B.Sc. Eng. CSE 7th Semester — 14 March 2018 (Afternoon)

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

MID SEMESTER EXAMINATION — WINTER SEMESTER, 2017-2018
DURATION: 1 Hour 30 Minutes — FULL MARKS: 75

CSE 4731: Internet Engineering

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 advantage does a circuit-switched network have over a packet-switched network? 7
   b) Do the routers in both datagram networks and virtual-circuit networks use forwarding tables? 4
   c) What is the difference between routing and forwarding? 5
   d) Suppose users share a 3 Mbps link. Also suppose each user requires 150 kbps when transmitting, but each user only transmits 10% of the time. 9
      i. When circuit-switching is used, how many users can be supported?
      ii. For the remainder of this problem, suppose packet-switching is used. Find the probability that a given user is transmitting
      iii. Suppose there are 120 users. Find the probability that at any given time, 90 users are transmitting simultaneously.

2. a) How does a newly arriving host in a subnet get an IP address automatically? 6
   b) What is the difference between routing and forwarding? 5
   c) Suppose Alice and Bob are sending packets to each other over a computer network. Suppose Trudy positions herself in the network so that she can capture all the packets sent by Alice and send whatever she wants to Bob; she can also capture all the packets sent by Bob and send whatever she wants to Alice. List some of the malicious things Trudy can do from this position. 7
   d) Suppose Host A wants to send a large file to Host B. The path from Host A to Host B has three links, of rates R1 = 500 kbps, R2 = 2 Mbps, and R3 = 1 Mbps. 7
      i. Assuming no other traffic in the network, what is the throughput for the file transfer?
      ii. Suppose the file is 4 million bytes. Roughly how long will it take to transfer the file to Host B?

3. a) Describe how a botnet can be created, and how it can be used for a DDoS attack. 6
   b) What is the key distinguishing difference between a tier-1 and tier-2 ISP? 5
   c) Suppose an application generates chunks of 40 bytes of data every 20 msec, and each chunk gets encapsulated in a TCP segment and then an IP datagram. What percentage of each datagram will be overhead, and what percentage will be application data? 6
   d) Consider sending a 2400-byte datagram into a link that has an MTU of 700 bytes. Suppose the original datagram is stamped with the identification number 422. How many fragments are generated? What are the values in the various fields in the IP datagram(s) generated related to fragmentation? 8

4. a) Compare and contrast link-state and distance-vector routing algorithms. 7
   b) How long does it take a packet of length 1,000 bytes to propagate over a link of distance 2,500 km, propagation speed 2.5*10^8 m/s, and transmission rate 2 Mbps? Does this delay depend on transmission rate? 5
   c) Suppose an ISP owns the block of addresses of the form 128.119.40.64/26. Suppose it wants to create four subnets from this block, with each block having the same number of IP addresses. What are the network and broadcast addresses (of form a.b.c.d/x) for the four subnets? 7

d) Suppose you purchase a wireless router and connect it to your cable modem. Also suppose that your ISP dynamically assigns your connected device (that is, your wireless router) one IP address. Also suppose that you have five PCs at home that use 802.11 to wirelessly connect to your wireless router. How are IP addresses assigned to the five PCs? Does the wireless router use NAT? Why or why not? 6