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CBCS SCHEME

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BEC402

Fourth Semester B.E./B.Tech. Degree Examination, June/July 2026
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 Conditional probability. Obtain the Baye's rule.	6	L2	CO1
	b.	Define Mean, Auto-correlation and Auto covariance function of a random process. List the properties of auto correlation function.	8	L2	CO1
	c.	Find the expected value and the variance of a Bernoulli Random variable $P(X = x) = \begin{cases} 1-P & x=0 \\ P & x=1 \\ 0 & \text{otherwise} \end{cases}$	6	L2	CO1
		OR			
Q.2	a.	Define Cumulative distribution function. Describe its properties.	6	L1	CO1
	b.	Explain Central Limit theorem as applied to Gaussian random process.	8	L2	CO1
	c.	Write a suitable code to generate probability density function of Gaussian distribution function.	6	L2	CO1
		Module – 2			
Q.3	a.	Define Amplitude Modulation. Obtain the AM signal and represent AM wave both in time and frequency domain.	8	L2	CO2
	b.	Explain the working of Lattice Modulator with neat waveform.	6	L2	CO2
	c.	An audio frequency signal $10 \sin 2\pi \times 500t$ is used to amplitude modulate a carrier of $50 \sin 2\pi \times 10^5 t$. Assume the modulation index as 0.2. Determine : i) Sideband frequencies ii) Bandwidth required iii) Total power delivered to the load of 600 Ω	6	L3	CO2
		OR			
Q.4	a.	Explain the working of high level collector modulator with neat circuit diagram.	7	L2	CO2
	b.	With neat circuit diagram and waveform, explain the working of diode detector.	8	L2	CO2
	c.	Write a suitable code to generate an AM wave and to demodulation waveform and display its spectrum.	5	L2	CO2

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		Module – 3			
Q.5	**a.**	With neat diagram, explain the concept of FM with an IC voltage controlled oscillator.	**7**	**L2**	**CO3**
	b.	Explain the basic block diagram of PLL for demodulation of FM signal along with capture and lock range.	**8**	**L2**	**CO3**
	c.	The input to an FM receiver has an S/N of 2.8. The modulating frequency is 1.5 KHz. The maximum permitted deviation is 4 KHz. What are i) The frequency deviation caused by the noise ii) Improved output S/N	**5**	**L3**	**CO3**
		OR			
Q.6	**a.**	Describe the principle of frequency and phase modulation with relevant waveform.	**7**	**L2**	**CO3**
	b.	With neat diagram, explain the principle of Operation of super heterodyne receiver.	**8**	**L2**	**CO3**
	c.	Write a suitable code for generation and demodulation of FM wave and display its spectrum.	**5**	**L3**	**CO3**
		Module – 4			
Q.7	**a.**	Explain the sampling process with mathematical expression and sketch the waveform for various sampling frequencies.	**7**	**L2**	**CO4**
	b.	With neat block diagram, explain the process of generation of pulse code modulation signal.	**8**	**L2**	**CO4**
	c.	Write a suitable code to generate raised cosine pulse signal.	**5**	**L3**	**CO5**
		OR			
Q.8	**a.**	Explain the concept of Time Division multiplexing with block diagram.	**8**	**L2**	**CO4**
	b.	Explain the generation of pulse position modulation with neat waveform.	**7**	**L2**	**CO4**
	c.	Draw the line code waveform for a given data [01101001] i) Unipolar NRZ ii) Polar NRZ ii) Unipolar RZ iv) Bipolar RZ v) Mancester code.	**5**	**L3**	**CO4**
		Module – 5			
Q.9	**a.**	State and explain the Nyquist criteria for distortion less baseband transmission.	**7**	**L2**	**CO5**
	b.	Define Signal to Noise Ratio. Explain the different types of External and Internal noise.	**8**	**L2**	**CO5**
	c.	Develop a code to generate and plot eye diagram.	**5**	**L3**	**CO5**
		OR			
Q.10	**a.**	Define Inter Symbol Interference. Outline baseband binary data transmission system with neat block diagram and equations.	**8**	**L2**	**CO5**
	b.	Explain the concept of noise in cascaded stages with a diagram. Write Friss formula and mention its term.	**7**	**L2**	**CO5**
	c.	A receiver with a 75Ω input resistance operates at a temperature of 31°C. The received signal is at 89MHz with a bandwidth of 6 MHz. The received signal voltage of 8.3 μv is applied to an amplifier with a noise figure of 2.8dB. Find : i) Input noise power ii) Input signal power iii) S/N in decibels iv) Noise factor.	**5**	**L3**	**CO5**

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