

JK Lakshmipat University Jaipur
INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination, December 2025

B. Tech. in Computer & Communication Engineering, Semester V

Roll No.....

EE1123: Digital Communication

Time: 2.5 hours

Max. Marks: 30

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.
4. Use of programmable Calculator is not allowed.

Q.1	a) Explain the significance and importance of Eye diagram in context of communication system. b) Determine the Symbol rate and bandwidth of 16-QAM system with roll-off factor $\alpha = 0.5$ and Bit rate $R_b = 2Mbps$. c) The bit stream 010010101 is differentially encoded using 'Delay and Ex OR' scheme for DPSK transmission. Assuming the reference bit as a '1' and assigning phases of '0' and ' π ' for 1's and 0's respectively, Determine the transmitted phase sequence of the bit stream.	02+02+02 CO2, CO4, CO5
Q.2	Explain the importance of Euclidean distance in digital communication. Calculate the Euclidean distance for BASK, BPSK and BFSK and show the constellation diagram for each scheme.	04 CO 5
Q.3	A compact disc (CD) records audio signals digitally using PCM. Assume the audio signal bandwidth is 15 kHz. a) What is the Nyquist rate? b) If the Nyquist samples are quantized into $L = 65,536$ levels and then binary-coded, determine the number of binary digits required to encode a sample. c) Determine the number of binary digits per second (bit/s) required to encode the audio signal. d) For practical reasons discussed in the text, signals are sampled at a rate well above the Nyquist rate. Practical CDs use 44,100 samples per second. If $L = 65,536$, determine the number of bits per second required to encode the signal, and the minimum bandwidth required to transmit the encoded signal.	05 CO3, CO4
Q.4	Design a communication system (Transmitter and Receiver) using QPSK scheme. Also show the waveform generated for the bit stream 1101010101010 using suitable diagram.	05 CO5

Q.5	It is required to transmit 1×10^6 binary digits per second over AWGN channel using BPSK with $P_e \leq 10^{-4}$. The channel noise PSD is 10^{-12} W/Hz. Determine the transmission bandwidth and the signal power required at receiver input. $\text{erf}(2.5) = 0.9998$	05 CO5, CO6
Q.6	Derive the expression of probability of error of binary FSK in presence of AWGN noise.	05 CO5, CO6