

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATIONS- 2026

B.Tech- IV Semester (ECE/VLSI/ECE MINOR)

COURSE CODE (CREDITS): 25B11EC411/25B11EC417 (4)

MAX MARKS: 35

COURSE NAME: Analog and Digital Communication

COURSE INSTRUCTOR: Dr. Alok Kumar

MAX. TIME: 2 Hours

Note: (a) All questions are compulsory.

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

(c) Use of calculator is allowed

Q.No	Question	CO	Marks
Q1	With the help of neat block diagram, explain the generation of PWM signal.	2	3
Q2	What is meant by quantization? Explain the need for quantization of a signal. Derived an expression for quantization error. What is the necessity of non-uniform quantization?	3	3
Q3	Why does the predictor in a DPCM system use quantized previous samples instead of original input samples? What problem would arise at the receiver if original samples were used for prediction?	3	3
Q4	The binary data 1100001 is transmitted over a baseband channel. Draw the line encoding waveforms for the transmitted data using following formats: a) Unipolar RZ b) Polar RZ c) Polar NRZ d) AMI e) Manchester f) Differential Manchester	1	3
Q5	What is sampling theorem? Find the Nyquist rate and Nyquist interval for the given signal $x(t)$. $x(t) = 100\sin(500\pi t) \cdot \cos(300\pi t)$	1	3
Q6	Derive the expression for Signal-to-Noise Ratio (SNR) in PCM by considering suitable assumptions wherever necessary. Design a digital communication system using PCM having signal to quantization noise ratio ≥ 40 dB for a signal $m(t) = 3\cos(2\pi 500t)$. Also find out the bandwidth of PCM signal.	2	5
Q7	Describe the working principle of Binary Phase Shift Keying (BPSK) with suitable waveforms and constellation diagram. Why is PSK more noise-resistant than ASK?	4	5

Q8	Identify whether granular noise or slope overload distortion occurs when the input signal changes rapidly. How can it be reduced? Determine the minimum sampling frequency required to avoid slope overload distortion for step size = 0.05V, and maximum input slope = 1000V/s	2	5
Q9	Answer the following questions a) Why is companding used in PCM transmission? b) What is a regenerative repeater? c) What is intersymbol interference (ISI)? Explain its effect on digital modulation systems. d) What is a constellation diagram? e) How can interchannel crosstalk be minimized?	4	5

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