Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

VII SEMESTER B.TECH (COMPUTER AND COMMUNICATION ENGG)

MAKEUP EXAMINATIONS, DECEMBER 2016

SUBJECT: WIRELESS SENSOR AND ADHOC NETWORKS [ICT 455]

REVISED CREDIT SYSTEM
(26/12/2016)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ANY FIVE FULL** questions.
- Missing data if any, may be suitably assumed.

1A. With an example of minimum 10 nodes, compare DSDV and DSR with respect to overheads and route optimality. **(05)**

1B. Time of Arrival (ToA) is an example of ranging technique in WSN. Answer the following questions with a propagation delay of 300 m/s.

i. What is the advantage of two-way ToA over one-way ToA?

ii. In a synchronized network with unknown synchronization error, an anchor node periodically broadcasts an acoustic signal to sensor nodes in its range. At time 1000 ms on the anchor node's clock, the anchor node issues a beacon, which is received by node A at time 2000 ms (on node A's clock). What is the distance that node A can compute?

iii. Instead of computing the distance itself, node A also responds with an acoustic signal issued at time 2500 ms, which is received by the anchor node at time 3300 ms. What is the distance computed by the anchor node and also discuss the synchronization of anchor node and node A. **(03)**

1C. Discuss any four design objectives for WSN. **(02)**

2A. Draw and explain the WSN Node Component Stack. **(05)**

2B. Explain with the format for network formation phase message of CS-MAC. **(03)**

2C. With an example application, describe the following IoT protocols.

i. COAP

ii. MQTT **(02)**

3A. Explain the following WSN MAC Protocols.

i. DS-MAC

ii. T-MAC

iii. CDMA S-MAC

iv. Z-MAC

v. Funneling MAC **(05)**

3B. Explain how dynamic reprogramming and module replacement is possible in SOS? **(03)**

3C. What is Man-in-the-Middle attack? Create a concrete WSN scenario where this attack could be catastrophic? **(02)**

4A. Explain in detail the GEAR and SPEED routing protocols in WSNs. **(05)**

4B. Discuss about Linked Cluster and Mobility Based Clustering algorithm by considering an example with necessary data structures. **(03)**

4C. Node A sends a synchronization request to node B at 1050 ms (on node A's clock). At 1150 ms, node A receives the reply from node B with a time stamp of 1020 ms. (you can ignore any processing delays at either node).

i. What is node A's clock offset with respect to the time at node B?
ii. Is node A's clock going too slow or too fast? **(02)**

5A. With a neat diagram, explain how routing protocols are categorized in WSN. **(05)**

5B. Explain various forwarding strategies involved in location based routing technique. **(03)**

5C. Explain the six different types of time stamps that characterize the communication in FTSP. How does FTSP remove the jitter of the interrupt handling and the encoding/decoding times? **(02)**

6A. Describe the CIA security model. Which services of this model are essential for the following scenarios? Justify your answers.

i. A WSN that allows emergency response teams to avoid risky and dangerous areas and activities.
ii. A WSN that collects biometric information at the airport.
iii. A WSN that measures air pollution in a city for a research study. **(05)**

6B. Explain the working principle of scalable position based multicast routing technique. **(03)**

6C. Compare and contrast TDoA and AoA ranging techniques. **(02)**