Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech/ICE(O)/SEM-5/IC-505/2012-13

2012

DATA COMMUNICATION AND 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 × 1 = 10

   i) Armstrong modulator generates

   a) AM signals b) PM signals

   c) FM signals d) both (b) and (c).

   ii) A carrier voltage is simultaneously modulated by two sine waves causing modulation indices of 0·4 and 0·3. The overall modulation index is

   a) 0·35 b) 0·7

   c) 0·5 d) none of these.

   iii) The most commonly used filter in SSB generation is

   a) mechanical b) RC

   c) LC d) high-pass.

iv) Which of the following will carry the same information as the AM wave itself ?

a) DSB b) SSB

c) VSB d) All of these.

v) Which of the following pulse-time midulations does not exist in practice ?

a) PWM b) PAM

c) PPM d) PFM.

vi) In PCM, the number of pulses p in code-group for q quantizing levels is given by

a) $\log_2^q$ b) $\log_q$

c) $\log_{10}^q$ d) $ln\ p$.

vii) Which of the following pulse modulation systems is analog ?

a) PCM b) DPCM

c) PWM d) DELTA.

viii) TDM

a) stacks several channels in adjacent frequency shots.

b) interleaves pulses belonging to different transmissions

c) combines 5 groups into a single super group

d) can be used with PCM only.

ix) HDLC is an acronym for

a) high-duplex line communication

b) high level data link control

c) half-duplex digital link control

d) host double-level circuit.

x) A buffer amplifier has a gain of

a) infinity

b) zero

c) unity

d) dependent upon the circuit parameters.

xi) In a Go-Back-N ARQ if the window size is 63, what is the range of sequence numbers ?

a) 0 to 63 b) 0 to 64

c) 1 to 63 d) 1 to 64.

xii) Which one of the following trunks handle(s) the telephone communication between offices ?

a) Twisted-par cable b) Fibre-optic cable

c) Satellite links d) Both (b) and (c).

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. a) Why is modulation required in data communication and telemetry ? 2

b) How does the transmitted power change with change in the amplitude modulation index and to what reference ? 3

3. State and prove sampling theorem.

4. a) Compare the merits and demerits of TDM and FDM systems. 3

b) Why is synchronization necessary in all TDM system ? 2

5. What is a USART ? How does it function ? Draw the scheme of a USART. 1 + 2 + 2

6. What is modem ? Describe the functions of modem. 2 + 3

GROUP – C

(Long Answer Type Questions)

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

7. a) Compare FM and PM systems. 2

   b) Define FM modulation index. How is it calculated ? Why is FM sometimes called the constant bandwidth system ? Explain. 3 + 3

   c) Why are balanced and double balanced modulators popular in telemetry applications ? Draw the circuit of a double balanced modulator and explain its operation briefly. 2 + 5

8. a) What are the methods for generating PAM signals ? Explain the operation of a PAM modulator circuit. 2 + 3

   b) Describe the operation of a PCM transmitter. How is companding technique useful minimizing quantizing error for low level signals ? 5 + 3

   c) What are the advantages of DPCM system ? 2

9. a) Why is band-pass filter used in a demodulator channel on a receiving side of the FDM telemetry system ? 2

   b) Draw and explain the block schematic diagram of a FDM/FM telemetry system. 8

   c) Briefly discuss the power line carrier communication (PLCC). 5

10. a) What are three popular ARQ mechanisms ? How does ARQ correct an error ? 3 + 3

    b) Stop-and-wait ARQ has two control variables *S* and *R*. What are their functions ? 3

    c) Discuss the size of the selective repeat ARQ sliding window at both the sender site and the receiver site. 6

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

    a) PABX

    b) Delta modulation (DM)

    c) Protocols for synchronous communication

    d) VSB signals

    e) Standards for serial I/O.