B.Sc. Engg. CSE 5th Semester **20 August 2020**
B.Sc. TE 1st Semester(2-Yr)

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

ONLINE WRITTEN ASSESSMENT **WINTER SEMESTER, 2019-2020**
DURATION: 1 Hour **FULL MARKS: 30**

CSE 4511/CSE 4585: Computer Networks

There are **4** questions. Answer all of them.
Figures in the right margin indicate marks.

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1. An organization is assigned the block 2000:1456:2474/48. What is the IPv6 address of an interface in the i_{th} subnet (**where i, := Last digit of your student ID**) if the IEEE physical address of the computer is (**F5-A'Student ID'**)$_{16}$. For Example, The student having the ID 170041020 should consider the physical address as (F5-A1-70-04-10-20)$_{16}$ 5

2. A TCP client opens a connection using an initial sequence number (ISN) of **N** (**where N:= Last 4 digits of your student ID**). The TCP server opens the connection with an ISN of M (**where M:=N+1000**).Show the three TCP segments during the three-way handshaking connection establishment. (Use timeline in y-axis for each side to show the states and the relative duration of the client and the server.) 5

3. A host sends five packets and receives three acknowledgments. The time is shown as hour:minute:seconds. 5

   i. Segment 1 was sent at 0:0:00.
   ii. Segment 2 was sent at 0:0:05.
   iii. ACK for segments 1 and 2 received at 0:0:07.
   iv. Segment 3 was sent at 0:0:20.
   v. Segment 4 was sent at 0:0:22.
   vi. Segment 5 was sent at 0:0:27.
   vii. ACK for segments 3 and 4 received at 0:0:45.
   viii. ACK for segment 5 received at 0:0:65.

   Calculate the values of RTT_M, RTT_S, RTT_D, and RTO of the retransmission timer of TCP. Given that the original RTO is **N** seconds.
   (The value of N should can be calculated from your student ID using the following formula. **N:= (Last two digits of student ID mod 10)+2** For Example, The student having the ID 170041020 should calculate the value of N as follows:

   N:=(20 mod 10)+2
   ⇨ N:=0+2
   ⇨ N:=2)

4. A TCP source sends segments of equal size, and maintains the sequence number for each segment (i.e., the TCP protocol is segment-oriented instead of byte-oriented). Assume that the sequence number of the first data segment is N (where **N:= Last two digits of your student ID**). The size of the receiver window (*rwnd*) is always larger than the congestion window (*cwnd*). For the first data segment, assume that the value of the *cwnd* is 1, and the value of the slow start threshold (*ssth*) is 65000. 15

You are asked to draw a timing diagram, where the y-axis shows the time, and two parallel lines in the y-axis represent the events (sending and receiving of data and ACK segments, *cwnd* values, etc.) at the source and destination TCP.

Assume that the source always tries to send as many data segments as it is allowed to.

Draw the diagram considering the followings:

- The successful transmission of at least 20 segments.
- Seventh (7_{th}) Segment is lost, and the source identifies this by triple duplicate acknowledgments.
- Fourteenth (14_{th}) Segment is lost (assume subsequent segments are also lost), and the source identifies this by a timeout.
- At the left side of the source TCP timeline, show the value of *cwnd* and *ssth*, whenever they are updated.
- Identify the slow start, congestion avoidance, congestion detection region in the source TCP timeline.