VIT
Vellore Institute of Technology

School of Electronics Engineering
Winter Sem 2023-2024
Continuous assessment test - I
BECE306L – Digital Communication Systems

B.Tech (ECE) SLOT: A2 Marks: 50

Q. No	Answer All Questions	Marks
1.	a) State sampling theorem and explain the concept of occurrence of aliasing in signal spectrum.	04
	b) Determine the Nyquist sampling rate and the Nyquist sampling interval for the following signals: i. $x(t) = \frac{1}{2\pi}[\cos(4000\pi t)\cos(1000\pi t)]$ ii. $x(t) = \text{sinc}(100\pi t) + 3\text{sinc}^2(60\pi t)$	06
2.	a) Find the DPCM transmitter output of the following signal $x(k) = \{0.3, 1.5, 0.7, 1, 2.3, 3.7, 2.8, 3.4, 2.8, 0\}$ by considering midtread type quantizer with step size of 1V.	04
	b) Derive the signal-to-quantization noise ratio for Delta Modulation system. Assuming under the condition of no slope overload distortion	06
3.	a) If a voice frequency signal is sampled at the rate of 32,000 samples/sec and characterized by peak value of 2 Volts, determine the value of step size to avoid slope overload distortion. What is quantization noise power and corresponding SNR? Assume bandwidth of signal as 4 kHz.	05
	b) Explain Adaptive Delta Modulation transmitter with suitable block diagram. Also, compare its performance with DM.	05
4.	a) A sinusoidal voice signal $x(t) = \cos(6000\ \pi t)$ is to be transmitted using either PCM or DM. The sampling rate for PCM system is 8 kHz and for the transmission with DM step size Δ is decided to be of 31.25 mV. The slope overload distortion is to be avoided. Assume that the number of quantization levels for a PCM system is 64. Determine the signalling rates of both these systems and also comment on the result.	06

5.	Consider a binary bit stream '11011000', 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: (i) AMI RZ format. (ii) Polar RZ format (iii) Biphase baseband signalling, (iv) NRZ pseudo-ternary signalling (v) Natural Code format	10