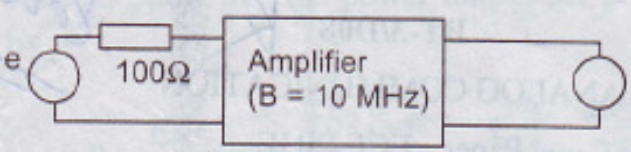
(b) The following system is maintained at T = 290° K. When e = 0 V, the voltmeter reads 3 volts. When e = 10 μ V rms, the voltmeter reads 5 volts. Find the noise figure.



8

3. (a) What is SSB modulation? Describe the filter method to generate SSB signal. 10

(b) The output signal from an AM modulator is

$v(t) = 5\cos(1800\pi t) + 20\cos(2000\pi t) + 5\cos(2200\pi t)$

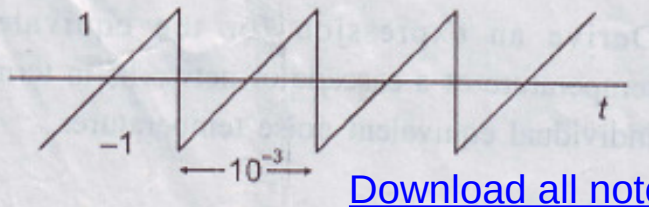
Determine: (i) the modulating signal (ii) the carrier, (iii) the modulation index, (iv) the bandwidth in Hz, and (v) the ratio of the power in the sidebands to the power in the carrier. 10

4. (a) What is DSB-SC modulation? Draw the circuit diagram of Balanced modulator using transistors and explain its operation. 10

(b) With the help of a diagram explain the principle of square-law demodulation of AM signals. 10

5. (a) Describe the reactance modulation method of FM generation. How is frequency stability obtained in this method ? 12

(b) Draw the waveforms of frequency and phase modulated signals for the given modulating signal. Why should the constant K_p (modulator's sensitivity) be less than π for phase modulation ?



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BT-3/D08

ANALOG COMMUNICATION

Paper : ECE-203E

Time : Three Hours] [Maximum Marks : 100

Note : Attempt any *five* questions.

1. (a) Explain the following terms :

(i) Signal to noise ratio.

(ii) Noise figure.

(iii) Noise bandwidth.

(iv) Noise temperature. 12

(b) Gaussian noise $n(t)$ of zero mean has a power spectral density

$$G_n(f) = \begin{cases} 2\mu v^2/\text{Hz} & |f| \le 1\text{ kHz} \\ 0 & \text{elsewhere} \end{cases}$$

The noise $n(t)$ is passed through a filter. The power output of the filter is one half the power of $n(t)$. Write the probability density function for the output noise of the filter. 8

2. (a) Derive an expression for the equivalent noise temperature of a cascade of networks in terms of their individual equivalent noise temperatures. 12

FM signal. Why is it necessary to employ a frequency multiplier in this method ? 10

(b) Draw the circuit diagram of a ratio detector and explain its operation. How is amplitude limiting obtained in this detector ? 10

7. (a) Draw the diagram of Armstrong FM radio transmitter and briefly describe the function of each stage. 10

(b) What are the main requirements of an ideal privacy device? Explain the principle of displaced speech-band privacy device used in radio communication. 10

8. (a) Explain the following terms in brief :

(i) Sensitivity.

(ii) Selectivity.

(iii) Fidelity.

(iv) Image frequency. 8

(b) Draw the block diagram of a super-heterodyne AM receiver and discuss the function of each block. 12
