Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech (ECE-OLD)/SEM-4/EC-403/2013

2013

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 : $10 \times 1 = 10$

   i) The bandwidth required for transmission of SSB-SC signal is

      a) more than AM signal

      b) less than DSB-SC signal

      c) more than VSB signal

      d) none of these.

   ii) If frequency for superheterodyne commercially available AM receivers is

      a) 460 kHz b) 500 kHz

      c) 455 kHz d) 355 kHz.

   iii) Balance modulator circuit is used to reject

      a) Carrier b) LSB

      c) USB d) LSB and USB.

iv) QAM modulator needs a phase shifter of phase shift

a) $\pi/6$ b) $\pi/4$

c) $\pi/3$ d) $\pi/2$.

v) If $X(\omega)$ is the Fourier transform of $x(t)$ then Fourier transform of $x(t)\, e^{j\omega t}$ is

a) $X(\omega - \omega_0)$ b) $X(\omega_0 - \omega)$

c) $X(\omega + \omega_0)$ d) $X(\omega_0)$.

vi) What is the maximum transmission efficiency of A.M. signal ?

a) 67·3% b) 50·2%

c) 33·3% d) 46·6%.

vii) The function of the input transducer in a communication system is

a) to transmit the message signal

b) to modulate the message signal

c) to convert the message sound signal into electrical signal

d) none of these.

viii) Flat-top sampling leads to

a) an aperture effect b) aliasing effect

c) loss of signal d) none of these.

ix) In TV broadcasting, sound is modulated in

a) VSB b) FM

c) SSB d) DSBSC.

x) A carrier wave of 500 watts is subjected to 100% amplitude modulation. The power in side band is

a) 759 W b) 300 W

c) 250 W d) 400 W.

xi) The range of human voice frequency is

a) 20 Hz - 20 kHz b) 20 Hz - 20 MHz

c) 20 Hz - 4 kHz d) 20 Hz - 4 MHz.

xii) If W_C be the carrier frequency of AM signal then the sideband frequencies are

a) $W_C + W_m$, $W_C - W_m$

b) $W_C + W_m /2$, $W_C - W_m /2$

c) $W_C^2 + W_m^2$, $W_C^2 - W_m^2$

d) $W_C^2 + W_m^2 /2$, $W_C^2 - W_m^2 /2$.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. a) State and prove Parseval's theorem.

   b) Draw the block diagram of a basic analog communication system. 2 + 3

3. What is angle modulation ? Justify that frequency modulation is an angle modulation.

4. What is balanced modulator ? Describe it. 2 + 3

5. What are PWM and PPM ? Compare the performance of the two signals. 2 + 3

6. Show that PLL acts as a FM demodulator.

7. What do you mean by TDM ? Where is the concept used ? 3 + 2

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

8. a) Write the Dirichlet's conditions for Fourier series.

   b) Write the trigonometric form of the Fourier series representation of a periodic signal.

   c) Find out the maximum limit of transmission efficiency of an AM signal. 6 + 3 + 6

9. a) Draw the block of a superheterodyne receiver & explain its working principle.

   b) What is image frequency related to it ?

   c) Explain the selectivity related to it. 10 + 2 + 3

10. a) Draw the schematic diagram of NBFM generation & explain.

    b) Explain the principle of FM wave generation using direct method. State the demerits of this method.

    c) Explain FDM with proper block diagram. 5 + 5 + 5

11. a) Discuss the method for modulation & demodulation of PAM signal.

    b) Compare PAM with PWM system of data transmission.

    c) A 10 MHz sinusoidal carrier wave of amplitude 10 mV is modulated by a 5 kHz sinusoidal audio signal wave of amplitude 6 mV. Find the frequency component of the resultant modulated wave and their amplitude.

    6 + 5 + 4

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

    a) VSB moduation.

    b) Envelope detector

    c) QAM system

    d) Stereophonic transmitter & receiver

    e) Pulse code modulation.