

Total No. of Questions : 12]

SEAT No. :

P618**[4457]-70**

[Total No. of Pages : 3

S.E. (Electronics / E & TC) (Semester - II)
COMMUNICATION THEORY
(2008 Course)

*Time : 3 Hours**[Max. Marks : 100**Instructions to the candidates:*

- 1) Answer 3 questions from Section I and 3 questions from Section II.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data, if necessary.

SECTION - I

- Q1)** a) With the neat diagram explain ring modulator for DSBSC. Draw waveform and spectrum for DSB-SC. [8]
- b) An AM transmitter radiates 9 kW of power when the carrier is unmodulated and 10.125 kW when the carrier is sinusoidally modulated. Find the modulation index, percentage of modulation. Now, if another sine wave, corresponding to 40 percent modulation is transmitted simultaneously, then calculate the total radiated power. [8]

OR

- Q2)** a) With the help of spectrum and block diagram explain VSB modulation. What is its application? [8]
- b) Sketch AM wave for a sinusoidal modulating signal of frequency 1 KHz and Peak magnitude of 10 V for different modulation indices $m = 30\%$ and 70% and 100% . [8]

- Q3)** a) Derive the equation for FM and PM signal. With the help of block diagrams explain how FM and PM are inseparable. [10]
- b) Estimate bandwidth for FM and PM for the triangular modulating wave $m(t)$ of peak amplitude = 1V and time period = 2×10^{-4} s for $K_f = 2\pi \times 10^5$ and $K_p = 5\pi$. Repeat the problem if the amplitude of $m(t)$ is doubled. Carrier frequency is 100 MHz. [8]

OR

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- Q4)** a) Explain a direct method of generation of FM. [8]
 b) An angle modulated signal with carrier frequency $W_c = 2\pi \times 10^5$ is described by the following equation [10]
- $$V_{EM}(t) = 10\cos(Wct + 5\sin 3000t + 10\sin 2000\pi t)$$
- i) Find the power of the modulated signal.
 - ii) Frequency Deviation.
 - iii) Phase deviation.
 - iv) Estimate the BW.

- Q5)** a) Explain Envelope Detector. What are the errors observed in the diode detector? [8]
 b) With the help of an example, waveforms and block diagram explain AM superhet receiver. [8]

OR

- Q6)** a) For tone modulation derive the equation for upper limit of RC to ensure the capacitor follows the envelope of an AM DSBFC wave. [6]
 b) Give the principle of detection of DSBSC waveform. [2]
 c) With the help of equations explain how PLL can be used for FM Detection. [8]

SECTION - II

- Q7)** a) Consider a receiving system consisting of an RF amplifier with a noise figure of $F_1 = 9$ dB and a gain of 30 dB followed by a mixer with a noise figure of $F_2 = 8$ dB and a conversion gain of 15 dB and finally IF amplifier with a noise figure of $F_3 = 6$ dB and a gain of 30 dB find overall noise figure and noise temperature. [8]
 b) Discuss thermal noise and shot noise in detail. [6]
 c) Define equivalent noise temperature and give its importance. [2]

OR

- Q8)** a) Explain Effect of Amplification on SNR in detail. [8]
 b) Derive the relation between equivalent noise voltage generated when resistors are connected in parallel and when they are connected in series. [6]
 c) Give the significance of equivalent noise bandwidth. [2]

- Q9)** a) Explain the importance of Pre - emphasis and De - emphasis network in the performance of FM system. [8]
 b) Describe the performance of baseband system in presence of noise. [8]

OR

- Q10)** a) Explain the performance of DSB - SC in presence of noise. [8]
b) Describe in detail capture effect and FM threshold effect. [8]

- Q11)** a) State and prove Sampling theorem in time domain. [6]
b) With the help of block diagram explain differential PCM. [6]
c) Describe with suitable example band limited and time limited signal. [6]

OR

- Q12)** a) With the help of block diagram explain Adaptive Delta Modulation. [6]
b) Explain in detail types of sampling and distortions. [8]
c) Describe distortions present in Delta Modulation. [4]

