PIT6J005 WIRELESS SENSOR NETWORKS

Module-1 (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, Nonfunctional Aspects, and Prototypes.

Module-2 (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-3 (10 Hours)

Node and Network Management:Power Management: Local Power Management Aspects, Dynamic Power Management, 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-4(10 Hours)

Security: Challenges of Security in WSN, Security Attacks in Sensor Networks, Protocols and Mechanisms for Security, 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 **Tiny OS and TOSSIM, OMNET, QUALNET** etc: Interfaces and Modules- Configurations and Wiring - Generic Components.

Text Books:

1. Fundamentals of Wireless Sensor Network: Theory and Practice: WaltenegusDargie 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

References Books:

1. Networking Wireless Sensors: BhaskarKrismachari, Cambridge University Press
2. Wireless Sensor Networks: Edited by C.S Raghavendra, Krishna M, Sivalingam, TaiebZnati, Springer
3. Tiny OS Programming: Philip Levis and David Gay, Cambridge University Press, 2009.