



Name :

Roll No. :

Invigilator's Signature :

CS/B.Tech /BME(N)/SEM-5/BME-503/2012-13

2012

**COMMUNICATION ENGINEERING &
BIO-TELEMETRY**

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) Compared to an analog communication system, a digital communication system is
 - a) complex and more noise immune
 - b) simple and more noise immune
 - c) complex and less noise immune
 - d) simple and less noise immune.
- ii) SSB signal can be detected by
 - a) envelop detector
 - b) PLL
 - c) synchronous detector
 - d) foster silly discriminator.
- iii) A signal of maximum frequency of 8 kHz is sampled at Nyquist rate. The time intervals between the two successive samples will be
 - a) 62.5 μ s
 - b) 125 μ s
 - c) 1250 μ s
 - d) none of these.



- iv) In FM sound broadcasting system, the maximum frequency deviation is usually
 - a) 15 kHz
 - b) 75 kHz
 - c) 200 kHz
 - d) 5.2 kHz.
- v) Quantization noise occurs in
 - a) PAM
 - b) PWM
 - c) DM
 - d) None of these.
- vi) The main advantage of TDM over FDM is that it
 - a) needs less power
 - b) gives better SNR
 - c) needs less bandwidth
 - d) needs simple circuitry.
- vii) Bandwidth required for PM is
 - a) same as FM signal
 - b) greater than FM signal
 - c) less than FM signal
 - d) less than SSB-SC signal.
- viii) In commercial radio receiver, a PLL can be used to demodulate
 - a) an AM signal
 - b) a PCM signal
 - c) an FM signal
 - d) a PM signal.
- ix) FDM transmitter includes
 - a) LPFs
 - b) BPFs
 - c) HPFs
 - d) none of these.
- x) In digital modulation
 - a) only baseband is discrete
 - b) only carrier is discrete
 - c) both (a) and (b)
 - d) none of these.
- xi) If f_m be the modulating signal frequency, then practical bandwidth of an NBFM signal is
 - a) f_m
 - b) $2 f_m$
 - c) $3 f_m$
 - d) $4 f_m$



GROUP - B
(Short Answer Type Questions)

Answer any *three* of the following.

3 × 5 = 15

2. A single tone FM signal is given by,

$$e_{FM} = 10 \sin \left[16\pi \times 10^6 t + 20 \sin (2\pi \times 10^3 t) \right] \text{ volts.}$$

Determine the modulation index, modulating frequency, frequency deviation and carrier frequency. 5

3. a) A carrier is simultaneously amplitude modulated by two sine waves causing individual modulation of 30% and 40% respectively. Find the overall modulation index.
b) In an amplitude modulation, the modulation envelop has a peak value twice the unmodulated carrier value. Find out the modulation index. 2 + 3
4. a) Classify telemetry system based type of data transmission and transmission distance respectively.
b) When should a telemetry system be considered as biotelemetry system ? 3 + 2
5. a) Is there any difference between a discrete signal and digital signal ? Justify your answer.
b) What does Quantization mean ? 3 + 2

GROUP - C
(Long Answer Type Questions)

Answer any *three* of the following.

3 × 15 = 45

6. a) Considering a message signal $e_m = E_m \cos \omega_m t$ and a carrier signal $e_c = E_c \sin (\omega_c t + \theta)$, find the expression for the resultant FM wave.



- b) A 600 Hz, 5 V modulating signal in an FM system produces a deviation of 10 kHz. If the modulating voltage is increased to 10 V, what will be the new frequency deviation ?
- c) What are the key differences between NBFM and WBFM ?
7. a) Justify the necessity of signal multiplexing in communication system.
- b) With a neat schematic, describe the principle of operation of TDM system.
- c) Draw the ASK, FSK and PSK waveforms generated by the binary sequence 10100101. Why is ASK also termed as OOK ? $3 + 8 + (3 + 1)$
8. a) Is companding necessary in PCM process ? Justify.
- b) With a neat schematic, briefly explain “slope overload”.
- c) When do we need to use ADM ? Draw the block diagrams of the transmitter and receiver part of an ADM system.
- d) What is telemedicine ? $3 + 3 + 7 + 2$
9. Write short notes on any *three* of the following : 3×5
- a) Superheterodyne receiver
- b) PLL
- c) FDM
- d) Biotelemetry applications
- e) Balanced modulator
- f) Foster silly method.
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