WIRELESS SENSOR NETWORKS AND ARCHITECTURE

V Group: ECE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AEC526	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Understand the basic WSN technology and supporting protocols, with emphasis placed on standardization basic sensor systems and provide a survey of sensor technology.

II. Understand the medium access control protocols and address physical layer issues.

III. Learn key routing protocols for sensor networks and main design issues.

IV. Learn transport layer protocols for sensor networks, and design requirements.

V. Understand the Sensor management, sensor network middleware, operating systems.

COURSE OUTCOMES:

I. Describe the overview of wireless sensor networks and enabling technologies for wireless sensor networks

II. Understand the architectures, operating systems, execution environments and network architecture gateway concepts.

III. Explore the networking sensors physical layer and transceiver design considerations assignment of MAC addresses.

IV. Understand the infrastructure establishment, topology control and joint routing and information aggregation.

V. Understand the sensor network platform and tools state-centric programming.

COURSE LEARNING OUTCOMES (CLOs):

1. Understand the challenges for wireless sensor networks.
2. Analyze the characteristic requirements of wireless sensor networks.
3. Understand the enabling technologies for wireless sensor networks.
4. Understand the Advantages of sensor networks and applications.
5. Understand the single-node architecture, hardware components.
6. Analyze the energy consumption of sensor nodes.
7. Understand the operating systems and execution environments, network architecture.
8. Analyze the Network scenarios, optimization goals and figures of merit, gateway concepts.

9. Illustrate the Physical layer and transceiver design considerations.
10. Illustrate the Physical layer and transceiver design considerations
11. Understand the mediation device protocol, wakeup radio concepts, address and name management.
12. Understand the topology control.
13. Analyze the localization and positioning, sensor tasking and control.
14. Determine the joint routing and information aggregation.
15. Understand the Sensor node hardware.
16. Understand the node-level software platforms.
17. Understand the state-centric programming.

UNIT-I	**OVERVIEW OFWIRELESS SENSOR NETWORKS**	**Classes: 10**

Challenges for wireless sensor networks, characteristic requirements of wireless sensor networks, enabling technologies for wireless sensor networks, advantages of sensor networks, sensor network applications.

UNIT-II	**ARCHITECTURES**	**Classes: 09**

Single-node architecture, hardware components, energy consumption of sensor nodes, operating systems and execution environments, network architecture, sensor network scenarios, optimization goals and figures of merit, gateway concepts.

UNIT-III	**NETWORKING SENSORS**	**Classes: 08**

Physical layer and transceiver design considerations, MAC protocols for wireless sensor networks, low duty cycle protocols and wakeup concepts-S-MAC, the mediation device protocol, wakeup radio concepts, address and name management.

Assignment of MAC addresses, naming and addressing, routing protocols, energy-efficient routing, geographic routing.

UNIT-IV	**INFRASTRUCTURE ESTABLISHMENT**	**Classes: 08**

Topology control, clustering, hierarchical networks by clustering time synchronization, localization and positioning, sensor tasking and control, joint routing and information aggregation.

UNIT-V	**SENSOR NETWORK PLATFORM AND TOOLS**	**Classes: 10**

Sensor node hardware, Berkeley motes, programming challenges, node-level software platforms, node-level simulators, state-centric programming.

Text Books:

1. Holger Karl, Andreas Willig, "Protocols And Architectures for Wireless Sensor Networks", John Wiley, 1st Edition, 2005.
2. A. Sudhakar, Feng Zhao & Leonidas J. Guibas, –Wireless Sensor Networks- An Information Processing Approach", Elsevier, 1st Edition 2007.
3. Jun Zheng, Abbas Jamalipour, "Wireless Sensor Networks- A Networking Perspective, John Wiley & Sons, 1st Edition, 2009.

Reference Books:

1. Kazem Sohraby, Daniel Minoli, & Taieb Znati, "Wireless Sensor Networks Technology, Protocols, And Applications‖, John Wiley, 1st Edition 2007.
2. Anna Hac, "Wireless Sensor Network Designs, John Wiley, 1st Edition 2003.
3. Waltenegus Dargie , Christian Poellabauer, "Fundamentals of Wireless Sensor Networks, John Wiley & Sons, 1st Edition, 2010.

Web References:

1. http://www.ida.liu.se/labs/rtslab/courses/wsn/notes.shtml
2. http://www.cs.umanitoba.ca/~comp7860/08R-Fall/lecturenotes.html
3. http://ceng.usc.edu/~bkrishna/research/talks/WSN_Tutorial_Krishnamachari_ICISIP05.pdf
4. http://www.ece.rochester.edu/courses/ECE586/lectures.htm

E-Text Books:

1. https://books.google.co.in/books?id=8c6k0EVr6rMC
2. https://books.google.co.in/books?id=qOPk-NWkgiMC
3. https://books.google.co.in/books?id=I3bJGo690SUC
4. https://books.google.co.in/books?id=3ad7AAAAQBAJ