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

COURSE CONTENT

INTERNET OF THINGS AND APPLICATIONS								
II Semester: ES								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
BESE13	**Core**	3	0	0	3	40	60	100
Contact Classes: 45	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: 45**		
Prerequisite: Embedded systems.								

I. COURSE OVERVIEW:
This course will explore the fascinating world of IoT and delve into its various applications that are shaping the futureof technology and connectivity. The course is designed to provide a solid foundation in both the theoretical and practicalaspects of IoT, equipping you with the knowledge and skills to understand, design, and implement IoT solutions acrossdiverse industries.

II. COURSES OBJECTIVES:
The students will try learn:

I. Build IoT Prototypes, design sensor networks, and work with IoT platforms to gain practical experience.
II. Explore the various wireless communication technologies that enable IoT devices to connect and communicate,such as Wi-Fi, Bluetooth, Zigbee, LoRa WAN, and cellular networks.
III. Delve into different types of sensors used in IoT applications, including environmental sensors, motionsensors, proximity sensors, and more.
IV. Engage in hands-on projects that allow to apply knowledge in real-world scenarios.

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

CO 1 Relate different types of sensors used in IoT applications, including their working principles and real - world use cases.
CO 2 Analyze advanced generation sensors, including their features, improvements over earlier technologies, and the role they play in enhancing data accuracy and precision in industrial applications.
CO 3 Demonstrate the components and architecture of wireless sensor systems, including their fundamental structure and the interplay of various modules in achieving wireless sensing capabilities.
CO 4 Identify the role and characteristics of energy storage modules in wireless sensor systems, and how they enable reliable and continuous sensor operation by storing and managing energy from various sources.
CO 5 Explain the NEST sensor ecosystem, including its characteristics, functionalities, and its contribution to creating smart and energy-efficient homes.
CO 6 Develop the ability to interact with hardware components using the chosen platform, including communication protocols, wiring, and programming.

IV. COURSE CONTENT:
MODULE - I: INTRODUCTION TO INTERNET OF THINGS (9)
Internet of things promises, definition. scope, sensors for IoT applications, structure of IoT, IoT map device.

MODULE –II: IOT SENSORS (9)

Industrial sensors, description & characteristics, first generation, description &characteristics, advanced generation, description & characteristics, integrated IoT sensors, description & characteristics, polytonic systems, description & characteristics, sensors' swarm, description & characteristics, printed electronics, description & characteristics, IoT generation-roadmap.

MODULE –III: IOT ANALYSIS (9)

Wireless Sensor Structure, processor, radio interface, ADC, Energy Storage Module, energy usage and storage, Power Management Module, power requirements.

Optimizing power consumption, lower power modes, monitoring power usage, testing and verifying performance, RF Module, basic components, modulation techniques, communication protocols

MODULE –IV: IOT DEVELOPMENT EXAMPLES (9)

ACOEM Eagle – EnOcean Push Button – NEST Sensor – Ninja Blocks -Focus on Wearable Electronics, Tesla IOT car,Hitachi, PTC Thing Worx, Caterpillar, Tom farms.

MODULE –V: IOT APPLICATIONS (9)

Creating the sensor project, preparing raspberry Pi/ ARM cortex, clyster libraries, hardware, interacting with the hardware, interfacing the hardware, internal representation of sensor values, persisting data, external representation of sensor values, exporting sensor data, creating the actuator project, hardware, interfacing the hardware, creating a controller, representing sensor values, parsing sensor data, calculating control states, creating a camera, hardware accessing the serial port on raspberry Pi/ ARM Cortex, interfacing the hardware, creating persistent default settings, adding configurable properties, persisting the settings, working with the current settings, initializing the camera.

V. TEXT BOOKS:

1. Dr. Guillaume Girardin, Antoine Bondable, Dr. Eric Mounier, 'Technologies Sensors for the Internet of ThingsBusinesses & Market Trends 2014 -2024', Yole Development Copyrights, 2014.
2. Peter Washer, 'Learning Internet of Things', Packet Publishing, 2015.

VI. REFERENCE BOOKS:

1. Editors Ovidiu Vermes a Peter Friess, 'Internet of Things – From Research and Innovation to Market, 2014.
2. N. Ida, Sensors, Actuators and Their Interfaces, SciTech Publishers, 2014.

VII. ELECTRONIC RESOURCES:

1. https://nptel.ac.in/courses/1081061
2. https://nptel.ac.in/courses/108108123

VIII. 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