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**PRESIDENCY UNIVERSITY**

**Bengaluru**

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| **End - Term Examinations – JANUARY 2025** |
| Date: 07 – 01- 2025 Time: 09:30 am – 12:30 pm |

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| **School:** SOIS | **Program:** MCA | |
| **Course Code :** CSA4027 | **Course Name :** Wireless Sensor Networks | |
| **Semester**: III | **Max Marks**:100 | **Weightage**: 50% |

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| **CO - Levels** | **CO1** | **CO2** | **CO3** | **CO4** | **CO5** |
| **Marks** |  |  |  |  |  |

**Instructions:**

1. *Read all questions carefully and answer accordingly.*
2. *Do not write anything on the question paper other than roll number.*

**Part A**

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| **Answer ALL the Questions. Each question carries 2marks. 10Q x 2M=20M** | | | | |
| **1** | List the key components of a basic sensor network architecture. | **2 Marks** | **L1** | **CO1** |
| **2** | Recall two characteristics of WSNs that makes them suitable for environmental monitoring. | **2 Marks** | **L1** | **CO1** |
| **3** | Define modulation and explain its role in wireless communication systems. | **2 Marks** | **L1** | **CO2** |
| **4** | List the advantages of using schedule-based MAC protocols in WSNs. | **2 Marks** | **L1** | **CO2** |
| **5** | Narrate the significance of schedule synchronization in MAC protocols for WSNs. | **2 Marks** | **L1** | **CO2** |
| **6** | Outline the primary purpose of routing in wireless sensor networks (WSNs). | **2 Marks** | **L1** | **CO3** |
| **7** | State the difference between proactive and reactive routing strategies. | **2 Marks** | **L1** | **CO3** |
| **8** | Describe why is scalability considered an essential factor in the design of a routing protocol? | **2 Marks** | **L1** | **CO3** |
| **9** | Name two advantage of using GloMoSim for large-scale network simulations. | **2 Marks** | **L1** | **CO4** |
| **10** | Recite how NS2 supports mobility in wireless network simulations. | **2 Marks** | **L1** | **CO4** |

**Part B**

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| **Answer the Questions Total 80 Marks.** | | | | | |
| **11.** |  | Explain the primary challenges in wireless sensor network deployments and how these affect network performance in real-world applications. And also Illustrate the differences between homogeneous and heterogeneous wireless sensor networks with relevant examples. | **20 Marks** | **L2** | **CO1** |
| **or** | | | | | |
| **12.** |  | Design an adhoc network for:  i) A team of autonomous drones for environmental mapping, considering node coordination, real-time data sharing, and mobility.  ii) Monitoring and controlling traffic in a smart city, focusing on dynamic topology, scalability, and efficient routing. | **20 Marks** | **L3** | **CO1** |
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| **13.** |  | Explain the three main types of MAC protocols used in wireless communication. Provide examples of each type and discuss their strengths and weaknesses in different network scenarios. | **20 Marks** | **L2** | **CO2** |
| **or** | | | | | |
| **14.** |  | Design a wireless sensor network for a smart campus with applications such as energy-efficient lighting and classroom monitoring. Choose an appropriate communication technology (Bluetooth, WLAN, ZigBee, or WiMax) for each application, justifying your selection based on factors like energy efficiency, coverage, and bandwidth requirements. | **20 Marks** | **L3** | **CO2** |

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| **15.** |  | Explain the working principle of table-driven routing protocols. How do they maintain up-to-date routing tables, and why is this approach suitable for certain types of ad hoc networks? | **20 Marks** | **L2** | **CO3** |
| **Or** | | | | | |
| **16.** |  | In a large-scale WSN deployed for monitoring a forest fire, describe how efficient flooding mechanisms can be implemented to reduce redundant communication while ensuring all nodes receive the necessary data. | **20 Marks** | **L3** | **CO3** |

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| **17.** |  | Use OMNeT++ to model a disaster management communication network and analyze the performance under different load conditions. Describe the process of setting up the model and interpreting the results. | **20 Marks** | **L3** | **CO4** |
| **Or** | | | | | |
| **18.** |  | Simulate a smart home automation network using MATLAB’s wireless toolbox. Describe the configuration, communication protocols used, and how energy efficiency is evaluated. | **20 Marks** | **L3** | **CO4** |

**\*\*\*\*\* BEST WISHES \*\*\*\*\***