WIRELESS SENSOR NETWORKS

I Semester: CSE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
BPSB03	**Elective**	3	-	-	3	30	70	100

Contact Classes:45	Tutorial Classes: Nil	Practical Classes: Nil	Total Classes: 45

COURSE OBJECTIVES:
The course should enable the students to:

I.   Architect sensor networks for various application setups.
II.   Devise appropriate data dissemination protocols and model links cost.
III. Understandings of the fundamental concepts of wireless sensor networks and have a basic knowledge of the various protocols at various layers.
IV.   Evaluate the performance of sensor networks and identify bottlenecks.

COURSE OUTCOMES (COs):

CO 1: Summarize the fundamental knowledge on basics of wireless sensor networks and network simulator tool.
CO 2: Develop programs in network simulator tool for understanding and visualization of different network algorithm.
CO 3: Learn to apply hypotheses and data into actionable predictions.
CO 4: Understand a range of rooting algorithms along with their strengths and weaknesses.

COURSE LEARNING OUTCOMES (CLOs):

1. Understand Fundamental concepts ofwirelesssensor networks and its applications.
2. Learn about network architecture techniques and find the differences between various types of network architecture.
3. Regain knowledge about the networkhardware platforms.
4. Understand network simulators of different types and Explore on core network simulators.
5. Experience in implementation/modification of methods of medium access protocols in WSN.
6. Describe duty-cycled Markov chain models and the skill sets needed to be a network analysis.
7. Understandtheconceptsofdiscretetime Markov chain and its applications.
8. Identify the difference between asynchronous duty-cycled and Markov chain analysis.
9. Understand significancemodels in WSN.
10. Describe the possible attacks in WSN.
11. Apply basic SPINS concepts forpredictive network performance.
12. Identify the difference between static and dynamic key distribution.
13. Identify common approaches used toroutingprotocols in MANETS.
14. Create effective results of data centric and geographic routing.
15. Understandtheadvancedtopicsinwireless sensor networks.

UNIT-I	INTRODUCTION TO WIRELESS SENSOR NETWORKING	Classes: 08

Introduction to Wireless Sensor Networks: Motivations, Applications, Performance metrics, History and Design factors Network Architecture: Traditional layered stack, Cross-layerdesigns, Sensor Network ArchitectureHardwarePlatforms: 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 example.

UNIT-III	MEDIUM ACCESS CONTROL PROTOCOL DESIGN	Classes: 10

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. KazemSohraby, Daniel Minoli and TaiebZnati, "wireless sensor networks -Technology, Protocols, and Applications", Wiley Interscience 2007
3. TakahiroHara,VladimirI.Zadorozhny,andErikBuchmann,"WirelessSensorNetwork Technologies for the Information Explosion Era", Springer 2010

Reference Books:

1. KamiloFeher, "Wireless Digital Communications", PHI, 1st Edition, 1999.
2. KavehPahLaven, P. Krishna Murthy, "Principles of Wireless Networks", Prentice Hall PTR, 1st Edition, 2002.
3. Andreaws F. Molisch, "Wireless Communications", Wiley India, 2nd Edition, 2006.