

Fourth Semester B.E./B.Tech. Degree Examination, June/July 2025

Principles of Communication Systems

Time: 3 hrs.

Max. Marks: 100

Notes: 1. Answer any FIVE full questions, choosing ONE full question from each module.

2. M : Marks, L: Bloom's level, C: Course outcomes.

Module – 1

		M	L	C
Q.1	a. Define Probability. Illustrate the relationship between sample space, events and probability.	6	L2	CO5
	b. What are moments? Determine the characteristic function of a Gaussian random variable with a given mean and variance.	6	L2	CO5
	c. Analyze the Gaussian process with Gaussian distribution curve. Infer the properties of a Gaussian process.	8	L2	CO5

OR

Q.2	a. Define a random process. Interpret mean and covariance function with respect to stationary random process.	6	L2	CO5
	b. What is Autocorrelation function? State and prove the properties of Autocorrelation function.	6	L2	CO5
	c. Analyze the PDF and CDF of a random experiment in which three coins are tossed and condition to get random variable is getting head.	8	L3	CO5

Module – 2

Q.3	a. Define Amplitude modulation. Derive an expression for Amplitude Modulation in time domain with necessary waveforms.	8	L2	CO1
	b. A standard AM broadcast station is allowed to transmit modulating frequencies upto 5 kHz. If the AM station is transmitting on a frequency of 980 kHz, compute the maximum and minimum upper and lower side bands and the total bandwidth occupied by the AM station.	5	L3	CO1
	c. Outline the block diagram of FDM transmitter. List the applications of FDM.	7	L2	CO1

OR

Q.4	a. Develop a code to generate Amplitude Modulation Waveforms and display its spectrum.	8	L3	CO1
	b. Apply the concept of side bands to explain DSB and SSB, draw the relevant waveforms.	5	L2	CO1
	c. Explain with diagrams, the working principle of Lattice-type balanced modulator.	7	L2	CO1

Module – 3

Q.5	a. Identify a method used to convert a Phase Modulated (PM) signal into a Frequency-Modulated (FM) signal.	6	L2	CO3
	b. The input to an FM receiver has S/N of 2.8. The modulating frequency is 1.5 kHz. The maximum permitted deviation is 4 kHz. Determine (i) The frequency deviation caused by the noise and (ii) The improved output S/N.	6	L3	CO2

	c. Interpret with a neat circuit diagram, the working principle of frequency modulation of a crystal oscillator with a Voltage Variable Capacitor (VVC).	8	L2	CO2
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OR

Q.6	a. Define Modulation. Identify any five differences between Frequency Modulation and Amplitude Modulation.	6	L2	CO2
	b. Why Pre-emphasis and de-emphasis are required? Explain how they are implemented?	6	L2	CO2
	c. Draw the block diagram of a super heterodyne receiver and explain the function of each.	8	L2	CO2

Module – 4

Q.7	a. State and prove sampling theorem. Write a program for sampling and reconstruction of low pass signals and display the signals and its spectrum.	10	L3	CO3
	b. Infer the working of TDM system with a neat block diagram.	5	L2	CO3
	c. Explain briefly the block diagram of PPM generator.	5	L2	CO3

OR

Q.8	a. Identify and explain the basic elements of a PCM system with neat diagrams. For the data stream [0 1 1 0 1 0 0 1], draw the following line code waveforms: (i) Unipolar NRZ (ii) Polar NRZ (iii) Unipolar RZ (iv) Bipolar RZ (v) Manchester code	10	L3	CO3
	b. Infer the advantages of digital signals over analog signals.	5	L2	CO3
	c. Explain briefly the midtread and midrise Quantizers with relevant figures.	5	L2	CO3

Module – 5

Q.9	a. What is Intersymbol Interference (ISI)? With a neat block diagram outline the baseband binary data transmission system and write the necessary equations?	8	L2	CO4
	b. Define SNR. Summarize the different types of external and internal noise.	7	L2	CO4
	c. Illustrate the concept of Noise in cascaded stages with a diagram. Write Friis formula and mention its terms.	5	L2	CO4

OR

Q.10	a. What is Baseband digital transmission? Explain the following concepts briefly: (i) Nyquist criterion for distortionless transmission. (ii) Baseband M-ary PAM transmission.	8	L2	CO4
	b. Define Noise. Classify the different types of semiconductor noise.	7	L2	CO4
	c. What is Noise Factor and Noise Figure? An RF amplifier has an S/N ratio of 8 at the input and an S/N ratio of 6 at the output. Calculate the Noise factor and Noise figure.	5	L2	CO4
