ANALOG COMMUNICATION

(Common with CO IT)

(According to Syllabus Dec. 2004)

Paper : ECE-203 E

Time : Three Hours] [Maximum Marks : 100

Note :— Solve any **FIVE** questions.

1. Explain the following terms :
   (a) Atmospheric noise. 2
   (b) Solar noise. 2
   (c) Cosmic noise. 2
   (d) Industrial noise. 3
   (e) Shot noise. 2
   (f) Flicker noise. 2
   (g) Thermal noise. 3
   (h) Transit time noise. 2
   (i) Partition noise. 2

2. (a) A parallel RLC circuit centred at 3 GHz has a bandwidth of 10 MHz. If the resistor R is 10 kΩ, calculate R(f) and the power spectral density Gu(f) of the noisy circuit. 10
   (b) Calculate the noise bandwidth of
   (i) a parallel RLC circuit having a 3 dB bandwidth B.
   (ii) an RC low pass filter having a 3 dB bandwidth f_c. 5, 5

3. (a) A carrier signal is
   $$S_i(t) = A \cos 2\pi f_c t$$

and message signal is
$$m(t) = A_m \sin 2\pi f_m t$$
assume $f_c = 10 f_m$
Plot :
   (i) AM wave
   (ii) FM wave
   (iii) PM wave. 2, 3, 3
   (b) Make the comparison between :
   (i) FM and AM.
   (ii) FM and PM.
   (iii) Wideband FM and Narrowband FM
   (iv) AM and narrowband FM. 3, 3, 3, 3

4. (a) Explain, with the help of necessary figures, the working of a balanced FM demodulator. 8
   (b) Explain the working of
   (i) Foster-Seeley discriminator.
   (ii) Ratio detector. 6, 6

5. (a) Explain the working of a diode detector. 8
   (b) The waveform $v(t) = (1 + m \cos w_m t) \cdot \cos w_c t$, with m a constant ($m \leq 1$), i, applied to the diode detector, show that, if the demodulator output is to follow the envelope of v(d), it is required that at any time to
   $$\frac{1}{RC} \geq w_m \left(\frac{m \sin w_m t_0}{1 + m \cos w_m t_0} \right).$$ 12

6. (a) A carrier is frequency modulated by a sinusoidal signal with $f_m = 2$ kHz, resulting in a frequency deviation of 5 kHz. What is the bandwidth occupied by the modulated wave ? The amplitude of the modulating sinusoid is increased by a factor of 3 and its frequency lowered to 1 kHz. What is the new bandwidth ? 10

modulation.

10

7. (a) What are carrier frequency requirements of a radio transmitter ?

5

(b) Explain the working of a radio transmitter using low power level modulation system.

7

(c) Explain the working of a harmonic generator.

8

8. (a) What are salient features of a broadcast radio receiver ? 4

(b) Give the characteristics of an ideal receiving antenna. 4

(c) Explain AVC in radio receiver.

6

(d) Draw the circuit of a simple noise limiter circuit and describe its functioning.

6