JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- 2025

B.Tech-IV Semester (ECE/CSE/IT)

COURSE CODE (CREDITS): 18B11EC413 (4)

COURSE NAME: Modern Analog and Digital Communication

MAX. MARKS: 15

COURSE INSTRUCTORS: Dr. Alok Kumar

Note: *(a) All questions are compulsory.*

MAX. TIME: 1 Hour

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

Q.No	Question	CO	Marks
Q1	Explain the different types of communication media with examples.	CO-1	2
Q2	How does entropy relate to the uncertainty of a source? Explain its significance. Define entropy in the context of information theory. A source emits four symbols {A, B, C, D} with probabilities 0.4, 0.3, 0.2, and 0.1, respectively. Calculate the entropy of the source.	CO-1	3
Q.3	a) If a multitone AM system transmits signals at 5 kHz, 10 kHz, and 15 kHz with a carrier at 200 kHz, sketch the frequency spectrum of the transmitted signal. b) Calculate the percentage of power in sidebands for a multitone AM signal with three modulating frequencies, each having a modulation index of 0.6. c) What are the major challenges of implementing multitone AM in practical communication systems?	CO-2	4
Q.4	a) Derived the expression for DSB-SC signal by considering message and carrier signal. Show the waveform of DSB-SC signal is frequency domain using Fourier transform. A DSB-SC signal has a total transmitted power of 200 W, and the message signal power is 50 W. Calculate the modulation efficiency. b) In a DSB-SC system, a message signal with 10 W power is used to modulate a carrier. Find the total transmitted power if the modulation index is 1.	CO-2	3
Q.5	a) What is Gaussian noise? b) What is the key difference between Gaussian noise and white Gaussian noise? What does "white" mean in the context of noise? c) How is the power spectral density (PSD) of white Gaussian noise characterized?	CO-1	3