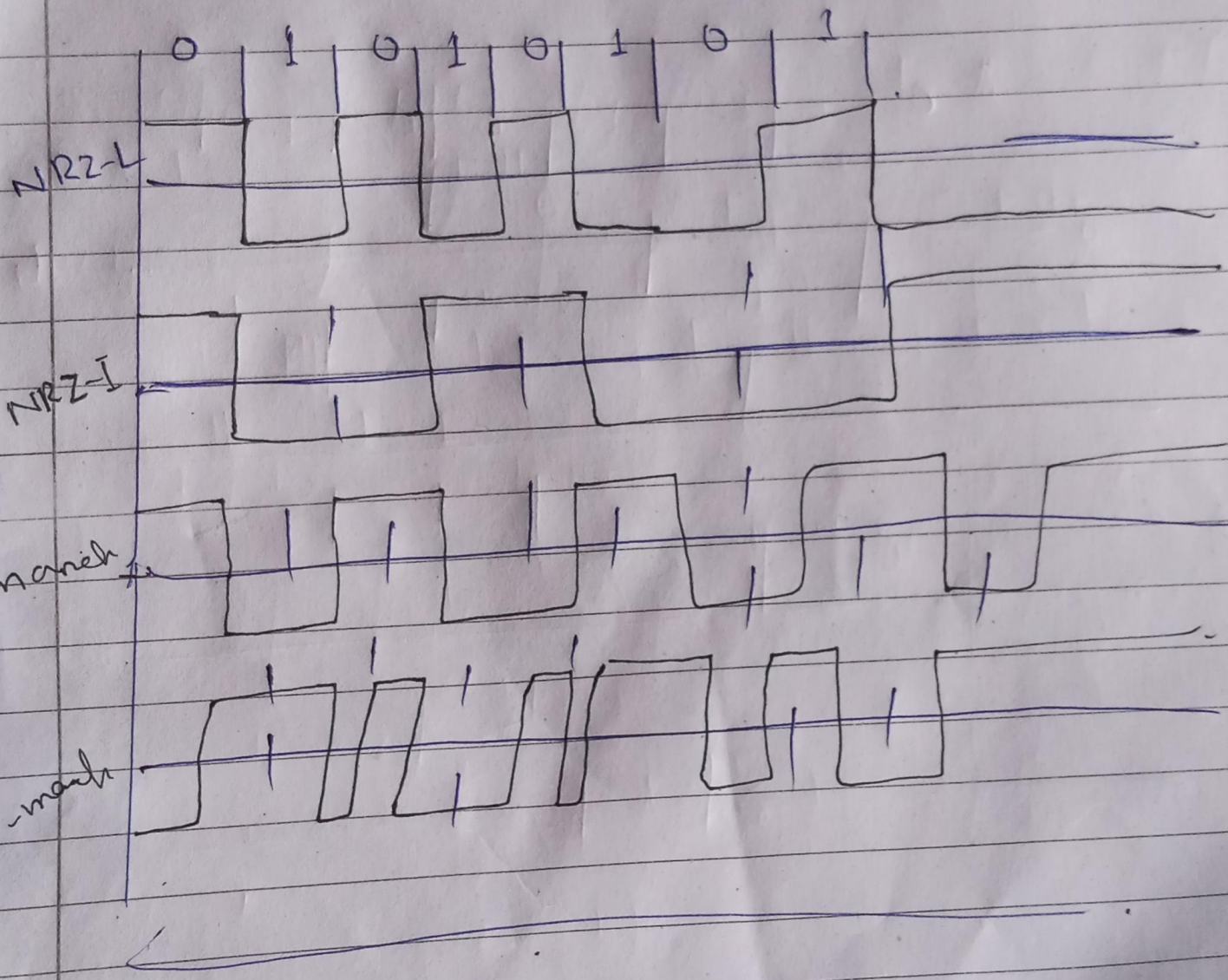
11000100

(4)

Q:NO:2 Sec (b) - (a)



Q: NO: 2. Section b - (b).



(QNO: 2. Part C)

Bandwidth = Highest frequency - Lowest frequency

$950\,KHz = x - 450\,KHz$

$x = 950 + 450 = 1400\,KHz$

Nyquist sampling rate $\Rightarrow$ should be at least twice the maximum frequency

