AMERICAN INTERNATIONAL UNIVERSITY – BANGLADESH
Faculty of Engineering

Course/Lab Name:	Data Communication	
Semester: Spring 2023-24	**Term**: Mid	**Assignment-1**

Question Mapping with Course Outcomes:

Item	COs	POIs	K	P	A	Marks	Obtained Marks
All Problems	**CO3**	**P.c.3.C5**	**K5**	**.**	**.**	**30**	
					Total:	**30**	

Student Information:

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Section: H	**Department: CSE**

Instructions for submission:

1. Use this page as a cover page.
2. Take pictures of your written answer and paste under each problem given below.
3. Give the file name using the middle 5 digits of your student ID.

For instance: if your ID is 20-40708-3 your file name will be 40708.pdf

4. Upload the pdf file to MS Teams portal.
5. The submission will not be considered if the instructions are not followed.

Answer the following Questions:

Problem 01: Why baseline wandering, DC component and lack of synchronization is a problem in digital data to digital signal representation, explain with necessary figures.

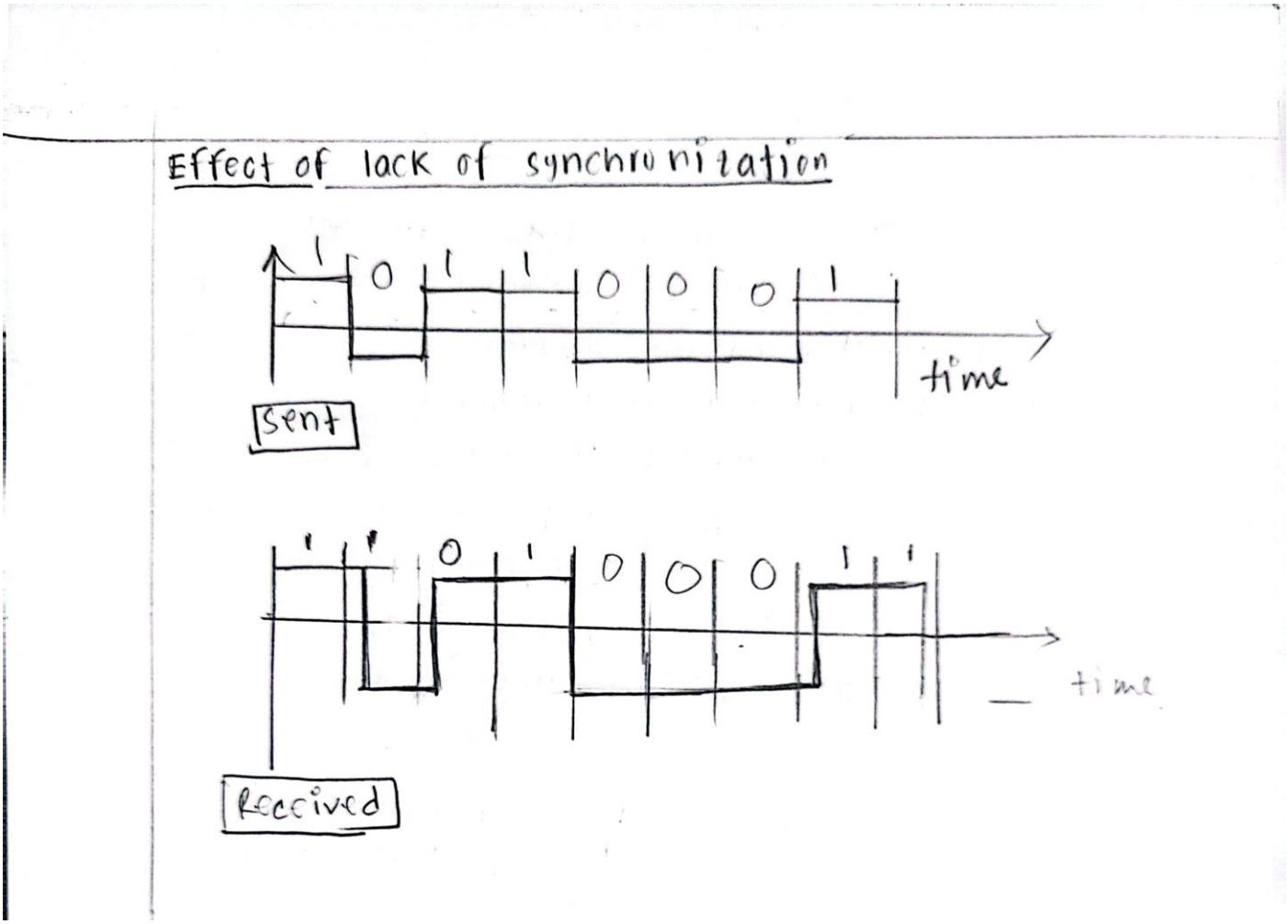
Answer:

