INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

EDGE COMPUTING								
VII Semester: CSE (CS)/CSE(DS)								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACCD22	Elective	3	0	0	3	40	60	100
Contact Classes: 48	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 48		
Prerequisites: There are no prerequisites to take this course								

I. COURSE OVERVIEW:
The course covers various topics such as the evolution of computing industry, cloud computing basics and edge computing. The course also educates the students on the different vendor platforms, software services, standard bodies and open source communities available for edge computing. This course provides a comprehensive understanding of multiple types of edge computing deployments, different types of edge compute services such as CDN Edge, IoT Edge, and Multi-access Edge (MEC).

II. COURSE OBJECTIVES:
The students will try to learn:

I	The introduction of distributed control planes
II	The architectures, algorithms, protocols and applications of data center networks
III	The concepts of Software defined network framework
VI	The network virtualization for handling bigdata

III. COURSE OUTCOMES:
After successful completion of the course, students should be able to:

CO1	Demonstrate the concepts, architecture, and principles of edge computing and its differentiation from traditional cloud computing.
CO2	Analyze the role of edge computing in real-world applications such as IoT, smart cities, autonomous vehicles, healthcare, and industrial automation
CO3	Apply knowledge of data processing, storage, and security challenges at the edge, including encryption and compliance with regulatory requirements**,**
CO4	Build and deploy AI/ML models on edge devices to enable real-time decision-making and automation
CO5	Outline the techniques to optimize edge networks for energy efficiency, cost, and performance
CO6	Illustrate the skills to deploy, monitor, and maintain edge computing infrastructures using industry-standard tools and frameworks..

IV. COURSE CONTENT:

MODULE -I: IOT AND EDGE COMPUTING DEFINITION AND USE CASES (10)

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.

MODULE –II: IOT ARCHITECTURE AND CORE IOT MODULES (10)

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.

MODULE-III: RASPBERRY PI (09)

Introduction to Raspberry Pi, about the Raspberry Pi Board: Hardware Layout and Pinouts, Operating Systems on RaspberryPi, Configuring Raspberry Pi, Programming Raspberry Pi.

MODULE-IV: IMPLEMENTATION OF MICROCOMPUTER RASPBERRY (10)

Implementation of microcomputer Raspberry Pi and device interfacing, edge to cloud protocols protocols, MQTT, MQTT publish-subscribe, MQTT architecture details, MQTT state transitions, MQTT packet structure, MQTT data, types, MQTT communication formats, MQTT 3.1.1 working example.

MODULE-V: EDGE COMPUTING WITH RASPBERRY PI (09)

Edge computing with Raspberry Pi, industrial and commercial IoT and edge, edge computing and solutions.

V. TEXTBOOKS:

1. Thomas D. Nadeau, Ken Gray," Software Defined Networks an Authoritative Review of Network Programmability Technologies", O'Reilly Media Publisher, 2nd Edition, 2013.

VI. REFERENCE BOOKS:

1. Paul Goransson, Chuck Black," Software Defined Networks: A Comprehensive Approach", Morgan Kaufmann Publishers, 1st Edition, 2014.
2. Raj Jain, Subharthi Paul, Rubens Fontes, Jeevankumar Tekchandani, "Network Function Virtualization (NFV) with a Touch of SDN", Wiley-IEEE Press, 1st Edition, 2019.

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VII. ELECTRONIC RESOURCES:

1. https://opennetworking.org/
2. https://www.juniper.net/us/en/solutions/sdn/
3. https://www.opendaylight.org/
4. https://www.etsi.org/technologies/nfv

VIII. MATERIAL ONLINE:

1. Course template
2. Tech-talk topics
3. Assignments
4. Definition and terminology
5. Tutorial question bank
6. Model question paper – I
7. Model question paper – II
8. Lecture notes
9. Early lecture readiness videos (ELRV)
10. Power point presentations