Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.TECH/EE/SEM-8/EE-802A/2013

2013

COMMUNICATION ENGINEERING

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) Maximum power efficiency of the AM modulator is

a) 25% b) 50%

c) 75% d) 100%.

ii) An FM signal with modulation index 9 is applied to a frequency tripler. The modulation index of the output signal is

a) 0 b) 3

c) 9 d) 27.

iii) Quantization noise occurs in

a) time division multiplexing

b) frequency division multiplexing

c) pulse code modulation

d) pulse width modulation.

iv) Thermal Noise Power in a resistance R is proportional to

a) T b) T^2

c) $1/T$ d) T^3.

v) The channel capacity of a white channel is given by

a) $C = B \log_2 (1 + S/N) \; b/s$

b) $C = B \log_2 (1 + N/S) \; b/s$

c) $C = N \log_2 (1 + N^2/S^2) \; b/s$

d) $C = nB \log_2 (1 + S/N) \; b/s$

The symbols having their usual meanings.

vi) Principle of propagation of signal through optical fibre is

a) Total internal reflection

b) total internal refraction

c) total internal dispersion

d) total internal polarization.

vii) Pre-emphasis circuit is used

a) after modulation

b) before modulation

c) before detection

d) after detection.

viii) If carrier modulated by a digital bit stream had one of the possible phases 0°, 90°, 180° and 270° then modulation is called

a) BPSK b) QPSK

c) QAM d) MSK.

ix) A source generates 4 messages. The entropy of the source will be maximum when

a) all probabilities are equal

b) one of the probabilities is 1 and others 0

c) probabilities are 1/2, 1/6, 1/6 and 1/6

d) two of the probabilities are 1/2 and others 0.

x) The spectral density of white noise is

a) Exponential

b) Uniform

c) 3 bits/symbol

d) Guassian.

xi) The Nyquist rate of the signal

$x(t) = \frac{1}{2\pi} \cos(4000\pi t) \cos(1000\pi t)$ is

a) 5 kHz b) 4 kHz

c) 2·5 kHz d) 10 kHz.

xii) PCM is preferred to PAM because of the

a) Resistance to quantizing error

b) Simplicity

c) Lower cost

d) Superior noise immunity.

GROUP – B

(Short Answer Type Questions)

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

2. Explain the operation of envelope detector. State the condition for proper envelope detection of AM wave. 4 + 1

3. Explain the working principle of a ring modulator. Why it is called double balanced modulator ? 4 + 1

4. Explain the operation of a PWM modulator using necessary waveforms.

5. Define the terms sensitivity and image frequency in AM receiver.

6. What are the similarities and dissimilarities between AM and NBFM ?

GROUP – C

(Long Answer Type Questions)

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

7. a) Explain how a non-linear device can be used for generation of AM signal. 5

   b) Discuss how an SSB-SC wave can be generated using phase shift method. 5

   c) An AM broadcast transmitter radiates 10 kW of power if modulation percentage is 60. Calculate how much of this is carrier power, depth of modulation and side band power. 5

8. a) With the help of block diagram explain the Armstrong indirect FM transmitter. 6

b) How can you produce FM using PM modulator and PM using FM modulator ? 4

c) How PLL is used to demodulate FM ? 5

9. a) Draw the block diagram of a simple superheterodyne receiver and explain its principle. 7

b) A single-tone AM wave has a modulation index of 80%. What is the saving in power if a carrier and one of the sidebands are suppressed ? 4

c) Define the Carson's rule for FM bandwidth. An FM wave modulated to a depth of 8, generates a signal of BW of 180 kHz. Find the frequency deviation. 4

10. a) Explain the working principle of a QPSK system (both transmitter and receiver). 8

b) Compare ASK, FSK and PSK. 5

c) What is the advantage of QPSK over BPSK ? 2

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

a) Reactance FET modulator

b) Automatic frequency control

c) Manchester code

d) Adaptive delta modulation

e) A/D conversions

f) MEO and LEO satellites.