Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.TECH(ECE-OLD)/SEM-4/EC-403/2012

2012
ANALOG COMMUNICATION

Time Allotted : 3 Hours *Full Marks :* 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : 10 × 1 = 10

i) SSB system is not used for broadcasting because

a) there will be poor fidelity as only one sideband is transmitted

b) there is more power in sidebands

c) transmitter and receivers are complicated

d) all of these.

ii) The saving in power in a DSB_SC system, modulation at 80% is

a) Nil b) 80%

c) 50% d) 75·56%.

iii) In the spectrum of FM

a) the carrier frequency disappears when modulation index is large

b) the amplitude of any sideband depends on the modulation index

c) the total number of sidebands depends on the modulation index

d) carrier frequency cannot disappear.

iv) Modulation is used to

a) Reduce bandwidth

b) Reduce power

c) Separate different transmission

d) None of these.

v) Range of audio frequencies is

a) 20 Hz to 20 kHz b) 25 Hz to 20 kHz

c) 20 MHz to 20GHz d) 2Hz to 20Hz.

vi) Entropy is basically a measured of

a) rate of information

b) average information

c) disorder of information

d) probability of information.

vii) If the SNR of the signal is increased, then the channel capacity

a) is decreased b) remains constant

c) is increased d) cannot be determined.

viii) In TV system, picture and sound respectively use

a) AM, FM b) FM, AM

c) FM, FM d) AM, AM.

ix) Recovering information from a carrier is known as

a) modulation b) detection

c) de-multiplexing d) carrier recovery.

x) The sampling frequency f_s , must be (B = Bandwidth)

a) equal to B

b) greater than B

c) greater than 2B

d) must lie between B and 2B.

xi) Which of the following modulation is analog ?

a) PCM b) MAM

c) Data modulation d) DPCM.

xii) The amplitude of sideband in an AM wave is

a) Independent of carrier amplitude

b) Independent of modulation index

c) $\frac{1}{2}$ *carrier amplitude* modulation index

d) Carrier amplitude *modulation index.

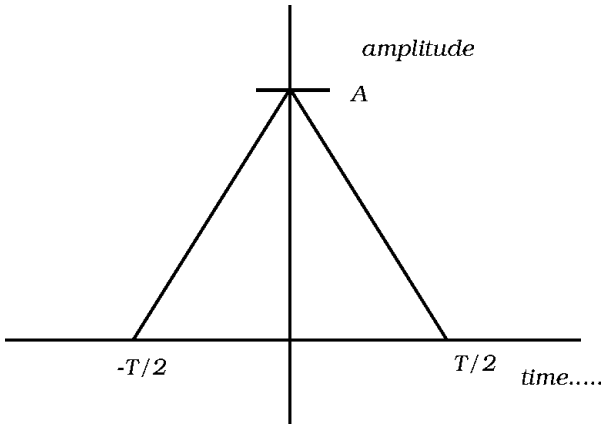
GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. a) Explain the difference between narrowband FM and Wideband FM.

b) Determine the Fourier Transform of given signal : 2 + 3



3. a) What is DSB_SC modulation ?

b) With neat diagram, show how DSB_SC signal can be generated using balanced modulator ? 1 + 4

4. What is shot noise ? Calculate the figure of merit for a DSB_SC system. 1 + 4

5. Explain the transmitter and receiver of pulse code modulation. Discuss noise effect in PCM. 4 + 1

6. a) What should be the transfer function of a system if it only amplify and shift the phase of input signal.

   b) How a square wave can be utilized to obtain the demodulated output of AM ? 2 + 3

7. a) What is Entropy ?

   b) Explain Shanon-Fano Algorithm. 2 + 3

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

8. a) Show that in case of AM with modulation index equal to 1, only 33·33% of transmitted power is used to carry information.

   b) Determine the power content of the carrier and each of the sidebands for an AM signal having a per cent modulation of 80% and a total power of 2500 W.

   c) Write down the advantages of FM over AM.

   d) Explain how PLL can be used as an FN demodulator.

3 + 4 + 4 + 4

9. a) Explain the principle of detection of FM signal using balanced slope detector circuit using proper diagram.

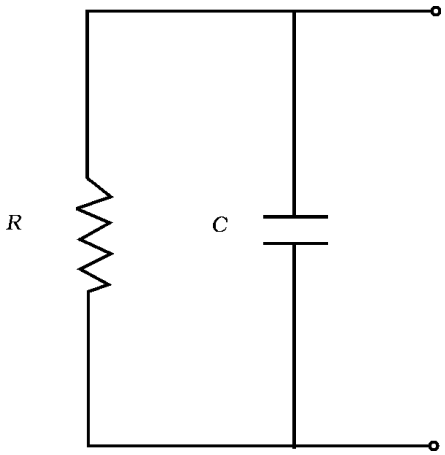
   b) Explain the operation of Quadrature Carrier Multiplexing with suitable block diagram.

   c) Evaluate noise performance of FM systems.

   d) Prove that the performance of an SSB system using synchronous detection is equivalent to the performance of both DSB and baseband systems. 5 + 3 + 4 + 3

10. a) Draw the block diagram of a super heterodyne receiver and explain the function of each block.

    b) Calculate the output rms noise voltage from the following figure :



   c) Prove that narrowband FM offers no improvement in SNR over AM.

   d) Draw the spectrum of (i) DSB_SC(AM), (ii) SSB signal, (iii) VSB signal. 5 + 4 + 3 + 3

11. a) Write down the advantages and disadvantages of cyclic code.

b) What are Hamming Codes ? Write the properties of Hamming Code.

c) Define Hamming Distance.

d) Explain coding and decoding mechanisms of Linear Block Code.

e) Determine a generator polynomial $g(x)$ for a (7, 4) cyclic code. 3 + 3 + 2 + 5 + 2

12. Write short notes on any *three* of the following : 3 × 5

a) Ring Modulator

b) Noise Performance in FM System

c) Pre-emphasis and De-emphasis

d) Reactance Modulator.