Roll No. ..... **Total Pages : 04**

BT-4/M-20 **34010**

COMMUNICATION SYSTEMS

EE-206E

Time : Three Hours] [Maximum Marks : 100

Note: Attempt *Five* questions in all, selecting at least one question from each Section. All questions carry equal marks. Assume missing data if any. Symbols have their usual meanings.

Section I

1. (a) What are the basic constituents of a communication system ? **10**

(b) Explain the need for modulation in a communication system. **10**

2. (a) Define Time domain and give examples of a time domain instrument. **5**

(b) What is the significance of the Fourier series? Describe the following wave symmetries : Even, odd, and half-wave. **8**

(c) For a nonlinear amplifier with two inputs 7 kHz and 4 kHz :

(a) determine first three harmonics present in the output for each frequency,

(b) determine the cross product frequencies produced in the output for values of n and m of 1 and 2. **7**

Section II

3. (a) Show how to derive the equation normally used to describe a nonlinear resistance. What happens when two frequencies are added and then passed through a nonlinear resistance. List the various circuits and processes which make use of this state of affair.

(b) An Amplitude Modulated transmitter radiates 9 kW of power when the carrier is unmodulated and 10.125 kW when the carrier is sinusoidally modulated. Find m_a. Now if another sine wave corresponding to 40% modulation is transmitted simultaneously, then calculate the total transmitted power. **6**

(c) How the message signal is recovered from DSBSC wave ? Explain any one method. **7**

4. (a) Explain the relationship between phase and frequency modulation. **5**

(b) Explain Carson's rule to calculate frequency bandwidth in FM system. **5**

(c) Discuss the direct generation of FM wave. **5**

(d) Explain with double spotting is. What is its nuisance value and advantage ? **5**

Section III

5. (a) Explain Pulse Code Modulation (PCM). Also derive the expression for quantization error. **8**

(b) Explain FDM scheme with the help of a diagram.

6. (a) Describe delta modulation system. What are its limitations ? How can they be overcome ?

(b) Design a block code with a minimum distance of three and a message block size of eight bits.

Section IV

7. (a) Explain Coherent Binary FSK. **5**

(b) Explain FSK and define FSK Bit rate, Baud and Bandwidth. **7**

(c) Determine (a) the peak frequency deviation (b) minimum bandwidth and (c) baud for a binary FSK signal with a mark frequency of 49 kHz, a space frequency of 51 kHz and n input bit rate of 2 kbps. **8**

8. (a) Calculate the noise figure for an amplifier or receiver having input impedance R_i and output impedance R_1 and an overall voltage gain A. **7**

(b) Discuss the types, causes and effects of the various forms of noise which may be created within a receiver or an amplifier. **7**

(c) The noise figure of the individual stages of a two-stage amplifier is 2.03 and 1.54 resp. The available power gain for the first stage is 62. Evaluate the overall noise figure. **6**