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

MID SEMESTER EXAMINATION   **SUMMER SEMESTER, 2019-2020**
DURATION: 1 HOUR 30 MINUTES   **FULL MARKS: 100**

CSE 4405: Data and Telecommunications
There are **3 (three)** questions. Answer all of them.
Figures in the right margin indicate marks.

1.	a)	What are the layers in **TCP/IP** protocol suite? Explain the followings in terms of **OSI** model. i.Process to process delivery i.Host to host delivery i.Node to node delivery	2+9
	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? (The value of N should can be calculated from your student ID using the following formula. **N:= (Last three digits of student ID mod 10)+2** For Example, The student having the ID 180041203 should calculate the value of N as follows: N:=(203 mod 10)+2 ☐ N:=3+2 ☐ N:=5)	2+2+4
	c)	What is the difference between a port address, a logical address, and a physical address? Observe Figure 1 carefully where the packet header format is given. Each device is attached with a specific logical address and physical addresses. Complete each of the packet headers with appropriate logical and physical addresses.	3+4

Figure 1: Network diagram for question 1.c)

	d)	How OSI and ISO are related to each other? Write down the functionalities of layer-N of the TCP/IP protocol suite. Where, **N: = (Last digit of your student ID mod 5) +1**.	3+4.33
2.	a)	A nonperiodic composite signal has a bandwidth of 200 kHz with a middle frequency of 140 kHz and peak amplitude of 20 V. The two extreme frequencies have an amplitude of 0. Draw the spectrum in frequency domain.	5
	b)	Briefly explain the concept of digital signal as a composite analog signal. Explain the baseband transmission of digital signal.	4+10.33
	c)	State the Nyquist bit rate formula. How does Nyquist bit rate formula differ from Shannon capacity formula? Consider a channel having SNR value of **M** (where, **M** is the last three digits of your **student ID**) and bandwidth of 2 MHz. What will be the approximate signal level and bit rate?	3+3+5
	d)	Name different causes of transmission impairments.	3
3.	a)	Compare and contrast pulse code modulation (PCM) and delta modulation (DM); discuss using their module diagram.	8.33
	b)	Consider the last three digits of your **student ID** as hexadecimal digits and generate 12 digit binary bit stream from the last three digits of your student ID (for example, if the last three digits of your student ID is 123 then you should consider the binary bit stream as 000100100011). Draw corresponding digital signals for following line coding schemes and also comment on the bandwidth requirement of each of the schemes. i. AMI ii. NRZ-I iii.MLT-3 iv. Manchester v. polar RZ	15
	c)	What do you mean by scrambling? How does scrambling differ from block coding? Consider a bit stream: 11000010000000000. Draw corresponding digital signals for the following line coding schemes. i. *B8ZS* ii. *HDB3*	4+6
		OR	
	a)	Distinguish between synchronous and statistical time division multiplexing (TDM). Briefly explain the strategies used when the input lines of a multiplexer have different data rates?	7+6
	b)	Briefly explain the concept of a constellation diagram. Give constellation diagram for the following: i. Binary ASK ii. BPSK iii. QPSK iv. 4-QAM v. 16-QAM	5+5
	c)	With necessary diagrams briefly explain the Frequency Hopping Spread Spectrum (FHSS) technique? How does the FHSS technique differ from the Direct Sequence Spread Spectrum (DSSS) technique?	7+3.33