Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

VII SEMESTER B.TECH. (COMUPTER COMMUNICATION AND ENGINEERING)

END SEMESTER EXAMINATIONS, NOV 2019

SUBJECT: WIRELESS SENSOR AND AD-HOC NETWORKS [ICT 4151]

REVISED CREDIT SYSTEM
(15/11/2019)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitably assumed.

1A. Name and explain at least four techniques to reduce power consumption in wireless sensor networks. **5**

1B. Explain how MECN Routing protocol identifies minimum energy path based on power of nodes. **3**

1C. What are the differences between passive sensors and active sensors and explain with suitable examples for each category? **2**

2A. With the help of neat diagram, explain the sensor node architecture. **5**

2B. Explain the followings with respect to TRAMA MAC scheme **3**

i. What are the advantages and disadvantages of the TRAMA protocol compared to contention-based protocols
ii. What is the difference between transmission slots and signaling slots?
iii. What is the purpose of the NP component?

2C. Assume that 100 nodes are uniformly distributed over an area of 500 sq. mts. What is the probability of having 5 nodes over an area of 100 sq. mts? **2**

3A. Draw 2-Hop clustering diagram and explain the various steps of passive clustering technique used in efficient flooding algorithm. **5**

3B. Discuss why overhearing is a problem in a wireless sensor network and explain how S-MAC addresses this problem **3**

3C. What is the main disadvantage for both TDoA and AoA ranging techniques? **2**

4A. Two nodes A and B use RBS to receive periodic acoustic synchronization signals from a reference node. Node A's clock shows 10 s when it receives the last synchronization beacon, while node B's clock shows 15 s. Node A detects an event at time 15 s, while node B detects the same event at time 19.5 s. Assume that node A is 100 m away from **5**

the synchronization source and node B is 400 m away from the synchronization source. Which node detected the event sooner and by how much? Assume a signal speed of 300 m/s.

4B. Explain the following with respect to sensor networks **3**

i. Data freshness
ii. Jamming attack
iii. Exhaustion attack

4C. For the APIT test, show a concrete scenario where an arbitrary node **M** would come to the wrong conclusion about its location whether it is inside the tringle or not. **2**

5A. Apply the minimum cost path algorithm and write intermediate steps till minimum cost path graph is derived for the graph given in **Fig Q5A.** Assume node **A** has minimum cost of **0.5** to the sink. **5**

5B. Why does node have mobility in a WSN scenario? What are the possible types of mobility? **3**

5C. List and explain any two applications of wireless sensor networks. **2**

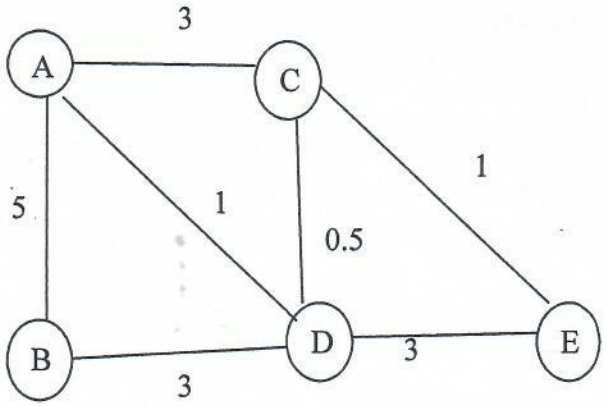

FIG. Q5A