



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

| IOT ARCHITECTURE & COMPUTING | | | | | | | | |
|---------------------------------|-----------------------|------------------------|---|---|-------------------|---------------|-----|-------|
| II Semester: ES | | | | | | | | |
| Course Code | Category | Hours / Week | | | Credits | Maximum Marks | | |
| BESE22 | Elective | L | T | P | C | CIA | SEE | Total |
| | | 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:

The course “IoT Architecture & Computing” introduces students to the concepts, technologies, and applications of the Internet of Things (IoT). It provides a comprehensive understanding of IoT architecture, hardware platforms, communication protocols, and cloud integration. Students will gain hands-on experience with IoT devices, learn to develop IoT applications, and understand the challenges of IoT security, privacy, and interoperability. The course also covers cloud computing fundamentals and demonstrates how cloud platforms can be leveraged to manage, analyze, and deploy IoT solutions for real-world applications such as smart cities, smart healthcare, and smart agriculture.

II. COURSES OBJECTIVES:

The students will try to learn

- I. Develop IoT applications using different hardware platforms such as Arduino, Raspberry Pi, and NodeMCU.
- II. Implement and evaluate various IoT communication and device management protocols (e.g., MQTT, CoAP, BLE, Wi-Fi).
- III. Comprehend the basic principles of cloud computing, including cloud service models (IaaS, PaaS, SaaS) and deployment strategies.
- IV. Integrate IoT applications with cloud platforms and address challenges related to security, privacy, and data management.

III. COURSE OUTCOMES:

At the end of the course students should be able to:

- CO1 Understand the various concepts of the IoT and their technologies.
- CO2 Develop the IoT application using different hardware platforms
- CO3 Understand the principles of cloud computing, cloud service models (IaaS, PaaS, SaaS), and cloud deployment strategies.
- CO4 Understand the basic principles of cloud computing.
- CO5 Develop and deploy the IoT application into cloud environment
- CO6 Develop IoT applications using different hardware platforms such as Arduino, Raspberry Pi, and NodeMCU.

IV. COURSE CONTENT:

MODULE – I: INTRODUCTION TO IOT (9)

Definition, Characteristics, Complete Architectural Stack, IoT enabling Technologies and Challenges. Sensors and Hardware for IoT – Hardware Platforms – Arduino, Raspberry Pi, Node MCU. A Case study with any one of the boards and data acquisition from sensors.

MODULE – II: IOT PROTOCOLS (9)

Infrastructure protocol (IPv4/V6/RPL), Identification (URIs), Transport (Wifi, Lifi, BLE), Discovery, Data Protocols, Device Management Protocols. – A Case Study with MQTT/CoAP usage-IoT privacy, security and vulnerability solutions.

MODULE – III: CLOUD ARCHITECTURE BASICS (9)

Fundamentals of cloud, cloud architecture standards and interoperability- Cloud types; IaaS, PaaS, SaaS. Benefits and challenges of cloud computing, public, private clouds community cloud, Development environments for service development; Amazon, Azure, Google App cloud platform in industry

MODULE –IV: IOT AND THE CLOUD (9)

Role of Cloud Computing in IoT, AWS Components, Connecting a web application to AWS, IoT using MQTT, AWS IoT Examples. Security Concerns, Risk Issues, and Legal Aspects of Cloud Computing- Cloud Data Security

MODULE – V: CASE STUDIES WITH ARCHITECTURAL ANALYSIS (9)

IoT applications, Smart City, Smart Water, Smart Agriculture, Smart Energy, Smart Healthcare, Smart Transportation, Smart waste management.

II. TEXT BOOKS:

1. Pethuru Raj and Anupama C. Raman by The Internet of Things: Enabling Technologies, Platforms, and Use Cases, CRC Press, 2007, 1st Edition.

III. REFERENCE BOOKS:

1. Adrian McEwen, Designing the Internet of Things, Wiley, 2013, 1st Edition.
2. Singh, Rajesh. Gupta, LoviRaj. Gehlot, Anita. Singh, Bhupendra. Swain, Mahendra, “Internet Things with Raspberry Pi and Arduino” United Kingdom: Taylor & Francis Limited, 2021.

IV. 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
-