Name : ……………………………………………………

Roll No. : …………………………………………………

Invigilator's Signature : ……………………………………

CS/B.Tech(EIE)/SEM-7/EI-701/2011-12
2011
TELEMETRY AND 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)   Companding means

a)   compressing and expanding

b)   compressing or expanding

c)   companding and expanding

d)   none of these.

7003   [Turn over

ii) The complementary error function, erfc(.) is known as

    a) the probability of misinterpreting a bit, a '0' to be '1' and '1' to be '0'

    b) the probability of misinterpreting a bit, a '0' to be '0' and '1' to be '1'

    c) the probability of misinterpreting a bit, a '0' to be '1/2' and '1' to be '–1/2'

    d) all of these.

iii) In PLL, the phase difference between two signals remains

    a) constant   b) varied

    c) both (a) and (b)   d) none of these.

iv) Pick the odd one out :

    a) Transponder   b) Earth station

    c) GSMd)   Equatorial orbit.

v) For step index fibre the NA across the core is

    a) variable

    b) constant

    c) dependent on core radius

    d) none of these.

vi) In digital telemetry, commonly used modulation is

    a)   AM   b)   PCM

    c)   PDM d)   PWM.

vii) For doubling the data rate, the encoding system used is

    a)   Manchester   b)   CMI

    c)   AMI   d)   all of these.

viii) At the receiving side of FDM/FM system, the filter used is

    a)   LPF   b)   BPF

    c)   Band Reject Filter   d)   BPF and LPF both.

ix) In telemetering system, the S/N ratio should be

    a)   S/N >> 1   b)   S/N > = 1

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

x) According to the IRIG standard, the channel-C should have Low Band Edge Frequency (LBEF)

    a)   189·75   b)   18·7

    c)   34·0   d)   none of these.
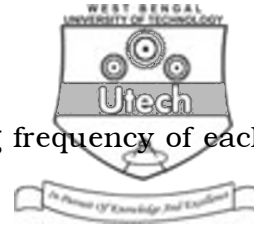
xi) If there are 2 channels and sampling frequency of each channel is 8 kHz, then line speed is

a) 64 kbps

b) 128 kbps

c) 256 kbps

d) 512 kbps.

xii) High-quality glass fibres have least losses in the wavelength range of (nm)

a) 820-880

b) 1200-1320

c) 1550-1610

d) 1620-1710.

GROUP – B
(Short Answer Type Questions)
Answer any *three* of the following. 3 × 5 = 15

2. a) Why is frequency telemetry system considered more advantageous over voltage or current telemetry system even in short distance telemetry ? Describe the frequency telemetry system with block diagram of a teletype channel based frequency telemetry system.

b) Mention the frequency ranges used in standard frequency telemetry systems. 1 + 3 + 1

3. Explain the operation of a QPSK receiver with the help of a block diagram.

4. What are BASK, BFSK and BPSK ? Describe with diagrams needed.

5. a) What are the different types of comparators used in telemetering equipment ? 1

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

6. What are the two telemetry standards of baseband configuration in terms of frequency as stipulated by IRIG ?

GROUP – C
(Long Answer Type Questions)
Answer any *three* of the following. 3 × 15 = 45

7. a) Explain a portable telemetry system with a neat sketch of transmitter and receiver.

b) Explain how noise becomes important in a receiving system. What precautions are needed to avoid or eliminate the noise in a portable telemetry system ?

c) What is noise figure and SINAD ? Explain.

7 + (3 + 1 + 1) + (2 + 1)

8. a) What do you mean by block-coding ?

b) Describe a 3B4B block-coding scheme with a block-diagram. Describe also the coding format for it.

c) What are efficiency and redundancy in respect of data transmission ? Find a relation between them.

d) Calculate the efficiency and redundancy of AMI code and 24B1P code. 2 + (4 + 2) + (2 + 1) + (2 + 2)

9. a) What do you mean by dispersion ? How does dispersion affect the tranmission through an optical fibre ? What precautions are needed to avoid or minimize the dispersion ? Explain.

b) What is WDM ? Explain with necessary sketch. Explain briefly with diagram how the WDM is used in optical fibre telemetry system. (2 + 3 + 3) + (3 + 4)

10. a) Why companding is used in PCM ? Draw the circuits used for companding and the companding curves.

b) Draw the different waveforms of the given message using :

i) AMI

ii) NRZ technique

iii) Manchester coding

iv) Differential Manchester coding

v) HDB3 coding

The signal is : (11 00001011011011)$_2$.

c) Explain the operation of a position telemetry system using synchro transmitter and receiver. (2 + 4) + 5 + 4

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

    a)   MODEM

    b)   Smart telemetry system

    c)   SCADA *vs* telemetry

    d)   QAM

    e)   Pipeline telemetry.