ANSWER TO THE QUESTION NO - 1

Baseline Wandering : In decoding a digital signal, the reciever calculates a running average of the recieved signal power. This average is called the baseline. The incoming signal power is evaluted against this baseline. to calculate the value of the data element. A long string of 0 and 1 can cause drift in the baseline and make it difficult for the receiver to decode correctly. A good line code seehem is required to prevent baseline wandering.

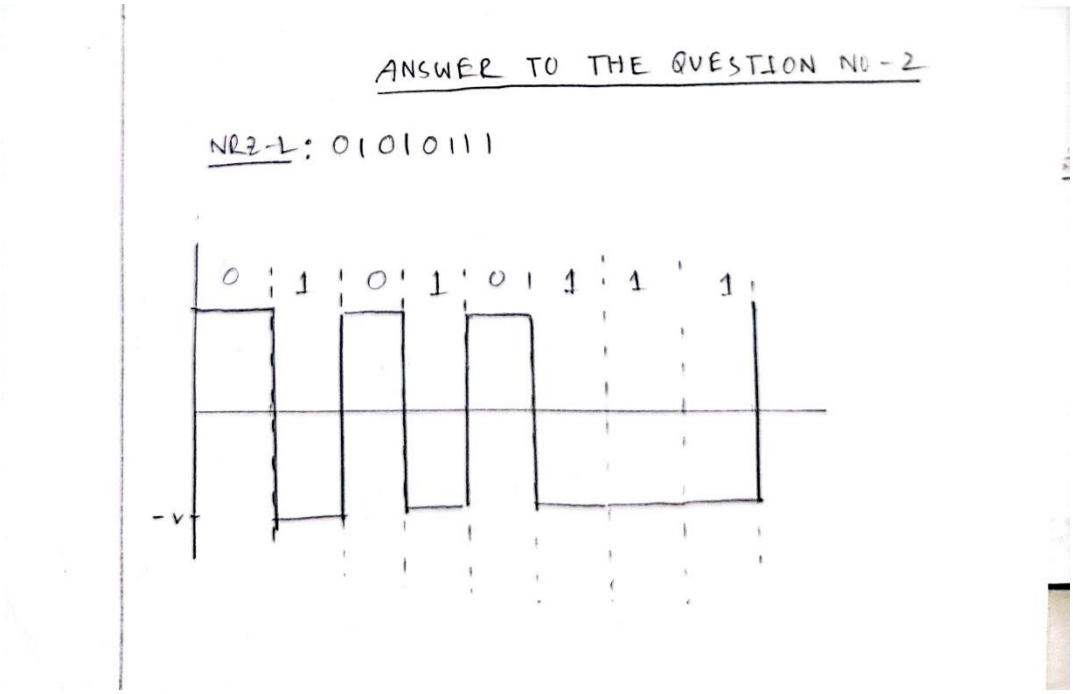
DC component: If the voltage of a digital signal is constant for a while, the specturm creates very low frequencies. This frequencies around zero are called DC component and make problem for a system that can not pass low frequencies or a system that uses electrical coupling. So, we need a scheme with no dc component.

lack of synchronization: To correctly interpret the signals received from the sender, the bit intervals of the reciever must correspond exactly with the sender's bit interval. If the receiver clock is faster or slower, the bit interval not matched. then the receiver might misterpret the signals

