

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2024

B.Tech- IV Semester (ECE/CSE)

COURSE CODE(CREDITS): 18B11EC413 (4)

MAX. MARKS: 35

COURSE NAME: Modern Analog and Digital Communication

COURSE INSTRUCTORS: Dr. Alok Kumar

MAX. TIME: 2 Hours

Note: (a) All questions are compulsory.

(b) Marks are indicated against each question in square brackets.

(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

- Q.1** A continuous analog signal with maximum amplitude of 6V and minimum amplitude of -6V, and assuming a quantization level of 8 bits, calculate the quantization step size, the signal-to-quantization noise ratio (SQNR), and the total number of quantization levels and the quantized PCM codes for specific analog signal values. [CO3] [3 Marks]
- Q.2** How does Differential Pulse Code Modulation (DPCM) differ from regular PCM (Pulse Code Modulation)? How does DPCM handle the prediction error? [CO3] [3 Marks]
- Q.3** What is the use of synchronization in line coding? How does the choice of line code affect the bandwidth requirements of a communication channel? [CO1] [3 Marks]
- Q.4** Consider a binary data sequence 110100010. Draw the waveform for the following signaling line codes formats.
(a) Unipolar NRZ (B) Bipolar RZ (c) Split-phase Manchester (d) AMI [CO1] [2 Marks]
- Q.5** Explain the concept of aliasing and how it relates to undersampling in signal processing? How does the choice of sampling rate affect the frequency spectrum of the sampled signal? A band-limited signal with a bandwidth of 4 kHz centered at 8 kHz, sample this signal using band pass sampling to reduce the sampling rate while still preserving the signal's information. Determine the minimum sampling rate required for bandpass sampling. [CO2] [5 Marks]
- Q.6** What are the key components of a digital modulation scheme? What are the key factors that determine the data rate in a digital communication system? [CO2, CO5] [3 Marks]

Q.7 What is phase shift keying (PSK) modulation, and how does it differ from frequency shift keying (FSK)? Show the transmitted waveform using Amplitude shift keying (ASK), FSK and PSK while employing following assumption. The carrier frequency for ASK is 1 MHz, the frequency deviation for FSK is 100 kHz, and the phase shift for PSK is 180 degrees.

[CO2] [5 Marks]

Q.8 How pulse modulation techniques can be used for analog-to-digital conversion?

[CO1, CO3] [2 Marks]

Q.9 How SSB-SC signal is generate using Hilbert Transform? Explain with suitable diagram and mathematical analysis.

[CO1, CO2] [5 Marks]

Q.10 What is an eye pattern, and why is it used in signal analysis? How is an eye pattern affected by different impairments in a communication channel? .

[CO4] [4 Marks]