


<b>Name:</b> <b>Enrolment No:</b>	
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**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**  
**End Semester Examination, December 2022**

**Course: M.Tech**  
**Program: Automation & Robotics**  
**Course Code: ECEG-7026**

**Semester: I**  
**Time : 03 hrs.**  
**Max. Marks: 100**

**Instructions:**

**SECTION A**  
**(5Qx4M=20Marks)**

S. No.	Question	Marks	CO
Q 1	Name the applications of wireless sensor networks.	4	CO1
Q 2	What are the performance requirements for a MAC protocol?	4	CO2
Q 3	Which routing is more suitable for WSN? Explain the reasons.	4	CO3
Q 4	Describe the operating system design issues for wireless sensor network.	4	CO4
Q 5	Point out the key characteristics of a microcontroller which makes it possible to use in wireless sensor node.	4	CO1

**SECTION B**  
**(4Qx10M= 40 Marks)**

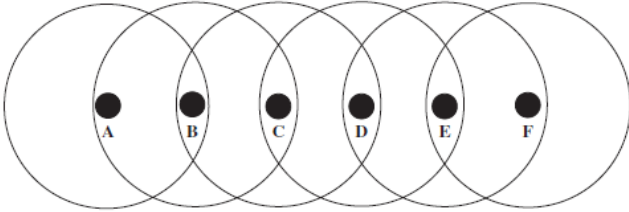
Q 6	Discuss about the transceiver tasks and characteristics in a sensor node in a wireless sensor network.	10	CO1
Q 7	Describe about the Directed Diffusion and Rumor routing protocol. Give its advantages and disadvantages.	10	CO3
Q 8	Write short notes on (a) MANTIS and (b) MATE	10	CO4
Q 9	<p>State the requirements and design issue of a sensor network management.</p> <p style="text-align: center;"><b>or</b></p> <p>Consider the network topology in Figure 1, where circles indicate the communication and interference range of each node, that is, each node can hear the immediate neighbors to the left and right. Assume that RTS/CTS is not being used.</p> <div style="text-align: center;">  </div>	10	CO2

Figure 1

	<p>(a) Node B currently sends to node A and node C wants to send to node D. Is node C allowed to do so (i.e., can it do so without causing a collision) and will it decide to do so?</p> <p>(b) Node C sends to node B and node E wants to send to node D. Is E allowed to do so and will it do so?</p> <p>(c) Node A sends to node B and node D sends to node C. Which other nodes are allowed to send at the same time?</p> <p>(d) Node A sends to node B and node E sends to node F. Which other nodes are allowed to send at the same time?</p>		
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**SECTION-C**  
**(2Qx20M=40 Marks)**

<p>Q 10</p>	<p>Explain the challenges and various strategies for routing in wireless sensor network.</p> <p align="center"><b>or</b></p> <p>For the network topology shown in Figure 2, identify the optimal routes for source A to sink M according to the following criteria (describe how you compute the cost for the optimal route). The numbers X/Y along each link indicate the latency (X) and energy cost (Y) for transmitting a single packet over the link. The number Z under each node indicates the node's remaining energy capacity.</p> <p>(a) Minimum number of hops</p> <p>(b) Minimum energy consumed per packet</p> <p>(c) Maximum average energy capacity (eliminate hops that would result in a higher average but unnecessarily add to the route length!)</p> <p>(d) Maximum minimum energy capacity</p> <p>(e) Shortest latency</p>	<p align="center"><b>20</b></p>	<p align="center"><b>CO3</b></p>
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Figure 2

<p>Q 11</p>	<p>What is the importance of MAC protocols in sensor networks. Explain SMAC, BMAC and TMAC protocols in detail.</p>	<p align="center"><b>20</b></p>	<p align="center"><b>CO2</b></p>
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