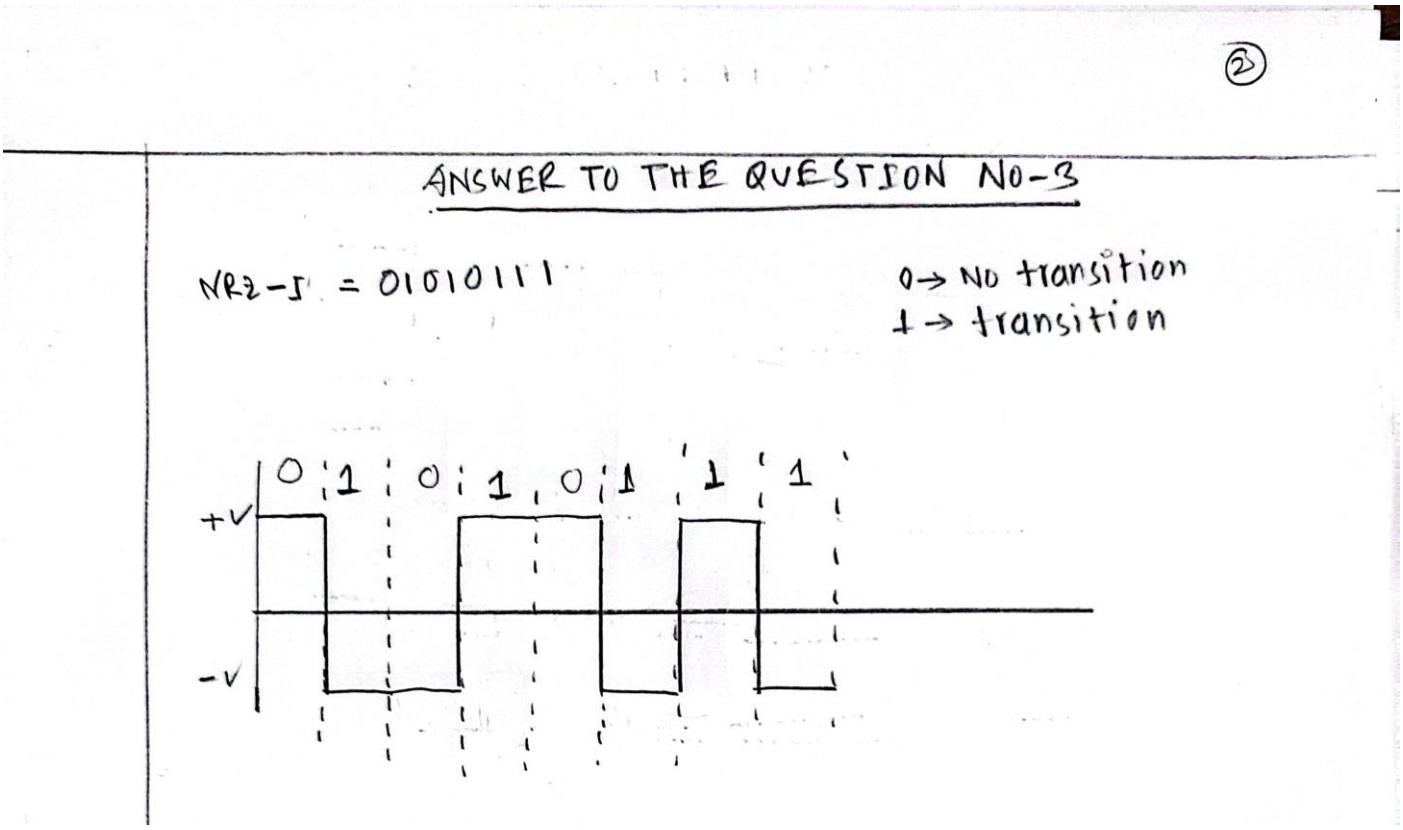


Problem 02: Draw the graph of the NRZ-L for the bit stream 01010111, assuming that the last signal level has been positive.

