



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Master of Engineering

Level: PG

Branch: Internet of Things

Course / Subject Code : ME01062011

Course / Subject Name: IoT Architecture

w. e. f. Academic Year:	2024-25
Semester:	1 st Semester
Category of the Course:	PCC

Prerequisite:	<ul style="list-style-type: none">Basic knowledge of computer networks, basic electronics, microprocessor, Python & C/C++ Programming
Rationale:	<ul style="list-style-type: none">The Internet of Things (IoT) has emerging requirements to connect various objects from anywhere and anytimeVarious kinds of things, architecture, protocols and networks are required to understand to design and develop IoT solutionsIt is required to impart basic understanding and implementation of architectures, access technologies, protocols to the students.Optimum choice of things, architecture, protocol, programming languages, and network are key parameters for a design of IoT system.

Course Scheme:

Teaching Scheme			Total Credits	Assessment Pattern and Marks				Total Marks
L	T	PR	C	Theory		Practical		
				ESE (E)	PA(M)	ESE (V)	PA (I)	
03	00	02	04	70	30	30	20	150

Course Content:

Sr No	Course Content	No of Hours	% of Weightage
1	UNIT-I: Introduction: The genesis of IoT, IoT and Digitization, IoT Impact, Convergence of IT and OT, IoT Challenges	02	5



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2	UNIT-II: IoT Network Architecture: Drivers behind new network architectures, Comparing IoT architectures, A simplified IoT Architecture, The core IoT functional stack, IoT Data management and compute stack	06	15
3	UNIT-III: Smart Objects and Connecting Smart Objects: Sensors, Actuators, smart objects, sensor networks, Communication criteria, IoT Access Technologies – IEEE 802.15.4, IEEE 802.15.4g & 802.15.4e, IEEE 1901.2a, IEEE 802.11ah, LoRaWAN, NB-IoT and other LTE variations	09	20
4	UNIT-IV: IP as the IoT Network Layer: The business case for IP, The need for optimization, optimizing IP for IoT, Profiles and Compliances	09	20
5	UNIT-V: Application Protocols for IoT: The transport layer, IoT Application Transport Methods, SCADA, Generic web-based protocols, IoT application layer protocols: CoAP, MQTT.	08	20
6	UNIT-VI: IoT in Industry Manufacturing: An introduction to connected manufacturing, An architecture for the connected factory, Industrial Automation Control Protocols, Connected factory security, Edge computing in the connected factory.	08	20

Reference Book:

1. David Hanes, Gonzelo Salgueiro, Patrick Grossetete, Robert Barton, and Jerome Hentry, “IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things”, Cisco Pres, 2017.
2. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, “From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”, 1st Edition, Academic Press, 2014.
3. Peter Waher, “Learning Internet of Things”, PACKT publishing, BIRMINGHAM –MUMBAI
4. Bernd Scholz-Reiter, Florian Michahelles, “Architecting the Internet of Things”, ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer
5. Daniel Minoli, “Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications”, ISBN: 978-1-118-47347-4, Willy Publications
6. Vijay Madiseti and Arshdeep Bahga, “Internet of Things (A Hands-on- Approach)”, 1st Edition, VPT, 2014. http://www.cse.wustl.edu/~jain/cse570-15/ftp/iot_prot/index.htmlBook1



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Course Outcome:

After completion of the Course, Students will be able to:

No	Course Outcomes	RBT Level*
01	Understand the architecture of IoT and its components - things, access technologies, internet protocols	UN
02	Implement components of the IoT system – smart objects, IP & network layers, application protocols	AP
03	Apply various smart devices, access technologies, protocols for real-time IoT applications	AP
04	Analyze various existing IoT Systems	AN
05	Evaluate various IoT architectures, IoT protocols for IoT industrial applications	EL

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

Suggested Course Practical List:

At least 10-12 practicals based on topics of the syllabus to be performed either in software tools and/or hardware kits.

List of Laboratory/Learning Resources Required:

- List of Hardware: IoT Builder, Raspberry Pi, Arduino, UNO boards
- List of Software: Python, C/C++
- List of Useful websites/MOOCs:
- <https://www.mooc-list.com/course/m2m-iot-interface-design-protocols-embedded-systems-coursera>
- <https://www.mooc-list.com/course/introduction-and-programming-iot-boards-coursera>
