

## MCAS205: WIRELESS SENSOR NETWORKS

Hours/Week: 4

I.A. Marks: 30

Credits: 4

Exam. Marks: 70

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### Course Learning Objectives: Students will be able to try,

1. To understand the basic WSN technology and supporting protocols, with emphasis placed on standardization basic sensor systems and provide a survey of sensor technology.
2. Understand the medium access control protocols and address physical layer concerns.
3. Learn key routing protocols for sensor networks and main design issues.
4. Understand the Sensor management, sensor network middleware, operating systems.

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### Course Outcomes: After completing the course, the students will be able to,

CO1: Learn Ad hoc network and Sensor Network fundamentals.

CO2: Understand the different routing protocols and the uses.

CO3: Have an in-depth knowledge on sensor network architecture and design issues.

CO4: Understand the transport layer and security issues possible in Ad hoc and Sensor networks.

CO5: Have an exposure to mote programming platforms and tools.

CO6: To develop wireless sensor systems for different applications using.

CO7: Demonstrate knowledge of routing protocols developed for WSN.

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**12Hrs.**

### UNIT-I

AD – HOC Networks, Introduction and Routing Protocols, Elements of Ad hoc Wireless Networks, Issues in Ad hoc wireless networks, Example commercial applications of Ad hoc networking, Ad hoc wireless Internet, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classifications of Routing Protocols, Table Driven Routing Protocols – Destination Sequenced Distance Vector (DSDV), On-Demand Routing protocols –Ad hoc On-Demand Distance Vector Routing (AODV).

### UNIT-II

**12Hrs.**

Sensor Networks, Introduction and Architecture, Challenges for Wireless Sensor Networks, Enabling Technologies for Wireless Sensor Networks, WSN application examples, Single-Node Architecture – Hardware Components, Energy Consumption of Sensor Nodes, Network Architecture – Sensor Network Scenarios, Transceiver Design Considerations, Optimization Goals and Figures of Merit.

**12Hrs.**

### UNIT-III

WSN Networking concepts and protocols, MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols And Wakeup Concepts – S-MAC, The Mediation Device Protocol, Contention based protocols – PAMAS, Schedule based protocols – LEACH, IEEE 802.15.4 MAC protocol, Routing Protocols Energy Efficient Routing, Challenges and Issues in Transport layer protocol.

### UNIT-IV

**12Hrs.**

Sensor Network Security, Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Layer wise attacks in wireless sensor networks, possible solutions for jamming, tampering, black hole attack, flooding attack. Key Distribution and Management, Secure Routing – SPINS, reliability requirements in sensor networks. Sensor network

platforms and tools. Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node-level software platforms – TinyOS, nesC, CONTIKIOS, Node-level Simulators – NS2 and its extension to sensor networks, COOJA, TOSSIM, Programming beyond individual nodes – State centric programming.

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#### REFERENCE BOOKS:

1. C. Siva Ram Murthy and B. S. Manoj, Ad Hoc Wireless Networks Architectures and Protocols, Prentice Hall, PTR, 2004. (UNIT I).
2. HolgerKarl , Andreas willig, Protocol and Architecture for Wireless Sensor Networks, John wiley publication, Jan 2006.(UNIT II-V).
3. Feng Zhao, Leonidas Guibas, Wireless Sensor Networks: an information processing approach, Elsevier publication, 2004.
4. Charles E. Perkins, Ad Hoc Networking, Addison Wesley, 2000.
5. I.F. Akyildiz, W. Su, Sankarasubramaniam, E. Cayirci, Wireless sensor networks: a survey, computer networks, Elsevier, 2002.

