

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEC75a-EMBEDDED SYSTEMS & IOT

(Open Elective-III)

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Course Objectives: The objectives of the course are to make the students learn about

- To understand the basics of Embedded Systems and IOT.
- To learn the architecture and programming of ARM Microcontroller.
- To be able to work with Raspberry Pi using Python Programming.
- To know about the IOT standards, communication technologies and protocols.
- To implement real time projects using the tools and techniques of IOT Platform.

UNIT – I:

Introduction to Embedded Systems and Internet of Things (IOT): Architecture of Embedded Systems, Embedded Systems Development process, Architecture of Internet of Things, Applications of Embedded Systems and IOT, Design Methodology for IOT Products

Learning Outcomes:

At the end of this unit, the student will be able to

- Gain knowledge on basics of embedded systems and IOT Architectures. L1
- Understand the design methodology and applications of embedded systems and IOT. L2

UNIT – II:

ARM Microcontrollers Architecture and Programming: Architecture, Instruction set, Programming ports, Timer/Counter, Serial communication, interrupts in C, Introduction ARM mBed platform.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the architecture and programming of ARM Microcontrollers. L2
- Work with ARM Microcontrollers in implementing real time projects. L6

UNIT – III:

Fundamentals of Python Programming & Raspberry Pi: Introduction to python programming, Working with functions, classes, REST full, Web Services, Client Libraries, Introduction & programming Raspberry Pi3, Integrating Input Output devices with Raspberry Pi3.

Learning Outcomes:

At the end of this unit, the student will be able to

- Write programs using Python to implement the given task. L6
- Use Raspberry Pi3 for integrating Input & Output devices. L3

UNIT – IV:

IOT Technologies, Standards and Tools: Fundamental characteristics and high level requirements of IOT, IOT Reference models; Introduction to Communication Technologies & Protocols of IOT: BLE, Wi-Fi, LORA, 3G/4G Technologies and HTTP, MQTT, COAP protocols; Relevant Practicals on above technologies.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the characteristics and high level requirements to design new IoT devices. L2
- Summarize different Communication Technologies & Protocols of IoT. L2



UNIT – V:

IOT Platform, Cloud Computing Platforms for IoT Development: IOT Platform Architecture (IBM Internet of Things & Watson Platforms); API Endpoints for Platform Services; Devices Creation and Data Transmission; Introduction to NODE-RED and Application deployment.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn how to use API Endpoints for Platform Services, Devices Creation and Data Transmission. **L1**
- To implement real time projects using the tools and techniques of IoT Platform. **L6**

Text Books:

1. ArsheepBahga, Vijay Madiseti, "Internet of Things: A Hands-On Approach", 1st Edition, VPT, 2014.
2. K.V.K.K.Prasad, "Embedded Real Time Systems: Concepts, Design and Programming", 1st Edition, Dreamtech Publication, 2014.
3. Adrian McEwen, Hakim Cassimally, "Designing the Internet of Things", Wiley Publications, 2013

Reference Books:

1. Jonathan W Valvano, "Embedded Microcomputer Systems: Real-Time Interfacing", 3rd Edition, Thomson Engineering, 2012.
2. Olivier Hersent, David Boswarthick, Omar Elloumi, "The Internet of Things: Key applications and Protocols", 2nd Edition, Wiley Publications, 2012.

Course Outcomes:

At the end of this Course the student will be able to

- Understand the basics of Embedded Systems and IOT. **L2**
- Correlate the architecture and programming of ARM Microcontroller. **L4**
- Work with Raspberry Pi using Python Programming. **L6**
- Summarize IOT standards, communication technologies and protocols. **L2**
- Implement real time projects using the tools and techniques of IOT Platform. **L6**

