



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Master of Computer Applications

Level: Post Graduate

Course / Subject Code: MC03094151

Course / Subject Name: Internet of Things

w. e. f. Academic Year:	2025-26
Semester:	3
Category of the Course:	Elective Group-2

Prerequisite:	Fundamentals of computer network, wireless sensor network, embedded systems, communication and internet technology, information security.
Rationale:	<ul style="list-style-type: none">• Internet of Things plays an important role in connecting the things i.e. variety of devices through the Internet.• The IoT has emerged as a cutting-edge technology with applications in manufacturing, healthcare, agriculture, transport, mining, smart cities & many more• This subject covers the fundamentals of IoT with its architecture, protocols and applications.• It also covers the overview and programming of two widely used IoT platforms Raspberry Pi.

Course Outcome:

After Completion of the Course, Student will able to:

No.	Course Outcomes	RBT Level*
1	Describe basics concepts of IoT, things, smart connecting devices, IP & network layers, application protocols	UN
2	Apply different Sensors and Actuators in IoT Application as required	AP
3	Describe key IoT protocols (messaging, transport, and addressing)	UN
4	Develop basic applications using Raspberry Pi platforms.	AP
5	Discuss IoT security principles	UN

*RM: Remember, UN: Understand, AP: Apply, AN: Analyze, EL: Evaluate, CR: Create

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR	C	Theory		Tutorial / Practical		
				ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
2	0	2	3	70	30	20	30	150



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Course Content:

Unit No.	Content	No. of Hours	Weightage (%)
1	Introduction to Internet of Things (IoT): Introduction and Definition of Internet of Things, Application Areas of IoT, Characteristics of IoT, Things in IoT, IoT Stack, Enabling Technologies, IoT Challenges, IoT Levels, Cyber Physical System and IoT, WSN and IoT	4	15
2	Introduction to Sensors, Microcontrollers and Their Interfacing: Introduction to Sensor Interfacing, Types of Sensors, Controlling Sensors through Webpages, Microcontrollers: A Quick Walkthrough, ARM,	5	15
3	Protocols for Internet of Things: <i>Messaging Protocols:</i> Message Queuing Telemetry Transport (MQTT), Constrained Application Protocol (CoAP) <i>Transport Protocols:</i> Bluetooth Low Energy (BLE), Light Fidelity (Li-Fi), <i>Addressing and Identification Protocols:</i> Internet Protocol Version 4 (IPv4), Internet Protocol Version 6 (IPv6), Uniform Resource Identifier (URI)	5	15
4	Raspberry Pi: Raspberry Pi Architecture, Compatible Peripherals, Add-Ons and Accessories, Operating System for Raspberry Pi, Setting up Raspberry Pi, Initial Configuration for Raspberry Pi, Linux Based Software in Raspberry Pi, Application Development with Raspberry Pi-A Quick Walk Through Application Building with IoT: Various Application of IoT: Smart Perishable Tracking, Smart Healthcare, Smart Inflight Lavatory Maintenance, Water Quality Monitoring, Smart Warehouse Monitoring, Smart Retail, Smart Driver Assistance Systems Measure Collision Impact in an Accident	10	35
5	IoT Security: Cyber Security Vernacular, Anatomy of IoT Cyber Attacks, Physical and Hardware Security, Cryptograph, Software Defined Perimeter, Blockchains and Cryptocurrencies in IoT, Government Regulations and Intervention, IoT Security Best Practices	6	20
Total Hours:		30	100%

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	U Level	A Level	N Level	E Level	C Level
10	40	50	0	0	0



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Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

Textbook: (Unit-1 to 4 from Book-1 and Unit-5 from Book-2)

1. Internet of Things, By: Shriram K Vasudevan, Abhishek S Nagarajan, RMD Sundaram, Wiley Publication, ISBN 978-81-265-7837-5
2. Internet of Things for Architects, By: Perry Lea, Packt Publication, ISBN 978-1-78847-059-9

Reference Books:

1. Designing the Internet of Things, By: Adrian McEwen, Hakim Cassimally, Wiley Publication, ISBN 978-1-118-43062-0
2. Internet of Things: Architecture and Design Principles, By: Dr. Raj Kamal, Mc Graw Hill Publication, ISBN-13: 978-93-5260-522-4
3. Internet of Things: Principles and Paradigms, By: Rajkumar Buyyaand and Amir Vahid Dastjerdi, Elsevier, ISBN: 978-0-12-805395-9

List of Useful websites / MOOCs

1. Learners are advised to opt for NPTEL and SWAYAM courses that are relevant to this course

Suggested Course Practical List:

To perform followings Lab work:

List of Experiments using Raspberry Pi

1	Serial Monitor, LED, Servo Motor – Controlling: (1) Controlling actuators through Serial Monitor. (2) Creating different led patterns and controlling them using push button switches. (3) Controlling servo motor with the help of joystick.
2	Distance Measurement of an object: (1) Calculate the distance to an object with the help of an ultrasonic sensor and display it on an LCD
3	LDR Sensor, Alarm and temperature, humidity measurement: (1) Controlling relay state based on ambient light levels using LDR sensor. (2) Basic Burglar alarm security system with the help of PIR sensor and buzzer. (3) Displaying humidity and temperature values on LCD



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4	<p>Experiments using Raspberry Pi</p> <p>(1) Controlling relay state based on input from IR sensors</p> <p>(2) Interfacing stepper motor with Raspberry-Pi</p> <p>(3) Advanced burglar alarm security system with the help of PIR sensor, buzzer and keypad. (Alarm gets disabled if correct keypad password is entered)</p> <p>(4) Automated LED light control based on input from PIR (to detect if people are present) and LDR (ambient light level)</p>
5	<p>IOT Framework:</p> <p>(1) Upload humidity and temperature data to Thing Speak, periodically logging ambient light level to Thing Speak</p> <p>(2) Controlling LEDs, relay and buzzer using Blynk app</p>
6	<p>HTTP Based:</p> <p>(1) Introduction to HTTP. Hosting a basic server from the ESP32 to control various digital based actuators (led, buzzer, relay) from a simple web page.</p> <p>(2) Displaying various sensor readings on a simple web page hosted on the ESP32</p>
7	<p>MQTT Based:</p> <p>(1) Controlling LEDs/Motors from an Android/Web app, Controlling AC Appliances from an android/web app with the help of relay.</p> <p>(2) Displaying humidity and temperature data on a web-based application</p>
8	<p>UAV / Drone:</p> <p>(1) Demonstration of UAV elements, Flight Controller</p> <p>(2) Mission Planner flight planning design</p>

CO- PO Mapping:

Semester : 3	Course Name : Internet of Things							
	POs							
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	1	-	1	-	-	-	-
CO2	2	2	1	1	-	-	-	-
CO3	2	2	1	2	-	-	-	-
CO4	2	2	3	2	1	1	-	-
CO5	-	3	2	3	-	-	-	-

Legend: '3' for high, '2' for medium, '1' for low and '-' for no correlation of each CO with PO.

Note: The CO-PO mapping is indicative; the institute/faculty member can change as required.

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