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No. of Printed Pages—3

EC-503

B. TECH.

FIFTH SEMESTER EXAMINATION, 2003-2004

ANALOG COMMUNICATION SYSTEM

Time : 2 Hours

Total Marks : 50

Note : Attempt ALL questions.

1. Attempt any *FOUR* parts of the following :—
- What is the fundamental limitation in Communication system ? Why is modulation of signal required for transmission ?
 - Explain how the external sources of noise affect the performance of communication system.
 - What do you understand by Noise Figure and Noise Temperature of a two port network.
 - Define Noise Equivalent Bandwidth. Calculate noise equivalent bandwidth of a tuned RLC filter centered at f_o and having 3 dB bandwidth $B < < f_o$.
 - An amplifier with a noise figure 6 dB and gain 20 dB is connected to another amplifier with noise figure 16 dB and gain 60 dB. What is the overall noise temperature of cascaded system ?
 - Explain the experimental determination of noise figure.

2. Attempt any *FOUR* parts of the following :—

- (a) Amplitude modulated wave is obtained by a base band signal $m(t)$ band limited to the interval $(-W, W)$ and sinusoidal carrier of frequency F_c . Find the spectrum of AM wave.
- (b) Explain the working of a modulator for generating AM wave.
- (c) Explain the working of square law demodulator for detection of AM wave.
- (d) Draw the block diagram of phasing method for generating SSB signal. What happens when carrier phase shift network produces a phase shift which differs from 90° by a small angle α .
- (e) What is a DSB-SC modulator ? Explain how the ring modulator for generation of DSB-SC wave acts as a commutator.
- (f) What are the advantages of having RF stage in AM receiver ? What is the selectivity of the receiver ?

3. Attempt any *TWO* parts of the following :—

- (a) What is phase deviation and frequency deviation in angle modulated system ?

A carrier which attains a peak voltage of 5 V has a frequency of 100 MHz. This carrier is frequency modulated by a sinusoidal waveform of frequency 2 kHz to such an extent that frequency deviation from carrier frequency is 75 kHz. The modulated waveform passes through zero and is increasing at time $t=0$. Write the expression modulated carrier waveform.

- (b) Explain, with the help of block diagram, the Armstrong method of generating FM signal.
- (c) What is a narrowband and wideband FM ? Find the bandwidth required for a Gaussian modulated wideband FM signal.
4. Attempt any *TWO* parts of the following :—
- (a) The average noise power per unit bandwidth measured at the front end of an AM receiver is 10^{-3} watts/Hz. The modulating wave is sinusoidal with a carrier power of 80 kW and sideband power of 10 kW per sideband. The message bandwidth is 4 kHz. Assuming the use of envelope detector in the receiver, determine the output signal-to-noise ratio of the system.
- (b) Prove that in FM System, an increase in transmission bandwidth, provides a corresponding increase in output signal-to-noise ratio, if carrier-to-noise ratio is high.
- (c) What is capture effect in FM. Explain the necessity of pre-emphasis and deemphasis in FM.
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