

Name:	
Enrolment No:	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2018

Programme Name: B.Tech EE IOT

Semester : V

Course Name : WIRELESS SENSOR NETWORKS

Time : 03 hrs

Course Code : ELEG427

Max. Marks : 100

Nos. of page(s) : 2

Instructions: 1) Mention Roll No at the appropriate place in the question paper.

2) Answers should be brief and concise.

3) All questions are compulsory.

SECTION A

S. No.	Question	Marks	CO
Q 1	Define components of a typical sensing node of a WSN with its block diagram.	5	CO
Q 2	What are the connectivity issues and deployment challenges in implementing WSN in Building Automation (Smart Buildings)?	5	CO
Q 3	Explain the use of SRAM, SD Card, SPI Flash and EEPROM in Microcontrollers?	5	CO
Q 4	Discuss all possible advantages and disadvantages of centralized topology of Wireless Networks.	5	CO

SECTION B

Q 5 A Block diagram of MICA2 sensor node hardware is shown in the figure 1. **10** **CO**

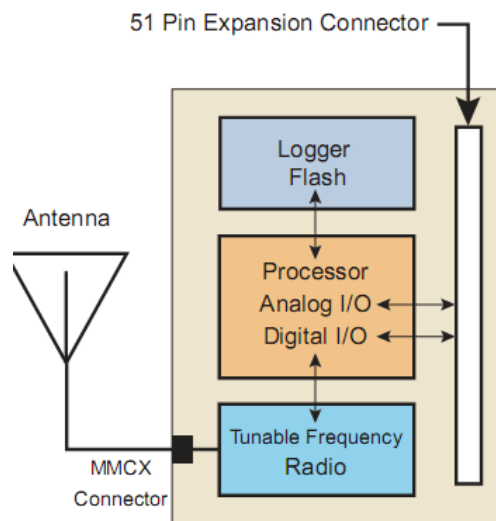


Figure 1: MICA2 Sensor Node Hardware

- a) Identify the range of transmission band that can be used by MICA2 mote.
- b) What is the size of flash memory for data logging used by MICA2 mote.

	c) Identify the transceiver IC and its specifications used by MICA2 mote. d) Name the WSN OS compatible with the MICA2 mote.		
Q 6	Suppose a WSN is to be designed for the early Forest fire during summer. Consider the size of forest to be of 100 square Kms. Identify and define the design objectives and technical challenges for such an application.	10	CO
Q 7	Define the following terms with respect to Wireless Sensor Networks: a) MAC Layer b) Sleep Mode c) Frame d) Packet e) Collision	10	CO
Q 8	Design a WSN (block diagram) that can be used in Structural Health Monitoring (for Bridges, etc.). Analyze its features and specifications, including possible wireless standards and network topologies.	10	CO

SECTION-C

Q 9	Compare the following MAC protocols on the basis of their applications, synchronization requirements, Maximum energy consumption and maximum latency: a) S-MAC b) PRIMA c) IEEE 802.11 d) LEACH e) IEEE 802.15.1	20	CO
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Q 10	<p>Assume that nodes A, B and C are within range of each other. Node D is within range of Node C and Node A transmits to Node B. Refer the figure 2 for the MAC protocol that has been designed to facilitate smooth communication in the WSN environment.</p> <p style="text-align: center;"><i>Figure 2: MAC Protocol for WSN</i></p> <p>a) Identify and explain the working of the MAC protocol shown in figure 2. b) Identify the applications in which the above shown protocol can be used. c) What is the level of synchronization required between nodes for the shown MAC protocol.</p>	20	CO
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SECTION A

S. No.		Marks	CO
Q 1	How to estimate range to a node to which no direct radio communications exists? Name and explain any one of such method.	5	CO
Q 2	Define components of a typical sensing node of a WSN with its block diagram.	5	CO
Q 3	Explain the layered architecture of OSI Reference Model for Wireless Sensor Network, with the functioning of each layer.	5	CO
Q 4	Name and differentiate between active and passive sensors used in wireless sensor network.	5	CO

SECTION B

Q 5	A Block diagram of IMote2 sensor node hardware is shown in the figure 1.	10	CO
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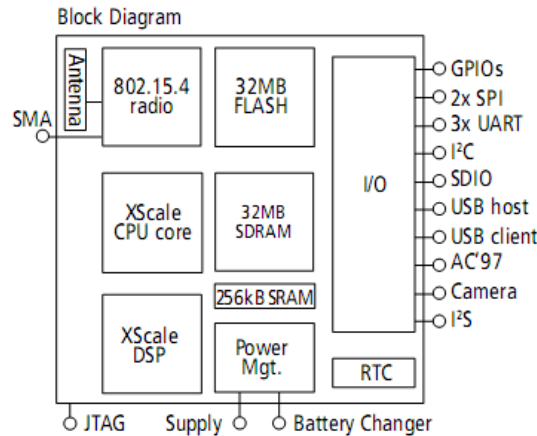
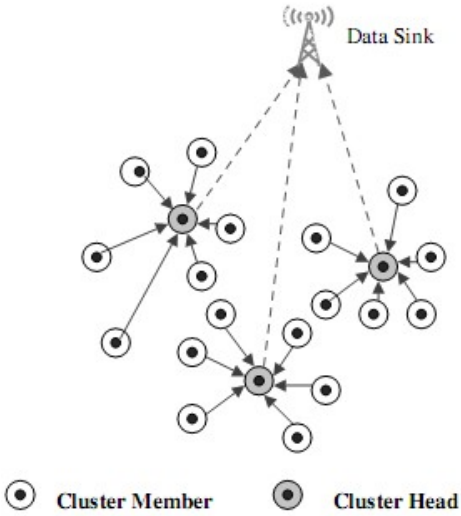


Figure 1: IMote2 Sensor Node Hardware

a) Identify the range of transmission band that can be used by IMote2 mote.

	b) What is the size of flash memory for data logging used by <i>IMote2</i> mote. c) Identify the transceiver IC and its specifications used by <i>IMote2</i> mote. d) Name the WSN OS compatible with the <i>IMote2</i> mote.		
Q 6	Suppose a WSN is to be designed for the Patient Monitoring System of a Hospital for about 100 patients under critical observations. Identify the technical issues and challenges for such an application.	10	CO
Q 7	Define the following terms with respect to Wireless Sensor Networks: a) MAC Layer b) Sleep Mode c) Frame d) Packet e) Collision	10	CO
Q 8	Design a WSN (block diagram) that can be used in Building Automation (Smart Buildings)? Analyze its features and specifications, including possible wireless standards and network topologies.	10	CO
SECTION-C			
Q 9	Name and Classify Routing Protocols in WSN on the following basis: a) Location-based protocols, b) Data-Centric Protocols, c) Hierarchical Protocols, d) Mobility-based Protocols, e) QoS-based protocols.	20	CO
Q 10	Refer the routing protocol shown in the figure 2. Routing protocols are designed to achieve special purposes in WSN. <div style="text-align: center;">  <p>● Cluster Member ● Cluster Head</p> </div> <p style="text-align: center;"><i>Figure 2: Routing Protocol for WSN</i></p> a) Identify and define the working of the Routing protocol shown in the figure. b) Identify the applications in which the shown Routing protocol can be used. c) What are the routing issues that the shown routing protocol is capable to resolve?	20	CO

