1. Identify the modulation method that converts analog signal to digital signal. Explain the same with a neat block diagram.

2. Explain a suitable digital modulation technique that adjusts its quantization step in response to changes in signal characteristics effectively encode and tansmit information in dynamic signal environments.

3. List and explain the two types of quantization noise. Identify the suitable modulation technique to overcome these noise and explain it with appropriate block diagrams.

4. In a communication system designed for efficient audio signal transmission and reception, there exists a system whose input signal undergoes a predictive encoding process. Identify the system and describe the various components within this system with their interconnections.

5. Derive the expressions for output signal to quantization noise ratio of a uniform quantizer.

6. Describe channel noise and error probability analysis

7. Consider a PCM system with a signal bandwidth of 4 kHz. The sampling rate is 10 kHz, and each sample is represented using 16 bits. Calculate the following: - Bit rate - Nyquist frequency - Signal-to-quantization noise ratio

8. In a PCM system, the input signal ranges from -5 V to +5 V. The quantization is performed using a 10-bit ADC. Determine the following: -

-Number of quantization levels

- Quantization step size

- Maximum quantization error

9. A PCM system is used to encode an analog signal with a frequency range of 0 to 4 kHz. If the quantization error should be less than 1% of the maximum input signal amplitude, calculate the minimum number of bits required for quantization. Additionally, determine the bit rate if the sampling rate is 16 kHz.

10. A speech signal has a total duration of 10 s. It is sampled at the rate of 8 kHz and then encoded. The signal-to-(quantization) noise ratio is required to be 40 dB. Calculate the minimum storage capacity needed to accommodate this digitized speech signal.

11. Consider a digital communication system that needs to transmit a binary data sequence 101001100110. For all line coding techniques, draw the waveform representation of the transmitted signal, including transitions, voltage levels, and time units.

12. Explain the concept of Discrete PAM (Pulse Amplitude Modulation) signals, highlighting its significance in digital communication. Discuss the factors affecting the choice of pulse shapes in Discrete PAM and elaborate on how these pulse shapes influence the overall power spectra of the modulated signals.

13. A Delta modulation system Input applied 10 kHz, 1Vp-p. The signal is sampled ten times more than Nyquist rate. What is the minimum step size required to prevent slope overload?

14. A 4 kHz sinusoidal message signal having amplitude 4 V is fed to a delta modulator (DM) operating at a sampling rate of 32 kHz. The minimum step size required to avoid slope overload noise in the DM (rounded off to two decimal places) is \_\_\_\_\_\_\_ V.

15. A sinusoidal signal of 2 kHz frequency is applied to a delta modulator. The sampling rate and step-size Δ of the delta modulator are 20,000 samples per second and 0.1V respectively. To prevent slope overload, the maximum amplitude of the sinusoidal signal (in Volts) is \_\_\_\_\_\_\_.

16. Explain the concept of Intersymbol Interference (ISI) in digital communication. Discuss the factors that contribute to ISI and how it can impact the performance of a communication system. Provide examples to illustrate the occurrence of ISI and methods to mitigate its effects.

17. State and explain the Nyquist Criteria for zero Intersymbol Interference (ISI) in digital communication. Discuss the relationship between bandwidth, symbol rate, and the Nyquist criteria. Calculate the minimum required bandwidth for a given symbol rate and analyze the implications of not satisfying the Nyquist criteria.

18. Define and describe the concept of an Eye Pattern in digital communication. Discuss the factors influencing the formation of an Eye Pattern and explain its significance in evaluating signal quality.