CBCS SCHEME

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BEC402

Fourth Semester B.E./B.Tech. Degree Examination, June/July 2025
Principles of Communication Systems

Time: 3 hrs. Max. Marks: 100

Note: 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 receives 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
		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-amphasis 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) Manchestor 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

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