WIRELESS SENSOR NETWORKS

I Semester: CSE							
Course Code	**Category**	**Hours / Week**		**Credits**	**Maximum Marks**		
BCSC04	**Elective**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	0	0	3	30	70	100
Contact Classes: 45	**Total Tutorials: Nil**	**Total Practical Classes: Nil**			**Total Classes: 45**		

I. COURSE OVERVIEW:

Wireless sensor networks are self-configured and infrastructure, fewer wireless networks to monitor physical or environmental conditions such as temperature, sound, vibration. Sensor nodes are used in WSN with the onboard processor that manages and monitors the environment in a particular area. It includes network simulator, access control protocol designs, routing protocols, security. Applications of WSN are precision agriculture, healthcare and smart cities.

II. COURSE OBJECTIVES:

The students will try to learn:
1. Architect sensor networks for various application setups.
2. Devise appropriate data dissemination protocols and model links cost.
3. Understandings of the fundamental concepts of wireless sensor networks and have a basic knowledge of the various protocols at various layers.
4. Evaluate the performance of sensor networks and identify bottlenecks.

III. COURSE OUTCOMES:

After successful completion of the course, students should be able to:

CO 1	**Summarize** a wireless sensor network design parameters for given sensor data using microcontroller, transceiver, middleware and operating system.	Understand
CO 2	**Categorize** the performance of schedule based and random Medium Access Control protocols in terms of power consumption, fairness, channel utilization and control packet overhead.	Analyze
CO 3	**Identify** the appropriate geographic routing protocols for improving the performance in terms of power consumption, scalability and latency parameters.	Apply
CO 4	**Evaluate** the performance of transport control protocols in terms of congestion detection and avoidance, reliability and control packet overhead parameters.	Evaluate
CO 5	**Distinguish** the design issues and different categories of MAC protocols	Analyze

IV. SYLLABUS:

MODULE-I: INTRODUCTION TO WIRELESS SENSOR NETWORKING (09)

Course Information, Introduction to Wireless Sensor Networks: Motivations, Applications, Performance metrics, History and Design factors.
Network Architecture: Traditional layered stack, Cross-layer designs, Sensor Network Architecture.
Hardware Platforms: Motes, Hardware parameters.

MODULE-II: INTRODUCTION TO NS-3 (09)

Introduction to Network Simulator 3 (ns-3), Description of the ns-3 core module and simulation.

MODULE-III: MEDIUM ACCESS CONTROL PROTOCOL DESIGN (09)

Fixed Access, Random Access, WSN protocols: synchronized, duty-cycled
Introduction to Markov Chain: Discrete time Markov Chain definition, properties, classification and analysis.

MAC Protocol Analysis: Asynchronous duty-cycled. X-MAC Analysis (Markov Chain).

MODULE-IV: SECURITY(09)
Possible attacks, countermeasures, SPINS, Static and dynamic key distribution.

MODULE-V: ROUTING PROTOCOLS (09)
Routing protocols: Introduction, MANET protocols
Routing protocols for WSN: Resource-aware routing, Data-centric, Geographic Routing, Broadcast, Multicast. Opportunistic Routing Analysis: Analysis of opportunistic routing (Markov Chain) Advanced topics in wireless sensor networks.

V TEXT BOOKS:
1. W. Dargie and C. Poellabauer, "Fundamentals of Wireless Sensor Networks –Theory and Practice", Wiley2010.
2. Kazem Sohraby, Daniel Minoli and TaiebZnati, "Wireless Sensor Networks -Technology, Protocols, and Applications", Wiley Inter science, 2007.
3. Takahiro Hara,Vladimir I. Zadorozhny, and Erik Buchmann, "Wireless Sensor Network Technologies for the Information Explosion Era", Springer, 2010.

VI. REFERENCE BOOKS:
1. KamiloFeher, "Wireless Digital Communications", PHI, 1st Edition, 1999.
2. Kaveh PahLaven, P. Krishna Murthy, "Principles of Wireless Networks", Prentice Hall PTR, 1st Edition,2002
3. AndreawsF. Molisch, "Wireless Communications", Wiley India, 2nd Edition, 2006.

VII. WEB REFERENCES:
1. http://www.yiritech.com/en/products/71.html?.
2. https://www.pearsonhighered.com/product/Stallings-Wireless-Communications-Networks-2nd Edition.
3. http://nptel.ac.in/video.php?subjectId=117102062

VIII. E-TEXT BOOKS:
1. http://www.cwins.wpi.edu/publications/pown/.
2. http://keshi.ubiwna.org/2015IotComm/Wireless_Communications_&_Networking_Stallings_2nd.pdf