53 (IT 302) DCMN

2013

(December)

DATA COMMUNICATION

Full Marks : 100

Pass Marks : 30

Time : Three hours

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

*Answer **any five (5)** questions out of **eight (8)**.*

1. *(a)* Which one is better — a point-to-point connection or a multipoint connection and why ? 5

   (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) Explain different forms of noise. How does noise affects channel capacity ? 6+3

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 the two related. 4+4+2

(b) Assume that TV picture is to be transmitted over a channel with 4.5*MHz* bandwidth and a 35*dB* signed to noise ratio. Find out the capacity of the channel and how many signalling levels are required ? 3+3

(c) Assume that a bit stream made of "10011011", encode this stream using the following encoding schemes. 4

(i) NRZ-I

(ii) NRZ-L

(ii) FSK

(iv) Manchester.

3. *(a)* Explain OFDM and FHSS in brief. How do these overcome fading problem in wireless. 8+2

(b) Enumerate *any four* reasons for using layered protocols. 4

(c) An analog signal has a bandwidth 5*KHz* with peak to peak voltage range of 10*volts*. The signal is to be converted to digital form with maximum quantization error of 1*mV* per sample. What shall be the minimum data rate of the digital signal? 6

4. (a) Distinguish between baseband and broadband transmission. 5

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

(c) What happens if one of the station is unplugged in bus topology and ring topology? 5

5. (a) With the help of mathematical relations, explain the process of sampling and re-construction of a signal. 10

(b) What is the advantage of statistical TDM over conventional TDM? 6

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

6. *(a)* Differentiate between QAM and QPSK in detail. What are the advantages of QAM over QPSK ? 6+4

(b) What is the important of critical angle with respect to optical fiber cable. 5

(c) Describe the quantization process in PCM with suitable diagram. 5

7. *(a)* Explain satellite and terrestrial microwave transmission. 6

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

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

8. *(a)* Describe the process of delta modulation system. How the quantization errors are minimized in delta modulation ? 4+2

(b) Draw the TCP/IP network architectural model and explain the features of various layers ? Also list the important protocols at each layer. Briefly describe the difference between the OSI and TCP/IP architectural model 6+2+4

(c) What do you mean by virtual circuit. 2