INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

WIRELESS SENSOR NETWORKS								
II Semester: ES								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
BESE20	**Elective**	3	0	0	3	40	60	100
Contact Classes: 45	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: 45**		
Prerequisite: Wireless Communication Networks.								

I. COURSE OVERVIEW:
This wireless sensor networks are a course wireless networks that are becoming very popular with a huge number of civilian and military applications. It provides an insight into foundation required for designing wireless sensor networks, through this course, the students will get an idea about different modules in a wireless sensor node and design of wireless sensor networks for different applications after considering the application specific challenges, requirements and trade-offs. This course also gives an insight in to the evolution of IOT from WSN and future scopeof IOT and civilian, military applications.

II. COURSES OBJECTIVES:
The students will try to learn

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

III. COURSE OUTCOMES:
At the end of the course students should be able to:

CO1 Understand and explain common wireless sensor node architectures.
CO2 Analyze protocols developed for sensor networks.
CO3 Demonstrate knowledge of MAC protocols developed for WSN.
CO4 To identify and address the security threats in ad hoc and sensor networks.
CO5 Establish a Sensor network environment for different type of applications.
CO6 Explain various wireless standards and protocols associated with WSN.

IV. COURSE CONTENT:

MODULE – I: OVERVIEW OF WSN (9)
Introduction and overview of wireless sensor networks (WSN), commercial and scientific applications

WSN,category of applications of WSN, challenges for WSN, enabling technologies for WSN. Introduction to Sensor Networks, unique constraints and challenges, Advantage of Sensor Networks, Applications of Sensor Networks, Types of wireless sensor networks.

MODULE – II: NETWORK ARCHITECTURE (9)

Single node architecture: hardware components, energy consumption of sensor nodes, operating systems and execution environments, examples of sensor nodes, network architecture: WSN scenarios, optimization goalsand figures of merits, design principles for WSNS, service interfaces for WSNS, gateway concepts.

MODULE – III: PHYSICAL LAYER AND PROTOCOLS (9)

Physical layer: wireless channel and communication fundamentals, physical layer & transceiver design considerations in WSN, MAC protocols: fundamentals, MAC protocols for WSNs, IEEE802.15.4 MAC Protocol,

Routing protocols, MAC protocols: Classification of MAC Protocols, S-MAC Protocol, B MAC protocol, IEEE 802.15.4 standard and ZigBee.

MODULE –IV: SENSOR TASKING AND CONTROL (9)

Sensor tasking and control: information-based sensor tasking, joint routing information aggregation, sensor network databases: challenges, query interfaces, in-network aggregation, data centric storage, data indices and range queries, distributed hierarchical aggregation, temporal data.

MODULE – V: OPERATING SYSTEMS FOR SENSOR NETWORKS (9)

Operating systems for sensor networks: introduction, design issues, examples of operating systems, node level simulators,performance and traffic management issues: WSN design issues, performance modelling of WSNs, emerging applicationsand future research directions.

V. TEXT BOOKS:

1. Kazem Sohrab, Daniel Minoli, Taieb Znati, “Wireless Sensor Networks”, technology, protocols, and Applications.
2. Holger Karl, Andreas Willig, “Protocols and architectures for wireless sensor networks”, John Wiley & Sons.

VI. REFERENCE BOOKS:

1. Feng Zhao, Leonidas Guibas, “Wireless Sensor Networks; An Information Processing Approach”, Elsevier.
2. C. S. Raghavendra, Krishna M. Shivalinga, Taieb Zenati, “Wireless sensor networks”, Springer Verlag.
3. H. Edgar, Jr. Callaway, “Wireless Sensor networks, Architectures and Protocols”, CRC Press.

VII. MATERIALS ONLINE

1. Course template
2. Tutorial question bank
3. Assignments
4. Model question paper - I
5. Model question paper - II
6. Lecture notes
7. Power point presentations
8. Early Lecture Readiness Videos