GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Master of Engineering

Level: PG

Branch: Internet of Things

Subject Code : ME02062031

Subject Name : Edge Computing

w. e. f. Academic Year:	2024-25
Semester:	2
Category of the Course:	Professional Elective Course

Prerequisite:	Fundamental knowledge of networking concepts, cloud computing, IoT devices and protocols is necessary. Proficiency in programming languages like Python or Java is required.
Rationale:	Knowledge on how edge computing and Internet of Things (IoT) can be used as a way to meet application demands in intelligent IoT systems.

Course Outcome:

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

No	Course Outcomes	RBT Level*
01	Understand concepts of Edge computing and IoT architecture with its entities.	UN
02	Apply various communication models and edge computing techniques for IoT	AP
03	Implement microcomputer RaspberryPi and device Interfacing for IoT	AP
04	Analyze cloud to edge computing protocols and Edge computing techniques.	AN
05	Evaluate performance of Edge computing technology for IoT	EL

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

Teaching and Examination Scheme:

Teaching Scheme			Total Credits	Assessment Pattern and Marks				Total Marks
				Theory		Practical		
L	T	PR	C	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: IoT and Edge Computing Definition and Use Cases:** Introduction to Edge Computing Scenario's and Use cases - Edge computing purpose and definition, Edge computing use cases, Edge computing hardware architectures, Edge platforms, Edge vs Fog Computing, Communication Models - Edge, Fog and M2M.	7	18
2	**UNIT – II IoT Architecture and Core IoT Modules**-A connected ecosystem, IoT versus machine-to-machine versus, SCADA, The value of a network and Metcalfe's and Beckstrom's laws, IoT and edge architecture, Role of an architect, Understanding Implementations with examples-Example use case and deployment, Case study – Telemedicine palliative care, Requirements, Implementation, Use case retrospective.	10	22
3	**UNIT – III RaspberryPi:** Introduction to RaspberryPi, About the RaspberryPi Board: Hardware Layout and Pinouts, Operating Systems on RaspberryPi, Configuring RaspberryPi, Programming RaspberryPi, Connecting Raspberry Pi via SSH, Remote access tools, Interfacing DHT Sensor with Pi, Pi as Webserver, Pi Camera, Image & Video Processing using Pi.	8	20
4	**UNIT – IV Implementation of Microcomputer RaspberryPi and device Interfacing, Edge to Cloud Protocols**- Protocols, MQTT, and MQTT publish-subscribe, MQTT architecture details, MQTT state transitions, MQTT packet structure, MQTT data types, MQTT communication formats, MQTT 3.1.1 working example.	10	22
5	**UNIT – V Edge computing with RaspberryPi**, Industrial and Commercial IoT and Edge, Edge computing and solutions.	7	18
	TOTAL	**45**	**100**

Reference Book:

- IoT and Edge Computing for Architects - Second Edition, by Perry Lea, Publisher: PACKT Publishing, 2020, ISBN: 9781839214806.
- Raspberry Pi Cookbook, 3rd Edition, by Simon Monk, Publisher: O'Reilly Media, Inc., 2019, ISBN: 978149204322.
- Fog and Edge Computing: Principles and Paradigms by Raj Kumar Buyya, Satish Narayana Srirama, Wiley publication, 2019, ISBN: 9781119524984.
- David Jensen, "Beginning Azure IoT Edge Computing: Extending the Cloud to the Intelligent Edge, MICROSOFT AZURE.

List of Laboratory/Learning Resources Required:

- List of Hardware: Raspberry Pi, Arduino, sensors
- List of Software: Python, Edge computing platforms
- List of Useful websites MOOCs:---

https://onlinecourses.nptel.ac.in/noc24_cs66/preview

https://techovedas.com/iit-patna-to-offer-free-online-course-on-edge-computing/#google_vignette

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