Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

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

MAKEUP EXAMINATIONS, DECEMBER 2019

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

REVISED CREDIT SYSTEM
(20 12 /2019)

Time: 3 Hours MAX. MARKS:

Instructions to Candidates:

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

1A. Explain the process of authenticated broadcast and pairwise authentication in LEACH protocol with a neat diagram. **5**

1B. Identify the components of a microcontroller that consumes energy of a WSN node. Explain any one solution for each of the components to save the energy. **3**

1C. With necessary diagram explain any two disadvantageous of flooding based data centric routing protocol. **2**

2A. It is assumed that a sensor node consumes 0dBm power whenever it is in sleep state and consumes 0.5 dBm in active state. The node takes 0.5 ms for turning OFF and 0.25 ms to turn ON its internal components to move from active to sleep state and sleep to active state respectively and also assume that power consumption is linear. It is also observed that a node will listen an event at 5th second and remain active for 4 second and sleep event occurs at 3rd second and the cycle repeats for every 6 seconds. Discuss scheduling of transition from "active" to "sleep" is beneficial or not. **5**

2B. With an appropriate diagram explain multi-hop awareness problem of the basic S-MAC scheme. Explain the proposed solution with appropriate diagram. **3**

2C. What is a "Hotspot" node in WSN? Explain with an appropriate example. **2**

3A. Compare and explain different WSN architectures with respect to power consumption **5**

3B. Explain a MAC protocol that avoids unnecessary wastage of bandwidth and energy consumption of both sender and receiver with suitable timing diagram. **3**

3C. Node A sends a synchronization request to node B at 3150 (on node A's clock). Node B receives the request from A at 3115 (on node B's clock). At 3240, node A receives reply from node B with a time stamp of 3120. What is the node A's clock offset? **2**

4A. List and explain any five drawbacks of LEACH protocol with suitable diagram. **5**

4B. Explain a time synchronization protocol which is suitable for low memory and low complex WSN applications. **3**

4C. Explain the differences between range-based and range-free localization **2**

5A. With the neat diagrams explain geographical forwarding techniques for lossy links in WSN. **5**

5B. Why is localization needed in wireless sensor networks? Name at least two concrete scenarios or applications where localization is required. **3**

5C. Explain the followings with respect to sensor networks **2**

i. Deterministic and Nondeterministic Network

ii. Homogeneous and Heterogeneous Network