GUJARAT TECHNOLOGICAL UNIVERSITY

Syllabus for Integrated MCA 9th Semester
Branch: MCA Integrated
Subject Name: Internet of Things
Subject Code: 2698607

With effective from academic year 2022-23

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory		Tutorial/ Practical		
L	P	OJT	C	University exams (ESE)	Progressive Assessment (PA)	External Practical /viva Exam(ESE)	Internal evaluation Practical /viva Exam(PA)	
3	2		4	70	30	30	20	150

Course Outcome (COs):

CO1: Understand the concept of Internet of Things (IoT)
CO2: Understand and compare various sensors and able to select sensors for IoT application
CO3: Design IoT applications in different domain and be able to analyze their performance
CO4: Identify real life problem and suggest solution using IoT
CO5: Understand security issues in IoT Application

Course Content:

Unit No.	Content	Hrs
1	• **Introduction to Internet of Things:** Application areas of IoT, Characteristics of IoT, Things in IoT, IoT stack, Enabling technologies, IoT challenges, IoT levels, IoT and cyber physical system, IoT and WSN	06
2	• **Sensors, Microcontrollers, and Their Interfacing:** Characteristics of Sensor, Sensor interfacing, Types of sensors, Controlling sensors, Actuators, Types of Actuators, Microcontrollers, ARM	06
3	• **Protocols for IoT & Connectivity Technology:** Messaging protocols, Transport protocols, IPv4, IPv6, URI, MQTT, CoAP, XMPP, AMQP. IEEE 802.15.4, Zigbee, 6LoWPAN, RFID, NFC, Bluetooth.	08
4	• **Application Building with IoT:** Various application of IoT: Food, Healthcare, Lavatory maintenance, Water quality, Warehouse, Retail, Driver Assistance, Collision impact	06
5	• **Arduino and Raspberry Pi:** **Arduino :** Architecture, Component, IDE, Programme Element, Function Library, Random Number, Interrupts. **Raspberry Pi :** Architecture, Compatible Peripherals, Add-Ons, and Accessories, PIN Configuration, Case Study, Programming and Implementation of Iot with Raspberry Pi.	08
6	• **IoT Security:** Various security issues and need, Security architecture, Network & Transport Layer Challenges, Authorization Mechanism, Privacy in IoT Network.	06
	Total Hours:	40

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks				
R Level	U Level	A Level	N Level	E Level
15	30	35	20	0

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

Text Books:

No.	Author	Name of the Book	Publisher
1	Vasudevan, Nagrajan and Sundaram	Internet of Things	WileyIndia
2	Dr. Jeeva Jose	Internet of Things	Khanna Book Publishing
3	Rajkumar Buyya, Amir Vahid, Dastjerdi	Internet of Things Principles and Paradigm	ELSEVIER

Reference Books:

No.	Author	Name of the Book	Publisher
1	David Hence at el,	IoT Fundamentals	CiscoPress
2	Yashavant Kanetkar, Shrirang Korde	21 IoT Experiments,	BPB
3	Adrian McEwen, Hakim Cassimally	Designing the Internet of Things	Wiley
4	Raj Kamal	Internet of Things Architecture and Design Principles	McGraw Hill

Chapter wise Converge from Text Book:

Unit No.	Text Book No.	Chapters
Unit - 1	1	1
Unit - 2	1 2	1 1.7 & 1.8
Unit - 3	1 2	3, 4 3
Unit - 4	1	7
Unit - 5	2	6, 8
Unit - 6	3	10

Sample Practical List:

Students are expected to:

1. Understand architecture of Arduino and Raspberry PI.
2. Understand various sensors and integration of sensors with Arduino/Raspberry PI.
3. Design an application like Smart Home using interfacing of various sensors and Arduino/Raspberry PI module.

Suggestive List of Practical is as follows:

1. Introduction to various sensors and various actuators & its Application. Example are as under:
    a. PIR Motion Sensor.
    b. Rain Drop Sensor.
    c. Moisture Sensor.
    d. Temperature Sensor.
    e. Touch Sensor.
    f. Infrared Sensor.
    g. Servo Motor.
    h. RFID Sensor.
    i. Bluetooth Module.
    j. Wi-Fi Module.
2. Experiment using Arduino Uno to measure the distance of any objects using Ultrasonic Sensor.
3. Create a circuit using Arduino and sensors. Perform experiment using Arduino to Learn Working of Servo Motor.
4. To interface LED/Buzzer with Arduino/Raspberry Pi and write a program to turn ON LED for 1 sec after every 2 seconds.
5. To interface Push button/Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED when push button is pressed or at sensor detection.
6. To interface motor using relay with Arduino/Raspberry Pi and write a program to turn ON motor when push button is pressed.
7. To interface OLED with Arduino/Raspberry Pi and write a program to print temperature and humidity readings on it.
8. To interface Bluetooth with Arduino/Raspberry Pi and write a program to turn LED ON/OFF when '1'/'0' is received from Smartphone using Bluetooth.
9. Write a program on Arduino/Raspberry Pi to retrieve temperature and humidity data from thingspeak cloud.
10. To install MySQL database on Raspberry Pi and perform basic SQL queries.
11. Write a program on Arduino/Raspberry Pi to publish temperature data to MQTT broker.
12. Write a program on Arduino/Raspberry Pi to subscribe to MQTT broker for temperature data and print it.