Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech(ICE)/SEM-5/IC-505/2011-12

2011

DATA COMMUNICATION & 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) Indicate false statement regarding the advantages of SSB over DSB full carrier AM from the following :

a) More channel space is available

b) Transmitter circuits must be more stable giving better reception

c) The signal is more noise resistant

d) Much less power is required for the same signal strength.

ii) The most commonly used filter in SSB generation is

a) Mechanical b) RC

c) LC d) Low-pass.

iii) In a communication system, noise is most likely to affect the signal

a) at the transmitter

b) in the channel

c) in the information source

d) at the destination.

iv) The telemetry system used as wireless telemetry system is

a) voltage telemetry b) current telemetry

c) frequency telemetry d) none of these.

v) The bandwidth of FM is ..... the bandwidth AM.

a) less than b) equal to

c) greater than d) less than equal to.

vi) The figure of merit for a satellite transmitter is

a) G/T ratio b) C/N ratio

c) EIRP d) none of these.

vii) Band pass filter is require at the receiver side for demultiplexing in which system ?

a) FDM b) TDM

c) Both FDM and TDM d) None of these.

viii) Which of the pulse modulation is analog ?

a) PCM b) DPCM

c) PWM d) Delta modulation.

ix) The envelope detector is

a) a high pass

b) a coherent detector

c) a product demodulator

d) an asynchronous detector.

x) 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.

xi) A buffer amplifier has a gain of

a) infinity

b) zero

c) unity

d) dependent upon the circuit parameters.

GROUP – B
(Short Answer Type Questions)

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

2. a) Define modulation. 2

b) Why is modulation required in data communication and telemetry ? 3

3. a) What is the difference between PAM and PWM ? 2

b) What is flat top sampling and natural sampling ? 3

4. a) What is sampling theorem ? Explain it. 4

b) What is anti-aliasing filter ? 1

5. a) Write a short note on major components of telephone network. 2

b) What is the mechanism for Go Back-N-ARQ ? 3

6. Explain the working principle of a ring modulator. 5

GROUP – C
(Long Answer Type Questions)

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

7. a) Describe the envelope detection method in connection with demodulation of AM. 4

   b) How do you optimize the time constant in envelope detection ? 2

   c) Make a comparative study among DSB-SC, SSB-SC and VSB-SC modulations. 6

   d) Explain the operation of a balanced modulator. 3

8. a) Define the terms 'transmission efficiency' and 'modulation index' for AM. 3

   b) Explain the operation of a PWM modulator using necessary waveforms. 5

   c) Describe the operation of a PCM transmitter. 5

   d) What are the limitations of delta modulation ? 2

9. a) Show that the current of a single tone AM signal will be $It = Ic \left[1 + 1/2\ m_a^{\,2} \right]^{\frac{1}{2}}$. 3

   b) What is the limitation of AM over DSB-SC ? 2

   c) What is over modulation ? 2

d) The antenna current of an AM transmitter is 8 amps when only carrier is sent, but it increase to 8·96 amps when the carrier is modulated by a single tone sinusoid.

i) Find modulation index

ii) Find the antenna current when the depth of modulation index changes to 0·8. 5

e) What modulation technique is used in TV broadcasting? Draw the block diagram of transmitter for that modulation technique. 3

10. a) What is the advantage of DPCM over PCM ? 2

b) What is quantization noise ? Derive the expression for signal-to-quantization noise ratio. 1 + 3

c) What is companding ? 1

d) What is slope overload error ? How it can be reduced by ADM ? Describe with diagram. 8

11. a) Define LAN, MAN and WAN. 3

b) What is local loop ? Explain with a diagram. 4

c) Define telemetry. Draw and explain the block diagram of basic telemetry system. 2 + 3

d) How the voltage converted in frequency for use in telemetry ? 3

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

a) Narrow band FM

b) T1 system

c) FDM

d) Digital private automatic branch exchange

e) Phase-locked loop.