

Enrolment No./Seat No _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER– VII EXAMINATION – SUMMER 2026

Subject Code:3173216

Date:08-06-2026

Subject Name: Wireless Sensor Networks

Time: 02:30 PM TO 05:00 PM

Total Marks:70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

		MARKS
Q.1	(a) Discuss the evolution of wireless networks.	03
	(b) Analyze the impact of wireless networks on modern communication systems.	04
	(c) Compare and contrast Bluetooth, ZigBee, and RFID technologies in terms of their applications and technical characteristics.	07
Q.2	(a) Describe the hardware components of a typical sensor node.	03
	(b) Discuss factors influencing energy consumption in sensor nodes.	04
	(c) Define medium access control (MAC) protocols. Compare and contrast schedule-based and random access-based MAC protocols with examples like Sensor-MAC and Zebra-MAC.	07
	OR	
	(c) Discuss the performance requirements of MAC protocols in wireless sensor networks. Evaluate the suitability of different MAC protocols for various application scenarios.	07
Q.3	(a) Explain the fundamentals of routing protocols in wireless sensor networks.	03
	(b) Compare flooding-based and selective forwarding-based routing strategies with examples.	04
	(c) Evaluate the performance metrics used to assess routing protocols. Discuss the trade-offs between energy efficiency and data reliability in routing protocol design.	07
	OR	
Q.3	(a) Discuss the security challenges in wireless sensor networks.	03
	(b) Analyze the vulnerabilities and mitigation strategies against threats such as eavesdropping, tampering, and denial-of-service attacks.	04
	(c) Compare and contrast different types of wireless sensor node architectures. Discuss their advantages, disadvantages, and suitability for specific application scenarios.	07
Q.4	(a) Compare and contrast TCP and UDP transport protocols in wireless sensor networks.	03
	(b) Discuss the feasibility and challenges of using TCP and UDP in resource-constrained environments.	04

- (c) Define and explain the concept of data aggregation in wireless sensor networks. Discuss its benefits, challenges, and techniques to improve efficiency and accuracy in data aggregation processes. **07**

OR

- Q.4 (a)** Evaluate the design issues and performance of CODA in wireless sensor networks. **03**
- (b)** Evaluate the design issues and performance of ESRT in wireless sensor networks. **04**
- (c)** Explain the fundamental principles of routing protocols in wireless sensor networks. Discuss the key differences between proactive and reactive routing protocols. Provide examples to illustrate each type. **07**

- Q.5 (a)** Explain the principles and architecture of middleware in wireless sensor networks. **03**
- (b)** Discuss the role of middleware in enhancing scalability and efficiency. **04**
- (c)** Explain the concept of localization in wireless sensor networks. Compare and contrast range-based and range-free localization techniques, highlighting their advantages and limitations. **07**

OR

- Q.5 (a)** Discuss the importance of time synchronization in wireless sensor networks. **03**
- (b)** Compare sender/receiver synchronization-based time synchronization protocols. **04**
- (c)** Explain the concept of Quality of Service (QoS) in wireless sensor networks. Discuss the factors influencing QoS metrics such as reliability, latency, and throughput. Evaluate strategies for improving QoS in resource-constrained environments. **07**
