**DA-IICT, CT 303, Autumn 2024-2025**
**Lab Exercise 1**
**Date: 29/07/2024, Expected by: 05/08/2024**
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**References for perusal:**

[1] *Manual, DCL-01 Kit : Analog Signal Sampling and Reconstruction Kit*, Akademika.

[2] *Introduction to Communication Systems*, Upamanyu Madhow, Cambridge University press.

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- The lab exercise comprises of 4 problems. First three are hardware-based experiments, and the last one is to be done using MATLAB.
- For the hardware, ready-made kits will be provided, while for developing the code, PCs on the desks are pre-installed with MATLAB.
- The hardware experiment is to be done in groups of 4, while the coding in MATLAB should be done in groups of 2.
- **It is required for a group of 4 to occupy two consecutive desks and share the kit among themselves. Once the hardware-based experiments are done, they should split in groups of 2 and occupy the adjacent PCs on the desks.**
- 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.

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1. From [1], perform experiment 1 to study the three methods of sampling: Natural, Sample and hold, and Flat top. You need to follow the procedures given in the manual and observe the output as suggested in the observations. You are then required to study the output with the switch faults. See the instructions below for preparing the report.
2. From [1], perform experiment 2 to study effect of different sampling frequencies on a signal. You need to follow the procedures given in the manual and observe the output as suggested in the observations. You are then required to study the output with the switch faults. See the instructions below for preparing the report.
3. From [1], perform experiment 4 to study the effect of the order of the filter on the reconstructed signal. You need to follow the procedures given in the manual and observe the output as suggested in the observations. You are then required to study the output with the switch faults. See the instructions below for preparing the report.
4. Study section 2.5.2 from [2]. Subsequently, study example 2.5.7. Then analyze code fragment 2.5.1 and implement it in MATLAB. Once done, solve problem 4 (all parts) in the laboratory assignment under section software Lab 2.0 on page number 86 of the text book.

**Instructions for Preparing Lab Report:**

- For experiments done on kit, you need to take a snap shot of each output on the oscilloscope. This can be done either by connecting a USB stick to the oscilloscope, or connecting the oscilloscope to the PC. Your lab report must contain these snapshots.
- You need to verify and subsequently mention in the report that the outputs given in the manual corresponding to the experiments are indeed correct.
- 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.