National Institute of Technology, Delhi

Name of the Examination: B.Tech
Mid Semester Examination (Autumn 2022)

Branch	**: ECE**	**Semester**	**: 5th**
Title of the Course	**: Digital Communication**	**Course Code**	**: ECB-303**

Time: 1.5Hours **Maximum Marks: 25**

Note: All Questions are Compulsory.

Q. 1:

(a) Obtain the Fourier transform of a Unit Step Function.

(b) An analog signal is represented by the equation $x(t) = 3 \cos(50 \pi t) + 10 \sin(300 \pi t) - \cos(100 \pi t)$. Calculate the Nyquist rate for the signal.

(c) Encode the given data 11000010 using following digital formats:
   (i) Unipolar, Polar & Bipolar NRZ
   (ii) M-ary Coding
   (iii) Split Phase Manchester

(d) A TV signal with a bandwidth of 4.2 MHz is transmitted using binary PCM. The number of quantization levels is 512. Determine:
   (i) Code word length
   (ii) Transmission bandwidth
   (iii) Final Bit Rate
   (iv) Output Signal to Quantization Noise

(e) Explain with the help of diagram working of Regenerative Repeater. (5*3=15)

Q.2: Derive the expression for Signal to Quantization Noise ratio for PCM system. Assume the input signal is sinusoidal. (5)

Q.3: Define Intersymbol Interference. Write the main causes and remedies for the removal of ISI in the system with the help of necessary diagrams and waveforms. (5)

*****BEST WISHES*****