BCSE313L	Fundamentals of Fog and Edge Computing	L	T	P	C
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Pre-requisite	**NIL**	**Syllabus version**			
		1.0			

Course Objectives

1. To introduce IoT enabling technologies and its opportunities.
2. To review underlying technologies, limitations, and challenges along with performance metrics and discuss generic conceptual framework in fog computing.
3. To impart the knowledge to log the sensor data and to perform further data analytics.

Course Outcome

At the end of this course, student will be able to:

1. Explore technologies behind the communication and management of fogs and edge resources.
2. Learn the techniques for storage and computation in fogs, edges, 5G and clouds.
3. Implement Internet of Everything (IoE) applications through fog computing architecture and use optimization techniques for the same.
4. Analyze the performance and issues of the applications developed using fog and edge architecture.

Module:1	**Internet of Things (IoT) and New Computing Paradigms**	**6 Hours**

Introduction - Relevant Technologies - Fog and Edge Computing Completing the Cloud - Hierarchy of Fog and Edge Computing - Business Models – Edge Computing Platforms - Opportunities and Challenges

Module:2	**Challenges in Federating Edge Resources**	**6 Hours**

Introduction - Methodology - Integrated C2F2T Literature by Modeling Technique - Integrated C2F2T Literature by Use - Case Scenarios - Integrated C2F2T Literature by Metrics – Threads - Standards

Module:3	**Orchestration of Network Slices in Fog, Edge, and Clouds**	**6 Hours**

Introduction – Background - Network Slicing - Network Slicing in Software-Defined Clouds- Network Slicing Management in Edge and Fog - Internet of Vehicles (IoV): Architecture, Protocols and Seven-layer security model architecture for Internet of Vehicles - IoV: Network Models, Challenges and future aspects

Module:4	**Optimization Problems in Fog and Edge Computing**	**6 Hours**

Preliminaries - The Case for Optimization in Fog Computing-Formal Modeling Framework for Fog Computing – Metrics - Further Quality Attributes - Optimization Opportunities along the Fog Architecture - Optimization Opportunities along the Service Life Cycle - Toward a Taxonomy of Optimization Problems in Fog Computing

Module:5	**Middleware for Fog and Edge Computing**	**6 Hours**

Need for Fog and Edge Computing Middleware - Design Goals-State-of-the-Art Middleware Infrastructures - System Model - Case Study.

Module:6	**Technologies in Fog Computing**	**7 Hours**

Fog Data Management - Smart Building - Predictive Analysis with FogTorch - Machine Learning in Fog Computing - Data Analytics in the Fog - Data Analytics in the Fog Architecture.

Module:7	**Applications of Fog and Edge Computing**	**6 Hours**

Exploiting Fog Computing in Health Monitoring-Smart Surveillance Video Stream Processing at the Edge for Real - Time Human Objects Tracking-Fog Computing Model for Evolving Smart Transportation Applications - Testing Perspectives of Fog - Based IoT Applications - Legal Aspects of Operating IoT Applications in the Fog

Module:8	**Contemporary Issues**		**2 Hours**
	Total Lecture hours:		**45 Hours**
Text Book(s)			
1.	Buyya, Rajkumar, and Satish Narayana Srirama, Fog and Edge computing: Principles and Paradigms, 2019, 1st edition, John Wiley & Sons, USA.		
Reference Books			
1.	Bahga, Arshdeep, and Vijay Madisetti, Cloud computing: A hands-on approach, 2014, 2nd edition, CreateSpace Independent Publishing Platform, USA.		
2	OvidiuVermesan, Peter Friess, "Internet of Things –From Research and Innovation to Market Deployment", 2014, 1st edition, River Publishers, India.		
Mode of Evaluation: CAT / Digital Assignments/ Quiz / FAT			
Recommended by Board of Studies	04-03-2022		
Approved by Academic Council	No. 65	Date	17-03-2022