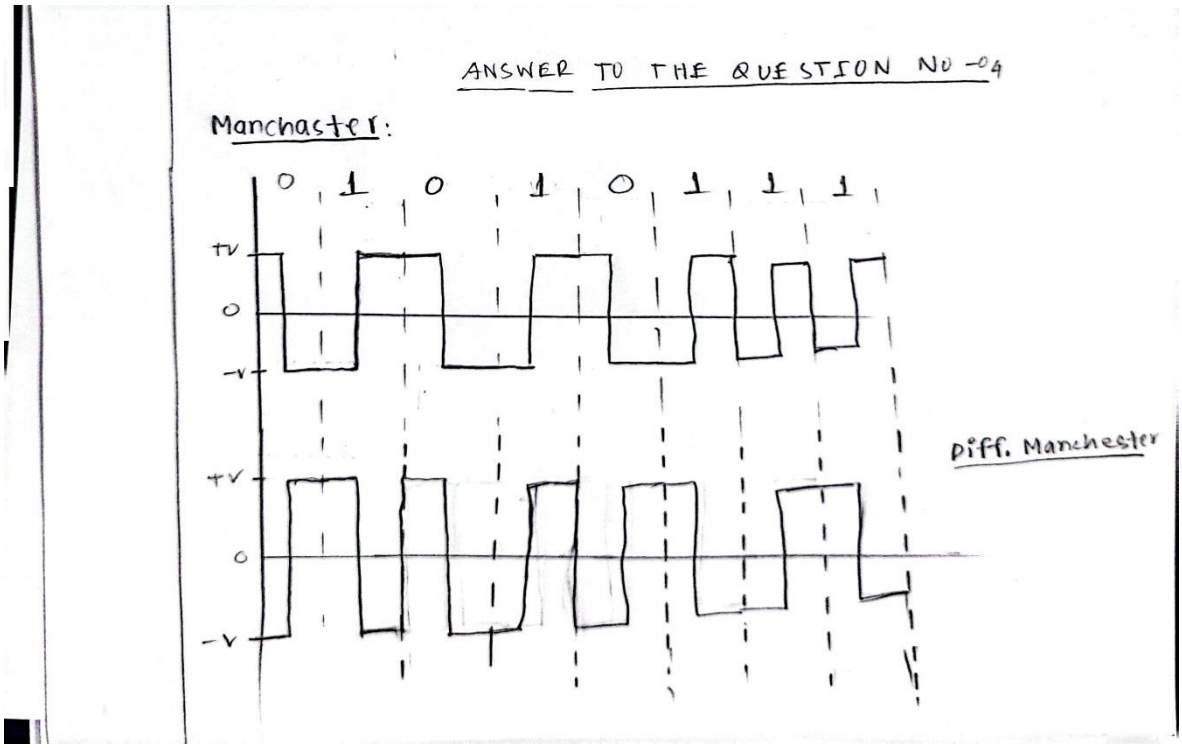
Answer:



