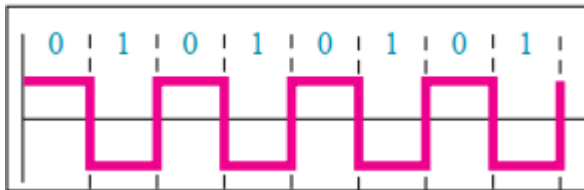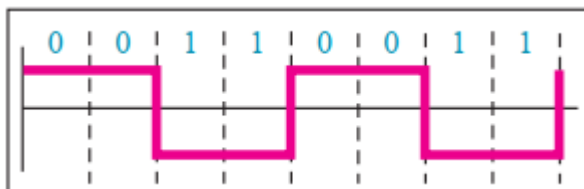Q 1. Draw the graph of the NRZ-L scheme for data stream 01010101, assuming that the last signal level has been positive.
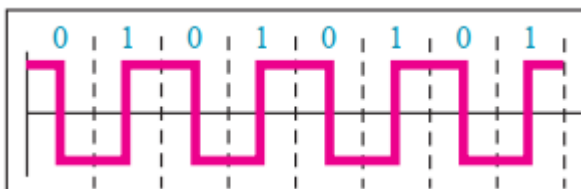
Solution:

Q 2. Draw the graph of the NRZ-L scheme for data stream 00110011, assuming that the last signal level has been positive.
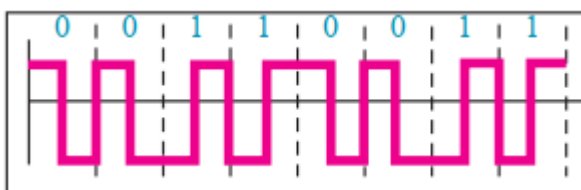
Solution:

Q 3. Draw the graph of the Manchester scheme scheme for data stream 01010101, assuming that the last signal level has been positive.
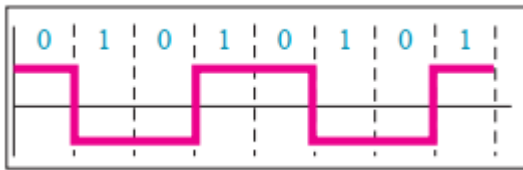
Solution:

Q 4. Draw the graph of the Manchester scheme for data stream 00110011, assuming that the last signal level has been positive.
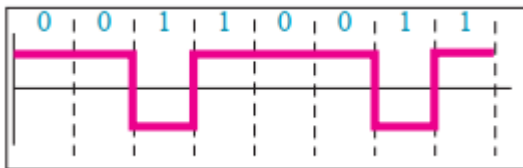
Solution:

Q 5. Draw the graph of the NRZ-I scheme scheme for data stream 01010101, assuming that the last signal level has been positive.
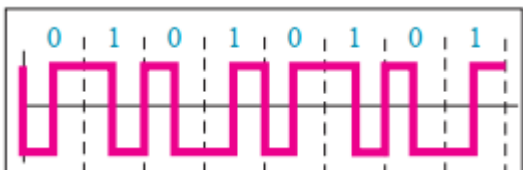
Solution:

Q 6. Draw the graph of the NRZ-I scheme for data stream 00110011, assuming that the last signal level has been positive.
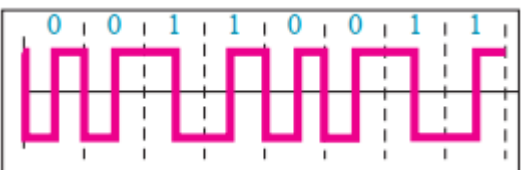
Solution:

Q 7. Draw the graph of the Differential Manchester scheme scheme for data stream 01010101, assuming that the last signal level has been positive.
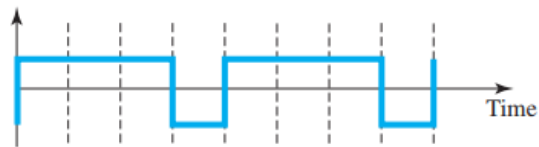
Solution:

Q 8. Draw the graph of the Differential Manchester scheme for data stream 00110011, assuming that the last signal level has been positive.
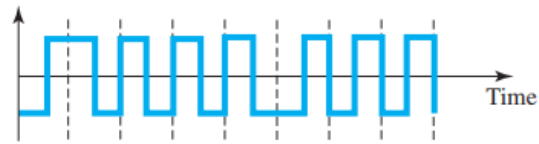
Solution:

Q 9. Find the 8-bit data stream for given figure.

Solution:

a. NRZ-I

b. differential Manchester

c. AMI

Solution:

        a. NRZ-I: 10011001.
        b. Differential Manchester: 11000100.
        c. AMI: 01110001.

Q 10. The input stream to a 4B/5B block encoder is **0100 0000 0000 0000 0000 0001**
Answer the following questions:
a. What is the output stream?
b. What is the length of the longest consecutive sequence of 0s in the input?
c. What is the length of the longest consecutive sequence of 0s in the output?

