Program : **Diploma in Electronics Engineering/ Electronics & Communication Engineering**	
Course Code : **6042A**	Course Title: **Concepts of IoT**
Semester : **6**	Credits: **4**
Course Category: **Open Elective**	
Periods per week: **4 (L:4, T:0, P:0)**	Periods per semester: **60**

Course Objectives:

- To provide an introduction to the internet of things to an understanding level.
- To cover the concepts of IoT protocols, prototyping boards including Arduino and Raspberry pi, sensors actuators, and protocol modules.
- To introduce domain-specific applications of IoT in home automation, smart city application, electricity metering, and agriculture.

Course Prerequisites:

Topic	Courseco de	Course name	Semester
IT skills		Introduction to IT systems Lab	I

Course Outcomes:

On completion of the course, the student will be able to:

COn	Description	Duration (Hours)	Cognitive Level
CO1	Explain the concept of Internet of Things.	14	Understanding
CO2	Illustrate Arduino-based prototyping boards	15	Understanding
CO3	Demonstrate interfacing of sensors and actuators with Arduino and supporting protocols.	15	Understanding
CO4	Illustrate domain-specific applications of IoT.	14	Understanding
	Series Test	2	

CO - PO Mapping:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2						
CO2	2						
CO3	2						
CO4	2						

3-Strongly mapped, 2-Moderately mapped, 1-Weakly mapped

Course Outline:

Module Outcomes	Description	Duration (Hours)	Cognitive Level
CO1	**Explain the concept of Internet of Things.**		
M1.01	Differentiate Internet of Things and machine to machine communication.	4	Understanding
M1.02	Explain IoT architecture and its platforms	6	Understanding
M1.03	List various challenges in IoT	4	Understanding
Contents: **Introduction to IOT**: Definition - Internet of Things, Machine to Machine (M2M) communication. M2M v/s. IOT. Introduction to IOT, Understanding IoT fundamentals, IOT Architecture. Various Platforms for IoT, Challenges in IOT.			
CO2	**Illustrate Arduino-based prototyping boards.**		
M2.01	Interpret microcontrollers.	2	Understanding
M2.02	Explain Arduino based prototyping boards	7	Understanding
M2.03	Demonstrate Raspberry pi and its features	6	Understanding
	Series Test - I	1	
Contents: **Prototyping Boards:** Microcontrollers -Block diagram, example for microcontrollers. Prototyping boards - Arduino Uno, Arduino Nano, NodeMCU-Block diagram. Raspberry Pi - Specifications and features, block diagram.			

CO3	**Demonstrate interfacing of sensors and actuators with Arduinoand supporting protocols.**		
M3.01	Classify various sensors.	3	Understanding
M3.02	Interface sensors with Arduino.	4	Understanding
M3.03	Interface actuators with Arduino.	4	Understanding
M3.04	Classify various IoT protocols and modules.	4	Understanding

Contents:

Sensor & Actuators: Sensors - Overview, working, Analog and Digital. Various types of sensors - Temperature, Distance, Humidity, Motion, Light and Gas. Actuators - Overview, working. Various types of actuators - Relay, LEDs, Buzzer, DCMotor and Servo Motor. Concept of shield and modules. Interfacing of sensors and actuators with Arduino

Basics of Wireless Networking - Protocols, specification, interfacing &application of Serial(RS232), Bluetooth(HC05), Wifi(ESP8266) .

CO4	**Illustrate domain-specific applications of IoT.**		
M4.01	Demonstrate home automation.	5	Understanding
M4.02	Explain the application of IoT in cities.	4	Understanding
M4.03	Explain the application of IoT in energy and agriculture.	5	Understanding
	Series Test - 2	1	

Contents:

Domain Specific IoT: Introduction, Features. Home automation and security - Smart lighting, intrusion detection, smoke and gas detectors. Cities- Smart Parking, Smart lighting, Smart Roads. Energy- Smart grids, Smart metering. Agriculture- Smart Irrigation.

Text / Reference:

T/R	Book Title/Author
T_1	The Internet of Things - Key Applications and Protocols, Wiley Publication, OlivierHersent, David Boswarthick, Omar Elloumi. ISBN: 9788126557653
T2	The Internet of Things , Pearson, By Michael Miller ISBN: 9789332552456

Online Resources:

Sl.No	Website Link
1	Arduino resources available at https://www.arduino.cc/
2	Arduino compatibles available at https://www.adafruit.com/
3	Getting started with Raspberry Pi, available at https://projects.raspberrypi.org/