53 (IT 302) DTCM

2014

DATA COMMUNICATION

Paper : IT 302

Full Marks : 100

Pass Marks : 30

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions from **seven**.*

1. *(a)* Explain different network topologies with their merits and demerits. What are the basic roles of topologies in computer networking ? Which network topology is widely used and why ? 8+2+2

   (b) What are the commonalities and differences between OSI and TCP/IP reference models ? Explain. 4+4

2. *(a)* What are the some factors that determine whether a communication system is LAN, MAN or WAN ? 6

Contd.

(b) What do you mean by bit-rate and band-rate ? What do you understand by $3dB$ bandwidth of a communication channel ? 4+2

(c) What are the relative merits and demerits of a single mode fiber in comparison to multimode fiber ? Describe the structure and composition of them. 4+4

3. (a) What do you mean by multipath fading ? Why it is a serious problem in Microwave Transmission ? Explain. 4+2

(b) We have a channel with a $1MHz$ bandwidth. The SNR for this channel is 63. What are the appropriate bit-rate and signal level ? 3+3

(c) Explain different forms of noise. How does noise affect channel capacity ? 6+2

4. (a) Explain about synchronous and statistical TDM in detail, with an example. 4+4

(b) Discuss the packet switching principle. How it is different from circuit switching ? 4+4

(c) Differentiate between Manchester and differential Manchester encoding. 4

5. *(a)* Assume that a bit stream '01100110', encode this stream using the following encoding schemes. 5×2

(i) NRZ-I

(ii) Manchester

(iii) ASK

(iv) NRZ-L

(v) AMI

(b) A PCM scheme transmits the signal at a rate 64 *kbps*. If it uses 8 *bits/sample*, calculate the sampling rate and maximum frequency that can be present in its input to reconstruct the same without error. 4+2

(c) Distinguish between baseband and broadband transmission. 4

6. *(a)* What do you mean by modulation ? What is the necessity of Modulation in communication ? Differentiate between AM and FM modulation. 2+2+4

(b) Draw the schematic diagram of PCM and explain the sampling and quantization blocks in detail. 4+4

(c) What is a GEO synchronous satellite ? Write its importance. 2+2

7. (a) What are the advantages of QAM over QPSK ? 4

(b) Why encoding is needed for baseband transmission ? Explain HDB3 and how it outperforms other encoding Schemes. 2+4+4

(c) Describe the function of Shannon and Nyquist on channel capacity. Each places an upper limit on bit rate of a channel based on two different approaches. 3+3
