



**SIDDARTHA INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)**

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Subject with Code: WIRELESS SENSOR NETWORKS (23CS1005)

Year & Sem.: III & I Sem.

Course & Branch: B.Tech. & CIC

Regulation: R23

UNIT - I

1	a)	Define Wireless Sensor Network.	[L1,CO1]	[2M]
	b)	List any two unique constraints of sensor networks.	[L1,CO2]	[2M]
	c)	Write two advantages of wireless sensor networks.	[L1,CO2]	[2M]
	d)	Differentiate between homogeneous and heterogeneous sensor networks.	[L2,CO1]	[2M]
	e)	State two real-world applications of wireless sensor networks.	[L1,CO2]	[2M]
2	a)	Explain the fundamental concept of wireless sensor networks with neat diagrams.	[L2,CO1]	[5M]
	b)	Discuss the unique challenges of wireless sensor networks and their implications on network design.	[L2,CO2]	[5M]
3	a)	Compare the architectures of traditional networks and wireless sensor networks.	[L4,CO1]	[5M]
	b)	Explain in detail the advantages and limitations of wireless sensor networks with examples.	[L2,CO2]	[5M]
4	a)	Analyze the role of wireless sensor networks in healthcare management system.	[L4,CO2]	[5M]
	b)	Discuss how constraints such as energy, bandwidth, and scalability affect the design of wireless sensor networks.	[L4,CO2]	[5M]
5		Differentiate between various types of wireless sensor networks (terrestrial, underground, underwater, etc.) with examples.	[L2,CO1]	[10M]
6		Create a comparative chart of different types of wireless sensor networks and their applications.	[L6,CO1]	[10M]
7		Discuss the potential of WSNs in agriculture and precision farming with examples.	[L2,CO2]	[10M]
8		Explain the types of wireless sensor networks with suitable case studies.	[L2,CO1]	[10M]
9	a)	Examine the advantages of deploying WSNs over conventional wired networks.	[L4,CO1]	[5M]
	b)	Analyze the relationship between challenges and applications in sensor networks.	[L4,CO2]	[5M]
10		Evaluate the performance factors that make wireless sensor networks suitable for IoT	[L5,CO1]	[10M]

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		integration.		
11		Illustrate the applications of wireless sensor networks in environmental monitoring and smart cities.	[L2,CO2]	[10M]

UNIT - II

1	a)	Define Mobile Ad-hoc Network (MANET).	[L1,CO1]	[2M]
	b)	State two enabling technologies for wireless sensor networks.	[L1,CO2]	[2M]
	c)	Differentiate between MANET and WSN.	[L2,CO1]	[2M]
	d)	List any two design issues in wireless sensor networks.	[L1,CO2]	[2M]
	e)	Mention two challenges in implementing WSN in real-time applications.	[L1,CO2]	[2M]
2	a)	Compare and contrast MANETs and Wireless Sensor Networks in terms of architecture and applications.	[L4,CO1]	[5M]
	b)	Discuss enabling technologies such as MEMS, low-power radios, and energy-efficient protocols in the development of WSNs.	[L2,CO2]	[5M]
3		Explain in detail the key challenges in the deployment of wireless sensor networks.	[L2,CO2]	[10M]
4	a)	Evaluate how power consumption and limited bandwidth impact wireless sensor networks.	[L5,CO2]	[5M]
	b)	Illustrate the role of short-range communication technologies (e.g., ZigBee, Bluetooth, IEEE 802.15.4) in WSN.	[L2,CO2]	[5M]
5	a)	Examine the scalability issues in WSN and propose solutions.	[L5,CO2]	[5M]
	b)	Discuss the integration of WSNs with MANETs for large-scale applications.	[L4,CO1]	[5M]
6	a)	Describe how energy efficiency is addressed by enabling technologies in sensor networks.	[L2,CO2]	[5M]
	b)	Analyze security challenges in wireless sensor networks and their impact on performance.	[L4,CO2]	[5M]
7		Evaluate the importance of mobility in MANETs compared to WSNs.	[L5,CO1]	[10M]
8		Discuss the technological advancements that have enabled the wide adoption of WSNs in IoT.	[L2,CO2]	[10M]
9		Explain with examples how enabling technologies support real-time applications of WSN.	[L4,CO2]	[10M]

10	Analyze the similarities and differences between MANETs and WSNs.	[L4,CO1]	[10M]
11	Design a conceptual framework that integrates MANET with WSN for disaster management.	[L6,CO1]	[10M]

