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

28 August 2017 (Morning)

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

MID SEMESTER EXAMINATION — SUMMER SEMESTER, 2016-2017

DURATION: 1Hour 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 do you understand by Data Communications? Explain the fundamental characteristics on which the effectiveness of data communications depends upon. 7

   b) Suppose an office has 6 (six) departments and in each of the department there are 4 (four) computers. Use hybrid network topology to connect them efficiently and give justification for your used topologies. 12.33

   c) Define protocol and explain the key elements of protocol. 7

   d) Explain three basic network criteria and mention the metrics to measure them. 7

2. a) What are the layers of OSI model? Write down the functionalities of each of the layers. 21

   b) What is a peer-to-peer process? How a particular process is identified on a host in TCP/IP protocol? 5

   c) What is the advantage of combining the session, presentation, and application layer in the OSI model into one single application layer in the Internet Model? 7.33

3. a) Define bandwidth for both analog and digital signal. Calculate the bit rate required for high-definition TV (HDTV) with 1080p resolution at 60fps. 6.33

   b) What do you understand by transmission impairment? Explain different factors causing transmission impairments with appropriate examples. 13

   c) Differentiate between Broadband transmission and Baseband transmission. 6

   d) Prove that, in case of digitization, the sampling rate should be at least twice the highest frequency contained in the signal. 8

4. a) What do you understand by DC Component of a signal? Explain how a digital signal with zero DC component is better for transmission. 7

   b) Encode the bit pattern 1010110010 into following encoding techniques 7.33

      i. NRZ-I
      ii. NRZ-L
      iii. Manchester
      iv. Differential Manchester
      v. Multilevel 2B1Q

   c) Explain the basic mechanisms of the modules of Pulse Code Modulation (PCM). 12

   d) What is Nyquist bit rate? Calculate the theoretical highest bit rate of a regular telephone line. A telephone line normally has a bandwidth of 3000 Hz (300 to 3300 Hz) assigned for data communications. The signal to noise ratio is usually 3162. 7