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

Autonomous Institute Affiliated to VTU

September / October 2023 Semester End Main Examinations

Programme: B.E.

Branch: Electronics and Communication Engineering

Course Code: 22EC4PCPCS

Course: Principles of Communication Systems

Semester: IV

Duration: 3 hrs.

Max Marks: 100

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)	Discuss how baseband signals are made compatible for direct transmission over the medium?	CO 1	PO 1	06
	b)	Show the generation of AM wave using a Switching Modulator with relevant mathematical equations and Waveforms	CO 2	PO 2	10
	c)	A 250W carrier of 1000kHz is simultaneously modulated by sinusoidal signals of 2kHz, 6kHz and 8kHz with modulation indices of 35%, 55% and 75% respectively. Analyze the frequencies present in the modulated wave and Compute the radiated power?	CO 2	PO 2	04
UNIT - II					
2	a)	Derive an output equation of ring modulator for sinusoidal modulating wave $m(t)$	CO 1	PO 1	06
	b)	A 400W Carrier is modulated on a depth of 75%; calculate the total power in the modulated wave in the following forms of AM. a) Double Sideband with full carrier b) Double sideband suppressed carrier c) Single sideband suppressed carrier. State your observations on the total power obtained for all the 3 cases.	CO 2	PO 2	06
	c)	Show the coherent detection of VSB-SC waves	CO 2	PO 2	08
OR					
3	a)	With a neat block diagram illustrate the principle of QAM, State the salient features of transmitter and receiver?	CO 1	PO 1	10
	b)	Show that SSB signal can be demodulated by the synchronous detector shown in the figure 1. Sketch the spectrum of the signal at each point and the time domain expression of the signals at each point.	CO 2	PO 2	10

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.

		<p>Figure 1</p>		
		UNIT - III		
4	a)	A single tone FM is represented by the Voltage equation : $V(t)=12 \cos (6 \cdot 10^8 t + 5 \sin 1250t)$. Determine the following Carrier Frequency, Modulation Index, Modulating Frequency, Maximum Deviation, What power will this FM wave dissipate in 10Ω resistor. Write your observations	CO 2	PO 2 06
	b)	Explain the difference between Wideband FM and Narrow Band FM.	-	- 06
	c)	Define Angle Modulation? Show the generation of FM wave using PM and PM wave using FM with the design blocks.	CO 2	PO 2 08
		OR		
5	a)	Show that FM wave has infinite sidebands.	CO 1	PO 1 08
	b)	A 25 MHz carrier is modulated by a 400 Hz audio sine wave. If the carrier voltage is 4V and the maximum frequency deviation is 10 kHz, write down the voltage equation of the FM wave.	CO 1	PO 1 05
	c)	Explain the generation of Narrow band FM using DSBSC Modulator?	CO 1	PO 1 07
		UNIT - IV		
6	a)	An AM receiver is designed using an envelope detector Obtain the design equation for SNR of the AM receiver.	CO 2	PO 2 10
	b)	An FM signal with a deviation of 75 kHz is applied to an FM demodulator. When the input SNR is 15 dB, the modulating frequency is 10kHz, estimate the SNR at the demodulator output.	CO 1	PO 1 05
	c)	Explain the need of pre-emphasis and de-emphasis? Show how they are implemented?	CO 1	PO 1 05
		UNIT - V		
7	a)	In a PCM System, the signal to noise ratio is to be held to a minimum of 40dB. Determine the number of levels required.	CO 1	PO 1 04
	b)	Determine the Nyquist rate and interval for the following Signal $x(t)=5\cos(2000t)+7\sin(7000t)$	CO 1	PO 1 06
	c)	State the Sampling theorem and Nyquist Criteria, Briefly explain its significance?	CO 1	PO 1 10