Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/M.Tech(EIE)/SEM-2/CIM-205A/2012

2012

INTRODUCTION TO DATA COMMUNICATION

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.

Answer Question No. 1 and any *four* from the rest.

GROUP – A

1. Justify the correctness of the statements with reasons :

$7 \times 2 = 14$

i) Digital transmissions have better noise immunity than analog transmission.

ii) FDM is more expensive than TDM.

iii) Transmission range of FM is small compared to AM.

iv) Bus Topology Network is better choice compared to Ring topology network considering network redundancy.

v) In synchronous communication data transfer blocks at a time while asynchronous communication transfers single type at a time.

vi) In frequency modulation telemetry system, the capacity of channels offered is less.

vii) A communication satellite is basically a RF repeater (transponder) station which has made broadband long distance communication feasible and ensures a high quality of service.

GROUP – B

2. What are the importances of modulation and demodulation in communication system ? Explain the double-sideband amplitude modulation. Discuss with circuit diagram about (a) Square law and balance modulators and (b) Envelope detection. 2 + 4 + 4 + 4

3. (a) What is pulse code modulation ? Explain with block diagram of (i) PCM generation and quantization characteristics and (ii) PCM receiver and reconstructed waveform.

   b) Build a binary PCM system with $q = 8$ and (i) draw the direct-conversion ADC circuit for sign/magnitude code and (ii) weighted-resistor decoder circuit. 2 + 4 + 3 + 5

4. a) Illustrate the AM, FM and PM for (i) a triangular and (ii) sinusoidal modulating signal. Discuss about these FM generation techniques (iii) Direct FM and VCOs and (iv) phase modulators & indirect FM.

   b) Explain frequency detector with linear and FM-to-AM conversion. 3 + 4 + 4 + 3

5. Give the differences between synchronous and asynchronous transmissions. Discuss the data transfer mechanism of IEE-488 bus. Briefly explain the features of RS-232 communication protocol. 3 + 7 + 4

6. a) What is LAN ? Describe various LAN topologies.

   b) Describe the operation of satellite communication earth station. What is the advantage of synchronous satellite communication ? 2 + 7 + 4 + 1

7. a) Mention briefly the salient features of Fiber Optic communication system. A step index fiber has $n1 = 1{\cdot}44$ and $n2 = 1{\cdot}42$ respectively. Calculate the numerical aperture.

   b) How does the hydraulic transmission take place ? Briefly explain pulse amplitude modulation and pulse code modulation telemetry system. 4 + 2 + 2 + 6

8. Write short notes on any *four* of the following : $4 \times 3\frac{1}{2}$

   a) Current telemetry system

   b) Modem

   c) Sampling techniques

   d) Nyquist frequency

   e) FDM system

   f) TDM system.