

# Kadi Sarva Vishwavidyalaya, Gandhinagar

## MCA Semester V

### MCA 505 : Internet of Things

**Rationale:**

The primary objective of this course is to interpret the vision of IoT from a global context.

**Prerequisite:** Fundamentals of computer networks, wireless sensor networks, fundamental of embedded system, sensors, web technology.

**Learning Outcomes:**

Students will learn seven concepts like basics of internet of things.

1. Understand the concepts of Internet of Things
2. Design IoT applications in different domain and be able to analyze their performance
3. Implement basic IoT applications on embedded platform
4. All these concepts are important to build their career in broad perspective in the domain of IoT.

**Teaching and Evaluation Scheme:** The objective of evaluation is to evaluate the students throughout the semester for better performance. Students are evaluated on the basis of continuous evaluation system both in theory and practical classes based on various parameters like term work, class participation, practical and theory assignments, presentation, class test, Regular Attendance, etc.

Sub Total Credit	Teaching scheme		Examination scheme				
	(per week)		MID	CEC	External		Total
	Th	Pr	Th	Th	Th.	Pr.	Marks
<b>4</b>	3	2	25	25	50	50	150

**Course Contents:**

**UNIT1: Introduction to Internet of things [20%]**

Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Communication models & APIs, Smart Objects: Sensors and actuators (LCD, LED, PIR, IR, Ultrasonic, Temperature, humidity, pressure, gas, bluetooth, GSM, Zigbee, etc)

**UNIT2: Internet of Things and M2M [20%]**

**IoT to M2M : A Basic Perspective**– Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies.

**IoT to M2M : An Architectural Overview**– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.

### **UNIT 3: Architecture of IoT**

**[20%]**

IoT Architecture -State of the Art – Introduction, State of the art, Architecture Reference Model-Introduction, Reference Model and architecture, IoT reference Model, IoT Reference Architecture-Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views.

### **UNIT 4: Iot Applications, Challenges, Privacy , Security and Governance**

**[20%]**

Introduction, IoT applications for industry: Smart Objects, Smart Applications, Value Creation from Big Data and Serialization, Home Automation, eHealth, Surveillance applications, Other IoT applications. Design challenges, Development challenges, Security challenges, other challenges, Security, Overview of Governance, Privacy and Security Issues, Data Aggregation for the IoT in Smart Cities.

### **UNIT 5: Developing IoTs**

**[20%]**

Introduction to different IoT tools, developing applications through IoT tools, developing sensor based application through embedded system platform, Implementing IoT concepts with python.

#### **Text Books:**

1. Vijay Madiseti, Arshdeep Bahga, “Internet of Things: A Hands-On Approach”
2. David Hanes, Rob Barton, “IoT fundamentals: networking technologies, protocols and use cases for the internet of things by pearson

#### **Reference Books:**

1. Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”, 1 st Edition, Apress Publications, 2013
2. Cuno Pfister, Getting Started with the Internet of Things, O’Reilly Media, 2011, ISBN: 978-1-4493- 9357-1
3. Gastón C. Hilla, Internet of Things with Python, Packt Publication.
4. Waltenegus Dargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice"

#### **Note: Practicals can be performed using Python and appropriate open source platform Practical Topics:**

1. Working with LED, SWITCH
2. Interfacing LCD with Arduino
3. Interfacing PIR sensor with Arduino
4. Interfacing temperature sensor (LM35) with Arduino
5. Interfacing DHT sensor with Arduino
6. Interfacing Ultrasonic sensor with Arduino
7. Configuring Bluetooth Module using AT commands
8. Bluetooth to Bluetooth communication: Bluetooth module to mobile/computer communication
9. ZigBee to ZigBee communication
10. Configuring the NodeMCU as Wi-Fi
11. Sensor interfacing with SBC using python
  - a) PIR
  - b) Temperature
  - c) DHT

d) Ultrasonic

**List of Open Source Software/learning website:**

- <https://github.com/connectIOT/iottoolkit>
- <https://www.arduino.cc/>
- <http://www.zettajs.org/>
- Contiki (Open source IoT operating system)
- Arduino (open source IoT project)
- IoT Toolkit (smart object API gateway service reference implementation)
- Zetta (Based on Node.js, Zetta can create IoT servers that link to various devices and sensors)