

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Electronics and Telecommunication)			
Subject Code & Name	Instructions Hours per Week			Credits			
ETR8E1 INTERNET OF THINGS	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Learning Objective:

- Assess the genesis and impact of IoT applications, architectures in real world.
- Illustrate diverse methods of deploying smart objects and connect them to network.
- Compare different Application protocols for IoT.
- Infer the role of Data Analytics and Security in IoT.
- Identify sensor technologies for sensing real world entities and understand the role of IoT in various domains of Industry.

Prerequisite: Computer Network, C Language

COURSE CONTENTS

Unit I

IoT Introduction, Genesis of IoT, IoT and Digitization, IoT Impact, Convergence of IT and IoT, IoT Challenges, IoT Network Architecture and Design, Drivers Behind New Network Architectures, Comparing IoT Architectures, A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Management and Compute Stack.

Unit II

Smart Objects: The “Things” in IoT, Sensors, Actuators, and Smart Objects, Sensor Networks, Connecting Smart Objects, Communications Criteria, IoT Access Technologies.

Unit III

IP as the IoT Network Layer, The Business Case for IP, The need for Optimization, Optimizing IP for IoT, Profiles and Compliances, Application Protocols for IoT, The Transport Layer, IoT Application Transport Methods.

Unit IV

Data and Analytics for IoT, An Introduction to Data Analytics for IoT, Machine Learning, Big Data Analytics Tools and Technology, Edge Streaming Analytics, Network Analytics, Securing IoT, A Brief History of IoT Security, Common Challenges in IoT Security, Formal Risk Analysis Structures: OCTAVE and FAIR, The Phased Application of Security in an Operational Environment

Unit V

IoT Physical Devices and Endpoints - RaspberryPi: Introduction to RaspberryPi, About the RaspberryPi Board: Hardware Layout, Operating Systems on RaspberryPi, Configuring RaspberryPi, Programming RaspberryPi with Python, Wireless Temperature Monitoring System Temperature Sensor, Connecting Raspberry Pi via SSH, Accessing Temperature from sensors, Remote access to RaspberryPi, Smart and Connected Cities, An IoT Strategy for Smarter Cities, Smart City IoT Architecture, Smart City Security Architecture, Smart City Use-Case Examples.

Learning Outcomes:

At the end of the course, the students would be:

- Interpret the impact and challenges posed by IoT networks leading to new architectural models.
- Compare and contrast the deployment of smart objects and the technologies to connect them to network.
- Appraise the role of IoT protocols for efficient network communication.
- Elaborate the need for Data Analytics and Security in IoT.
- Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.

BOOKS RECOMMENDED:

- [1].David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry,"IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", 1 st Edition, Pearson Education
- [2].Srinivasa K G, "Internet of Things", CENGAGE Learning India, 2017.
- [3].Vijay Madiseti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", 1 st Edition, VPT, 2014.
- [4].Raj Kamal, "Internet of Things: Architecture and Design Principles", 1st Edition, McGraw Hill Education, 2017.

List of Practical Assignments:

1. To study the architecture of application board of Raspberry Pi.
2. To demonstration the OS (Debian) for RPi in a SD card preparation, configuration of Raspberry Pi during first booting and use of remote SSH like putty
3. To demonstrate the basic linux commands on Raspberry pi.
4. To create a database & Store the value in Raspberry Pi.
5. To install Android on Raspberry Pi.
6. To Setup R Pi first time without using screen, mouse, keyboard.
7. To interface ADC at GPIOs of Raspberry Pi for measuring analog voltage.