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

Autonomous Institute Affiliated to VTU

September / October 2023 Supplementary Examinations

Programme: B.E. **Semester: V**
Branch: Electronics and Communication Engineering **Duration: 3 hrs.**
Course Code: 19EC5PCCT1 **Max Marks: 100**
Course: Communication Theory I

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

1. a) State and explain three properties of autocorrelation function **06**

   b) Obtain the expression for AM wave considering a single tone message signal? A broadcast AM transmitter radiates 50 kilowatts of carrier power. What will be the radiated power at 85% Modulation? When the Modulation percentage is 75, an AM transmitter produces 10KW. How much of this is the carrier power? **08**

   c) Evaluate mean and variance of a random variable X which is uniformly distributed between x = a and x = b. **06**

OR

2. a) Analyze the working of a diode circuit for generating a modulated wave with only two sidebands. Draw the spectrum and provide design specification of band pass filter to extract desired modulated wave. **10**

   b) Show that $P_t = P_c(1 + \frac{\mu^2}{2})$ for Standard AM **04**

   c) Define a Random Variable with an example. State the properties of CDF and PDF of a random variable. **06**

UNIT - II

3. a) Suggest a suitable amplitude modulation technique to transmit a message signal which contains significant components at extremely low frequencies such as television signals and provide specification of filter transfer function H(f) of a sideband shaping filter to extract the desired modulated wave considering coherent detection **08**

   b) State and prove the properties Hilbert Transform **06**

	c)	In coherent detection of SSB wave, if the reference signal is $Cos(2\pi fct+\varphi)$, Prove that there is a phase error in the output and the output consist not only the message signal but also its Hilbert Transform	**06**

UNIT - III

4.	a)	Starting from basic principle explain the generation of FM from PM and PM from FM and also derive the necessary expressions.	**08**
	b)	What are the different ways to demodulate FM wave? Explain how Zero crossing detector can be used to demodulate FM wave?	**07**
	c)	The equation of an FM wave is $S(t)=10Sin[5.7*10^8t+5Sin12*10^3t]$ Calculate Carrier frequency, Modulating Frequency, Modulating Index, Frequency Deviation, and Transmission Bandwidth	**05**

OR

5.	a)	Analyze the generation of FM using direct method. What are its disadvantages? Explain how to overcome this?	**10**
	b)	Explain with neat diagram demodulation of FM using PLL	**10**

UNIT - IV

6.	a)	Define Noise. List different types of noises encountered in the communication system. Explain any two in detail.	**07**
	b)	Show that Figure of Merit (FOM) of SSB receiver is unity	**06**
	c)	Explain pre-emphasis and de-emphasis in FM receiver	**07**

UNIT - V

7.	a)	Define Digital Communication. List the advantages of Digital Communication over Analog Communication.	**04**
	b)	State and prove the sampling theorem for low pass signal	**10**
	c)	Explain with neat diagram TDM (Time Division multiplexing)	**06**

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