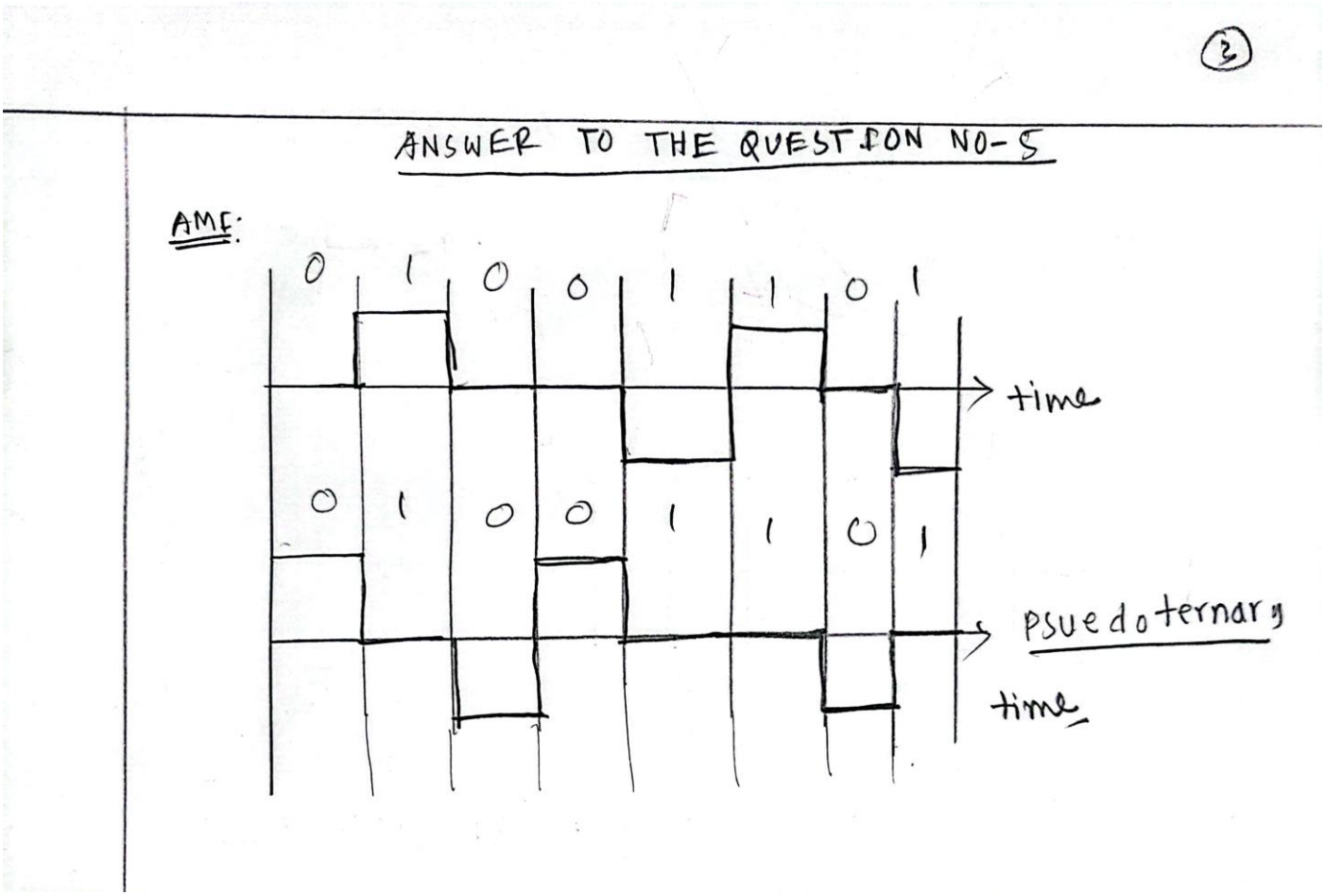
Problem 03: Repeat problem 02 for NRZ-I.
Answer:



Problem 04: Repeat problem 02 for Manchester and Differential Manchester.
Answer:



