B.Sc. Engg. CSE 8th Semester (45) 324 23 October 2015

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

SEMESTER FINAL EXAMINATION **SUMMER SEMESTER, 2014-2015**

DURATION: 3 Hours **FULL MARKS: 150**

CSE 4805: Wireless Networks

Programmable calculators are not allowed. Do not write anything on the question paper.

There are **8 (eight)** questions. Answer any **6 (six)** of them.

Figures in the right margin indicate marks.

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1. a) How is a wireless network different from a wired network? 4
   b) What does a Routing Metric mean? 3
   c) Congestion factor at a node is an indicator of congestion seen by the current node. Mention at least three factors which can be used in the calculation of the total congestion factor locally in wireless networks. 6
   d) Propose an appropriate network model aimed at providing cost-effective connectivity to rural villages of developing countries, where deploying a standard Internet access is not cheap. However, your answer should depict the complete working mechanism of proposed network model. 12

2. a) Draw a time line diagram representing the sequence of actions for one successful data transmission and one collision within a structured basic service set (BSS) using DCF medium access mechanism. 15
   Note that, the x-axis of the diagram shows time and y-axis shows one horizontal line for each stations. The transmission/reception of the frames of any station should be represented as rectangles on the horizontal line with source and destination addresses inside the rectangle.
   b) Delay Tolerant Networks (DTNs) relies on three fundamental requirements. Mention them. Briefly explain the end to end data delivery paradigm in DTN. 10

3. a) Briefly mention the challenges associated with Wireless Sensor Networks (WSNs). 5
   b) Extending the battery life time is one of the crucial requirements of WSNs. List few approaches to meet this requirement. 7
   c) Ubiquitous Computing can be employed in WSNs to construct an Intelligent Home. Justify the statement with appropriate examples. 6
   d) In Figure 1, four stations, A, B, C, and D, are shown. Which of the last two stations do you think is closest to A and why? 2

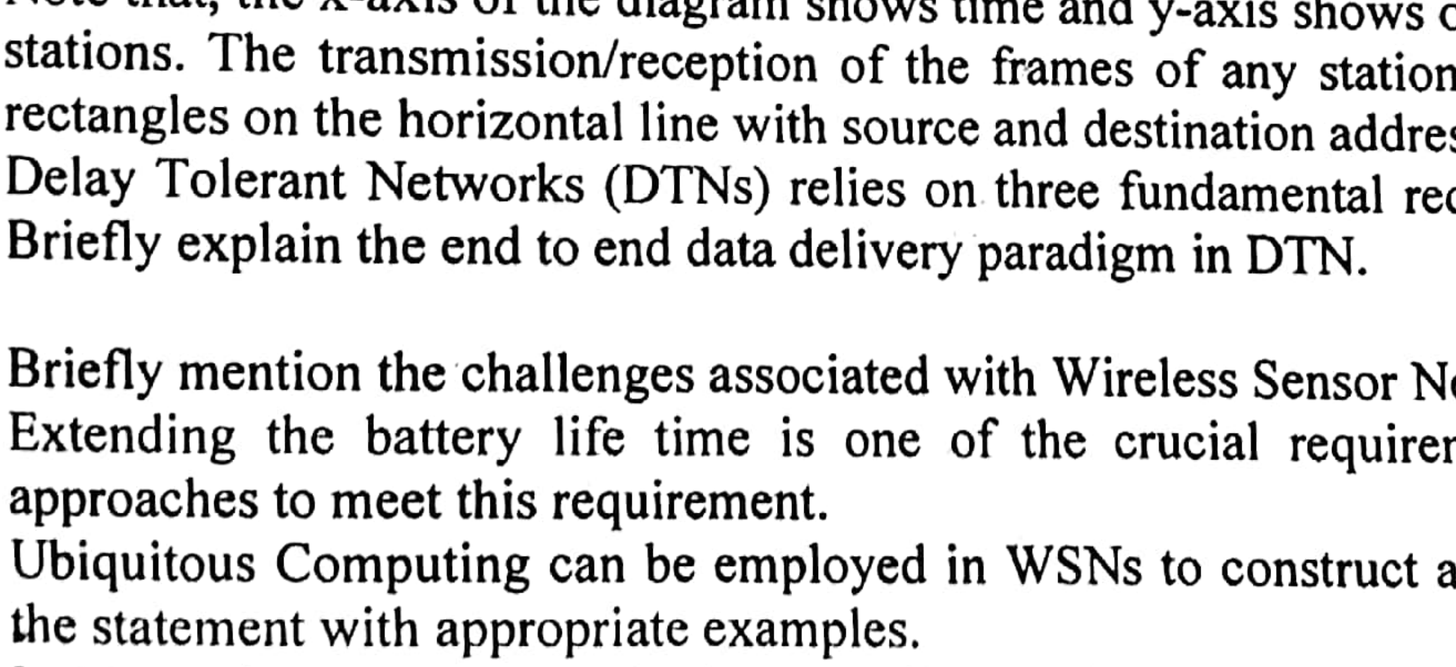

Figure 1

e) "The Routing Metric, ETX minimizes total transmissions per packet". Justify the statement. 4+1
Mention one drawback of routing metric ETX.

4. a) What are the differences between carrier sensing mechanism in the IEEE 802.11 and IEEE 802.3 standards? 4
   b) IEEE 802.11E includes a contention based channel access called EDCA to ensure Quality of Service (QoS). Depict the behavior of EDCA by dint of appropriate example and time line diagram. 15
   c) If a binary signal is sent over a 5-kHz channel whose signal-to-noise ratio is 10 dB, what is the maximum achievable data rate? 6

5. a) What is Cognitive Radio (CR) and how cognitive radio works? 4
   b) Why is TCP performance in wireless networks poor? 4
   c) Mention at least two solution approaches to elevate the efficiency of TCP in wireless networks. 5
   d) Receiver initiated medium access control protocols experience few merits and demerits over sender initiated MAC protocols. List those in brief. 6
   e) How does Bluetooth work? Mention its limitations. 6

6. a) With the aid of appropriate example clarify the week point of Distance Vector Routing algorithm. 8
   b) How does Destination-Sequenced Distance-Vector (DSDV) routing protocol eliminate the shortcomings of Distance Vector Routing algorithm? 7
   c) IEEE 802.16 standard assures quality-of-service by allocating an integral number of physical layer time slots for upstream traffics to different subscribers. Have a brief discussion to clarify such claim. 10

7. a) How does Prioritized Epidemic Routing (PREP) work? Figure out the pros and cons of Prioritized Epidemic Routing (PREP). 6
   b) IEEE has drawn up a Broadband Wireless standard for Metropolitan Area Networks (MANs). Have an elaborate discussion on Physical layer of that standard. 6
   c) Clarify the synchronization procedure by Sensor-MAC (S-MAC) protocol in WSNs. 7
   d) "B-MAC, a configurable MAC protocol for WSNs appears to be better than S-MAC". Justify the statement. 6

8. a) What services does RTS/CTS provide in a multi hop wireless networks? 4
   b) Stations utilizing binary exponential back-off mechanism for collision resolution use random back-off count. However, determination of random back-off count depends on Contention Window (CW). Clarify this selection procedure in brief. 5
   c) What is the purpose of PIF, DIF, and SIF time intervals and how are they used in the IEEE 802.11 based network? 6
   d) How does the node scanning procedure works in IEEE 802.11 networks? 5
   e) Define Access Networks with appropriate examples. 5