CSE320 – Home Assignment 1

BRAC UNIVERSITY | FALL 2023

Deadline: 02-Nov-2023 (Thursday) 11:59 PM | (*No Late Submission Accepted)*

Total Mark: 15 (10 questions* 1.5 marks each)

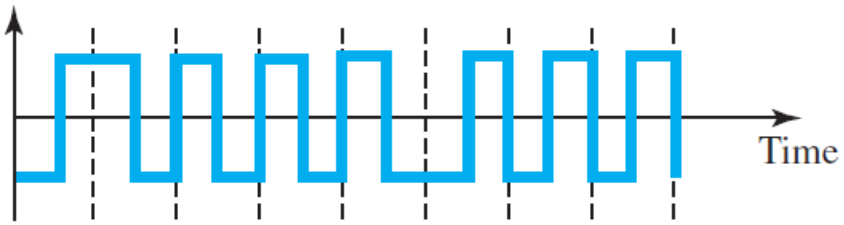
1. Write the functionalities of the upper 4 layers in the TCP/IP model. Include their protocols, PDUs, special tasks, etc.

2. Suppose a computer sends a frame to another computer on a bus topology LAN. The physical destination address of the frame is corrupted during the transmission. What happens to the frame? How can the sender be informed about the situation?

3. Imagine the following scenario:
   You are playing a video game with a friend, and you both have reached a crucial level where you need to work together to defeat a powerful boss. You decide to save the game at regular intervals to ensure that neither of you loses progress. If one of you loses, you can quickly return to the last saved point and continue playing from there.
   Can you identify which layer of the OSI Model resembles such a procedure? What is the purpose of this mechanism? Briefly explain with any relevant example

4. Match the following to one or more layers of the **OSI Model**:
   a. Communicates directly with the user's application program
   b. Error correction and retransmission
   c. Mechanical, electrical, and functional interface

5. Find the 8-bit data stream



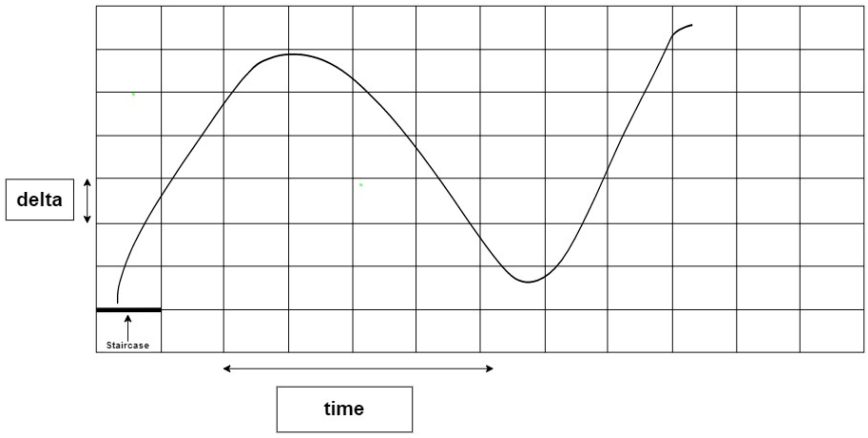
b. differential Manchester

6. How does B8ZS differ from HDB3? Give two comparisons only.

7. The following table depicts a sampled analog signal for digital signal representation. By applying the concept of Pulse Code Modulation, assume there will be 3-bit code words for each sampled amplitude. **Show** the **normalized PAM value** and **quantization code** only for the given analog signal value at different time stamps. Assume that the sampling amplitudes are between -32V to +32V.

Time	Analog Signal Value (V)
0	4.7
1	12.3
2	-6.8
3	-28.3
4	20.3

8. Show the staircase in the following graph and generate the digital data from the given analog signal using the Delta Modulation (DM) technique.



9. A non-periodic composite signal contains frequencies from 25 to 60 KHz. The peak amplitude is 30 V for the lowest and the highest signals and 10 V for the 45-KHz signal.
    a. What is the bandwidth of this signal?
    b. Assuming that the amplitudes change gradually from the maximum to the minimum and then minimum to the maximum, **draw** the frequency spectrum.

10. Illustrate diagrammatically a hybrid topology with a bus backbone and three-star networks consisting of 4 nodes at each hub. In the topology drawn, identify at least one possible problem or failure that could bring the whole network down and justify your answer.