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

EMESTER FINAL EXAMINATION SUMMER SEMESTER, 2013-2014

URATION: 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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a) List the basic characteristics of Wireless Sensor Networks (WSNs). 4

b) Lifetime is crucial in WSNs. How can we extend the lifetime of a WSN? 7

c) Predict the future of WSN by proposing at least three potential smart home/office applications. Your answer should include elaborate description of each applications. 14

a) A wireless LAN with four stations (A, B, C, D) uses the CSMA/CA protocol to send/receive data in the infrastructure less mode of IEEE 802.11. Stations use binary exponential backoff mechanism for collision resolution. Draw a diagram showing the transmission and reception of the frames which satisfies the followings. 18

a) The diagram should show one successful transmission from B to D, and one from A to C, one collision and one successful retransmission.

b) The diagram should show the backoff process of all stations which includes the backoff slots, DIFS period and the SIFS period.

Note that, the x-axis of the diagram shows time and y-axis shows one horizontal line for each station. The transmission/reception of the frames of any station should represent as rectangles on the horizontal line with source and destination addresses inside the rectangle.

b) "TCP performs poor in wireless networks"-Justify the statement. 7

a) Present a review of Sensor-MAC (S-MAC) protocol in brief. 9

b) Mention the appropriate policy for selecting cluster head in any WSNs. 4

c) Television channels are 6 MHz wide. How many bits/sec can be sent if four-level digital signals are used? Assume a noiseless channel. 6

d) Point out the limitations of Bluetooth system 6

a) Illustrate a sequence of data transmissions following the MACA-BI which results in at least one data collision due to one of the weak points of MACA-BI. Consider the sample wireless network shown in figure 1 to prepare your answer. However, a connecting line between two nodes represents their respective transmission range. 9

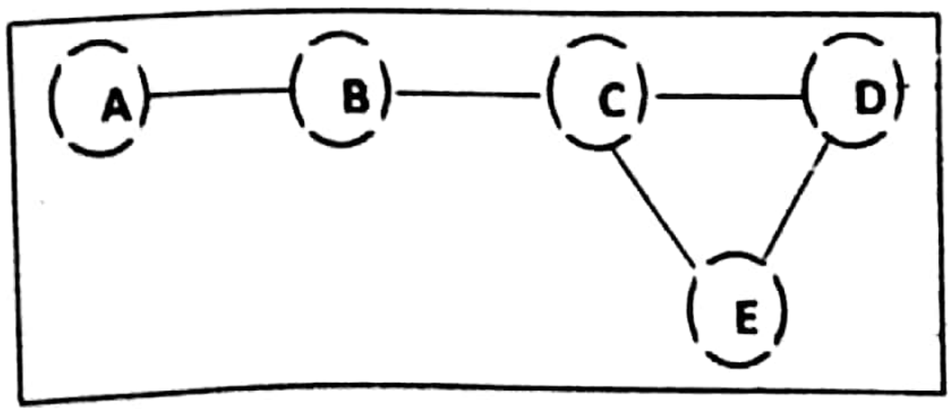

Figure: 1: Sample network for 4.a)

b) What are the motivations and challenges associated with any Receiver Initiated MAC protocol? 9

c) Have a comparative analysis between IEEE-802.11 and IEEE-802.16 based networks. Your analysis should cover the context, requirements and working procedure of both networks. 7

5. a) If a binary signal is sent over a 3-kHz channel whose signal-to-noise ratio is 20 dB, what is the maximum achievable data rate? 7

b) How does Delay Tolerant Network(DTN) work ? Point out the key properties of DTNs. 8

c) Prioritized Epidemic Routing (PREP) for Opportunistic Networks lies on two modules. Explain the detailed operations of both modules. 10

6. a) Propose a network model which allows most appropriate communication methodology at the presence of an oppressive administrations in a city. Explicit merits and challenges associated with proposed model should be mentioned. 13

b) Oracle Based Routing protocol designed for DTN proposes the use of one or more knowledge centers (Oracles). Describe those in brief and mention various schemes it follows to make routing decisions in the availability of those oracles. 7

c) Figure out the importance of RTS and CTS in any multi-hop wireless networking. 5

7. a) Do a comparative analysis between proactive routing and reactive routing protocols. 6

b) "Distance-Vector routing algorithm may creates the problem of counting to infinity". Clarify the statement by appropriate example. 10

c) How does the Destination-Sequenced Distance-Vector (DSDV) routing protocol guarantee loop-free paths? 9

8. a) How does the scanning procedures work in WLAN? 5

b) IEEE 802.11e attempts to ensure quality of services. Clarify the working paradigm of 802.11e MAC in contention-based mode. 12

c) What is High Speed TCP? How does it eliminate the shortcomings of traditional TCP? 8