Marwadi University
Faculty of Diploma studies
Information and Communication Technology

Subject Code: 09CT0608
Subject Name: Sensor and IoT (SIoT)
Diploma Year – III (Semester VI)

Objective: The rationale behind this course is to learn to understand working of sensor, sensor interfacing and develop IoT solutions.

Credits Earned: 4 Credits

Course Outcomes: After learning this course, students should be able to,

CO1: To understand the concept of IoT and its architecture.

CO2: Interfacing of various sensors with programmable boards

CO3: To write programs for various IoT applications.

CO4: Integration of various sensors and data transfer protocols.

CO5: To develop solutions for different topics in society by means of IoT.

Pre-requisite of course: Electromagnetic Theory.

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	IA (M)	CSE (I)	Viva (V)	Term work (TW)	
3	0	2	4	50	30	20	25	25	150

Contents:

Sr No	Course content	Total Hrs.
1	**Introduction to Internet of Things:** Definitions, core concepts, related concepts, IoT reference models, IoT architectures, challenges, IoT functional stack	08
2	**Sensors:** Working principles, different types, selection of sensors for practical applications, Introduction to different types of sensors such as capacitive, resistive, temperature, humidity, pressure, ultrasonic, gas, Hall effect, PIR, MEMS, Image, IR, Proximity, GPS and GSM module, Interfacing sensor with IoT hardware boards	10

3	**Communication devices and protocols:** Bluetooth and BLE, Wifi, Zigbee, IPv6, 6LowPAN, LTE-M, RFID, NFC, LiDAR	**08**
4	**Application layer:** MQTT, CoAP, XMPP, Integrating internet services with interoperable data encoding with XML, JSON, CBOR, sensor markup language, lightweight web services for IoT	**08**
5	**IoT application domains:** Smart Cities, Smart Manufacturing, Smart Grid, Smart Buildings, Intelligent Transportation Systems, Healthcare	**08**
	Total	**42 hrs.**

References:

1. Q. F. Hassan, "Internet of Things A to Z: Technologies and Applications", IEEE Press, Wiley
2. D. Hanes, G. Salguerio, P. Grossetete, R. Barton, J. Henry, " IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", CISCO Press
3. Randy Frank, Understanding Smart Sensors, ARTECH House
4. J. Holler, V. Tsiatsis, C. Mulligan, S. Karnouskos, S. Avesand, D. Boyle, "From Machine to Machine to Internet of Things", Academic Press, ELSEVIER
5. P. Raj, A. Raman, "The Internet of Things Enabling Technologies, Platforms, and Use Cases",

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyse	Evaluate	Create
20%	30%	40%	10%	0%	0%

Suggested List of Experiments:

1. To sense temperate and humidity using sensors interfaced with IoT hardware board.
2. To detect presence using proximity sensor interfaced with IoT hardware board.
3. To detect distance of object using ultrasonic sensor interfaced with IoT hardware board.
4. To interface pressure sensor with IoT hardware board and read sensed data.
5. To read RFID tag using RFID reader interfaced with IoT hardware board.

6. To control LED on IoT hardware board using Bluetooth module interfaced with it.
7. To get location data using GPS module interfaced with IoT hardware module on webpage.
8. To understand implementation of MQTT using ContikiOS.
9. To understand implementation of CoAP using ContikiOS.
10. To create IPv6 network and configure network stack using Cooja simulator.

Reference Materials:

- https://www.coursera.org/specializations/iot
- https://www.coursera.org/specializations/internet-of-things
- https://nptel.ac.in/courses/106/105/106105166/