IV B.Tech II Semester

15AEC81 - EMBEDDED SYSTEMS & INTERNET OF THINGS

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Course Objectives:

1. *Understand the basics of Embedded System, IoT and the development model*
2. *Understand the architecture, Instruction set and work on ARM microcontroller using practical hands-on.*
3. *Ability to select appropriate hardware and microcontrollers based on need of application*
4. *Understand the Internet of Things Standards, Frameworks and Techniques*
5. *Apply the tools, techniques and skills acquired towards development of Projects.*

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.

UNIT II – ARM Microcontrollers Architecture and Programming

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

UNIT III – Fundamentals of Python Programming & Raspberry Pi

Introduction to python programming, Working with functions, classes, RESTfull Web Services, Client Libraries, Introduction & programming Raspberry Pi3, Integrating Input Output devices with Raspberry Pi3

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

UNIT V – IoT Platform: Cloud Computing Platforms for IoT Development (IBM Cloud)

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

Course Outcomes: *After completion of the course, the student is able to*

a. *Understand the vision of IoT from a global context.*
b. *Provide in-depth knowledge about ARM Architecture and its instruction set.*
c. *Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks*
d. *Implement state of the art architecture in IoT.*
e. *Illustrate the application of IoT in Industrial Automation and identify Real World Design Constraints.*

TEXT BOOKS

1. ArsheepBahga, Vijay Madisetti, "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

REFERENCES

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.