Hence,

Nyquist Sampling Rate =

$2 \times 1400\,KHz$

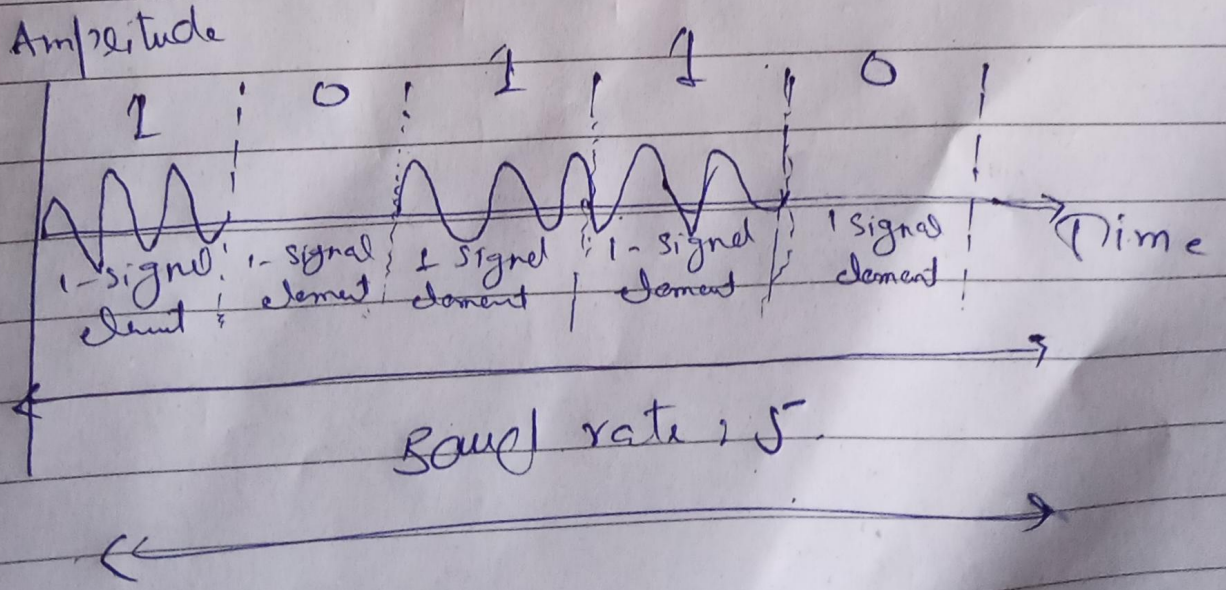
$= 2800\,KHz$

Ans

(Q:NO: 3. Part b)

- Although we can have several levels of signal elements, each with a different amplitude. ASK is normally implemented using only two levels.
- This is refered to as a 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.



(Q:NO: 4 Section a)

Explanation;;

In FDM the total bandwidth is divided to a set of frequency bands that do not overlap Each of these bands in a carrier of a different Signal that is generated and modulated by one of the Sending devices. The frequency bands are separated from one another by strips of unused frequenes called the guard bands. to prevent overlapping of Signals. The modulated Signal are Combined together using a multiplexer (MUX) in the sending end. The combined signal is transmitted over the communication channel, thus allowing multiple independent data streams to be transmitted simultaneously. At the receiving end, the individuals Signal are extracted from the combined signal by the processor of demultiplexing (DEMUX).

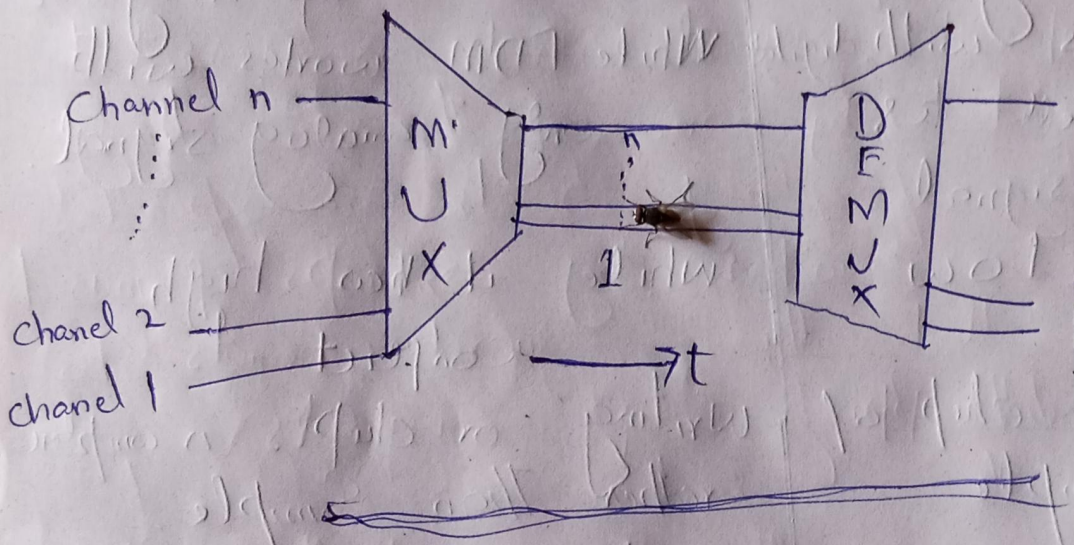
(Q.NO: 4 Section a)

Differentiate

TDM	FDM
① TDM stands for division multiplexing	FDM stands for frequency division multiplexing
② TDM works with digital signal as well as analog signal	While FDM works with only analog signal.
③ TDM has low conflict	while it has high conflict.
④ Writing or chip of TDM is Simple	Writing or chip is complex rather than Simple
⑤ TDM is efficient	While it is ineffecient.
⑥ In TDM Time Sharing takes place	While in this frequency sharing takes place
7- In TDM synchronization pulse is necessary.	while in it guard band is necessary.

