53 (IT 302) DTCM

2016

DATA COMMUNICATION

Paper : IT 302

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. *(a)* What are the commonalities and differences between OSI and TCP/IP reference models ? Explain. 5+5

   (b) Assume a data stream is made of "1010111001" encode this stream using the following encoding schemes 10

   (i) Manchester

   (ii) Differential Manchester

   (iii) MLT-3

   (iv) Polar NRZ-I

   (v) RZ

2. *(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 two related? 4+4+4

(b) Suppose that the spectrum of a noise-free channel is between 3*MHz* to 4*MHz* and $SNR_{dB} = 24dB$. 4+4

(i) What is the maximum achievable data rate?

(ii) How many signal levels are required to achieve this rate?

3. *(a)* What is modulation? Explain the need of modulation in communication. Explain briefly *three* basic types of modulation. 2+2+6

(b) Describe ASK, FSK and PSK mechanisms and apply them over the digital data 101101. 6+4

4. *(a)* Explain different forms of noise? How does noise affect channel capacity? 8+2

(b) Explain what is B8ZS encoding. Represent the stream 100100000000010 using the B8ZS Bipolar encoding scheme. 4+2

(c) What is half-duplex and full-duplex communication ? 4

5. (a) Draw the schematic of PCM and explain the sampling quantization blocks in detail. 5+5

(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 any error. 6

(c) What are the advantages of having layered architecture ? 4

6. (a) What is flow control ? Why is it essential at the datalink layer ? Mention few techniques for the same. 4+2+4

(b) What are the factors that determine whether a network system is a LAN, MAN or WAN ? 6

(c) Compute the bit rate of a modem that uses QAM with 4 amplitudes and 16 phases. Modem transmits signal at 1200*baud*/second. 4

7. *(a)* What are the *three* major classes of guided media ? How do guided media differ from unguided media ?

6+2

(b) Draw the block diagram of Delta Modulation (DM) system and brief the principle of operation. 8

(c) Differentiate between packet switching and circuit switching. 4

8. *(a)* Why is encoding needed for baseband transmission ? Explain HDB3 and how it outperforms most other encoding scheme. 4+6

(b) Differentiate the following : ***(any five)*** 5×2

(i) QAM and QPSK

(ii) Thin Ethernet and Thick Ethernet

(iii) Step index fiber and Graded index fiber

(iv) Connection-less and Connection oriented

(v) Geo and Leo

(vi) STP and UTP cable
