Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech/ICE/NEW/SEM-6/IC-605B/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) Granular noise is associated with

a) PCM b) DPCM

c) DM d) QAM.

ii) The difference between PM and FM

a) is purely theoretical as they are same in practice

b) is too great to make the two systems compatable

c) lies in the poorer audio response of phase modulation

d) lies in the different definition of modulation index.

iii) The length of the antenna to transmit a singal must be at least

a) one third of wavelength

b) two third of wavelength

c) one fourth of wavelength

d) none of these.

iv) SSB signal can be detected by

a) envelope detector

b) PLL

c) synchronous detector

d) Foster-Seeley discriminator.

v) Which of the following modulations is analog ?

a) PCM b) Differential PCM

c) PAM d) Delta modulation.

vi) The bandwidth required for transmitting a 4 kHz signal using PCM with 128 quantization levels is

a) 8 kHz b) 16 kHz

c) 28 kHz d) 32 kHz.

vii) A broadcast radio transmitter radiates 20 kW when the modulation percentage is 60. The carrier power will be

a) 1·2 kW b) 1·45 kW

c) 16·94 kW d) 20 kW.

viii) Recovering information from carrier is known as

a) demultiplexing b) modulation

c) detection d) carrier recovery.

ix) In an envelope detector for AM signal

a) only diode is used

b) only capacitor is used

c) diode and capacitor are used

d) indicator and capacitor are used.

x) The main advantage of PCM system is

a) lower bandwidth b) lower power

c) lower noise d) none of these.

xi) Which one is the digital modulation scheme ?

a) PWM b) PPM

c) None of these d) All of these.

xii) If *fm* is the message signal then bandwidth of narrow band frequency modulated signal is

a) *fm* b) 2*fm*

c) infinity d) none of these.

GROUP – B
(Short Answer Type Questions)

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

2. Distinguish between PAM, PWM and PPM.

3. How can balanced modulator be used to generate a DSBSC signal ?

4. Explain the working priciple of envelope detector.

5. State the sampling theorem. Explain anti–aliasing filter.

6. Encode the data stream 110100 using the following line coding techniques :

   a) RZ (unipolar)

   b) AMI

   c) NRZ (polar).

GROUP – C
(Long Answer Type Questions)

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

7. a) What is modulation ? Why is modulation needed for any communication system ? 2 + 3

   b) Expain the basic block diagram for the communication system. 5

   c) Write down the basic difference between analog communication and digital communication. 3

   d) What is entropy ? 2

8. a) Derive the expression for the PM and FM waves. What is the relation between them ? 8 + 2

   b) What is Carson's rule ? 2

   c) What is the modulation index of an FM signal having a carrier swing of 100kHz when the modulating signal has a frequency of 8kHz ? 3

9. a) Derive the total power of a single tone AM wave $P_t = P_c (1 + m^2 / 2)$ where P_c is the carrier power and m is the modulation index for a single tone AM signal. From this expression derive the current relation of a single tone AM singal. 4 + 3

   b) The antenna current of an AM transmitter is 8A, if only the carrier is sent, but it increases to 8.93A, if the carrier is modulated by a single sinusoidal wave. Determine the percentage of modulation. Also find the antenna current if percentage of modulation changes to 0.8. 6

   c) What is over-modulation ? 2

10. a) Explain the block diagram for the total PCM system. 5

    b) What are the limitations for PCM system ? 2

    c) What is delta modulation ? What are the limitations for delta modulation ? How can the limitation be overcome ? 2 + 2 + 1

    d) What is flat top sampling ? How does it differ from the natural sampling ? 2 + 1

11. a) Define ASK. What is the difference between ASK and FSK ? 1 + 2

b) Explain BPSK generation and reception technique. 7

c) The probabilities of the five possible outcomes of an experiment are given as $P(x_1) = 1/2$,

$P(x_2) = 1/4$, $P(x_3) = 1/8$, $P(x_4) = P(x_5) = 1/16$.

Detemine the entropy and information rate if there are 16 outcomes per second. 5

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

a) Eye pattern

b) TDM *vs* FDM

c) Entropy

d) Ring modulator

e) Non-uniform quantizer.