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

Autonomous Institute Affiliated to VTU

February / March 2023 Semester End Main Examinations

Programme: B.E. **Semester: V**
Branch: Electronics and Communication Engineering **Duration: 3 hrs.**
Course Code: 19EC5PCCT1 **Max Marks: 100**
Course: Communication Theory I **Date: 21.02.2023**

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

1	a)	Find the Fourier Transform of $x(t) = \{\cos\pi t \quad -1/2 \le t \le ½$; $0 \quad$ otherwise$\}$	**05**
	b)	Discuss a Switching Modulator with relevant equations and Waveforms.	**06**
	c)	A certain AM transmitter radiates 20KW with the carrier unmodulated, and 21.8KW when the carrier is sinusoidally modulated. Calculate the modulation index. If another sine wave, corresponding to 25% modulation, is transmitted simultaneously determine the total radiated power.	**05**
	d)	Discuss the draw backs of Envelop detector	**04**

OR

2	a)	State and explain the significance of DSBSC Modulation with time domain description? Explain Costas Receiver for demodulating DSB-SC.	**10**
	b)	Explain with a neat sketch Frequency Translation.	**06**
	c)	A 1000 KHz carrier is simultaneously modulated with 300Hz, 800Hz and 1 KHz audio sine waves. What will be the frequencies present in the output?	**04**

UNIT - II

3	a)	Explain a Scheme for generation of VSB modulated wave with relevant block diagrams and construct the positive frequency portion of the frequency response of a side band filter for a VSB modulated wave that contains a vestige of lower side band.	**08**
	b)	Consider the bandwidth of a signal 20KHz and the midband frequency range 0.615-1.715MHz. It is required to translate this signal to a fixed frequency band centered at 0. 475MHz.Determine the range of tuning that must be provided in the local oscillator to perform necessary frequency translation.	**04**
	c)	With a neat block diagram and Mathematical expression explain the demodulation of SSB.	**08**

UNIT - III

4	a)	Discuss Phase Modulation? An FM wave is defined by $s(t)=10\cos[10\pi t+\sin(4\pi t)]$ Calculate the instantaneous frequency of S(t).	**06**

b) Explain the generation of Narrow band FM using DSBSC Modulator. **08**

c) An Single tone FM signal is given by $s(t)=10\text{Sin}[16\pi\times10^6t+20\sin(2\pi\times10^3t)]$volts. Determine Modulation Index, Modulation frequency, frequency deviation, Carrier frequency bandwidth, and power of FM signal. **06**

OR

5 a) Explain how operation of balanced discriminator with circuit diagram and characteristics for the demodulation of FM signals? **07**

b) Show that the Spectrum of FM contains infinite number of sidebands. **07**

c) Consider figure 5.c, Find the carrier frequency, frequency deviation and modulation index at A and B. Assume the output of the mixer, the additive frequency component is being selected. **06**

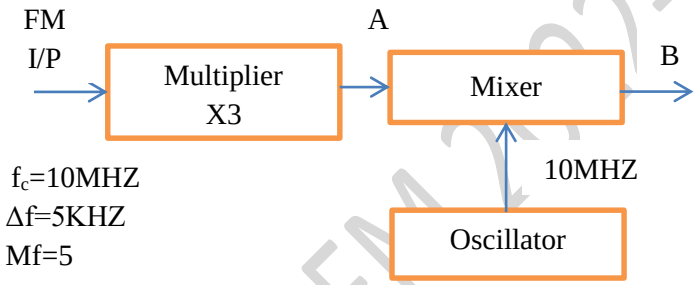

Figure 5.c

UNIT - IV

6 a) An AM receiver operating with a sinusoidal wave and 80% modulation has an output signal to noise ratio of 30dB. Calculate the corresponding carrier to noise ratio. Prove the formula used. **10**

b) Obtain an expression for the improvement in the SNR of FM receiver from the use of pre-emphasis and de-emphasis filters. **10**

UNIT - V

7 a) State Sampling Theorem for low pass signals? Explain the significance of continuous time signal represented by samples? **08**

b) Define aliasing? Suggest and explain the methods used to avoid aliasing. **08**

c) Find the Nyquist rate and Nyquist interval for the signal m(t)= Sin (500 πt)/ πt **04**

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