U.S.N.										

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

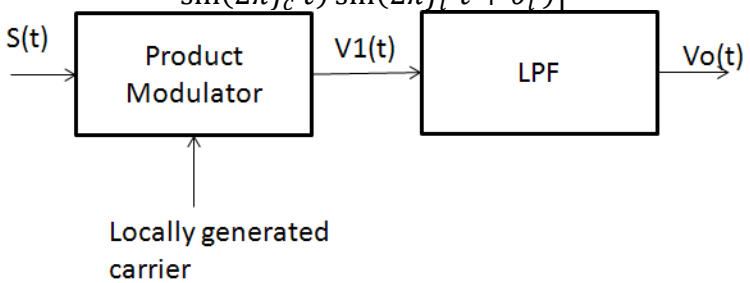
Autonomous Institute Affiliated to VTU

June 2025 Semester End Main Examinations

Programme: B.E. **Semester: IV**
Branch: Electronics and Telecommunication Engineering **Duration: 3 hrs.**
Course Code: 22ET4PCCS1 **Max Marks: 100**
Course: Communication System 1

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)		Explain distortions in envelope detector with diagram and equations	CO1		06
	b)		Show that removal of the unwanted terms in the following equation $V_2(t)=Ac/2[1+(4/\pi Ac)m(t)]\cos(2\pi f_c t)$+unwanted terms is accomplished if the band pass filter satisfies the following specifications. Midband frequency=f_c, Bandwidth=2W, f_c>2W	CO2	PO1	08
	c)		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.	CO3	PO2	06
			OR			
2	a)		Explain the generation of DSBSC using Balance modulator			10
	b)		Show that how ring modulator can be used to generate DSBSC along with circuit diagram,derivation and spectrum.			10
			UNIT - II			
3	a)		Explain the detection of VSB using appropriate block diagram and equations	CO2	PO1	10
	b)		As an illustration of phase and frequency discrepancy in synchronous detection of SSB-SC signal shown the following figure, consider the synchronous detection of the signal given by $s(t) = \sum_{i=1}^{N}[\cos(2\pi f_c t)\cos(2\pi f_i t + \theta_i) - \sin(2\pi f_c t)\sin(2\pi f_i t + \theta_i)]$ 	CO2	PO1	10

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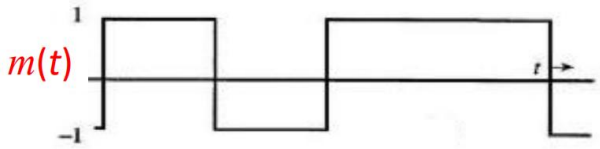
			i)Show that the modulation can be completely recovered if the cutoff frequency of the filter $f_N < fo < 2f_c$ ii)Analyze the recovered signal(Vo(t)) when the multiplying signal is $\cos(2\pi f_c t+\Theta)$ with appropriate equation. iii) Analyze the recovered signal when the multiplying signal is $\cos\{2\pi f_c +\Delta f)t\}$ with appropriate equation. Given $\Delta f << f_i$			
			OR			
4	a		Show that how 2 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)		With block diagram explain the generation of wideband frequency modulated wave with appropriate block diagram and equations	*CO1*		**06**
	b)		Derive time domain equation for single tone sinusoidal FM.	*CO2*	*PO1*	**08**
	c)		FM signal is given by $s(t)=20 \sin[8x10^8t+5 \sin(12x10^3t)]$. Calculate i) Carrier frequency ii)Modulating frequency iii) Modulation index iv)Frequency deviation v)Power dissipated in 100Ω load	*CO3*	*PO2*	**06**
			OR			
6	a)		Sketch FM (Frequency Modulation) and PM(Phase Modulation) waveform for the modulating signal m(t) shown below. The constant k_f is $2\pi 10^5$. Carrier frequency is 100 M Hz.  b)Sketch PM (Phase Modulation) FM(Frequency Modulation) signals that are produced by the m(t) shown below: 	*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 explain PAM-TDM along with waveforms	*CO1*		**06**
	b)		Derive the Nyquist criterion for zero ISI in baseband data transmission	*CO2*	*PO1*	**06**

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		c)	i) Derive the equation for overall transfer function and impulse response of modified duo binary encoder with precoder ii)For the given input binary sequence 11010101 Obtain the modified duobinary coder output with precoder			**08**
			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	Give the block diagram of duo-binary signaling scheme. Obtain and sketch the transfer function of the system. Obtain and sketch the impulse response of the system	*CO2*	*PO1*	**10**
			UNIT - V			
	9	a)	Describe ASK transmitter and receiver with appropriate block diagram and equations	*CO2*	*PO1*	**06**
		b)	Derive expression for the average probability of symbol error in terms of Eb/No for BFSK modulation technique along with signal space diagram.	*CO2*	*PO1*	**06**
		c)	Describe Gram Schmidt procedure along with appropriate equations.			**08**
			OR			
	10	a)	Discuss the properties of matched filter.	*CO1*		**06**
		b)	Derive an expression for probability of error in binary PSK scheme along with signal space diagram.	*CO2*	*PO1*	**08**
		c)	A binary data is transmitted over an AWGN channel using binary phase shift keying at a rate of 1 MBps. It is desired to have average probability of error Pe$\leq 10^{-4}$. Noise power spectral density is 10^{-12} W/Hz. Determine the average carrier power required at the receiver input, if the detector is of coherent type. Take erfc(3.5)=0.00025.			**06**

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