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B.Sc. Engg. SWE 4th Semester

29 August 2019 (Afternoon)

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

**MID SEMESTER EXAMINATION** **SUMMER SEMESTER, 2018-2019**

**DURATION: 1 Hour 30 Minutes** **FULL MARKS: 75**

## CSE 4411: Data Communication and Networking

**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. 9

   b) Write short notes on the followings: 7

   i. DC Component ii. Self-Synchronization iii. Baseline Wandering

   c) Distinguish the four levels of addresses (used in internet) based on their roles. 5

   d) Suppose we have a channel with a 5-MHz bandwidth. The SNR of the channel is 123. What is the appropriate bitrate and signal level. **(Explain any assumption in your calculation and mention the formula)**. 4

2. a) Assume that a voice channel occupies a bandwidth of 4-kHz. We need to combine three voice channels into a link with a bandwidth of 12 kHz from 64 to 76 kHz. Show the **configuration** using **Block Diagram (both multiplexing and demultiplexing)** using frequency domain (assume that no guard band is present) 9

   b) Find out the **bit sequence** for the given digital signals from the following figures. For the Figure-1, consider **NRZ** and **NRZ-I** coding. And for the Figure-2, consider **Manchester** and **Differential Manchester** coding schemes. 7

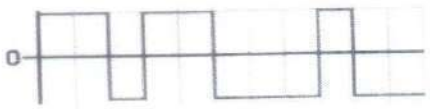

Figure 1: sample graph for Question 2. (b)

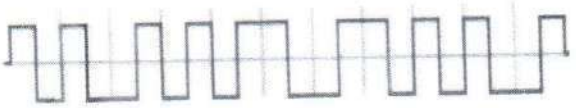

Figure 2: sample graph for Question 2. (b)

   c) Show the hierarchical organization of the Internet using figure with clear notation. 5

   d) How many bits can bit can fit on a link with a 3-ms delay if the bandwidth of the link is : 4

      i. 2 Mbps
      ii. 10 kBps
      iii. 150 Mbps

3. a) Briefly explain the three processes of Pulse Code Modulation (PCM) technique for digitization. Include **Block diagrams** to show different components of PCM encoder. 10

   b) 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. 9

   i. AMI ii. Polar RZ iii. MLT-3

   c) Write down the advantages and disadvantages of optical fiber technology. 6

4. a) Describe the three Analog-to-Analog conversion techniques in brief. Your answer should contain the block diagram representing the conceptual implementation of each technique. 10

   b) In Figure 3 the Physical Address is represented with English letter and Logical Address is represented with numerical value. Example: Top-Left PC (sender) has physical address P and Logical Address 11. Only write the Datagram and Frame with '?' sign mentioning the numbers. 9

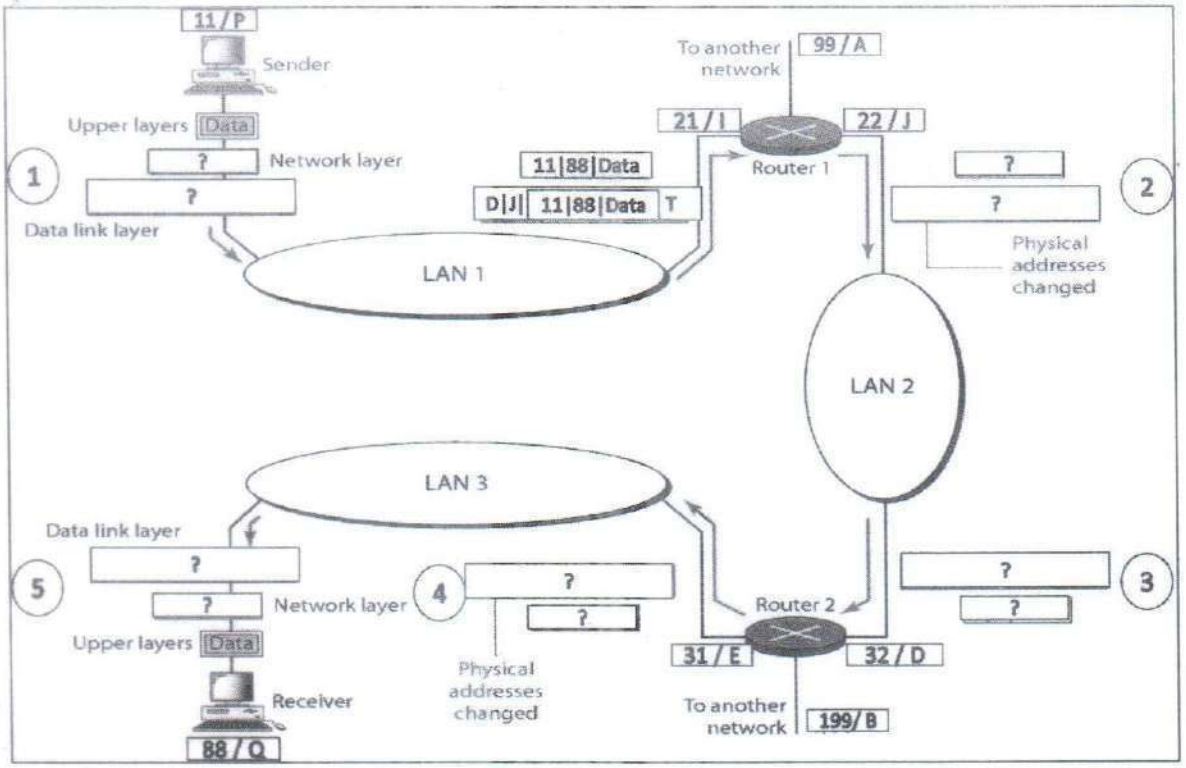


Figure 3: sample diagram for Question 4. (b)

c) Write down the differences between Synchronous TDM and Statistical TDM. 6