COURSE CONTENT

WIRELESS SENSOR NETWORKS

VII Semester: ECE

Course Code	Category	Hours /Week			Credits	Maximum Marks		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
AECC47	**Elective**	3	-	-	3	30	70	100
Contact Classes:45	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: 45**		

Prerequisites: Wireless Communications and Networks

I. COURSE OVERVIEW:

WSNs are beginning to be organized in an enhanced step. It is not awkward to expect that in 10 to 15 years that the world will be protected with WSNs with entree to them via the Internet. This can be measured as the Internet becoming a physical n/w. This technology is thrilling with infinite potential for many application areas like medical, environmental, transportation, military, entertainment, homeland defense, crisis management and also smart spaces. The most common WSN architecture follows the OSI architecture Model. The architecture of the WSN includes five layers and three cross layers. Mostly in sensor n/w we require five layers, namely application, transport, n/w, data link & physical layer.

II. COURSE OBJECTIVES:

The Students will try to learn:

I.   The basic WSN technology and supporting protocols, with emphasis placed on standardization basic sensor systems and provide a survey of sensor technology.
II. The medium access control protocols and address physical layer issues.
III. The different routing protocols for sensor networks and main design issues.
IV. The transport layer protocols for sensor networks, and design requirements.
V.   The sensor management, sensor network middleware, operating systems.

III.COURSE SYLLABUS

MODULE-I: OVERVIEW OF WIRELESS SENSOR NETWORKS (10)

Introduction: Components of a wireless sensor node, Motivation for a Network of Wireless Sensor Nodes, Classification of sensor networks, Characteristics of wireless sensor networks, Challenges of wireless sensor networks, Comparison between wireless sensor networks and wireless mesh networks, Limitations in wireless sensor networks, Design challenges, Hardware architecture, Applications : Structural Health Monitoring, Traffic Control, Health Care, .Pipeline Monitoring, Precision Agriculture, Active Volcano, Underground Mining Node Architecture: The Sensing Subsystem, the Processor Subsystem, Communication Interfaces, Prototypes. Operating Systems: Functional Aspects, Nonfunctional Aspects, Prototypes, Evaluation.

MODULE -II: BASIC ARCHITECTURAL FRAMEWORK (09)

Physical Layer, Basic Components, Source Encoding, Channel Encoding, Modulation Medium Access Control: Wireless MAC Protocols, Characteristics of MAC Protocols in Sensor Networks, Contention-Free MAC Protocols, Contention-Based MAC Protocols, Hybrid MAC Protocols.

MODULE -III: NETWORK LAYER (09)

Network Layer: Routing Metrics, Flooding and Gossiping, Data-Centric Routing, Proactive Routing, On-Demand Routing, Hierarchical Routing, Location-Based Routing, QoS-Based Routing Protocols Node.

Network Management: Power Management, Local Power Management aspects, Dynamic Power Management, Conceptual Architecture

MODULE -IV: TIME SYNCHRONIZATION (09)

Time Synchronization: Clocks and the Synchronization Problem, Time Synchronization in Wireless Sensor Networks, Basics of Time Synchronization, Time Synchronization Protocols Localization: Ranging Techniques, Range-Based Localization, Range-Free Localization, Event Driven Localization.

MODULE -V: SECURITY (8)

Fundamentals of Network Security, Challenges of Security in Wireless Sensor Networks , Security Attacks in Sensor Networks, Protocols and Mechanisms for Security, IEEE 802.15.4 and Zig Bee Security.

IV. TEXTBOOKS:
1. Waltenegus Dargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice", Wiley 2010.
2. Mohammad S. Obaidat, Sudip Misra, "Principles of Wireless Sensor Networks", Cambridge, 2014.

V. REFERENCE BOOKS:
1. Ian F. Akyildiz, Mehmet Can Vuran , "Wireless Sensor Networks", Wiley 2010.
2. C S Raghavendra, K M Sivalingam, Taieb Znati, "Wireless Sensor Networks", Springer, 2010.
3. C. Sivarm murthy & B.S. Manoj, "Adhoc Wireless Networks", PHI-2004.
4. FEI HU., XIAOJUN CAO, "Wireless Sensor Networks", CRC Press, 2013.
5. Feng ZHAO, Leonidas GUIBAS, "Wireless Sensor Networks", ELSEVIER , 2004.

VI. WEB REFERENCES:
1. https://www.geeksforgeeks.org/wireless-sensor-network-wsn/
2. https://www.intechopen.com/chapters/38793
3. https://www.elprocus.com/introduction-to-wireless-sensor-networks-types-and-applications/