DA-IICT, CT 303, Autumn 2024-2025
Lab Exercise 4
Date: 03/09/2024, Expected by: 13/09/2024
Prepared by: Dr. Abhishek Jindal & Dr. Manish Kumar

References for perusal:

[1] *Contemporary Communication Systems Using MATLAB*, John G. Proakis, and Masoud Salehi, 2013, Cengage learning.

[2] *Communication Systems*, Simon Haykin, 4th edition, Wiley Student Edition.

- In the exercise sheet, there are 2 lab problems.
- Both the lab problems are to be done in MATLAB.
- The coding in MATLAB should be done in groups of 2.
- All the required soft copies of the texts referred to in the exercises are available in the lecture folder of the instructor for section A.

---

1. Study sections 4.3.3 and 4.3.4 from [1]. In these sections, you must go through all the theory, examples, and the associated M-files. Particularly, first reproduce "illustrative problem 4.17". Based on the knowledge gained, make your own code for the following problems.
   (a) Problem 4.17 and 4.24.
   (b) Problem 4.18 and 4.21.
2. Using "handel.mat", create a ".wav" file in MATLAB (or you may read any other ".wav" file) and quantize the sequence using DPCM, where the scheme employs 8 bits/sample. Plot the quantization error and determine the corresponding SQNR. For the predictor, you can use the normalized LMS algorithm defined by the three consecutive equations in problem 3.40 in [2], with the initial conditions given therein, or you may use any linear/nonlinear predictor of your choice.

Instructions for Preparing Lab Report:

- For MATLAB based experiments, your lab report must contain the code and all the figures. Further, you need to explain the results in the graphs.

General Instructions:

- The lab is intentionally made from the references given above so that you have ample resources to refer to and learn.
- For the final evaluation, we may have a quiz/lab test which will test if you have gone through the codes and tweaked them in Matlab.
- For learning Matlab functions used in the codes, refer to the help section which pops up as you press F1 in Matlab.