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

Autonomous Institute Affiliated to VTU

July / August 2019 Supplementary Examinations

Programme: B.E. **Semester : V**
Branch : ELECTRONICS AND COMMUNICATION ENGG **Duration: 3 hrs.**
Course Code: Communication Theory-1 **Max Marks: 100**
Course: 16EC5DCCT1 **Date: 26.07.2019**

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

UNIT - I

1 a) What is PDF? Discuss the various properties of PDF. **10**

b) Define Autocorrelation function of a WSS random process and discuss the various properties of Autocorrelation function **10**

UNIT - II

2 a) Discuss and Analyze the working principle of switching modulator for generating AM signal. Write down the relevant equations, waveforms and spectrum for modulated, carrier and sideband components. **10**

b) A Carrier of 5v rms with frequency of 1MHz and modulating signal of 2v rms with frequency of 1 KHz are applied to a circuit whose characteristics is $I=5+V+0.05V^2$.Compute the Modulation Index and frequencies of total output. **10**

OR

3 a) Analyze a envelop detector for demodulating a modulated signal with carrier and two side bands and design it for a carrier frequency of 100 KHz and message frequency of 4 KHz and |m(t)| « Amplitude of the carrier. **10**

b) Analyze the working of a ring modulator for generating a DSBSC signal. Draw the spectrum and provide design specification of band pass filter to extract desired wave. **10**

UNIT - III

4 a) Prove that the FOM of an SSB receiver using coherent detector is unity **10**

b) Consider a two stage SSB modulator with message 0.3KHz to 3.4KHz and the two carrier frequencies are f_{c1}=10KHz and f_{c2}=490KHz.Evaluate the following a) Spectrum of the signal at two stage b) filter specifications **10**

UNIT - IV

5 a) An angle modulated signal is described by $S(t)=5\cos[5.7*10^8 t+3\sin(2000)\pi t]$. **10**
Find the following (i) power in the modulated signal (ii) frequency deviation (iii) carrier frequency (iv) approximate transmission bandwidth.

b) Show that the bandwidth of WBFM is infinity and specify the amplitude of carrier and sidebands. **10**

OR

6 a) Analyze the working of PLL as an FM demodulator with relevant block diagram and expressions. **10**

b) Why pre emphasis and de emphasis are needed? How they are implemented? Explain **10**

UNIT - V

7 a) State and prove sampling theorem for low pass signals. Define aliasing effect with the measures undertaken to prevent it. **10**

b) Given signal $x(t)=5\cos(2000\pi t)+3\cos(10000\pi t)$ is sampled at its Nyquist rate, **10**

i.) Draw the spectrum of signal and its sampled version. ii.) State and comment on the frequency components that appear at the output of a reconstruction filter