WIRELESS SENSOR NETWORKS

I Semester: CSE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
BCSB04	Elective	3	0	0	3	30	70	100
Contact Classes: 45	Total Tutorials: Nil	Total Practical Classes: Nil				Total Classes: 45		

I.COURSE OVERVIEW:

In this course students equips with a solid foundation in understanding the architecture, performance analysis, routing protocols, and security considerations of these networks. By exploring simulation techniques, analyzing performance metrics, and identifying potential attacks.

II.OBJECTIVES:

The students will try to learn:

I. The Architect sensor networks for various application setups.
II. The Devise appropriate data dissemination protocols and model links cost.
III. The Understandings of the fundamental concepts of wireless sensor networks and have a basic knowledge of the various protocols at various layers.
IV. 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 architectures and its related hardware platforms.	Understand
CO 2	**Demonstrate** the network simulator-3 for simulation of wireless sensor networks.	Apply
CO 3	**Analyze** the performance of Medium Access Control protocols in terms of power consumption, fairness, channel utilization and control packet overhead.	Analyze
CO 4	**Identify** possible attacks and their counter measures wireless sensor networks.	Apply
CO 5	**Categorize** various routing protocols for improving the performance of the wireless sensor networks.	Analyze

IV. SYLLABUS:

UNIT-I	**INTRODUCTION TO WIRELESS SENSOR NETWORKING**	**Classes: 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.

UNIT-II	**INTRODUCTION TO NS-3**	**Classes: 09**

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

UNIT-III	**MEDIUM ACCESS CONTROL PROTOCOL DESIGN**	**Classes: 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)

UNIT-IV	**SECURITY**	**Classes: 09**

Possible attacks, countermeasures, SPINS, Static and dynamic key distribution.

UNIT-V	**ROUTING PROTOCOLS**	**Classes: 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.

Text Books:

1. W. Dargie and C. Poellabauer, "Fundamentals of Wireless Sensor Networks –Theory and Practice", Wiley 2010.
2. Kazem Sohraby, Daniel Minoli and TaiebZnati, "wireless sensor networks -Technology, Protocols, and Applications", Wiley Interscience, 2007.
3. Takahiro Hara,Vladimir I. Zadorozhny, and Erik Buchmann, "Wireless Sensor Network Technologies for the Information Explosion Era", springer, 2010.

Reference Books:

1. Kamilo Feher, "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.

Web References:

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

E-Text Books:

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