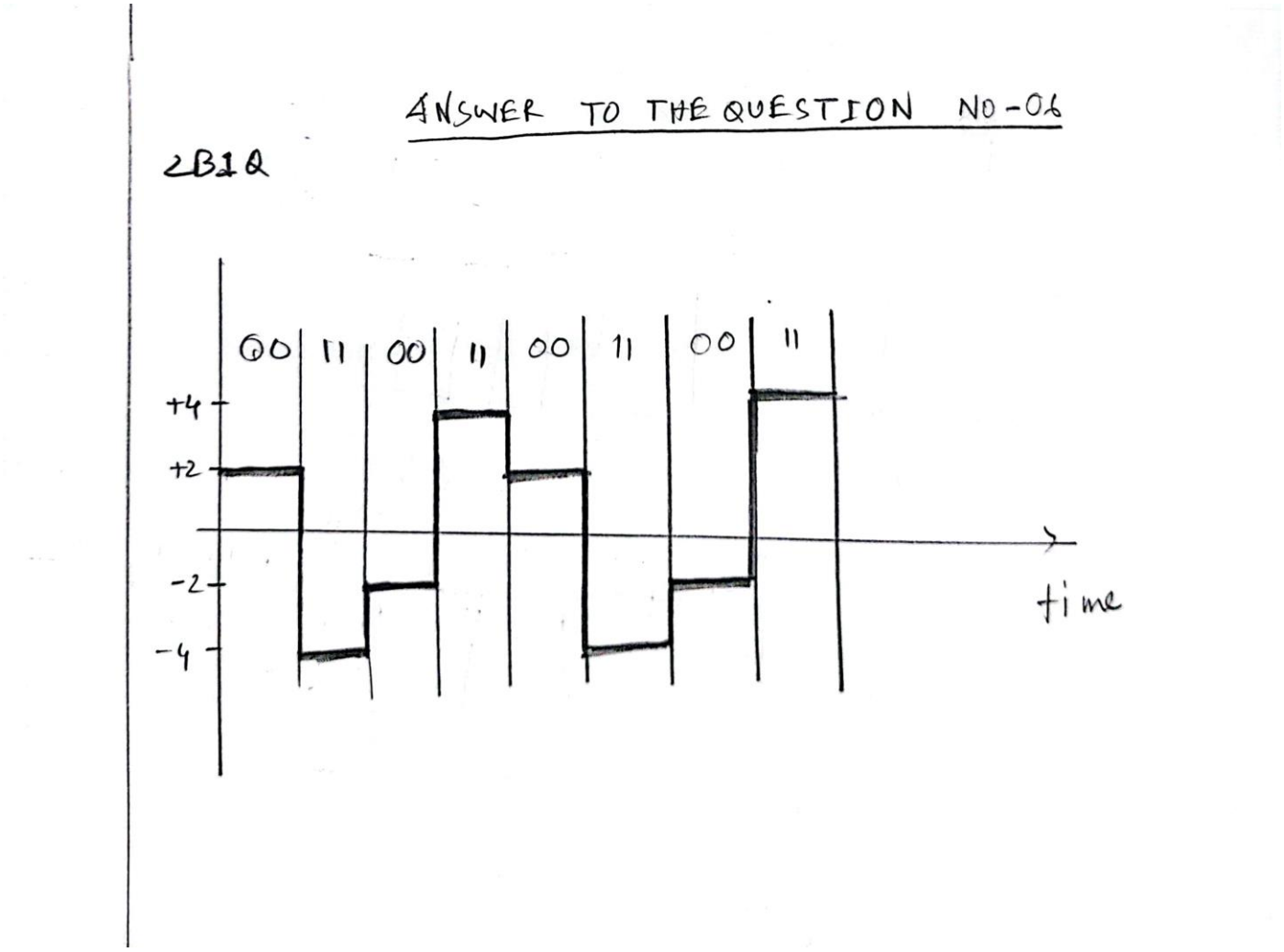
Problem 05: Encode digital bit stream 01001101 using AMI and Pseudoternary.
Answer:



Problem 06: Encode digital bit stream 0011001100110011 by using 2B1Q by assuming last signal level was positive and consider the voltage level for each bit stream pair according to following table:

