

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 × 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 made 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.

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- 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.

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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^2f 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.

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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 orbits ?
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 ?

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GROUP - C

(Long Answer Type Questions)

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

7. a) State and prove sampling theorem. Sketch a pulse amplitude modulator circuit 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, 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.
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