Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech (ICE)/SEM-5/IC-505/2010-11

2010-11

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) Voltage telemetry system, the preferred single to triose ratio is

a) < 0·5 b) > 1·0 & < 2·0

c) > 0·5 & < 1·0 d) < 0·5.

ii) Theoretically the bandwidth required in 'F'th is

a) Zero b) Unity

c) 10 d) Infinite.

iii) The envelope detector is

a) a high pass-filter

b) a coherent detector

c) a product demodulator

d) an asynchronous detector.

iv) In a communication system, noise is most lively to affect the signal

a) at the transmitter

b) in the channel

c) in the information source

d) at the destination.

v) AM is the process of

a) Superimposing a low frequency on a high frequency

b) Superimposing a high frequency on a low frequency

c) Carrier interruption

d) Frequency shift & phase shift.

vi) Indicate which of the following pulse modulation systems is in analog :

a) PCM b) DPCM

c) PWM d) DELTA.

vii) In TV broadcasting the modulating scheme is

a) AM b) DSB-SC

c) SSB–SC d) VSB.

viii) The ..... is a device that connects n inputs to m outputs.

a) Cross-point b) Cross-bar

c) Modem d) RAM.

ix) HDLC is an acronym for

a) high duplex line communication

b) high level data link control

c) half duple digital link combination

d) host double level circuit.

x) For Stop-and-Wait ARQ, for n data packets sent, ... acknowledgements are needed.

a) n b) $2n$

c) $n - 1$ d) $n + 1$

xi) Modem is an acronym of

a) modulation

b) demodulation

c) modulation & demodulation

d) all of these.

xii) In order to reduce quantizing noise one must

a) increase the no. of standard amplitudes

b) send pulses whose sides are more nearly vertical

c) use an RF amplifier in the receiver

d) increase the no. of samples per second.

xiii) The biggest disadvantage of PCM is

a) its inability to handle analog signals

b) the high error rate which its quantizing noise introduces

c) its incompatibility with TDM

d) the large bandwidth that are required for it.

xiv) Time division multiplexing requires

a) constant – data transmission

b) transmission of data at random

c) transmission of data samples

d) transmission of data of only one measurand.

GROUP – B

(Short Answer Type Questions)

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

2. a) Define AM & PM. 2

   b) Show an AM wave and its frequency spectrum. 3

3. How are FM modulation & PM modulation related ? 5

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

5. Sate and explain sampling theorem for band limited signals. 1 + 4

6. a) Define transmission efficiency and modulation index for AM. 3

   b) What is the difficulty of filtering technique for generation of SSB-SC signal ? 2

GROUP – C

(Long Answer Type Questions)

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

7. a) Describe how DSB–SC signal is obtained. 3

   b) Describe demodulation technique of DSB-SC signal by using Synchronous Detection Method. 3

   c) Define how SSB-SC signal is obtained by Frequency Discrimination Method. 3

   d) Describe generation of VSB signal. 3

   e) Explain demodulation technique of VSB signal. 3

8. a) How Amplitude Modulation take places ? What are the characteristics of AM wave ? 3 + 3

   b) Draw the spectrum of AM wave on Frequency Domain Representation with mathematical representation. 3

   c) What is modulation index ? How its over modulation happens ? 1 + 1

   d) Show that the Carrier power $P_c = A^2/2$ and Sideband power $P_{s\,(LSB)} = P_{S\,(USB)} = 1/4\ x^2\ (t)$. 2 + 2

9. a) Make a comparison between TDM and FDM systems.

   b) How is PWM signal generated from PAM signal ? Describe using necessary waveforms.

   c) How is baseband signal recovered from PCM signal ? Explain with a block diagram.

   d) What is the advantage of DPCM over PCM ?

   3 + 5 + 5 + 2

10. a) What are the three main components of a telephone system ? 3

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

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

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

11. a) What are three popular ARQ mechanisms ? 3

b) What are the control variables in Go-Back-N ARQ technique ? Discuss about their functions. 3

c) How does Go-Back-N technique take care of damaged or lost frame case ? 5

d) Discuss about the sender and receiver sliding windows in Go-Back-N ARQ technique. 4

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

a) Balanced modulator

b) Pulse modulation

c) Companding

d) BISYNC

e) HDLC.