



# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal - 500 043, Hyderabad, Telangana

## COURSE CONTENT

PRINCIPLES OF IOT								
VII SEMESTER: CSIT								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
ACIC10	Elective	L	T	P	C	CIA	SEE	Total
		3	0	0	3	30	70	100
<b>Contact Classes: 45</b>	<b>Tutorial Classes: Nil</b>	<b>Practical Classes: Nil</b>			<b>Total Classes:45</b>			
<b>Prerequisite: Computer Networks</b>								
<p><b>I. COURSE OVERVIEW:</b>            The course aims to deliver a sound understanding of the design and analysis of Internet of Things through lectures and practice. The lectures provide the foundational knowledge in sensors and actuators, fusion of data from multiple sensors, sensor data calibration and topics in sensor data analytics: pre-processing and extraction of features in time, series sensor data, and classification methods. The students conduct a major piece of coursework working in pairs to develop an IoT application using the Orient speck platform. Students will experience all the stages in the design and implementation of a complex system, from its specification to the demonstration of a working prototype. They will be exposed to aspects of embedded systems programming, networking algorithms, wireless protocols, user interface design, system integration and testing.</p>								
<p><b>II. COURSE OBJECTIVES:</b>  <b>The students will try to learn:</b></p> <ol style="list-style-type: none"> <li>I. The IoT value chain structure (device, data cloud), application areas and technologies involved.</li> <li>II. The IoT sensors and technological challenges faced by IoT devices, with a focus on wireless, energy, power, and sensing modules.</li> <li>III. Market forecast for IoT devices with a focus on sensors.</li> <li>IV. Explore and learn about Internet of Things with the help of preparing projects designed for Raspberry Pi.</li> </ol>								
<p><b>III. COURSE SYLLABUS:</b>  <b>MODULE – I: INTRODUCTION TO INTERNET OF THINGS (10)</b>            Introduction to Internet of Things, definition and characteristics of IoT, physical design of IoT, IoT protocols, IoT communication models, IoT communication APIs, IoT enabled technologies, wireless sensor networks, cloud computing, big data analytics, communication protocols, embedded systems, iot levels and templates; Domain Specific IoTs: Home, city, environment, energy, retail, logistics, agriculture, industry, health and lifestyle.</p>								
<p><b>MODULE – II: IoT NETWORKS AND MANAGEMENT (08)</b>            IoT and M2M – Software defined networks, network function virtualization, difference between SDN and NFV for IoT. Basics of IoT System Management with NETCOZF, YANG, NETCONF, YANG, SNMP NETOPEER.</p>								
<p><b>MODULE – III: CONTROLLING HARDWARE AND SENSORS (10)</b>            Controlling Hardware, Connecting LED, buzzer, switching high power devices with transistors, controlling AC power devices with relays, controlling servo motor, speed control of DC motor,</p>								

unipolar and bipolar stepper motors

Sensors, Light sensor, temperature sensor with thermistor, voltage sensor, ADC and DAC, temperature and humidity sensor DHT11, motion detection sensors, wireless bluetooth sensors, level sensors, USB Sensors, embedded sensors, distance measurement with ultrasound sensor.

#### **MODULE IV: IOT PHYSICAL DEVICES AND ENDPOINTS (09)**

Introduction to Arduino and Raspberry Pi, Installation, Interfaces (serial, SPI, I2C), Programming – Python program with RaspberryPI with focus on interfacing external gadgets, controlling output, reading input from pins.

#### **MODULE V: IOT PHYSICAL SERVERS AND CLOUD OFFERINGS (08)**

Introduction to Cloud Storage models and communication APIs Webserver – Web server for IoT, Cloud for IoT, Python web application framework Designing a RESTful web API.

#### **IV. TEXT BOOKS:**

1. Arshdeep Bahga and Vijay Madisetti, “Internet of Things: A Hands on Approach”, Universities Press, 2015.
2. Matt Richardson and Shawn Wallace, “Getting Started with Raspberry Pi”, O’Reilly (SPD), 2014.
3. Simon Monk, “Raspberry Pi Cookbook-Software and Hardware Problems and Solutions”, O’Reilly (SPD), 2016.

#### **V. REFERENCE BOOKS:**

1. Peter Waher, “Learning Internet of Things”, Packt Publishing, 1<sup>st</sup> Edition, 2015.
2. Peter Friess, “Internet of Things – From Research and Innovation to Market Deployment”, River Publishers, 2014.
3. N. Ida, “Sensors, Actuators and Their Interfaces”, SciTech Publishers, 2014.

#### **VI. WEB REFERENCES:**

1. <http://www.drps.ed.ac.uk/20,21/dpt/cxinfra11150.htm>
2. [https://mrcet.com/downloads/digital\\_notes/EEE/IoT & Applications Digital Notes.pdf](https://mrcet.com/downloads/digital_notes/EEE/IoT & Applications Digital Notes.pdf)
3. <https://www.coursehero.com/file/44580892/IOT,LECTURE,NOTES,CSE,0doc/>
4. [https://www.tutorialspoint.com/internet\\_of\\_things/internet\\_of\\_things\\_tutorial.pdf](https://www.tutorialspoint.com/internet_of_things/internet_of_things_tutorial.pdf)
5. <https://lecturenotes.in/subject/370/internet-of-things-iot>