

20CS002 INTERNET OF THINGS

Hours Per Week :

L	T	P	C
3	-	2	4

Total Hours :

L	T	P	WA/RA	SSH/HSB	CS	SA	S	BS
45	-	30	15	30	-	5	5	-

Course Description and Objectives:

This course gives a foundation in the Internet of Things, including the components, tools, and analysis by teaching the concepts behind the IoT and a look at real-world solutions.

The students will be able to :

COs	Course Outcomes	POs
1	Compare and differentiate the IoT with other technologies	3
2	Design and develop solutions using IoT	3,5
3	Identify the need of domain specific IoT application sensors and Operating Systems	2
4	Apply the internet and mobile technologies for IoT communications	1
5	Analyse and understand the different domain specific IoT applications	2

SKILLS:

- ✓ Design domain specific IoT device.
- ✓ Identify the level of IoT applications.
- ✓ To use various domain specific hardware like sensors, actuators and controllers.
- ✓ To integrate emerging technologies like Cloud Computing, Big data, Mobile Technologies and so on.

UNIT - I

Internet of Things Fundamentals: Introduction to Internet of Things; Physical design & Functional Block of IOT, Device architectures, Core IoT Functional Stack; Resource constrained devices; Sensors and Components; IOT Enabling Technologies.

Societal Benefits of IoT (Domain Specific), Risks, Privacy, and Security.

UNIT - II

Network and Communication Protocols: Network Components; Internet Structure, Wireless Protocols; IoT Communication Model & APIs, Wireless Protocol Stack, IoT levels.

Unit III

Introduction to Systems Design & Development: IoT system building blocks, Arduino, Node MCU – Board details, IDE programming; Raspberry Pi-Model and Interfaces, Platform: Axonize, Blynk IoT platform, Fogwing

UNIT - IV

M2M & SYSTEM MANAGEMENT WITH NETCONF-YANG: SDN; NFV; Need for IOT Systems Management; SNMP-NETCONF, YANG; IOT Systems management with NETCONF-YANG.

UNIT - V

Programming and Case Study: Embedded C vs Python; Operating systems for constrained devices; Domain Specific IoT Application, Task Support IoT Example: The Refrigerator, Weather Monitoring System – Case study- Design, Programming and Execution.

LABORATORY EXPERIMENTS**LIST OF EXPERIMENTS****Total hours: 30**

1. **The Study**
 - a. **Overview of the IoT Kit** -Common Components, Power Supplies, Sensors, Microcontrollers, Single Board Computers, LEDs and Displays
 - b. **Safeguards and Basics**- Handling Various Components Safely, Voltage Levels and Handling Mains, Polarity, Indicators and Conventions, Handling Displays, Using the Soldering Iron.
 - c. **Understand the Common components** – Breadboards, Jumper Wires, Soldering Irons, Wire Strippers, Multi-meter.
2. **The usage of various components:**
 - a. **Power Supplies** - Breadboard Power Supply, USB Power Supply, 12V Power Supply, Power Strips, LiPo Batteries
 - b. **The Need and usage of Sensors** – Pulse, Water, Current Non-Invasive Current, Temperature (Analog), Temperature (Digital), Humidity, Simple LED, RGB LED, Switch, Hall Magnetic, Reed Relay, Relay, Photo Resistor, Joystick.
 - c. **Working with LEDs and Displays** - RGB LED Strip, OLED Displays, OrangePi 2G LCDs, 7" HDMI LCDs
3. **Microcontrollers and SoC:**
 - a. **Understand the Roll and Working with Microcontrollers** - Arduino Mega, Arduino Pro Micro, NodeMCU.
 - b. **The Usage Single Board Computers** - Raspberry Pi 3, Raspberry Pi Zero
4. **Study of Communications Systems and Platform:**
 - a. MQTT, REST, XMPP, WebSockets, etc.
 - b. Bluetooth, Wi-Fi, ZigBee, LoRa
 - c. Platform: Axonize, Blynk IoT platform, Fogwing
5. **Design and Development of an IoT Application with Cloud Integration.**
 - a. Weather Monitoring System (Temp, Air, Moisture, Humidity)
 - b. Smart Home. (Temp, Water, Appliances)
 - c. Patient Health Monitoring System. (Heart Rate, BP, Temp)

TEXT BOOKS:

1. ArshdeepBahga and Vijay Madisaetti, "Internet of Things –A Hands-on Approach", University Press, 2015.
2. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, "IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things", Cisco Press, 2017

REFERENCE BOOKS:

1. Rajkamal, "Internet of Things: Architecture, Design Principles and Applications", McGraw Hill Higher Education, 2016.
2. Peter Waher, "Learning Internet of Things", Packt Publications, 2015
3. Raj Kamal, "Embedded Systems", 2nd Edition, Tata McGraw Hill, 2009.
4. Lyla B Das, "Embedded Systems an Integrated Approach", 1stEdition, Pearson, 2012.