53 (IT 302) DTCM

2017

DATA COMMUNICATION

Paper : IT-302 (Back)

Full Marks : 100

Time : Three hours

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

*Answer **any five** questions out of **eight**.*

1. Answer the following questions : 10×2

   (a) What are the factors that determine whether a communication system is a LAN, MAN or WAN ?

   (b) What is the difference between simplex and half-duplex transmission ?

   (c) Define the term broadcasting and Unicasting.

   (d) What are the services provided by data link layer to network layer ?

(e) In ring topology, how the chance of collisions can be reduced ?

(f) What is the difference between encoding and modulation ?

(g) A signal travels through an amplifier and the power is increased 10 times. Calculate power gained.

(h) Relate baud rate and bit rate.

(i) "Ultra Violet light, *X*-Rays and Gamma rays are not used for data transmission", why are they not used for communication ?

(j) What do you mean by VSAT ?

2. (a) Describe with a neat diagram the functionalities of each layer in the OSI reference model. How is it different from TCP/IP reference model ? 6+4

(b) Consider a channel with 1 *MHz* capacity and a nominal SNR of 56*dB* and certain level of distortion, 3+3

(i) What is the theoretical maximum limit to the data rate the channel can carry ?

(ii) To achieve this how many signal levels are required ?

(c) What is the advantage of statistical TDM over conventional TDM ? 4

3. (a) Describe the function of Shannon and Nyquist on channel capacity. Each places an upper limit on the bit rate of a channel based on two different approaches. How are the two related ? 4+4+2

(b) With the help of mathematical relations, explain the process of sampling and reconstruction of a signal in PCM encoding scheme. 10

4. (a) Discuss the different network topologies in detail, with their performance indicators. 10

(b) Explain the need of modulation in communication. Explain briefly *three* basic types of modulation. 4+6

5. *(a)* What are the *three* major classes of guided media ? How guided media differs from unguided media ? 3+3

(b) Show the Unipolar NRZ, NRZ-I, Manchester and AMI encoding for the bit pattern 8

1001111100010001

(c) Apply ASK, FSK and PSK mechanisms over the digital data 101101. 6

6. *(a)* Explain different forms of noise. How does noise affect channel capacity ? 6+4

(b) What do you mean by Multipath fading ? Why is it a series problem in Microwaves, why ? 3+3

(c) State how connectionless protocol differs from connection oriented protocol. 4

7. *(a)* Describe the process of Delta modulation system. How the quantization errors are minimized in delta modulation ? 6+2

(b) Differentiate between QAM and QPSK in detail. What are the advantages of QAM over QPSK ? 4+2

(c) Differentiate between Packet switching and Circuit switching. 6

8. (a) Explain HDB3 and represent the stream 1100001000000000 using HDB3 bipolar encoding scheme. 4+4

(b) What is the importance of critical angle with respect to fiber optic cable communication ? 6

(c) Distinguish between Baseband and Braodbond transmission. 6