UNIT - III

1	a) Define routing protocol in the context of WSN.	[L1,CO4]	[2M]
	b) List the classifications of MAC protocols.	[L1,CO4]	[2M]
	c) State one key feature of the S-MAC protocol.	[L1,CO4]	[2M]
	d) Differentiate between B-MAC and S-MAC in a single point.	[L2,CO4]	[2M]
	e) Write the significance of IEEE 802.15.4 standard in WSN.	[L1,CO4]	[2M]
2	a) Explain the classification of MAC protocols in detail with suitable examples.	[L2,CO4]	[5M]
	b) Discuss the design and working principles of the S-MAC protocol.	[L2,CO4]	[5M]
3	a) Compare and contrast S-MAC and B-MAC protocols in terms of energy efficiency and delay.	[L4,CO4]	[5M]
	b) Analyze the role of IEEE 802.15.4 standard in the development of ZigBee.	[L4,CO4]	[5M]
4	Discuss the importance of routing protocols in wireless sensor networks.	[L2,CO4]	[10M]
5	Evaluate the performance differences between contention-based and contention-free MAC protocols.	[L5,CO4]	[10M]
6	Illustrate the architecture and operation of the ZigBee protocol stack.	[L2,CO4]	[10M]
7	Analyze the challenges in designing routing protocols for WSN.	[L4,CO4]	[10M]
8	a) Compare IEEE 802.15.4 with other short-range communication standards.	[L4,CO4]	[5M]
	b) Design a scenario using S-MAC for energy-efficient communication in a sensor network.	[L6,CO4]	[5M]
9	a) Discuss the key features of B-MAC and its suitability for low-power applications.	[L2,CO4]	[5M]
	b) Evaluate the trade-offs between throughput and energy consumption in MAC protocols.	[L5,CO4]	[5M]
10	Explain the working mechanism of IEEE 802.15.4 standard and its importance in WSN.	[L2,CO4]	[10M]
11	Analyze how routing protocols interact with MAC protocols to improve network performance.	[L4,CO4]	[10M]

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UNIT - IV

1	a)	Define data dissemination in wireless sensor networks.	[L1,CO3]	[2M]
	b)	List any two data gathering methods in WSN.	[L1,CO3]	[2M]
	c)	What is data fusion in the context of WSN?	[L1,CO3]	[2M]
	d)	Write two parameters that define the quality of a sensor network.	[L1,CO3]	[2M]
	e)	Mention one example of a security protocol used in sensor networks.	[L1,CO3]	[2M]
2	a)	Explain the working principle of dissemination protocols for large sensor networks.	[L2,CO3]	[5M]
	b)	Discuss the differences between data dissemination and data gathering with examples.	[L2,CO3]	[5M]
3	a)	Analyze the significance of data fusion in improving network efficiency.	[L4,CO3]	[5M]
	b)	Evaluate the trade-offs between data accuracy and energy efficiency in data dissemination.	[L5,CO3]	[5M]
4		Explain the factors that determine the quality of a sensor network.	[L2,CO3]	[10M]
5	a)	Analyze how security protocols enhance reliability in large-scale WSN deployments.	[L4,CO3]	[5M]
	b)	Compare centralized and distributed data gathering techniques.	[L4,CO3]	[5M]
6		Evaluate the challenges of providing QoS in real-time WSN applications.	[L5,CO3]	[10M]
7		Discuss how data fusion reduces redundancy in WSNs and improves overall performance.	[L2,CO3]	[10M]
8	a)	Create a conceptual model for secure data dissemination in healthcare sensor networks.	[L6,CO3]	[5M]
	b)	Explain with examples how real-time traffic support is critical for mission-critical applications.	[L2,CO3]	[5M]
9		Analyze the relationship between data gathering, data dissemination, and energy consumption.	[L4,CO3]	[10M]
10		Evaluate the effectiveness of data fusion algorithms in enhancing the performance of WSNs.	[L5,CO3]	[10M]
11		Illustrate real-time traffic support mechanisms in WSNs with neat diagrams.	[L2,CO3]	[10M]

UNIT-V

1	a)	Define gateway in the context of wireless sensor networks.	[L1,CO6]	[2M]
	b)	State the need for gateway in WSN communication.	[L1,CO6]	[2M]
	c)	List two hardware components of single-node architecture.	[L1,CO6]	[2M]
	d)	What is TinyOS?	[L1,CO6]	[2M]
	e)	Mention one design constraint in WSN hardware.	[L1,CO6]	[2M]
2	a)	Explain the design principles of wireless sensor networks with suitable examples.	[L2,CO6]	[5M]
	b)	Discuss the role of gateways in enabling WSN-to-Internet communication.	[L2,CO6]	[5M]
3	a)	Analyze the differences between WSN-to-Internet and Internet-to-WSN communication.	[L4,CO6]	[5M]
	b)	Describe the single-node architecture of a WSN in detail.	[L2,CO6]	[5M]
4		Discuss the various hardware components used in sensor nodes and their functions.	[L2,CO6]	[10M]
5	a)	Explain the working of TinyOS and its importance in WSNs.	[L2,CO6]	[5M]
	b)	Analyze the execution environment provided by nesC for sensor nodes.	[L4,CO6]	[5M]
6		Compare TinyOS with other operating systems used in embedded sensor networks.	[L4,CO6]	[10M]
7	a)	Illustrate the need for gateways with a real-world WSN application example.	[L2,CO6]	[5M]
	b)	Evaluate the effectiveness of different gateway architectures for large-scale WSN deployments.	[L6,CO6]	[5M]
8		Discuss how design constraints such as energy, memory, and computation affect WSN performance.	[L2,CO6]	[10M]
9		Analyze the interaction between WSN operating systems and hardware components.	[L4,CO6]	[10M]
10		Propose a simple framework using TinyOS and nesC for a healthcare monitoring application.	[L6,CO6]	[10M]
11		Evaluate the design constraints faced in building sensor network nodes.	[L5,CO6]	[10M]