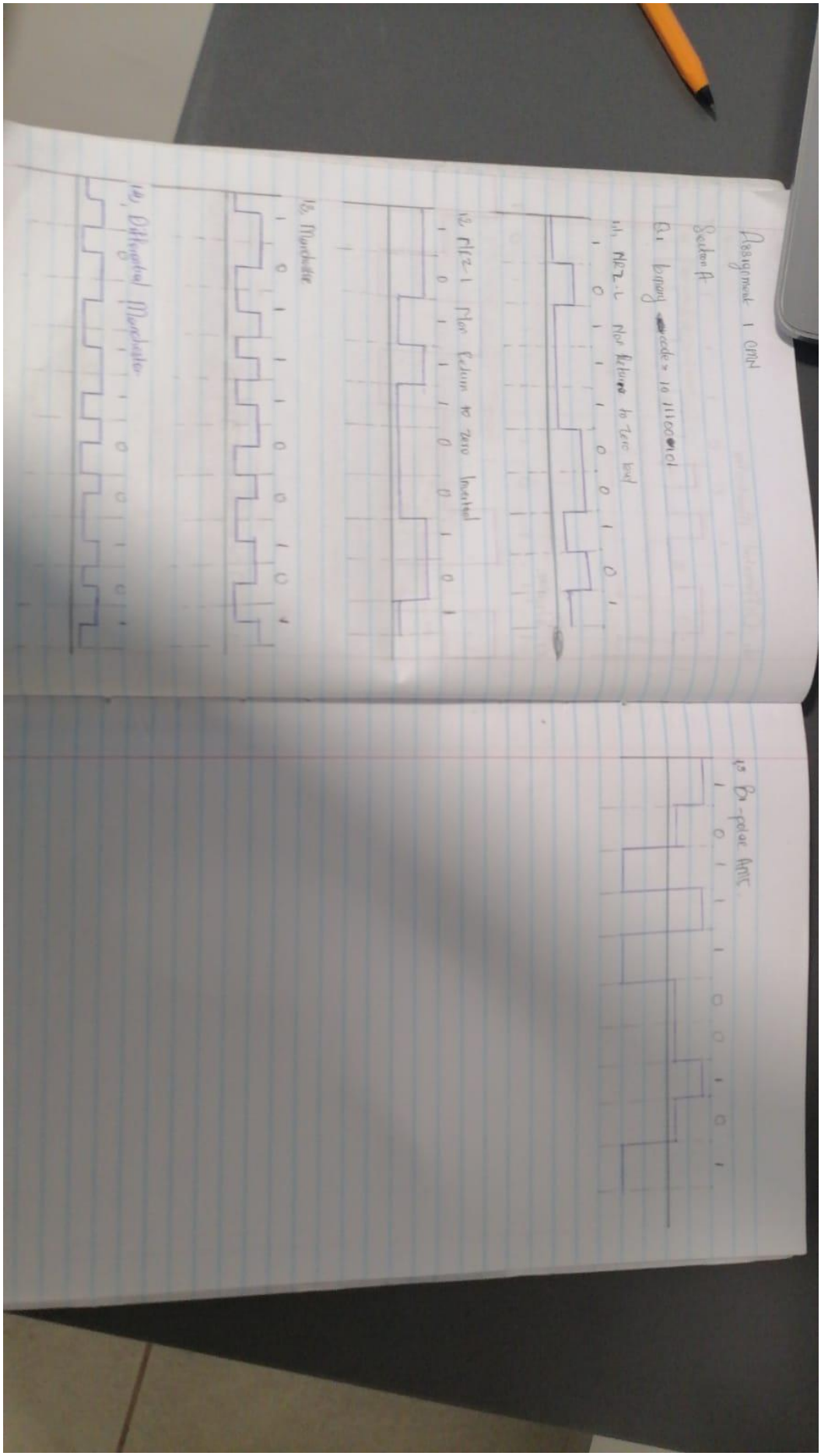
223052724
GSL Khoza
Assignment 1
Communications Network 2A

Question1



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Question2

2.1, Delta modulation is a second method of analog data-to-digital signal conversion. How does it work, with delta modulation a codec tracks the incoming analog data by assessing up or down steps, during each period, the codec determines whether the waveforms risen one delta step or dropped one delta step.

