Roll No. ..... Total Pages : 3

BT-4/M-21 **44161**

BASICS OF ANALOG COMMUNICATION
Paper–ES-208A

Time : Three Hours] [Maximum Marks : 75

Note : There is total *eight* questions. Each question carries equal marks. The candidate is required to attempt *five* questions selecting *one* question from each unit.

UNIT–I

1. (a) Determine the expression for noise figure of cascaded amplifier and write final expression for multistage amplifier. 9

(b) The first stage of a two stage amplifier has voltage gain of 10, a 600 ohm input resistor, a 1600 ohm equivalent noise resistance and a 27 kilo ohm output resistor. For the second stage, these values are 25 kilo ohm, 81 kilo ohm, 10 kilo ohm and 1 mega ohm respectively. Find the equivalent noise resistance. 6

2. (a) With the help of suitable waveforms, derive an expression for instantaneous voltage of amplitude modulated signal. Also describe the power relation involved in AM. 7

(b) Differentiate between :

(i) NBFM and WBFM.

(ii) FM and PM. 8

UNIT–II

3. (a) With the help of suitable diagram and waveforms, describe the operation of balanced modulator. 7

(b) What are the constituent stages of amplitude modulation radio transmitter and briefly describe the function of each stage ? 8

4. (a) Explain superhetrodyne receiver in detail with the help of diagram using concept of frequency mixing. 9

(b) An amplitude wave $10[1 + 0.6 \cos 2\pi 10^3 t] \cos 2\pi 10^6 t$ is to be detected by a linear diode detector. Find (i) time constant τ, (ii) the value of resistance R if the capacitor used is 100 Pf.

UNIT–III

5. (a) A carrier A cos $w_c t$ is modulated by a signal

$$f(t) = 2 \cos 2\pi 10^4 t + 5 \cos 2\pi 10^3 t + 3 \cos 4\pi 10^4 t.$$

Find the bandwidth of FM signal by using Carson's rule. Assume $K_f = 15 \times 10^3$ Hz per volt. Also find Modulation index. 6

(b) Draw the complete block diagram of the Armstrong frequency modulation system and explain the function of the mixer and multipliers in it. 9

6. (a) What is the principle of operation of FM detection? Explain in detail the working of Foster Seelay Detector with its merits and demerits. 8

(b) What is Pre-emphasis and De-emphasis? Why it is required? 7

UNIT–IV

7. (a) With neat diagram explain the Weaver's method for SSB generation. State the advantage and disadvantage of this method. 7

(b) With the help of circuit diagram, explain how balanced modulator is able to demodulate the SSB signal ? 8

8. (a) Explain vestigial side band modulation. What are the advantages and disadvantages of vestigial side band modulation? 7

(b) What is pulse width modulation? Describe the process of generation and demodulation of PPM. 8

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