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Department of Computer Science & Information Technology
B. Sc in CSE
Semester Final Examination 2014(Jan-June)
Level 3 Semester I, Course Code: CIT 303, Credit: 3.0
Course Title: Data Communication (Theoretical)

Time: 3 Hours   Total Marks: 90

[N.B. The figure in the right margin indicates the marks for respective question]

Section-A
Answer any **THREE**

1. a) What is data communication? Why protocol is necessary in data communication?   3
   b) Sketch some possible topologies for a multipoint subnet principle.   2
   c) Define network. What are the criteria necessary for an efficient network? Explain.   4
   d) What is a De-jure standard? Give an example of one.   3
   e) Write some names of different Standards Organization.   3

2. a) Write the name of the layers in OSI model. Discuss briefly the function of a Data   6
      Link and Application layer in OSI model.
   b) Define periodic signal. What are the three important characteristics of periodic   3
      signal?
   c) Explain time-domain and frequency-domain representation of a signal with suitable   4
      example.
   d) A telephone line normally has a bandwidth of 3000 Hz. The Signal to noise ratio is   2
      usually 3162. Find the maximum capacity (bit rate) of this channel.

3. a) Define Scrambling and give its purpose.   3
   b) What is Line coding? Write its classification.   3
   c) Encode the digital signal 01001110 with following techniques: 4
         i) NRZ-L   ii) NRZ-I   iii) Bipolar   iv) Manchester
   d) How analog signal can be converted into PCM digital code? Show it in figure.   5

4. a) What is multiplexing? What are the three major multiplexing techniques?   2
   b) Distinguish between synchronous and statistical TDM.   4
   c) Four channels, each with a 100-kHz bandwidth, are to be multiplexed together. What   2
      is the minimum bandwidth of the link if there is a need for a guard band of 10-kHz
      between the channels to prevent interference?
   d) Define Spread Spectrum and explain how Direct Sequence Spread Spectrum (DSSS)   7
      technique achieves bandwidth spreading.

Section-B
Answer any THREE

1. a) What do you mean by the process of modulation? Why is it necessary for the transmission of intelligence?   3

   b) Explain the term bandwidth. Why is it useful?   2

   c) An audio signal given by 30 sin ($2\pi \times 2500$ t) is used for modulating a carrier wave given by the equation 60 sin ($2\pi \times 200,000$ t). Determine: 4
   i) modulation index,   ii) percent modulation, iii) frequencies of the signal and the carrier, iv) frequency spectrum of the modulated wave.

   d) Describe the constituents of a super heterodyne AM receiver.   6

2. a) Define switch. Compare space-division and time-division switches.   4

   b) What is cross-point in a crossbar switch?   2

   c) Discuss the transmission of the packets using the datagram approach of packet switching.   6

   d) What are the limitations of using a circuit-switching network for data transmission?   3

3. a) What is parity bit? When parity check technique is failed to detect an error?   3

   b) Discuss Go-Back-N mechanism for error control. What are the disadvantages of this mechanism?   4

   c) Detect and correct the single error in the received Hamming code word 10110010111. Assume odd parity.   5

   d) Discuss the concept of redundancy in error detection and correction.   3

4. a) Compare the two methods of serial transmission. Discuss the advantages of each.   5

   b) Write some advantages of optical fiber over twisted-pair and coaxial cable.   4

   c) How do guided media differ from unguided media?   3

   d) What are some major advantages and disadvantages of microwave transmission?   3