2.2, **Amplitude shift keying** >> it represents digital data as variation in the amplitude of a carrier wave.

Frequency shift keying>> it uses two different frequency ranges to represent data values 1 and 0.

Phase shift keying>> it represents 0s and 1s by different change in the phase of a waveform.

2.3, a, **Pulse code modulation** converts the analog data to a digital signal by tracking the analog waveform and taking snapshot of the data at fixed intervals.

b, **Delta modulation** a codec tracks the incoming analog data by assessing up or down steps

2.4, a, **Manchester Digital Encoding scheme**>> it ensures that each bit has some type of signal change and solves the synchronization problem.

b, **Differential Manchester Digital encoding scheme**>> it was used in a now extinct form of local area network but exists in a number of unique applications.

c, **The advantages and disadvantages of Manchester schemes**>> Advantages the Manchester scheme has an advantage over the NRZ scheme, there is always a transition in between a bit

self-clocking each bit is represented by a transition this ensures that the receiver can accurately recover the clock signal,

the detection of errors makes simpler to detect errors and correct them during a transmission.

Disadvantage the Manchester code, the direction of this transition in the middle doesn't differentiate between a 0 or a 1.

Complexity can increase the cost of communication systems,

Lower data rate may impact the achievable data transmission speed in applications where high data rates are crucial.

Section B

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Question3

3.1, c= 2b log2(l)

C=1023 mbps

B=128 mbps

L= 2 c/2b

L = 2 1023 mbps/2*128

L=2 1024/256

L = 2 ^4

L= 16

3.2, c=b*log2(1+snr)

C= 166,67 mbps

Snr=32

B=166,67/log2(1+snr)

B=166,67/log2(1+32)

B=166,67/log2(33)

B=166,67/5

B= 33,334 mhz

3.3,

Starland→Fayside: power loss=0,333

Fayside→Angerford: power loss=0,455

Angerford→Southingbrough: power loss=0,125

Total=0.77675

Starland→Shadytown: power loss=0,454

Shadytown→Southingbrough: power loss=0

Total=0,454

The Starland to shadytown and to southingBrough has lower total power loss.

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3.4,

3.4.1, 1000001 1001001 1010011

CAN EM :

3.4.2, 0101000 1010010 0101001

ENQ * NAK

Section C

Question4

4.1, Signal Bandwidth is how big the range is between its lowest and highest frequency, because unnecessary noise degrades original signals, electronic devices usually have a effective bandwidth.

Bandwidth determines data transmission speed and how accurate the signal is, bandwidth efficiency determines how effectively the spectrum is utilized meeting the demand for high-speed data transmissions relies on the efficient bandwidth utilization. bandwidth decides how quickly data moves, more bandwidth means data moves faster and allows more data to pass in time. bandwidth affects the accuracy of a signal being transmitted and received.

4.2, The amplitude of a signal is the height of wave above or below a given reference point, this height often denotes the voltage level of the signal and the current level of the signal. The amplitude of the signal can be expressed in volts, amps, or watts,

The frequency of the signal is the number of times a signal makes a complete cycle within a given time frame. A frequency is represented by hertz (Hz), The range of frequencies that a signal spans from minimum to maximum is called a spectrum.

The phase of a signal is the position of the waveform relative to a given time or relative to time zero. The waveform swings up and down in a repeating way. A phase is represented by degrees.

4.3, with analog signals it is very difficult to separate the noise form the original waveform, but it is very simple or easier to separate the noise in a digital signal. All systems use digital signal to transmit data, these advantages contribute to improved signal reliability ,flexibility ,and efficiency in various communication applications like phones and TVs , sending data and making networks.

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