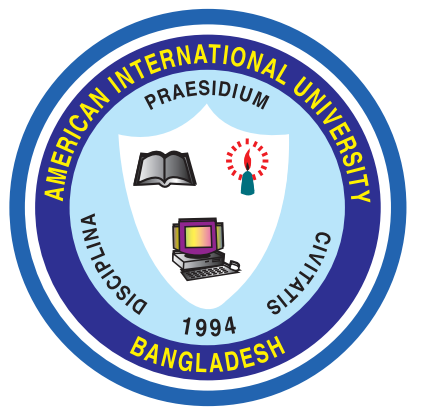
***American International University - Bangladesh  
Faculty of Engineering  
COE 3201: Data Communication  
Assignment #1  
Spring 2023-24  
Instructor: Nowshin Alam***

**Due Date: March 08, 2024.**

***INSTRUCTIONS:***

**Consider, your ID = AB-CDEFG-H.**

***Note: Copied/identical submissions will be graded as 0 for all parties concerned.***

1. A signal is carrying data in which 16 data elements are encoded as **(A+E)** signal elements. What is the value of r? If the bit rate is **(C+H)** kbps, what is the average value of the baud rate if c is assumed to vary between 0 and 1? [5]

2. A communication channel has a signal power S = **(A+D)** x 5 milliwatts with an average noise power, N = **H** milliwatts. The channel capacity is **(50+B)** Mbps. Calculate the bandwidth of channel’s transmission medium, and then find the signal levels needed to achieve a Nyquist data rate equal to 70% of the channel capacity. [5]

3. For the following line coding schemes, draw the signal for **ABGH** where each digit is expressed with a bit pattern of 4 bits. For example, 1234 would be a stream of 0001 0010 00110100. [10]

i) NRZ-I

ii) Manchester

iii) Differential Manchester

iv) 8B6T

v) Pseudoternary

4. An ethernet cable performs properly above an SNRdB above 27. What is the minimum number of bits per sample? What is the data rate through the cable if digital signal to be sent has been sampled at that number of bits per sample and the sampling frequency is **(B+G)** kHz? [5]

5. A signal has passed through three cascaded amplifiers, first one with a **(4+B)** dB gain, second one with a **(5+H)** dB gain and the third one with a **(2+D)** dB gain. What is the total gain in decibels and absolute number? If the output power is 20 mW, how much was the original input power? How much would the output power be if the input power is changed to 55mW? [5]