6th Semester	RCS6D002	**Wireless Sensor Networks**	L-T-P 3-0-0	3 Credits

Objectives
☐ To learn fundamentals and application of WSN
☐ To learn various protocols of WSN
☐ To understand security issues in WSN

Module-I: (10 hours)
Introduction: Definitions and Background, Challenges and Constraints, Applications. (Structural Health Monitoring, Habitat Monitoring, Smart Transportation, Health Care, Pipeline Monitoring, Precision Agriculture, Active Volcano, Underground Mining, Tracking Chemical Plumes).Node Architecture: The Sensing Subsystem, the Processor Subsystem, Communication Interfaces, Prototypes, Operating Systems: Functional Aspects, Non-functional Aspects, and Prototypes.

Module-II: (10 hours)

Basic Architectural Framework: Physical Layer: Basic Components, Source and Channel Encoding, Modulation, signal Propagation. Medium Access Control: Wireless MAC Protocols, Characteristics of MAC Protocols in Sensor Networks, Contention-Free MAC Protocols, Contention-Based MAC Protocols, Hybrid MAC Protocols. Network Layer: Routing Metrics, Flooding and Gossiping, Data-Centric Routing, Proactive Routing, On-Demand Routing, Hierarchical Routing, Location-Based Routing, QoS-Based Routing Protocols

Module-III: (09 hours)
Node and Network Management: Power Management: Local Power Management Aspects, Dynamic Power Management and Conceptual Architecture. Time Synchronization: Clocks and the Synchronization Problem, Time Synchronization in WSN, Basics of Time Synchronization, Time Synchronization Protocols. Localization: Ranging Techniques, Coarse-grained and Fine-grained node localization, Range-Based Localization, Range-Free Localization, Event-Driven Localization

Module-IV: (09 hours)
Security: Challenges of Security in WSN, Security Attacks in Sensor Networks, Protocols and Mechanisms for Security, Introduction to IEEE 802.15.4 and Zig Bee Security. Sensor Network Databases: Sensor Database Challenges, Querying the physical environment, Query interfaces, High-level database organization, In-network Aggregation, Data Centric Storage, Distributed and Hierarchical aggregation. Introduction to discrete event network simulators.

Outcomes
☐ Ability to learn fundamentals and application of WSN
☐ Ability to learn various protocols of WSN
☐ Ability to understand security issues in WSN

Books:
[1] Fundamentals of Wireless Sensor Network: Theory and Practice: Waltenegus Dargie and Christian Poellabauer, Wiley Publication, 2010
[2] Wireless Sensor Networks: An Information Processing Approach- by Feng Zhao, Leonidas Guibas , Morgan Kaufmann Series in Networking 2004