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 and Instrumentation Engineering **Duration: 3 hrs.**
Course Code: 19EI5PCCST / 22EI5PCCST **Max Marks: 100**
Course: Communication Systems

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)	Describe generation of AM signal using switching modulator and write relevant waveform.	CO2	PO1	**08**
	b)	For the following baseband signal, m(t)=2cos1000πtcos2000πt find: i) Sketch the spectrum of m(t) ii) Sketch the spectrum of DSB-SC signal m(t)cos10,000πt iii) Identify the upper sideband and lower sideband spectra iv) Identify the frequencies in the baseband and the corresponding frequencies in the DSB-SC, USB and LSB spectra.	CO3	PO2	**04**
	c)	Explain with neat schematic the quadrature carrier multiplexing transmitter and receiver system.	CO2	PO1	**08**
		OR			
2	a)	Derive an expression to determine the modulation index given the maximum and minimum values of the envelope of the modulated wave.	CO2	PO1	**06**
	b)	An AM transmitter radiates 9K watts of power when a carrier is unmodulated and 10.125K watts when the carrier is sinusoidally modulated. Find the modulation index and percentage of modulation. Now if another sine wave corresponding to 40 percent modulation is transmitted simultaneously, then calculate the total radiated power.	CO3	PO2	**07**
	c)	Describe the demodulation of DSB-SC using costas receiver.	CO2	PO1	**07**

			UNIT - II			
	3	a)	An angle modulated signal having a carrier frequency $w_c = 2\pi x10^5$ is described by the equation $fm(t) = 10cos(w_c t + 5sin3000t + 10sin2000\pi)$ a) Find the power of the modulated signal b) Find the frequency deviation Δf c) Find the deviation ratio β d) Find the phase deviation Δ^{φ} e) Estimate the bandwidth of $fm(t)$	*CO3*	*PO2*	**10**
		b)	With a neat block diagram and necessary equations explain the demodulation of FM using PLL method	*CO2*	*PO1*	**10**
			OR			
	4	a)	Show that FM wave generated from PM and PM wave from FM.	*CO2*	*PO2*	**06**
		b)	Prove that Wide Band Frequency Modulation (WBFM) having infinite number of side bands.	*CO2*	*PO2*	**10**
		c)	List the difference between AM and FM.	*CO2*	*PO1*	**04**
			UNIT - III			
	5	a)	With necessary equations derive the figure of merit in AM using envelope detection.	*CO3*	*PO2*	**10**
		b)	Discuss the necessity of pre-emphasis and de-emphasis circuits in FM modulation	*CO3*	*PO2*	**10**
			OR			
	6	a)	Derive the Figure of Merit (FOM) of Frequency Modulation using general FM receiver model.	*CO3*	*PO2*	**10**
		b)	Summarize the threshold effect in AM and FM system.	*CO3*	*PO2*	**10**
			UNIT - IV			
	7	a)	Determine the Nyquist sampling rate and Nyquist sampling interval for the signals: $x(t) = sin100\pi t$ $x(t) = sin^2 100\pi t$ $x(t) = \sin(100\pi t) + \sin(50\pi t)$	*CO3*	*PO2*	**06**
		b)	With necessary waveform and circuit, discuss the generation of pulse amplitude modulated signal.	*CO3*	*PO1*	**08**
		c)	Explain with neat schematic the generation of PCM waveform.	*CO3*	*PO1*	**06**
			OR			
	8	a)	Discuss Quantization process in communication system.	*CO3*	*PO1*	**06**
		b)	With transmitter and receiver diagram explain the delta modulation system.	*CO3*	*PO1*	**10**
		c)	List the difference between natural sampling and flat top sampling.	*CO3*	*PO1*	**04**

			UNIT - V			
	9	a)	With necessary waveforms and block schematic, explain QPSK Transmitter.	*CO4*	*PO1*	**06**
		b)	Explain the BPSK generation with a block diagram and also discuss the spectrum of a BPSK signal.	*CO4*	*PO2*	**08**
		c)	Give the working principle of FDMA and CDMA	*CO4*	*PO2*	**06**
			OR			
	10	a)	A binary data stream 0 0 1 0 0 1 0 0 1 1 needs to be transmitted using DPSK technique. Prove that the reconstruction of DPSK signal remains the same even if the initial bit in the differentially encoded data is 0 or 1.	*CO4*	*PO2*	**06**
		b)	Explain the BFSK generation with a block diagram and also discuss the spectrum of a BFSK signal.	*CO4*	*PO1*	**08**
		c)	Represent the bit stream 10110011 in ASK, FSK and PSK	*CO4*	*PO2*	**06**

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