American International University-Bangladesh (AIUB)
Faculty of Engineering

COE 3101: Data Communication
Mid Term Theory Assignment Question Paper

Instructions:

- This assignment must be submitted online as a **PDF** file on **VUES** under the component named '**MT Theory ASSIGNMENT**'.
- The file name must be '**MT Theory ASSIGNMENT ID.pdf**', where **ID** is your ID. For example, the file name can be **MT Theory ASSIGNMENT 19-34567-2.pdf**.
- On cover page of this assignment, **NAME**, **ID**, and **SECTION** must be mentioned clearly.
- **ID** related calculations must be presented clearly.
- You can prepare the assignment by hand or on computer.
- Total grade is **10**.
- **Plagiarism will be penalized.**
- **Deadline: 21/10/2021 (Thursday) 10:00 PM.**

Question:

Assume your **ID** is **AB-CDEFG-H**. Convert each digit of **G**, **B**, **D**, **F**, **C**, and **E** into **4-bit binary** data units in that order. Convert this **24-bit** binary bit stream into digital signal using the following line coding methods. **Show your signals very clearly**. Also find out **required average bandwidth** (**BW**) for each of these methods given the data rate (**N**) is **(E + F + G + H)*100** bps. Also comment on how much these methods experience **Baseline Wandering** and **DC Component** problem, and if they provide **Auto Synchronization**.
a) Bipolar AMI
b) Polar NRZ-L
c) Polar differential Manchester
d) 2B1Q
e) MLT-3

Example bit stream and data rate:

Bit Stream: If your ID is **19-34587-2** then **G = 7 = (0 1 1 1)$_B$**, **B = 9 = (1 0 0 1)$_B$**, **D = 4 = (0 1 0 0)$_B$**, **F = 8 = (1 0 0 0)$_B$**, **C = 3 = (0 0 1 1)$_B$**, and **E = 5 = (0 1 0 1)$_B$**. So, your **24-bit** binary bit stream is: **0 1 1 1 1 0 0 1 0 1 0 0 1 0 0 0 0 0 1 1 0 1 0 1**.

Data Rate: N = (E + F + G + H)*100 bps **= (5 + 6 + 7 + 2)*100** bps = **(20)*100** bps = **2000** bps