



PRESIDENCY UNIVERSITY

BENGALURU

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End - Term Examinations - December 2025

Date: 15-12-2025

Time: 1.00pm to 04.00pm

SCHOOL: SOCSE	PROGRAM: B. TECH IN COMPUTER SCIENCE AND NETWORKS		
COURSE CODE: CSN2504	COURSE NAME: WIRELESS SENSOR NETWORK		
SEMESTER: V	MAX MARKS: 100	WEIGHTAGE: 50%	

CO - Levels	C01	C02	C03	C04
Marks	24	24	26	26

Instructions:

- (i) Read all questions carefully and answer accordingly.
- (ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2marks.

10Q x 2M=20M

1.	Explain the role of reconfigurable sensor networks in military surveillance	2 Marks	L3	C01
2.	List out the constraints in WSNs	2 Marks	L1	C01
3.	Explain collaborative data processing in WSNs.	2 Marks	L2	C02
4.	What is intelligent data reduction?	2 Marks	L2	C02
5.	Define Energy Consumption of Sensor Nodes. List its 4 classifications	2 Marks	L1	C03
6.	Define Sink Mobility and Event Mobility	2 Marks	L1	C03
7.	Explain the need for gateways in WSN	2 Marks	L2	C03
8.	Why is ZigBee preferred over Wi-Fi for WSN applications?	2 Marks	L3	C04
9.	Define LoRaWAN and list its key properties.	2 Marks	L1	C04
10.	Define RFID and Mention the main advantages of RFID in IoT-based tracking systems.	2 Marks	L2	C04

Part B

Answer the Questions.

Total Marks 80M

11.	a.	Describe the applications of Wireless Sensor Networks in: <ul style="list-style-type: none"> • Military • Environmental • Health • Commercial sectors 	10 Marks	L2	C01
	b.	Compare and contrast Category 1 and Category 2 WSNs with architecture and examples.	10 Marks	L3	C01
Or					
12.	a.	Explain about the sensing nodes with block diagram?	10 Marks	L2	C01
	b.	Case Description: The FireBug system is a real-time wildfire monitoring network developed using small wireless sensor nodes (motes) running on TinyOS. These motes are deployed in forest regions prone to fires. They form a self-organizing wireless sensor network that continuously measures parameters such as temperature, humidity, smoke, and flame intensity. Each sensor node transmits collected data to a base station, which processes and forwards the data to a central web and database system. FireBug helps detect fire outbreaks early, predict fire behavior, and assist firefighters in response and resource management. Its low power usage, scalability, and rapid deployment make it ideal for remote or hazardous environments. 1. What is the purpose of the FireBug system? 2. Which operating system is used in FireBug motes? 3. Mention any two parameters monitored by FireBug sensors. 4. What type of network topology is formed by FireBug motes? 5. Give one major advantage of using WSNs like FireBug in forest areas.	10 Marks	L3	C01
13.	a.	Explain the Hardware and Software of Sensor Node Technology	10 Marks	L2	C02

	b.	Explain campus applications of WSNs with examples.	10 Marks	L3	CO2
Or					
14.	a.	Explain MAN/WAN applications of WSNs.	10 Marks	L3	CO2
	b.	Explain Bluetooth and ZigBee technology (architecture, duplexing, MAC, applications)	10 Marks	L2	CO2

15.	a.	Draw and Explain Middleware for Wireless Sensor Networks. List its functions and design principle	10 Marks	L2	CO3
	b.	Explain the optimization goals & figures of merit of Wireless Sensor Networks.	10 Marks	L3	CO3

Or

16.	a.	List and Explain the Design Principles For Wireless Sensor Networks.	10 Marks	L2	CO3
	b.	<p>Case Description</p> <p>A city installs a Wireless Sensor Network at major intersections to monitor traffic flow, vehicle density, and air pollution. Each intersection has multiple sensor nodes that detect vehicle motion, count traffic density, and measure CO₂ levels.</p> <p>Data is transmitted to local gateway nodes, which send summarized information to the city traffic control center through a 5G link. To handle thousands of vehicles moving across the city, the WSN employs sink mobility, where mobile base stations (mounted on buses) collect data periodically.</p> <p>The main challenges include event mobility (vehicles moving fast), data overload during peak hours, and robust communication in a noisy urban environment. The middleware layer manages multiple applications like pollution monitoring, traffic light control, and congestion prediction, ensuring Quality of Service (QoS).</p> <p>Questions:</p> <ol style="list-style-type: none"> 1. How does sink mobility help in this system? 2. What are the major optimization goals and how are they achieved? 3. Explain how middleware supports multiple urban applications. 4. Suggest methods to improve robustness in such dynamic environments. 	10 Marks	L3	CO3

17.	a.	Explain the Physical Layer and Transceiver Design Considerations In Wireless Sensor Networks	10 Marks	L2	CO4
	b.	Discuss in detail the performance requirements of MAC protocols in Wireless Sensor Networks with suitable examples.	10 Marks	L3	CO4
Or					
18.	a.	Explain the three common MAC Protocols	10 Marks	L2	CO4
	b.	<p>Case Description :</p> <p>A city government deploys smart waste bins equipped with ultrasonic and gas sensors to monitor fill levels and detect hazardous gases. Each bin sends data to a central IoT server using NB-IoT (Narrowband IoT) protocol, suitable for low-power and wide-area coverage.</p> <p>Collected data is processed on an IoT analytics platform that optimizes waste collection routes using GPS and AI algorithms. The system sends alerts to the nearest collection truck when bins are full, ensuring faster response and reduced operational cost.</p> <p>Communication between bins, trucks, and servers uses HTTP and MQTT. Security is handled through end-to-end encryption. The integration of sensors and IoT protocols enables real-time visibility and smart decision-making for waste management.</p> <p>Questions:</p> <ol style="list-style-type: none"> 1. Explain how NB-IoT supports smart city applications. 2. What role do MQTT and HTTP play in communication? 3. How does data processing optimize waste collection? 4. Discuss the importance of security in IoT-based public systems. 	10 Marks	L3	CO4