Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech(EIE)/SEM-7/EI-701/2009-10

2009

TELEMETRY & REMOTE CONTROL

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 use of non-uniform quantization leads to

a) reduction in transmission bandwidth

b) increase in maximum SNR

c) increase in SNR for low level signals

d) simplification of quantization process.

ii) In electrical telemetry system the transmission system is so designed that the interference due to noise remains such that

a) $S/N = 1$ b) $S/N = 2$

c) $S/N << 2$ d) $S/N >> 2$.

iii) Fiber's absorption occurs due to

a) impurities of the material

b) core diameter

c) clad refractive index

d) none of these.

iv) The wavelength that is choose for optical communication is

a) 1550 nm b) 1880 nm

c) 2880 nm d) 780 nm.

v) For total coverage round of the earth, the minimum no. of satellite needed is

a) 4 b) 7

c) 3 d) 2.

vi) The term transponder is related to

a) satellite communication

b) fiber optic communication

c) GSM communication

d) CDMA communication.

vii) Smart transmitter allows

a) one-way communication

b) two-way communication

c) both (a) and (b)

d) none of these.

viii) Population inversion is a property found in

a) LED b) photodiode

c) FET d) LASER.

ix) In digital telemetry, commonly used modulation is

a) AM b) PCM

c) PDM d) PWM.

x) The bit rate of a signal is 3000. If each signal unit carries 6-bits, what is the baud rate ?

a) 3000 b) 500

c) 600 d) none of these.

xi) Guard band is essential in

a) FDM system

b) TDM system

c) CDM system

d) both TDM and CDM systems.

xii) Which of the following system is digital ?

a) PPM

b) PCM

c) PWM

d) Pulse-frequency modulation.

GROUP – B

(Short Answer Type Questions)

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

2. What do you understand by intersymbol interference ? How can intersymbol interference be eliminated ? Explain with appropriate diagrams. 2 + 3

3. Draw different waveforms of the given message using

   a) AMI

   b) NRZ technique

   c) Manchester coding

   d) Differential manchester coding

   e) HDB3 coding

   Message signal : $(1100000000110000011)_2$ 5

4. a) What are the different types of comparators used in telemetering equipments ? 1

   b) What is a window comparator ? Design a window comparator with two op-amps and an AND gate. Obtain its transfer characteristics. 4

5. a) What are the different types of modulation codes used in telemetry system ? 2

b) What do you mean by source coding and line coding ? Explain with suitable example. 3

6. a) What is Geostationary satellite ?

b) On what parameters of a system does the carrier level depend in satellite telemetry ? Why is the receiver gain to temperature ratio as a factor so important in a receiver system ? 1 + 2 + 2

GROUP – C
(Long Answer Type Questions)

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

7. a) Draw the block schematic diagram of TDMP/PCM/FM system of telemetering and make appropriate lebels, both on the transmitting and receiving sides. 8

b) What do you mean by time frame in TDM/PAM system ? 1

c) How is synchronization done in TDM system ? Explain with a circuit diagram for synchronization pulse generation with input blank synchronization channel. 6

8. a) Draw the scheme of a WDM system for optical fibre telemetry. 3

b) What is a cut-off parameter ? How is it introduced in fibre cable mode calculation ? 1 + 2

c) What is dispersion ? Calculate the total time dispersion in a multimode step-index fibre. 1 + 3

d) What is the difference between splices and connectors ? Where are connectors used in an optical fibre telemetry/communication system ? What are the basic mismatch conditions that may develop associated with the connectors ? 5

9. a) Describe QPSK. Why is it adopted in digital data transmission ? Demonstrate by carrier sine wave mixing how QPSK can be obtained ? 7

b) Draw and explain the block diagram of QPSK receiver. 4

c) Write down the flow-chart of eight level serial quantizer and 3-bit encoder. 4

10. a) What is BER ? What is the highest allowed BER in speech transmission ? 2 + 1

b) Prove that, the average error probability

$P(E) = Q\left(V_p / \sigma_n\right)$, where V_p is the received pulse amplitude and σ_n is the rms value of the noise. 4

c) In a digital data transmission system the code word is of 8-bit and the bit error probability is 10^{-2}. Calculate the probability that the code word would have 2 errors and 3 errors. 3

d) What is companding ? What is it used in PCM ? How is companding done using suitable amplifier ? Draw these amplifiers and the companding curves. 5

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

a) Quadrature Amplitude Modulation (QAM)

b) MODEM protocols

c) Differential coding

d) Comparison between TDM and FDM

e) DPCM

f) IRIG standards.