U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

January / February 2025 Semester End Main Examinations

Programme: B.E. **Semester: V**

Branch: Electronics & Telecommunication Engineering **Duration: 3 hrs.**

Course Code: 19ET5PCACM **Max Marks: 100**

Course: ANALOG COMMUNICATION

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

			UNIT - I	*CO*	*PO*	Marks
1	a)		List the properties of cumulative distribution function and probability density function	*CO1*		**06**
	b)		In an experiment, a trial consists of four successive tosses of a coin. If we define an RV x as the number of heads appearing in a trial, Determine $P_x(x)$ and $F_x(x)$	*CO2*	*PO1*	**06**
	c)		A certain random variable has the CDF given by $F_X(x) = \begin{cases} 0 & for\ x \le 0 \\ kx^2 & for\ 0 < x \le 10 \\ 100k & for\ x > 10 \end{cases}$ i)Calculate the value of k ii)Find the value of P(x≤5) and P(5<x≤7) iii)Plot the corresponding PDF(Probability density function)	*CO2*	*PO1*	**08**
			OR			
2	a)		Explain the various types of noise in communication system.	*CO1*		**06**
	b)		White Gaussian noise with zero mean and power spectral density $N_0/2$ is applied to a RC – LPF. Obtain the sketch of noise PSD and the autocorrelation functions of the output noise.	*CO2*	*PO1*	**06**
	c)		The probability density function(pdf) of a random variable x is given by $Fx(x) = \begin{cases} k & a \le x \le b \\ 0 & \text{otherwise, where k is constant} \end{cases}$ Determine K and sketch PDF	*CO2*	*PO1*	**08**

			UNIT - II			
	3	a)	Explain ring modulator to generate DSBSC wave.	*CO1*		**06**
		b)	Show that a SQUARE LAW device can be used for the detection of AM wave	*CO2*	*PO1*	**08**
		c)	A sinusoidal carrier has amplitude of 10 V and frequency 30KHz. It is amplitude modulated by a sinusoidal voltage of amplitude 3V and frequency 1KHz. Modulated voltage is developed across a 100 Ω resistance. Determine the modulation index , write the equation for modulated wave, plot the modulated wave showing maxima and minima of waveform, draw the spectrum of modulated wave	*CO2*	*PO1*	**06**
			OR			
	4	a)	Show that the zero demodulated signal in coherent detection of DSBSC occurs at $\Phi = \pm\pi/2$ which represents the quadrature null effect of the coherent detector	*CO2*	*PO1*	**07**
		b)	Let $c(t)=A_c\cos(2\pi f_c t)$ and $m(t)=\cos(2\pi f_m t)$. It is given that $f_c >> 5f_m$. The signal c(t)+m(t) is applied to the input of a non-linear device, whose output Vo(t) is related to input $V_i(t)$ as $V_o(t)=aV_i(t)+bV_i^2(t)$, where a and b are positive constants. The output of the non linear device is passed through an ideal band pass filter with center frequency f_c and bandwidth $3f_m$, to produce an amplitude modulated (AM) wave. If it is desired to have the sideband power of the AM wave to be half of the carrier power, then find a/b ?	*CO3*	*PO2*	**07**
		c)	Explain the envelope detector along with types of noise which may occur in the demodulation process of AM	*CO1*		**06**
			UNIT - III			
	5	a)	State and prove the properties of Hilbert transform	*CO1*		**06**
		b)	Derive the equation for time domain representation of SSB .	*CO2*	*PO1*	**08**
		c)	With the block diagram explain Frequency Division Multiplexing along with spectrum			**06**
			OR			
	6	a)	With the block diagram explain frequency translation along with spectrum.	*CO1*		**08**
		b)	In SSB coherent receiver,obtain the effect of phase and frequency error in the local-oscillator,and hence explain the Donald Duck voice effect	*CO2*	*PO1*	**08**
		c)	Describe the generation of VSB with block diagram	*CO2*	*PO1*	**04**

			UNIT - IV			
	7	a)	Describe the generation of FM signal using indirect method .	*CO1*		**10**
		b)	Show that how PLL can be used in the demodulation of FM wave with relevant mathematical equations.	*CO2*	*PO1*	**10**
			OR			
	8	a)	Describe the frequency discrimination method to recover message signal from FM modulated signal	*CO1*		**10**
		b)	Show that FM signals has infinite sidebands with appropriate derivation	*CO2*	*PO1*	**10**
			UNIT - V			
	9	a)	Explain Tuned Radio Frequency Receiver with block diagram	*CO1*		**05**
		b)	Show that the FOM of a noisy FM receiver using the frequency discriminator is given by $1.5\beta^2$	*CO2*	*PO1*	**10**
		c)	In a broadcast superheterodyne receiver having no RF amplifier, the loaded Q of the antenna coupling circuit (at the input to the mixer) is 100. If the intermediate frequency is 455kHz, calculate a) the image frequency and its rejection ratio at 1000 kHz and b)the image frequency and its rejection ratio is 25MHz.	*CO2*	*PO1*	**05**
			OR			
	10	a)	Explain with block diagram working of a super heterodyne receiver	*CO1*		**06**
		b)	Derive the expression for FOM of DSB-SC receiver.	*CO2*	*PO1*	**08**
		c)	An AM receiver operating with a sinusoidal wave and 70 % modulation has an output signal to noise ratio of 30 dB. Calculate the corresponding carrier to noise ratio	*CO2*	*PO1*	**06**

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