Course Name	**:**	**Introduction to Internet of Things using Raspberry Pi**
Course Code	**:**	**IOT01**

Course Objective This Course focuses on hands-on IoT concepts such as sensing, actuation and communication. It covers the Hands On Experience with Raspberrypi and development of Internet of Things (IoT) prototypes—including devices for sensing, actuation, processing, and communication—to help you develop skills and experiences.

Duration of course = 24 hrs.

Lecture/Lab wise breakup		**Number of hours**
1.	Introduction to IOT, Understanding IoT fundamentals, IOT Architecture and protocols, Various Platforms for IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Study of Communication models & APIs, Devices and gateways, Local and wide area networking, Introduction to M2M, Real time Examples of IoT, IoT Communication Technologies, Challenges in IOT.	**8**
2.	Getting started with Raspberry Pi, Introduction to Raspberry Pi, Comparison of various Rpi Models, Pin Description of Raspberry Pi, On-board components of Rpi, Raspberry pi Installation Projects using Raspberry Pi.	
3.	Booting Up RPi- Operating System and Linux Commands, Raspbian O.S.- Introduction, Installing Raspbian on Pi, first boot and Basic Configuration of Pi, LED Blinking with Raspberry Pi using GPIO commands, LED control with Button using GPIO commands.	**8**
4.	Sensors & Actuators**,** Application of Sensors - Temperature - Vibration - Humidity, Ultrasonic sensor, Gas detection sensor, Examples for sensor, actuator, control circuits with sensors.	
5.	Working with RPi using Python and Sensing Data using Python, Introduction to Python, Sensors Interfacing- Temperature and Humidity Sensor (DHT11), Obstacle detection using Ultrasonic sensor. How to work with DHT 11 Sensor, How to sense Temperature and Humidity. Introduction to Node – Red, Installation of Node Red, Using Node Red with Raspberry Pi, Led On/Off with Node Red and Raspberry, Led On/Off with Button using Node Red and Raspberry Pi. Control an LED using App.	**8**

Course Outcome Students will be explored to understand the various enabling IoT concepts, application areas of IOT, Hands on Experience on Node Red with Raspberry Pi.

Course Name	:	**IOT Essentials Training for Mindsphere**
Course Code	:	**IOT02**

Course Objective

This course focusses on the Introduction of Industrial Internet of Things (IIOT), Fundamentals of M2M Communication, Overview of Mindsphere used in Industrial Automation, and Hands on projects based on Raspberrypi and Node red, Posting Data on Siemens Mindsphere.

Duration of course = 24 hrs.

Lecture/Lab wise breakup		**Number of hours**
1.	**Introduction to PLC and TIA (Totally Integrated Automation) Portal:** Overview of PLC and its application, Configuration of devices and networks, TIA Portal online communication.	**8**
2.	**Mindsphere:** Introduction to Siemens Mindsphere architecture, Asset Manager, Fleet Manager, Creating Assets. Aspects, Types in Mindsphere.	
3.	**Introduction to Mindconnect Nano as Gateway device**: Configuration of Mind connect Nano, Creating the sensor project, interacting with the hardware-Raspberry pi, Node Red, Internal & External representation of sensor values, exporting sensor data, Pushing sensor data to Cloud.	**8**
5.	**Projects** Using DHT11 sensor sending values of Temperature and humidity on Mindsphere, Mind connect application - Nano Box Overview, Onboarding Nano Box, Mindconnect Library, On boarding of MAPS 6S, Fleet Management - Monitoring of MAPS 6S KPIs.	**8**

Course Outcome

Students will be explored to understand the various concepts of Cloud & Sensor Networks, able to understand the Data Mapping and Monitor and Analyze the data on Cloud, and Interconnection of the physical world and the cyber space.