Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech (CSE-IT)/SEM-4/EC-411/2010

2010

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 : $10 \times 1 = 10$

i) The modulating technique which is most affected by noise is

a) PSK b) ASK

c) DPSK d) FSK.

ii) Recovering information from a carrier is known as

a) Demultiplexing b) Carrier recovery

c) Modulation d) Detection.

iii) The nyquist sampling rate for a signal band limited to 4 kHz is

a) 4 kHz b) 8 kHz.

c) 2 kHz d) 16 kHz.

iv) Pulse amplitude modulation is a process where by

a) the position of the pulse is changed as a function of the sample value

b) the width of the pulse is varied as a function of time

c) the height of a pulse is maid proportional to the sampled value

d) none of these.

v) Which of the following methods is employed in telephony ?

a) FDM b) TDM

c) Both (a) & (b) d) None of these.

vi) Synchronous detection is more disadvantageous than

a) phase shifting method

b) envelope detection method

c) selective filtering method.

vii) Maximum value of modulation index for AM is

a) 0 b) 0·5

c) 1 d) ∞.

viii) In TV system, picture and sound respectively use

a) AM, FM b) FM, FM

c) FM, AM d) AM, AM.

ix) For global communication number of satellite needed is

a) 1 b) 3

c) 5 d) 7.

x) Quantisation occurs in

a) PCM b) TDM

c) FDM d) PWM.

xi) For the generation of FSK the data pattern must be given in

a) RZ form

b) NRZ form

c) Any format.

xii) One of the main functions of the RF amplifiers in a superheterodyne receiver is to

a) provide improve tracking

b) permit better adjacent channel rejection

c) increase the tuning range of the receiver

d) improve the reflection of the image frequency.

xiii) The bandwidth of an 'N' bit binary coded PCM signal for modulating a signal having bandwidth of 'f Hz is

a) (f/N) Hz b) (f/N^2) Hz

c) Nf Hz d) $N^2 f$ Hz.

xiv) The channel capacity of a band limited Gaussian channel is given by

a) $C = B \log_2 \left(1 + \frac{S}{N}\right)$

b) $C = B \log_2 \left(\frac{S}{N}\right)$

c) $C = \frac{1}{B} \log_2 \left(\frac{S}{N}\right)$

d) $C = \frac{1}{B} \log_2 \left(1 + \frac{S}{N}\right)$.

xv) The bandwidth required for transmitting 4 kHz signal using PCM with 128 quantisation level is

a) 8 kHz b) 16 kHz

c) 28 kHz d) 32 kHz.

GROUP – B

(Short Answer Type Questions)

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

2. a) What is nyquist interval ?

   b) What is folding frequency ?

   c) Which kind of filter is used to demodulate a PAM signal ?

3. a) What is apogee ?

   b) Define Azimuth angle.

4. a) What is the difference between geosynchronous and geostationary arbits ?

   b) Discuss the advantages and disadvantages of geostationary orbit ?

5. a) Why do we use VSB in case of picture signal ?

   b) What is synchronous detection ? Is it advantageous than non-coherent detection ? Explain.

6. a) What is S/N ratio ? Draw the block diagram for the communication system.

   b) Why FM and PM waves are called inseparable ?

GROUP – C
(Long Answer Type Questions)

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

7. a) State and prove sampling theorem. Sketch a pusle amplitude modulator cricuit and explain its operation. What is meant by aliasing effect ? 5 + 4 + 2

   b) Compare TDM and FDM. 4

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

   b) What is image frequency and how is it removed in superheterodyne receiver ? 4

   c) For a superheterodyne AM receiver having no RF amplifier, the loaded quality factor Q of the antenna coupling circuit is 100. Now if the intermediate frequency is 455 kHz, the determine the image frequency and its rejection ratio at an incoming frequency of 1000 kHz. 4

9. a) What is noise figure ? What is its significance ? 3

   b) Calculate $\frac{S}{N}$ ratio in DSM-SC scheme. 6

   c) Compare the AM, PM and FM in terms of noise. 3

   d) What is pre-emphasis and de-emphasis in FM ? 3

10. a) Draw the block diagram of a PCM system (transmitter and receiver both). 5

b) A telephone signal has a maximum frequency of 4 kHz. It is limited in voltage between +1V to – 1V. It is transmitted by using PCM. The required SNR is 40dB. What is the minimum bandwidth required for transmission ? 4

c) A television signal has a bandwidth of 4·5 MHz. This signal is sampled and converted into a PCM signal. 6

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

a) Balanced modulator

b) FSK

c) Analog-to-Digital Converter

d) PLL

e) Tone Modulation.