Course Code	Course Title	L	T	P	C
BECE351E	**Internet of Things**	**1**	**0**	**2**	**2**
Pre-requisite	NIL	**Syllabus version**
		**1.0**

Course Objectives

1. To impart knowledge on the infrastructure, communication and networking technologies of IoT.
2. To analyse, design and develop Industrial IoT solutions.
3. To develop IoT architecture for use cases under discussion.

Course Outcomes

1. To focus on the technologies that enable IoT and to interpret the different components in IoT architecture.
2. Comprehend the concepts of edge computing and edge enabled solutions for real-time industrial applications.
3. Envision the IoT architecture models and the protocol stack for the design and development of IoT applications on different platforms.
4. Interpret the security threats and to design a resilient IoT Architecture.
5. Program the controller and sensors as part of IoT
6. Assess different Internet of Things technologies and their applications
7. To apply the concepts of Internet of Things in the real world scenarios

Module:1	**Essentials of Internet of Things**	**2 hours**

IoT Emergence, Definition and Characteristics of IoT, Impact of IoT on business and society, IoT product development life cycle, IoT enabling Technologies, Applications.

Module:2	**Architecture Reference Model**	**2 hours**

Domain Model, Information Model, Functional Model – Communication and security model, SOA based architecture.

Module:3	**Protocol Suite**	**2 hours**

Physical layer, Link layer -BLE, LoRAWAN, Network layer, Transport layer, Application Layer protocols - MQTT, CoAP – Communication Models.

Module:4	**Edge Computing**	**2 hours**

Introduction to Edge/Fog computing, Front end Edge Devices, Gateway, Edge ML for Industry automation.

Module:5	**Security Engineering**	**2 hours**

IoT Attacks and Security Challenges, Threat and Mitigating Threats to IoT Systems, Privacy concerns - Access control, Lightweight Cryptography, Privacy in IoT

Module:6	**IoT Platforms for Usecase Development**	**2 hours**

Open source IoT platforms and services, Communication API's- REST, Websocket, Scalability of IoT Solutions

Module:7	**IoT Verticals**	**1 hours**

Roadmap for developing complete IoT solutions; Smart Cities, Healthcare, Agriculture and Farming

Module:8	**Contemporary Issues**	**2 hours**

	Total Lecture hours:	**15 hours**

Text Book(s)

1. Arshdeep Bahga, Vijay Madisetti, "Internet of Things: A hands-on Approach", University Press, 2015.
2. Ammar Rayes,Samer Salam, " Internet of Things from Hype to Reality- A road to

Digitization" Second Edition, Springer, ISBN 978-3-319-99515-1.
3. Rajkumar Buyya,Amir Vahid " Internet of Things Principles and Paradigms", Elsevier, 2016.

Reference Books
1. Brian Russell, Drew Van "Practical Internet of Things Security "Packt Publishing, ISBN 978-1-78588-963-9, 2016.
2. Adrian McEwen & Hakim Cassimally, "Designing the Internet of Things", Wiley, 2017, Second Edition.
Mode of Evaluation: Continuous Assessment Test, Digital Assignment, Quiz and Final Assessment Test

List of Experiments (Indicative)

1. IoT based soil health Monitoring
2. Air Quality monitoring system
3. Smart Parking System using an appropriate IoT visualization services
4. IoT based Healthcare and fitness monitoring
5. Real-time environmental weather prediction
6. IoT enabled accident prevention and detection system
7. Smart Street light system
8. Plant health monitoring using a suitable IoT platform and services
9. Build a web based application to automate the door that unlocks itself using facial recognition.
10. Intelligent Traffic light control system for ambulance services

	Total Laboratory Hours	**30 Hours**
Mode of assessment: Continuous assessment and FAT		
Recommended by Board of Studies	28.02.2023	
Approved by Academic Council	No. 69	Date	16-03-2023