

Department of Electrical Engineering

Assignment

Date: 16/06/2020

Course Details

Course Title: _____ Digital Signal Processing _____

Module: _____ 6th _____

Instructor: _____

Total Marks: _____ 30 _____

Student Details

Name: _____

Student ID: _____

Q1.	(a)	<p>Consider the following analog signal</p> $x_a(t) = 3\cos 100\pi t + 4\sin 200\pi t$ <p>i. Determine the minimum sampling rate required to avoid aliasing.</p> <p>ii. Suppose that the signal is sampled at the rate $F_s = 100\text{Hz}$. What is the discrete-time signal obtained after sampling? Also explain the effect of this sampling rate on the newly generated discrete time signal.</p> <p>iii. What is the analog signal $y_a(t)$ we can reconstruct from the samples if we use ideal interpolation?</p>	Marks 5 CLO 1
	(b)	<p>Consider a discrete time signal which is given by</p> $x(n) = \begin{cases} 0.5^n, & n \geq 0 \\ 0, & n < 0 \end{cases}$ <p>This signal is sampled at the rate $F_s = 2\text{Hz}$.</p> <p>i. Draw the sampled signal.</p> <p>ii. The samples of the signals are intended to carry 3 bits per sample. Determine the quantization level and quantization resolution to quantized the sampled signal achieved in part i.</p> <p>iii. Perform the process of truncation and rounding off on all the values of the sampled signal and find the quantization error for each of the sampled data. Express your answer in tabular form.</p>	Marks 5 CLO 1
Q2.	(a)	<p>Determine the response of the system to the following input signal with given impulse response</p> $x[n] = \left\{ \underset{\uparrow}{1}, 1, 1, 1 \right\}, \quad h[n] = \left\{ 6, 5, 4, \underset{\uparrow}{3}, 2, 1, 0 \right\}$	Marks 5 CLO 2

	<p>(b) Compute the convolution $y(n)$ of the following signal</p> $x(n) = \begin{cases} \alpha^n, & -3 \leq n \leq 5 \\ 0, & \text{elsewhere} \end{cases}$ $h(n) = \begin{cases} 1, & 0 \leq n \leq 4 \\ 0, & \text{elsewhere} \end{cases}$	<p>Marks 5</p> <p>CLO 2</p>
Q3.	<p>Determine the z- transform of the following signals and also sketch its Region of Convergence (ROC).</p> <p>i. $x(n) = -na^n u(-n - 1)$</p> <p>ii. $x(n) = n(-1)^2 u(n)$</p>	<p>Marks 10</p> <p>CLO 2</p>