Solution:

    a. The output stream is 01010 11110 11110 11110 11110 01001
    b. The maximum length of consecutive 0s in the input stream is 21.
    c. The maximum length of consecutive 0s in the output stream is 2.

Q 11. We have a baseband channel with a 1-MHz bandwidth. What is the data rate for this channel if we use NRZ-L coding scheme.

Solution:

$N = 2 \times B = 2 \times 1 \text{ MHz} = 2 \text{ Mbps}$

Q 12. We have a baseband channel with a 8-KHz bandwidth. What is the data rate for this channel if we use NRZ-L coding scheme.

Solution:

$N = 2 \times B = 2 \times 8 \text{ KHz} = 16 \text{ Kbps}$

Q 13. We have a baseband channel with a 1-MHz bandwidth. What is the data rate for this channel if we use Manchester coding scheme.

Solution:

N = 1 × B = 1 × 1 MHz = 1 Mbps

Q 14. We have a baseband channel with a 3-MHz bandwidth. What is the data rate for this channel if we use Manchester coding scheme.

Solution:

N = 1 × B = 1 × 3 MHz = 3 Mbps

Q 15. We want to transmit 1000 characters with each character encoded as 8 bits.
**a.** Find the number of transmitted bits for synchronous transmission.
b. Find the number of transmitted bits for asynchronous transmission.
c. Find the redundancy percent in each case.

Solution:

a. For synchronous transmission, we have 1000 × 8 = 8000 bits.
b. For asynchronous transmission, we have 1000 × 10 = 10000 bits. Note that we assume only one stop bit and one start bit. Some systems send more start bits.
c. For case a, the redundancy is 0%. For case b, we send 2000 extra for 8000 required bits. The redundancy is 25%.
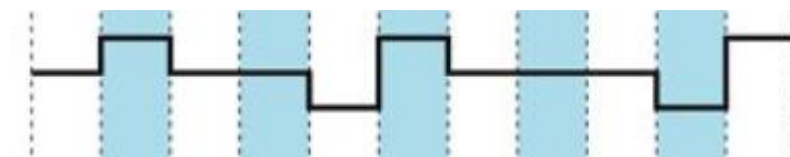

Q 16. Draw the graph of the Pseudoternary scheme for data stream 01001100011, assuming that the last signal level has been positive.
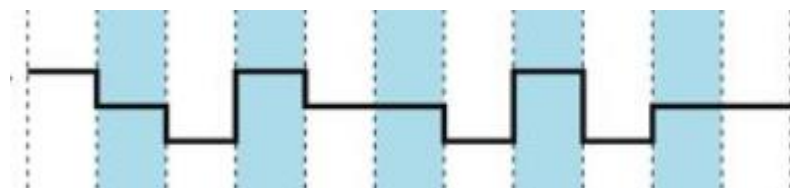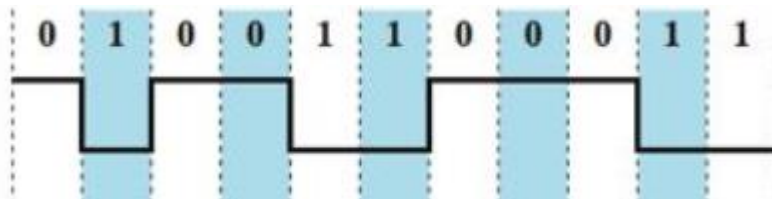
Solution:

Q 17. Draw the graph of the AMI scheme for data stream 01001100011, assuming that the last signal level has been positive.
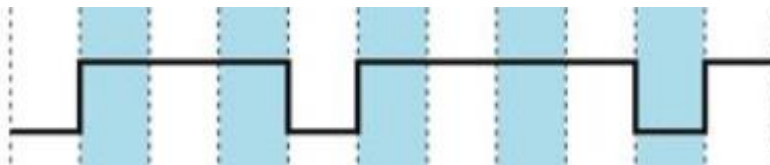
Solution:

Q 18. Draw the graph of the NRZ-L scheme for data stream 01001100011, assuming that the last signal level has been positive.
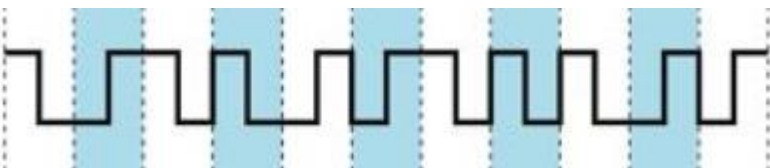
Solution:

Q 19. Draw the graph of the NRZ-I scheme for data stream 01001100011, assuming that the last signal level has been positive.

Solution:

Q 20. Draw the graph of the Manchester scheme for data stream 01001100011, assuming that the last signal level has been positive.

Solution:

Q 21. Draw the graph of the Differential Manchester scheme for data stream 01001100011, assuming that the last signal level has been positive.

Solution: