Vellore Institute of Technology

School of Electronics Engineering
Fall Sem 2024-25
Continuous Assessment Test - I
BECE306L – Digital Communication Systems

B.Tech (ECE) **SLOT: C1** **Marks: 50**

Q. No	Answer All Questions	Marks
1.	a) Assume an analog signal x(t), sampled by a train of impulses at a sampling rate of $f_s = 2f_m$, where f_m is the maximum frequency of x(t). Draw the spectrum of the sampled signal with $f_s = 2f_m$, $f_s > 2f_m$ and $f_s < 2f_m$.	4
	b) The continuous time signal $s(t) = \cos(320\pi t) + \cos(220\pi t)$ sampled at 300 Hz. To reconstruct the original signal, the sampled signals are passed through an ideal low pass filter (LPF). The cut off frequency of LPF is 250 Hz. Find the frequency/frequencies component present at the output of the LPF.	6
2.	A message signal is $m(t) = 4\cos(8\pi \times 10^3 t)$ transmitted through a channel using 3-bit PCM. The sampling rate is twice the Nyquist Rate. a) Calculate bit rate and bandwidth of PCM system. b) If the sampled values are {3.9, 2.5, 0.2, -1.2, -3.8, -3.3}, determine the mid-rise quantizer output, encoder output and quantization error per each sample.	10
3.	The signal $x(t) = 4\sin(2\pi \times 2 \times 10^3 t)$ is sampled at four times the Nyquist rate. Assume the quantization levels are 16. Encode the signal $x(t)$ using pulse code modulation (PCM). a) Draw the sampled signal diagram with proper specification/scaling. b) Plot encoded output using Unipolar RZ Format.	8+2
4	a) Discuss about the quantization noise introduced by delta modulation scheme. Suggest a scheme to overcome the effects of quantization noise with block diagram.	5
	b) Using Delta Modulation (DM) encode the following sampled signal $x(nT_s) = \{1.4, 1.6, 1.8, 1.4, 1.2, 1.6, 1.8\}$	5
5	Consider a binary bit stream '1 0 0 1 0 1 1 1 0 0', where 'a' is the peak amplitude, and 'T' is duration of one bit. Sketch the waveform for each of these signalling using the following line coding schemes: a) NRZ pseudo-ternary signalling, b) Biphase baseband signalling, c) AMI RZ format. d) Polar RZ format	10