Model Question Paper-1 with effect from 2022-23 (CBCS Scheme)

USN | | | | | | | | | | |

Fourth Semester B.E. Degree Examination

Subject Title Principles of Communication Systems

TIME: 03 Hours **Max. Marks: 100**

Note: 01. Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.
02.
03.

		Module -1	*Bloom's Taxonomy Level	Marks
Q.01	a	Define Probability. Illustrate the relationship between sample space, events and probability.	L2, CO5	06
	b	Define the autocorrelation and cross-relation functions. Infer the properties of autocorrelation function.	L2, CO5	06
	c	Develop a program to generate the probability density function of Gaussian distribution function.	L3, CO5	08
		OR		
Q.02	a	What is conditional probability? Prove that P(B/A) = P(A/B).P(B)/P(A)	L2, CO5	06
	b	Outline random processes and illustrate an ensemble of sample functions with a neat diagram.	L2, CO5	06
	c	Show that, if a Gaussian process X(t) is applied to a stable linear filter, then the random process Y(t) developed at the output of the filter is also Gaussian.	L3, CO5	08
		Module-2		
Q. 03	a	Interpret the concepts of modulation index and percentage of modulation. Write the necessary equations.	L2, CO1	08
	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 sidebands and the total bandwidth occupied by the AM station.	L3, CO1	05
	c	Explain high-level collector modulator with a neat block diagram.	L2, CO1	07
		OR		
Q.04	a	Outline a diode detector AMD modulator with necessary block diagram and waveforms.	L2, CO1	08
	b	An AM transmitter has a carrier power of 30W. The percentage of modulation is 85 percent. Calculate (i) the total power and (ii) the power in one sideband.	L3, CO1	05
	c	Explain a general block diagram of an FDM system.	L2, CO1	07
		Module-3		
Q. 05	a	Compare and contrast FM and AM.	L3, CO2	06
	b	Explore with a neat diagram the concept of frequency modulation with an IC VCO.	L2, CO2	07
	c	Draw the block diagram of a super heterodyne receiver and explain the function of each block.	L2, CO2	07
		OR		
Q. 06	a	Identify a method used to convert a phase-modulated (PM) signal into a frequency-modulated (FM) signal.	L3, CO2	06
	b	Define PLL. Explain the basic block diagram of a PLL along with capture and lock ranges.	L2, CO2	07
	c	Interpret the concept of a mixer with a neat schematic diagram.	L2, CO2	07
		Module-4		
Q. 07	a	What are the advantages of digital signals over analog signals?	L1, CO3	04

	b	State sampling theorem. Explain sampling with neat sketches and equations. What are the challenges faced with Nyquist criteria for sampling? Develop a program to display the signals and its spectrum.	L3, CO3	10
	c	Explain the generation and detection of PPM waves with a relevant block diagram.	L2, CO3	06
		OR		
Q. 08	a	What is aperture effect in PAM systems? How can it be minimized?	L1, CO3	04
	b	What is multiplexing and why is it required in communication? Explain the working of TDM with a neat block diagram.	L3, CO3	10
	c	Explain the basic elements of a PCM system with neat diagrams.	L3, CO3	06
		Module-5		
Q. 09	a	Define Intersymbol Interference (ISI). Outline Baseband binary data transmission system with neat block diagram and equations.	L2, CO4	08
	b	Develop a code to generate and plot eye diagram.	L3, CO4	06
	c	Illustrate the concept of noise in cascaded stages with a diagram. Write Friis' formula and mention its terms.	L2, CO1	06
		OR		
Q. 10	a	Explain the following concepts briefly: (i) Nyquist criterion for distortionless transmission. (ii) Baseband M-ary PAM transmission	L2, CO4	08
	b	Develop a code to generate NRZ and RZ pulse.	L3, CO4	06
	c	Define Signal-to-Noise Ratio (SNR). Explain the different types of external and internal noise.	L2, CO1	06

*Bloom's Taxonomy Level: Indicate as L1, L2, L3, L4, etc. It is also desirable to indicate the COs and POs to be attained by every bit of questions.

Model Question Paper-2 with effect from 2022-23 (CBCS Scheme)

USN | | | | | | | | | | |

Fourth Semester B.E. Degree Examination

Subject Title: Principles of Communication Systems

TIME: 03 Hours **Max. Marks: 100**

Note: 01. Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.
02.
03.

