NATIONAL INSTITUTE OF TECHNOLOGY PATNA
Department of Computer Science and Engineering
End-Semester Examination, July-Dec 2020

Subject: Advanced Wireless Sensor Networks (CS410109/CS420111/ CS420111)
Course: M. Tech. and Ph.D.

Time: 2 hrs. Max. Marks: 40

Answer any four questions.

1. A) You, being a network administrator, have been assigned a task to build a large wireless sensor network (WSN) with 1000 sensor nodes in hilly terrain of size 1km by 1km, and single base station placed outside the network.
   (i) Discuss in detail about the challenges you would face while designing this network. [4]
   (ii) What are the mechanisms you would consider to mitigate these challenges? [4]
   B) What are the possible deployment options for WSN? Suggest a suitable application area for each of the mentioned options. [2]

2. A) Explain the working of various components of a sensor node with a suitable diagram. Which is the most energy-consuming component? Discuss the ways in which its working can be improved to conserve energy. [6]
   B) Discuss different types of mobility in a WSN giving real-life example for each case. Why data-centric networking is suitable for WSN over address-centric networking? [4]

3. A) Illustrate hidden node and exposed node problem with a suitable diagram [2]
   B) i) What are the various parameters that can be considered for evaluating a MAC protocol of WSN? [2]
   ii) Discuss the working of LEACH protocol? What is the main limitation of LEACH protocol? Suggest a suitable mechanism to possibly overcome the mentioned limitation? [6]

4. A) The coordinates of three points A, B, and C are (2, 1), (5, 4), (8, 2). Find the coordinates of a point D using trilateration, where the distances AD, BD, and CD are $\sqrt{10}$, 2, 3 respectively. [5]
   B) (i) Why it is important for a node to locate itself in a network? [1]
   (ii) Comment on various distance estimation techniques in WSN. [4]

5. A) Why time synchronization is required among nodes in WSN? Discuss the pairwise synchronization component of LTS and mention the possible sources of inaccuracies that can affect the synchronization mechanism. [5]
   B) (i) What is a dead-end? How Geometric Perimeter State Routing (GPSR) resolves the problem of ‘dead-end’? [3]
   (ii) Differentiate between proactive and reactive routing protocols. [2]