Principles of Communication Systems Lab (303 P)

Lab-8 (Analog to Digital Conversion)

(Due Date: 26-10-2021, Time: 1 pm)

Instructions:

1. NO PLAGIARISM. Your solution must be written in your words.
2. Please strictly follow the LaTex template for making lab reports. The template has been uploaded on LMS.
3. Please mention legends, axis labels, titles etc in your plot/subplot for better understanding and clarity.
4. For best quality, please add .eps format of simulation plot in the report. You can directly export .eps plot from MATLAB.
5. The report to be submitted must include MATLAB code and all observations pertaining to each plot below the same.
6. Kindly number your answers correctly.
7. Please feel free to ask any questions in class or via LMS..

Questions:

1. Consider an information signal $m(t) = A_m \sin(2\pi f_m t)$ over two complete cycles with $A_m = 1$ V and $f_m = 10$ Hz.

   (a) Sample this signal at rate $f_s = 10 f_m$. Plot the continuous time and sampled signals.

   (b) Reconstruct the signal from its samples. Plot the reconstructed signal.

   (c) Sample the signal $m(t)$ at the rate $f_s = 2f_m$ and $f_s = f_m$, and plot the reconstructed signal in each case.

   (d) Write your observations.

   Note: Plot all the sub-parts in the same plot using subplot.

2. Consider an information signal $m(t) = A_m \sin(2\pi f_m t)$ over one complete cycles with $A_m = 2$ V and $f_m = 10$ Hz.

   (a) Sample this signal at rate $f_s = 50 f_m$. Plot the continuous time and sampled signals.

(b) Quantize the sampled signal by dividing its range in $L = 16$, $L = 64$ and $L = 256$ uniforms steps. Assume mid point of a step as quantization level. Plot the quantize signal.

(c) Generate bit sequence by encoding the quantize samples in each case.

(d) Recover the signal from the bit sequence in each case, and write your observations.

Note: Plot all the sub-parts in the same plot using subplot.