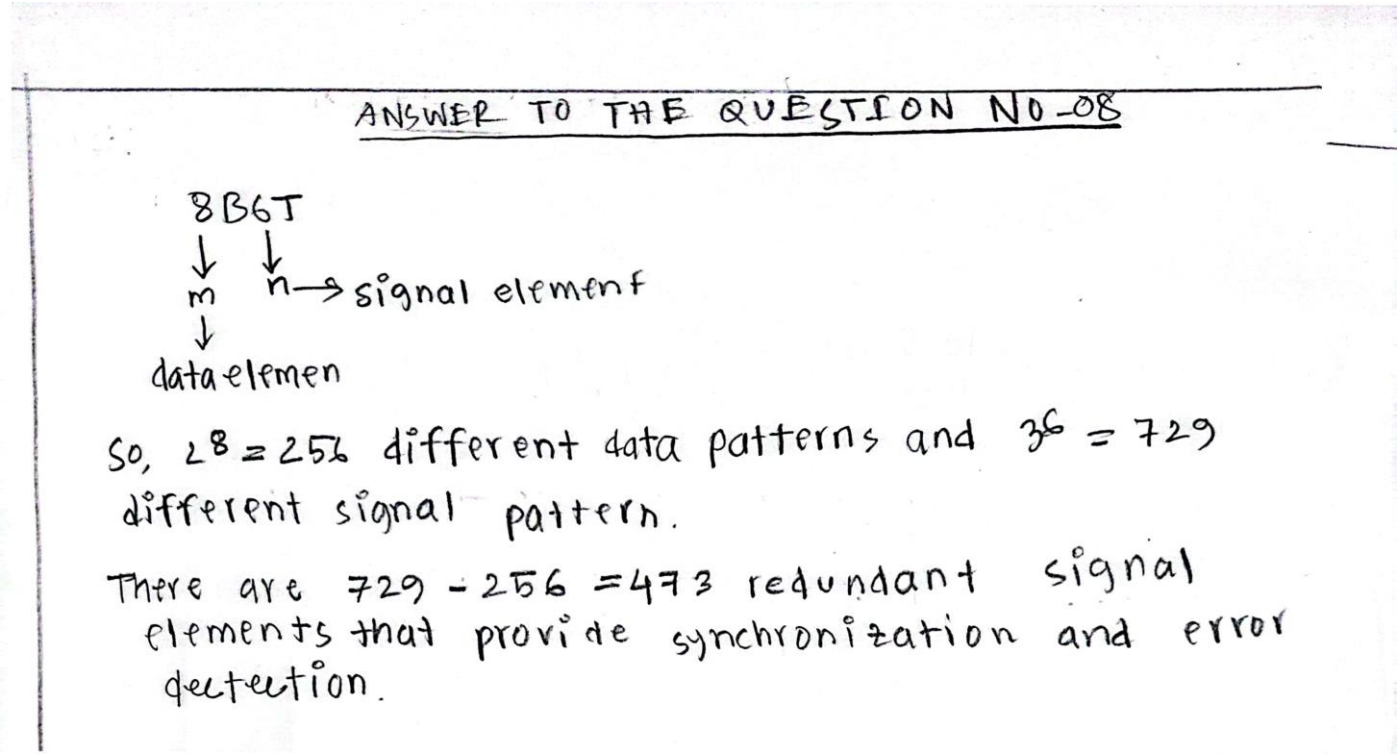
	Previous level positive	**Previous level negative**
Bit stream pair	**Next level**	**Next level**
00	+2	-2
01	+4	-4
10	-2	2
11	-4	4

Answer:



Problem 08: Determine the combination of data element and signal element in 8B6T line coding method. Write the possible use cases of remaining signal element in 8B6T.

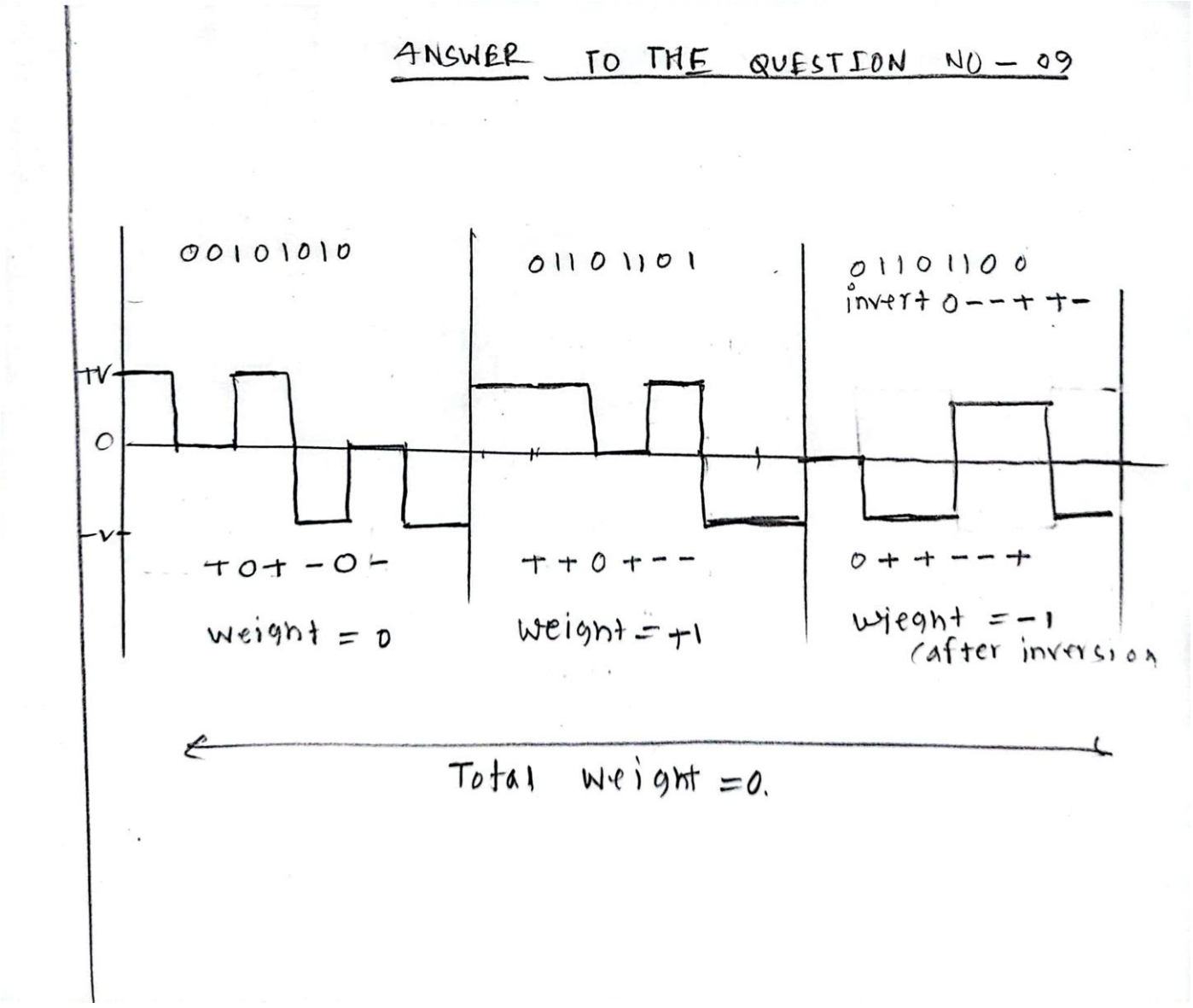
Answer:



