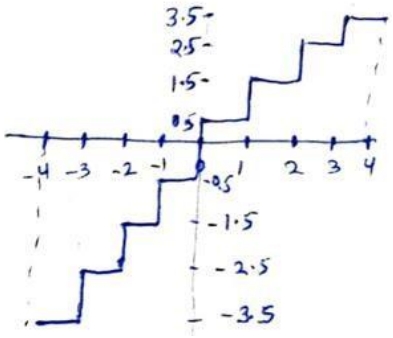
Thapar Institute of Engineering & Technology, Patiala

Department of Electronics and Communication Engineering

UEC639 – Digital Communication

B. E. (Third Year): Semester- V (ENC)

Tutorial-4

Q1	Given an audio waveform $$f(t) = 3\,sin(500t) + 4\,sin(1000t) + 4\,sin(1500t)$$ find the signal to quantization noise ratio if this is coded using delta modulation for sampling at a) Nyquist rate b) 32 times of Nyquist rate c) Comment which one among 'a' and 'b' is practically suitable
Q2	Determine the output SNR of a DM system if input signal is given as $(t) = Cos(2000\,\pi\,t)$. Assume sampling frequency 16 kHz, no slope overload condition. Also determine the output if it is followed by a 4 kHz post reconstruction filter .
Q3	What is the data rate of DM system given in above question (Q2)? What configuration is required for a PCM system to obtain same data rate? Determine the SNR of this PCM system
Q4	Draw the block diagram of adaptive delta modulation system and explain the algorithm of step generation. Consider a suitable example with different sample values.
Q5	Consider a mid-rise uniform quantizer (quantization level = 8, step size $\Delta = 1\,V$). Find DPCM output to be coded for sampled sequence $\{0,\ 0.5,\ 1.5,\ 0.7,\ 1,\ 2.3, 3.5, 2.8\}$ using first order prediction filter $\hat{m}[n] = m_q[n-1]$ 
Q6	For a binary sequence 1101100101, draw the line coded waveform for the following signalling scheme a) NRZ unipolar b) NRZ bipolar c) NRZ polar d) Manchester coding
Q7	Derive the expression of power spectral density of NRZ-polar coded waveform