1-1-2020

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

BT-3/D-19 33089

ANALOG COMMUNICATION

ECE-209N (Opt. II)

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. (a) Summarize the cause and effects of thermal noise in electronic system in terms of noise power, noise voltage and spectral density. **5**

(b) The parallel tuned circuit at the input of a radio receiver is tuned to resonant at 300 MHz by a capacitance of 25 pF. If the Q factor of the circuit is 35 and the channel bandwidth is 10 kHz, calculate the effective noise voltage and noise power at 290 K. **4**

(c) Explain the amplitude modulation, derive the expression for modulation index and obtain the frequency spectrum when message is sinusoid. **6**

2. (a) Derive an expression for the equivalent noise temperature of a cascade of networks in terms of their individual equivalent noise temperature. **8**

(b) Define Frequency Modulation. Derive the expression for instantaneous value of an FM voltage and define the modulation index and sideband production in FM. **7**

Unit II

3. (a) With the help of suitable diagrams and waveforms describe the square law diode modulation system. **7**

(b) With neat diagram explain working of enveloped detector. The RC load for a diode detector is a 1000 pF capacitor in parallel with a 10 KΩ resistor. Calculate the maximum modulation depth for message frequency of 10 kHz to avoid diagonal peak clipping ? What is the other error associated with envelope detector ? How can it be avoided ? **8**

4. (a) Write short notes on the following :

(i) Frequency scientillation

(ii) Frequency drift. **8**

(b) With the block diagram, explain the working of a super heterodyne receiver and list their advantges. **7**

Unit III

5. (a) Explain, with the aid of a block diagram, how you would design an FM stereo transmission system which does not need to be compatible with monaural FM systems. 8

   (b) With the help of block diagrams, explain the working of Armstrong FM transmitter. 7

6. (a) Using circuit diagram, show how the Foster-Seelay discriminator is derived from the balanced slope detector, and how, in turn, the ratio detector is derived from the discriminator. In each step stress the common characteristics, and show what it is that makes each circuit different from the previous one. 8

   (b) Why pre-emphasis and de-emphasis are used in FM? Draw the circuit diagrams and the characteristics of pre-emphasis and de-emphasis circuits. 7

Unit IV

7. (a) With neat diagram explain the phase shift method for SSB generation. State the advantages and disadvantages of this method. 8

(b) Explain with the help of waveforms modulation and demodulation of vestigial side band system. 7

8. (a) Explain the operation of ISB receiver with necessary block diagram. 7

(b) Draw and explain the generation and demodulation of PAM with its frequency spectrum waveform. Also describe time division multiplexing using PAM system. 8