Problem 09: Sketch the line coding sequence using 8B6T for following data and signal pattern:

Data pattern in Hexa Decimal/binary	Signal pattern
2A (00101010)	+ 0 + - 0 -
6D (01101101)	++0+--
6C (01101100)	0++--+

Answer:



Problem 10: Encode digital bit steam 01101011 by using MLT-3 (**Note:** Assume last level was at 0 voltage and last non-zero pulse was negative).

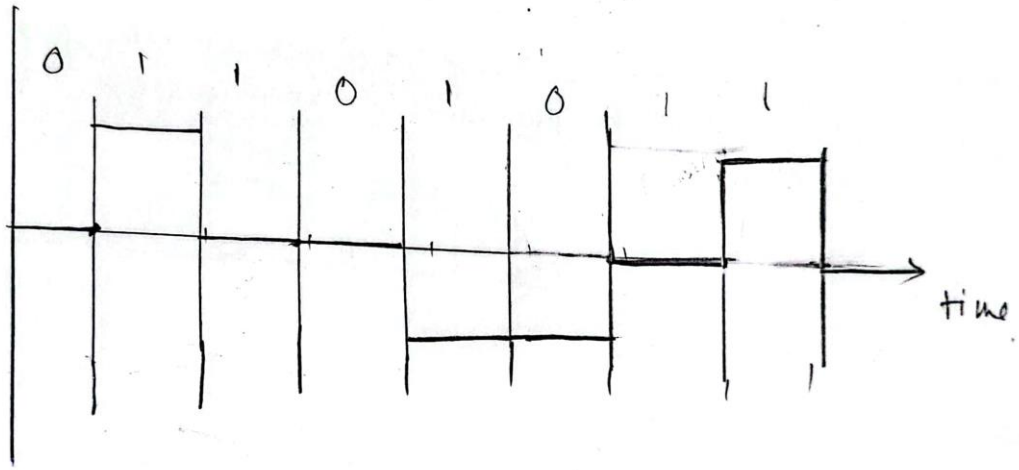
Answer:

ANSWER TO THE QUESTION NO - 10

MLT-3:

Assumption:

last level was at 0 voltage.
last non zero pulse was negative.



MLT-3

Next Bit	current level	Transition
0	-	No transition
1	Non-zero	0
1	0	opposite of last non zero level