B.Sc. Engg. / HD CSE 6th Semester — 28 August 2017 (Afternoon)

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

CSE 4605: Computer Networks

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.

---

1. a) Briefly explain the necessity of layering in designing a communication system. Match the followings functionalities to one or more layers of the OSI model: 5+3
   i. Flow control ii. Route Determination iii. Segmentation and reassembly
   iv. Physical addressing v. Service-point addressing vi. Access control
   b) Neatly sketch the *IEEE 802.3* MAC frame. An Ethernet destination address is 05:01:02:03:04:05, what is the type of the address? How does the address appear on the line in binary? 3+4
   c) Draw the send and receive window for '*Selective Repeat ARQ*' protocol. Using 5-bit sequence numbers, what is the maximum size of send and receive windows for each of the following protocols? 4+6
      i. Stop-and-Wait ARQ
      ii. Go-Back-N ARQ
      iii. Selective repeat ARQ

2. a) What is the slot time in CSMA/CD? Explain how the slot time is related to the maximum network length. 2+5
   b) An Ethernet MAC sublayer receives 4540 bytes of data from the upper layer. Can the data be encapsulated in one frame? If not, how many frames need to be sent? What is the size of the data in each frame? 5
   c) "The vulnerable time in ALOHA depends on the frame transmission time, whereas it depends on the propagation delay in CSMA" -Justify the statement in your own word. 8
   d) How does Thicknet (10Base5) differ from Cheapernet (10Base2)? 5

3. a) Briefly explain the hidden station problem of *IEEE 802.11* with one possible solution to eliminate the problem. 6
   b) How does the Distributed Coordination Function (DCF) differ from the Point Coordination Function (PCF) as a MAC sublayer for *IEEE 802.11*? What is a repetition interval and why is this necessary? 5+3
   c) With the aid of necessary diagrams briefly explain the working principles of a transparent bridge. Demonstrate the major problem of a transparent bridge. 5+6

4. a) What are the differences between classful addressing and classless addressing in IPv4? What are the restrictions Internet authorities impose on classless address block? 4+3

b) What are the main motivations for *subnetting*? How can we find the sub-network address if one of the address in that sub-network is given? If the IPv4 address of a host is 10.1.0.65/19 then what is the subnet address and the broadcast address of the subnet? 3+2+3

c) An ISP is granted a block of addresses starting with 172.15.0.0/16. The ISP wants to distribute these blocks to 2500 customers as follows: 10

i. The first group has 100 medium-size business, each needs 32 addresses
ii. The second group has 400 customers, each needs 16 addresses
iii. The first group has 2000 customers, each needs 8 addresses

Design the sub blocks and show the address allocation and distribution by the ISP. Find out how many addresses are still available after these allocations.