GUJARAT TECHNOLOGICAL UNIVERSITY
Syllabus for Integrated MSc, 8th Semester
Branch: Computer Science
Subject Name: IOT and Smart Sensors
Subject Code: 1380305

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE(E)	PA (M)	PA (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Teaching Hours	Module Weightage (%)
1	**Introduction to IoT** • Definition, scope, and applications of IoT • IoT architecture: Layered view • Edge computing and fog computing • Communication protocols (MQTT, CoAP, HTTP, etc.)	06	15
2	**IoT Devices and Hardware Platforms** • IoT hardware platforms: Raspberry Pi, Arduino, ESP8266/ESP32 • Sensors: Types and working principles (temperature, pressure, motion, etc.) • Actuators: Types and integration with sensors • Interfacing sensors and actuators with microcontrollers • Hands-on session: Sensor interfacing and data collection	08	20
3	**Smart Sensors** • Definition and types of smart sensors • Sensor fusion and sensor networks • Power management in smart sensors • Calibration and compensation techniques	06	15
4	**IoT Networking and Communication** • Wireless communication technologies: Wi-Fi, Zigbee, LoRaWAN, Bluetooth • Networking protocols for IoT: 6LoWPAN, RPL, and IPv6 • Data transmission and processing in IoT systems • Security concerns in IoT: Encryption, authentication, and privacy	08	20

5	**Data Analytics in IoT** • Data acquisition and storage in IoT • Data preprocessing and cleaning for sensor data • Cloud platforms for IoT data: AWS IoT, Google Cloud IoT, Azure IoT • Real-time data analytics and visualization tools	06	15
6	**IoT Security and Challenges** • Security issues in IoT devices and networks • Privacy and ethical concerns in IoT • IoT standardization: Need for interoperability • Future trends and challenges in IoT	06	15

Reference Books

1. **"Internet of Things: A Hands-on Approach"** by Arshdeep Bahga and Vijay Madisetti (VPT, 2014)
2. **"Internet of Things: Principles and Paradigms"** by Rajkumar Buyya and Amir Vahid Dastjerdi (Morgan Kaufmann, 2016)
3. **"Building the Internet of Things: Implement New Business Models, Disrupt Competitors, and Transform Your Industry"** by Maciej Kranz (Wiley, 2016)
4. **"IoT Security: Advances in Authentication"** by Madhusanka Liyanage, Andrei Gurtov, and Mika Ylianttila (Wiley, 2017)
5. **"Smart Sensors and MEMS"** by Sabrie Soloman (Elsevier, 2014)

Course Outcomes

Students will be able to,

1. Understand the fundamental architecture, components, and applications of IoT systems.
2. Gain hands-on experience with IoT hardware platforms, sensors, and actuators.
3. Learn to integrate and network smart sensors and devices using IoT communication protocols.
4. Analyze and process sensor data for real-time applications using cloud platforms.
5. Identify and address security, privacy, and ethical issues related to IoT systems.