B.Sc. Engg. CSE 8th 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 4805: Wireless 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.

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a) Define the *Access Networks* along with an appropriate diagram. 6

b) Consider a *multi-hop wireless ad-hoc network* consists of η number of stations ($10<\eta<15$), where all of the participating stations share a common channel through a contention based medium access mechanism. Let a station titled *X* has just captured a wireless link and transmitted a frame to a station titled *Y*, which is within its transmission range. Thus this channel capture at link (X-Y) restricts few more *neighboring links* (within certain geographical area) to be captured within next Δt period of time. 10

Considering the above scenario, *draw a diagram* to correctly identify these restricted *neighboring links* during Δt period. Assume the sample network and station's individual transmission ranges by yourself.

c) Clarify the significance of *Short Inter-frame Space (SIFS)* in any contention based channel access mechanism. 5

d) Mention the scope of *IEEE 802.11* standard on *OSI* reference model. 4

2. a) List the different challenging issues of networking protocols for *Mobile Ad Hoc Networks (MANETs)*. 6

b) Discuss the *IEEE 802.11* network architecture. 5

c) Consider a *Basic Service Set (BSS)* of *Wireless Local Area Network (WLAN)* consists of three stations (A, B, and C) which are controlled by *Distributed Coordination Function (DCF)*. Draw a time line diagram representing the sequence of actions for a successful re-transmission of a single *MAC Service Data Unit (MSDU)* from station-A to station-C. The diagram should depict the detail *backoff* procedure performed by every contending stations. Consider the *minimum contention window, CWmin* value is 4 (four). Note that, the x-axis of the diagram shows time and y-axis shows one horizontal line for each contending station. 14

3. a) *IEEE-802.11E* defines the *Enhanced Distributed Channel Access (EDCA)* for assuring medium access control with support for *Quality of Service (QoS)*. Discuss at-least 3 (three) key features adopted by *EDCA*. 8

b) "With the increase of physical-layer data rate in modern *WLANs* (e.g., 802.11n/s), the overhead of *Media Access Control (MAC)* progressively degrades the data throughput efficiency". Justify the above statement with proper argument. 9

c) "*RTS/CTS* handshaking *partly* overcomes the *hidden node problem*". Justify the statement with proper example. 8

4. a) Mention at-least 5 (five) effective approaches that enhance the network lifetime of energy-constrained *Wireless Sensor Networks (WSNs)*. 6

b) Evaluate the pros and cons of exploiting the *sleep mode TDMA scheduling* in any energy constrained *WSNs*. 7

c) How does a routing in *Delay Tolerant Networks (DTNs)* differ from traditional routing? 6

d) How does a new station in *WLAN* join a *BSS*? Mention the available approaches in brief. 6