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

Autonomous Institute Affiliated to VTU

February 2025 Semester End Main Examinations

Programme: B.E. **Semester: IV**

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

Course Code: 23ET4PCCS1 **Max Marks: 100**

Course: COMMUNICATION SYSTEMS 1

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

			UNIT - I	CO	PO	Marks
1	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 carrier wave c(t)=10sin($2\pi \times 500 \times 10^3$t) is amplitude modulated by an audio wave m(t) =0.5sin 3($2\pi \times 500$t) + 0.4 sin 5($2\pi \times 500$t). Determine upper and lower sidebands and sketch the complete spectrum of the modulated wave. Estimate power in sidebands.	CO3	PO2	**06**
			OR			
2	a)		Describe the generation of AM using switching modulator with time domain equation and spectrum	CO2	PO1	**10**
	b)		Show that how DSBSC signal is demodulated using coherent detector with supporting spectrum	CO2	PO1	**10**
			UNIT - II			
3	a)		Describe frequency division multiplexing with appropriate block diagram.	CO1		**06**
	b)		Derive a time domain expression for SSB modulated wave for which upper side band is retained.	CO2	PO1	**08**
	c)		Prove that the signal $$s(t) = \sum_{i=1}^{N} [\cos(2\pi f_c\, t)\cos(2\pi f_i\, t + \phi_i) - \sin(2\pi f_c\, t)\sin(2\pi f_i\, t + \phi_i)]$$ i) Is an SSB signal ($f_c \gg f_N$), Identify the sideband and plot the spectrum. ii) obtain an expression for missing sideband and plot the spectrum.	CO3	PO2	**06**

			iii) Obtain an expression for the total DSBSC signal and plot the spectrum.			
			OR			
	4	a)	Show that how a two stage SSB modulator increases the guard band of SSB modulated signal with relevant block diagram and spectrum.	*CO2*	*PO1*	**10**
		b)	What is frequency translation? With appropriate derivation and spectrum explain upward frequency translation.	*CO2*	*PO1*	**10**
			UNIT - III			
	5	a)	Describe the detection of FM using frequency discrimination method	*CO1*		**08**
		b)	Show that FM signals has infinite sidebands with appropriate derivation.	*CO2*	*PO1*	**12**
			OR			
	6	a)	With block diagram explain the generation of wideband frequency modulated waves using indirect method.	*CO1*		**08**
		b)	With relevant equations describe detection of FM using linear model of PLL.	*CO2*	*PO1*	**12**
			UNIT - IV			
	7	a)	With block diagram describe the generation and detection of PCM wave	*CO1*		**06**
		b)	State and prove sampling theorem for low pass signals.	*CO2*	*PO1*	**08**
		c)	The signal g(t)=20 cos(50πt) cos(250πt) is sampled at the rate of 250 samples per second. i)Determine the spectrum of the resulting sampled signal. ii)Specify the cutoff frequency of the ideal reconstruction filter so as to recover g(t) from its sampled version iii)What is the Nyquist rate for g(t)?	*CO2*	*PO1*	**06**
			OR			
	8	a)	Derive the SNR of Pulse code modulation for sinusoidal signal as input and show that it is equal to 1.76+6n.	*CO2*	*PO1*	**10**
		b)	State and prove sampling theorem for band pass signals.	*CO2*	*PO1*	**10**
			UNIT - V			
	9	a)	What is ISI? Derive an expression for Nyquist's pulse shaping criteria for distortionless baseband binary data transmission.	*CO2*	*PO1*	**10**
		b)	With an appropriate block diagram describe the process of Adaptive Equalization.	*CO1*		**10**
			OR			
	10	a)	Assume 8 bit binary sequence with an alternating 1s and 0s. Draw the waveforms for this sequence, using the following signaling format. i)Unipolar NRZ and RZ signaling ii)Polar NRZ and RZ signaling	*CO2*	*PO1*	**08**

			iii)Bipolar NRZ signaling iv)AMI NRZ signaling			
		b)	i)Derive the equation for overall transfer function and impulse response of duo binary encoder with precoder. ii)For the input binary sequence 11010101 Obtain the duobinary coder and decoder output with precoder.	*CO2*	*PO1*	**12**

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