QNo: 4 Section a.

Diagram.



(Q:NO: 4 Section b)

i: 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.
- 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 station, the low pass signals need to be shifted, each to a different range

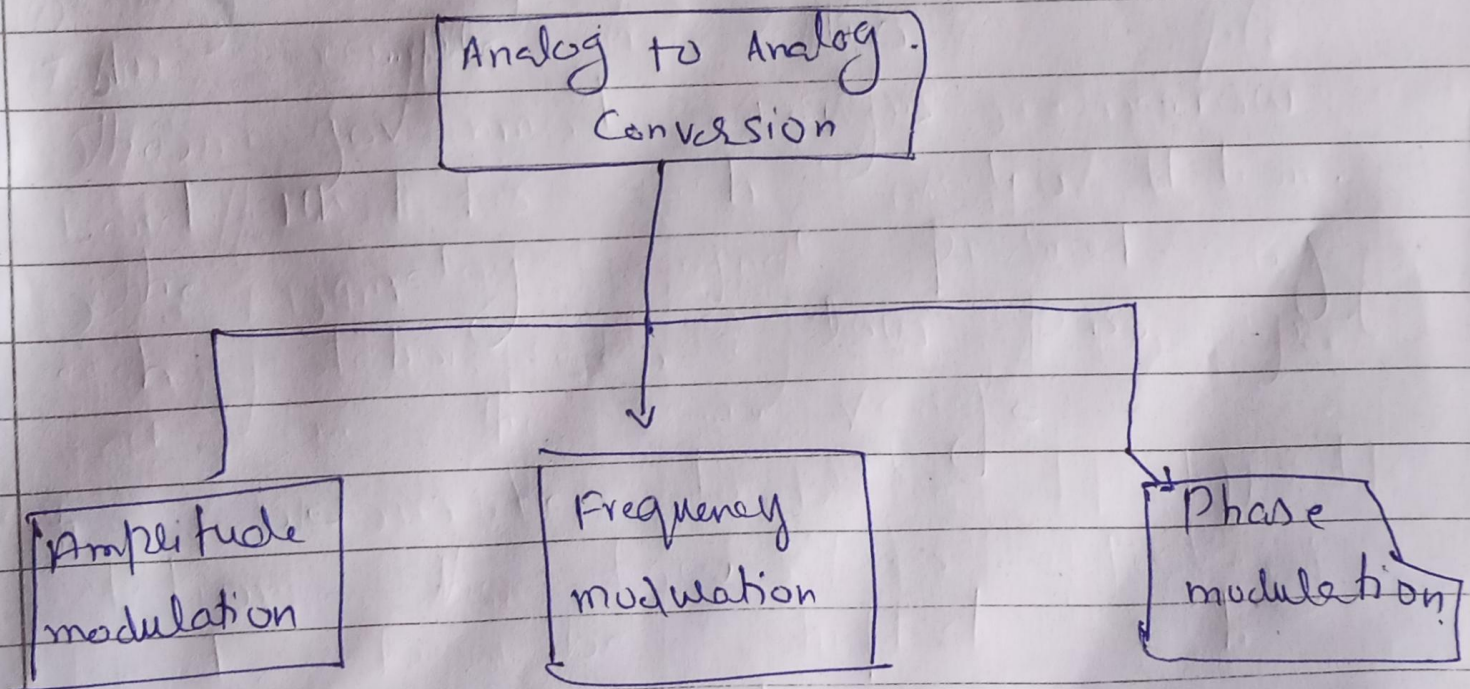
(Q:NO: 4 Section b)

Analog to analog conversion.

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

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

Diagram.



(7)

(Q.NO: 3. section A)

The middle of the bandwith is located at 650 kHz. This mean our carriers frequency can be at $f_c = 650$ kHz we can use the formula for bandwidth to find the bit rate with d = 1 can

300 kHz.

500 to 800 kHz

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

$B = 2S$

$B = 2(N \times 1/8)$

$B = 2(N)$

$300 = 2N \Rightarrow N = 2/300$

$N = 150$ kbs