



Name :

Roll No. :

Invigilator's Signature :

CS/B.Tech (CSE/IT)/SEM-4/EC-411/2011

2011

**PRINCIPLES OF 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 × 1 = 10

- i) If the noise level of the signal is increased then capacity of a band limited AWGN channel
 - a) is increased
 - b) is decreased
 - c) remains constant
 - d) none of these.
- ii) The modulation index of an AM wave is changed from 0 to 1. The transmitted power is
 - a) unchanged
 - b) halved
 - c) doubled
 - d) increased by 50 percent.



iii) In telephone channel, the bandwidth of each frequency division multiplexed SSB voice channel in a basic group is

- a) 4 kHz b) 5 kHz
- c) 3 kHz d) none of these.

iv) The intermediate frequency used for a superheterodyne AM receiver is

- a) 455 kHz b) 755 kHz
- c) 545 kHz d) 745 kHz.

v) If f_m is the frequency of the message signal then bandwidth of narrow band frequency modulated signal is

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

vi) If an FM wave has been generated from the message signal $m(t)$ then a PM wave can also be generated from

- a) $\int m(t) dt$ b) $\frac{d}{dt} m(t)$
- c) $[m(t)]^2$ d) none of these.



vii) Source coding in a data communication system is done in order to

- a) enhance the information transmission rate
- b) reduce transmission error
- c) conserve the transmitted power
- d) facilitate clock recovery in the receiver.

viii) Satellite capacity depends on

- a) weight that can be placed in orbit
- b) panel area available for energy dissipation
- c) transmitter power
- d) all of these.

ix) The main advantage of PCM system is

- a) lower bandwidth
- b) lower power
- c) lower noise
- d) none of these.

x) Which one is a digital modulating scheme ?

- a) PCM
- b) PAM
- c) PPM
- d) PWM.



- xi) Entropy is basically a measure of
- a) rate of information
 - b) average information
 - c) probability of information
 - d) disorder of information.
- xii) One of main functions of the RF amplifiers in a superheterodyne receiver is to
- a) provide improved tracking
 - b) permit better adjacent channel rejection
 - c) increase the tuning range of the receiver
 - d) improve the reflection of the image frequency.
- xiii) If the incoming carrier frequency in a super-heterodyne receiver is 1100 kHz with an intermediate frequency of 455 kHz, the image frequency is
- a) 910 kHz
 - b) 1555 kHz
 - c) 2010 kHz
 - d) none of these.
- xiv) In TV telecast, the sound signal is modulated in
- a) VSB
 - b) SSB
 - c) AM
 - d) FM.



GROUP – B
(Short Answer Type Questions)

Answer any *three* of the following.

3 × 5 = 15

2. a) What is the function of a transponder in satellite communication ? 3
- b) State the importance of 6/4 GHZ system. 2
3. Encode the data stream 110100 using the following line coding techniques :
 - a) RZ (polar)
 - b) RZ (bipolar)
 - c) NRZ (polar).
4. a) Define modulation. 2
- b) Why is modulation needed in a communication system ? 3
5. a) State sampling theorem. $2\frac{1}{2}$
- b) What is aliasing ? $2\frac{1}{2}$
6. With a neat sketch describe the indirect method of FM generation. 5



GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following.

3 × 15 = 45

7. a) Considering a sinusoidal modulating signal $m(t)$ and carrier $c(t)$, draw the following waveforms :
- i) AM signal
 - ii) PM signal
 - iii) FM signal. 2 + 2 + 2
- b) Derive the general expression for PM and FM waves. Hence comment on the relationship between them. 8 + 1
8. a) Draw the circuit of a weighted resistor type D/A converter and explain its principle of operation. 2 + 5
- b) What do you mean by geostationary satellite ? 2
- c) A 500 W carrier is modulated on a depth of 50%. Calculate the total power in the modulated wave in the following forms of AM :
- i) DSB with full carrier
 - ii) DSB with suppressed carrier. 6
9. a) With the help of necessary diagrams explain the basic principle of operation of TDM. 3 + 5
- b) Discuss the relative merits and demerits of ASK, PSK and FSK. 7



10. a) Give a neat sketch of an envelope detector circuit and explain its principle of operation. 7

- b) Consider a (7, 4) linear block code whose generator matrix is given below :

$$G = \begin{bmatrix} 1 & 0 & 0 & 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 0 & 1 & 1 & 1 \\ 0 & 0 & 1 & 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 & 0 & 1 & 1 \end{bmatrix}$$

Find the code vector for a message 1011 and also the parity check matrix. 6

- c) Find the bandwidth of a commercial FM transmission, if frequency deviation is 75 kHz and modulating frequency is 15 kHz. 2

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

- a) Ring modulator
- b) Pulse modulation
- c) Entropy
- d) LEO and MEO
- e) Delta modulation.

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