



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 compatible
 - 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 signal 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 f_m is the message signal then bandwidth of narrow band frequency modulated signal is

- a) f_m b) $2f_m$
- c) infinity d) none of these.

GROUP - B

(Short Answer Type Questions)

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

2. Distinguish between PAM, PWM and PPM.
3. How can balanced modulator be used to generate a DSBSC signal ?
4. Explain the working principle 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

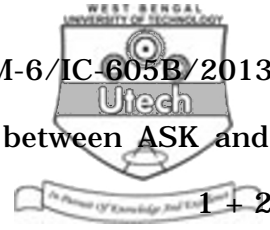
(Long Answer Type Questions)

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

- 7. a) What is modulation ? Why is modulation needed for any communication system ? 2 + 3
- b) Explain 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 signal. 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 $P(x_1) = 1/2$,

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

Determine 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.
-