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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: 23EI5PCCST **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.

			MODULE - I	CO	PO	Marks
1	a)		with suitable block diagram and necessary derivations, explain the working of switching modulator	*CO1*	*PO1*	**08**
	b)		Explain how costas receiver is used for demodulating DSBSC signal.	*CO1*	*PO1*	**07**
	c)		An audio frequency signal $5\sin 2\pi(1000)t$ is used to amplitude modulate a carrier of $100\sin 2\pi(10^6)t$. Assume modulation index is 0.4 find i) Sideband frequencies ii) Amplitude of each sideband iii) Bandwidth required	*CO1*	*PO2*	**05**
			OR			
2	a)		Describe the operation of the ring modulator circuit which generates the DSBSC waves.	*CO1*	*PO1*	**10**
	b)		Explain with a neat diagram, the working of quadrature carrier multiplexing.	*CO1*	*PO1*	**07**
	c)		A broadcast transmitter radiates 20 kilowatts of power when the modulation percentage is 75. How much of carrier power required?	*CO1*	*PO2*	**03**
			MODULE - II			
3	a)		Derive the expression for a narrow band FM signal.	*CO1*	*PO1*	**08**
	b)		With block diagram explain generation of FM wave using PM and PM wave using FM.	*CO1*	*PO1*	**06**
	c)		With a neat circuit diagram, explain FM demodulation using balanced slope detector.	*CO1*	*PO1*	**06**

			OR			
	4	a)	Explain the generation of FM wave with necessary circuit diagram and equations.	*CO1*	*PO1*	**08**
		b)	Distinguish between AM and FM system.	*CO1*	*PO1*	**06**
		c)	The equation for an FM wave is $s(t)=10\sin[5.7x10^8t]+5\sin[12 x10^3t]$.Calculate (i) Carrier frequency (ii)Modulating frequency (iii)Modulation index (iv)Frequency deviation (v)Power dissipated in 100 Ω	*CO1*	*PO2*	**06**
			MODULE - III			
	5	a)	Derive the expression of Figure of Merit (FOM) for a standard AM receiver.	*CO2*	*PO2*	**08**
		b)	Briefly explain the following terms related to FM system. (i) Pre-emphasis (ii) De-emphasis	*CO2*	*PO1*	**08**
		c)	A carrier wave of frequency 100kHz is frequency modulated by a sine wave of amplitude 5V and frequency 20kHz.Find the FOM of FM receiver if the frequency sensitivity of the modulator is 10kHz/volt.	*CO2*	*PO2*	**04**
			OR			
	6	a)	Derive the expression of FOM for a FM receiver model.	*CO2*	*PO2*	**10**
		b)	Explain the following term related to measure the efficiency of communication system. (i) Figure of Merit (ii) Signal to Noise ratios	*CO2*	*PO1*	**06**
		c)	An AM receiver operating with a sinusoidal wave and 80% modulation has an output signal to noise ratio of 30db. Calculate the corresponding signal carrier to noise ratio.	*CO2*	*PO2*	**04**
			MODULE - IV			
	7	a)	State sampling theorem and explain ideal sampling with neat sketches and equations.	*CO3*	*PO1*	**06**
		b)	Describe the construction of delta modulation system.	*CO3*	*PO1*	**08**
		c)	A 10kHz sinusoidal with amplitude 1V peak is quantized to have SNR of about 45dB.Find the number of bits required per sample, bit rate and bandwidth of the system, if sampling frequency is twice the Nyquist rate.	*CO3*	*PO2*	**06**
			OR			

	8	a)	Explain the construction and regeneration of PCM signal.	*CO3*	*PO1*	**10**
		b)	With a neat circuit diagram explain the generation of PAM waves.	*CO3*	*PO1*	**07**
		c)	An analog signal is expressed by the equation x(t)=3cos50 πt+10sin300 πt+cos100 πt . Calculate the Nyquist rate and Nyquist interval for this signal.	*CO3*	*PO2*	**03**
			MODULE - V			
	9	a)	Describe with transmitter and receiver daiagram the generation and detection of BPSK signal.	*CO3*	*PO2*	**10**
		b)	With block diagram explain the non-coherent detection of FSK signals.	*CO3*	*PO1*	**06**
		c)	Draw the signal space or constellation representation of BFSK and ASK signal.	*CO3*	*PO1*	**04**
			OR			
	10	a)	Considering transmitter and receiver diagram, explain the generation and detection of QPSK signal.	*CO3*	*PO2*	**10**
		b)	Summarize the fundamental principles behind FDMA and TDMA in multiple access techniques.	*CO3*	*PO1*	**06**
		c)	Explain with a neat diagram the detection of BASK signal.	*CO3*	*PO1*	**04**

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