		Module -1	*Bloom's Taxonomy Level	Marks
Q.01	a	A random variable is said to be uniformly distributes over the interval (a,b). Determine the probability density function of uniformly distributed RV.	L2, CO5	06
	b	Determine the characteristic function of a Gaussian random variable with a given mean and variance.	L2, CO5	08
	c	Prove the following two properties of the Autocorrelation Function of a Random Process i)If X(t) contains a dc component equal to A, then Rx(t) will contain a constant amplitude equal to A^2. ii) If X(t) contains a sinusoidal component, then Rx(t) will also contain a sinusoidal component of the same frequency	L2, CO5	06
		OR		
Q.02	a	Define correlation, covariance and correlation coefficient	L2, CO5	04
	b	Explain central limit theorem as applied to Gaussian Random Process	L2, CO5	06
	c	Define Autocorrelation Function and Crosscorrelation Function State and prove the properties of ACF	L3, CO5	08
		Module-2		
Q. 03	a	Explain amplitude modulation in time domain and frequency domain with necessary expressions and illustrations.	L2, CO1	08
	b	With necessary schematic of square -law circuit and expressions, explain the generation of AM.	L3, CO1	05
	c	Write a MATLAB code to generate Amplitude Modulation and demodulation waveforms and display its spectrums.	L2, CO1	07
		OR		
Q.04	a	An AM transmitter uses high-level modulation of the final RF power amplifier. Which has a de supply voltage Vcc of 48 V with a total current I of 3.5 A. The efficiency is 70 percent. a. What is the RF input power to the final stage? b. How much AF power is required for 100 percent modulation?	L2, CO1	08
	b	Explain with neat diagrams, amplitude demodulator using the diode detector	L3, CO1	05
	c	Explain with diagrams, the working principle of Lattice-type balanced modulator.	L2, CO1	07
		Module-3		
Q. 05	a	The input to an FM receiver having an S/N of 2.8. The modulating frequency is 1.5 kHz. The maximum permitted deviation is 4 kHz. What are (a) the frequency deviation caused by the noise and (b) the improved output SIN?	L3, CO2	06
	b	Explain with a neat diagram, the frequency spectrum of FM Modulated wave	L2, CO2	07
	c	Explain with diagrams, the working principle of Frequency-Modulation using Crystal Oscillator	L2, CO2	07
		OR		
Q. 06	a	Identify the Noise Suppression Effects of FM.	L3, CO2	06

	b	Compare and contrast FM using crystal oscillator circuits with FM using varactors	L2, CO2	07
	c	Explain general block diagram of a super-heterodyne receiver.	L2, CO2	07
		Module-4		
Q. 07	a	State and prove sampling theorem	L1, CO3	04
	b	For the data stream [01101001], Draw the following line code waveforms i)Unipolar NRZ ii)Polar NRZ iii)Unipolar RZ iv)Bipolar RZ v)Manchestor code	L3, CO3	10
	c	Explain the generation and detection of PPM waves with a relevant block diagram.	L2, CO3	06
		OR		
Q. 08	a	What is aperture effect in PAM systems? How can it be minimized?	L1, CO3	04
	b	What is multiplexing and why is it required in communication? Explain the working of TDM with a neat block diagram.	L3, CO3	10
	c	Exercise examples from Text 2 in the prescribed syllabus, 7.3, 7.4, 7.14,7.17	L3, CO3	06
		Module-5		
Q. 09	a	Define Intersymbol Interference (ISI). Outline Baseband binary data transmission system with neat block diagram and equations.	L2, CO4	08
	b	Develop a code to generate and plot eye diagram.	L3, CO4	06
	c	Explain bandwidth requirements of T1 system	L2, CO1	06
		OR		
Q. 10	a	Explain the following concepts briefly: (i) Nyquist criterion for distortionless transmission. (ii) Baseband M-ary PAM transmission	L2, CO4	08
	b	Develop a code to generate NRZ and RZ pulse.	L3, CO4	06
	c	Define Signal-to-Noise Ratio (SNR). Explain the different types of external and internal noise.	L2, CO1	06

*Bloom's Taxonomy Level: Indicate as L1, L2, L3, L4, etc. It is also desirable to indicate the COs and POs to be attained by every bit of questions.