B.Sc. Engg. / HD CSE 4th Semester 149

06 August 2018 (Morning)

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)
Department of Computer Science and Engineering (CSE)

MID SEMESTER EXAMINATION **SUMMER SEMESTER, 2017-2018**

DURATION: 1 Hour 30 Minutes **FULL MARKS: 100**

CSE 4405: Data and Telecommunications

Programmable calculators are not allowed. Do not write anything on the question paper.

There are **4 (four)** questions. Answer any **3 (three)** of them.

Figures in the right margin indicate marks.

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1. a) What is data communication? Describe the components and fundamental characteristics of effective data communication system. 2+8.33

   b) What do you understand by network topology? Mention the basic network topologies. For *N* devices in a network, what are the numbers of cable links required for each of the topologies? 2+2+4

   c) Differentiate among the roles of logical address and physical address? 4

   d) What are the layers of OSI model? How does OSI model differ from TCP/IP protocol suite? Write down the functionalities of middle three layers of TCP/IP protocol suite. 2+3+6

2. a) What is throughput? A network with bandwidth of 100 Mbps can pass only an average of 120,000 frames per minute with each frame carrying an average of 10,000 bits. What is the throughput of this network? 2+4

   b) What do you understand by transmission impairment? Explain different factors causing transmission impairments with appropriate examples. 11.33

   c) State and explain the Shannon capacity formula. How does Shannon capacity formula differ from Nyquist bit rate formula? What does the Nyquist theorem have to do with communication? 5+2+3

   d) Consider a channel having SNR 50 and bandwidth 2 MHz. What will be the approximate signal level and bit rate? 3+3

3. a) Write short notes on any two of the followings: 4x2
   i. DC Component ii. Self-Synchronization iii. Baseline Wandering

   b) Find out the bit sequence for the given digital signals from the following figures. For Figure 1, consider NRZ and NRZ-I coding. For Figure 2, consider Manchester and Differential Manchester coding schemes. 4x2

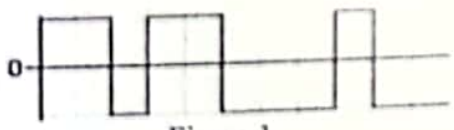

Figure 1

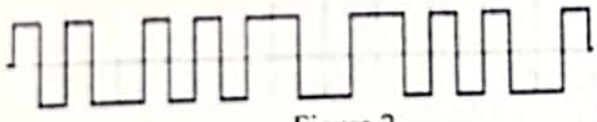

Figure 2

   c) Consider a bit stream: 0110001001. Draw corresponding digital signal for following line coding schemes and also comment on the bandwidth requirement of each of the scheme. 3x3
   i. AMI ii. Polar RZ iii.MLT-3

   d) What do you mean by scrambling? Briefly explain the B8ZS scrambling technique. 2+6.33

4. a) With necessary diagrams and equations, explain the Pulse Code Modulation (PCM) technique for digitization. 12.33

   b) Give the taxonomy of digital-to-analog conversion techniques. Which of the techniques is the most susceptible to noise? Justify your answer. 3+3

   c) Briefly explain the concept of a constellation diagram. Give constellation diagram for the following: 4+5
   i. Binary ASK ii. BPSK iii. QPSK iv. 4-QAM v. 16-QAM

   d) You have an available bandwidth of 200kHz which spans from 1500 to 1700 kHz. What would be the bit rates and carrier frequencies if you modulate your data using ASK and FSK? (Assume $d=1/2$) 3+3