

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Information Technology)			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
SITRE4 Introduction to industry 4.0 And Industrial Internet of things	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objective: The objective of this course is to provide students with a comprehensive understanding of the Industrial Internet of Things (IIoT) and its applications in various domains. This course will also introduce students to the concepts of cybersecurity, communication, networking, and big data analytics in the context of IIoT.

UNIT-I

Introduction: Sensing & actuation, Communication-Part I, Part II, Networking-Part I, Part II , Globalization, The Fourth Revolution, LEAN Production Systems, Cyber Physical Systems and Next Generation Sensors, Collaborative Platform and Product Lifecycle Management

UNIT-II

Cybersecurity in Industry 4.0, Basics of Industrial IoT: Industrial Processes, Industrial Sensing & Actuation IIoT-Introduction, Industrial IoT: Business Model and Reference Architecture: IIoT-Business Models- IIoT Reference Architecture.

UNIT-III

Industrial IoT- Layers: IIoT Sensing, IIoT Processing IIoT Communication Industrial IoT- Layers: IIoT Communication , IIoT Networking Industrial IoT: Big Data Analytics and Software Defined Networks: IIoT Analytics - Introduction, Machine Learning and Data Science .

UNIT-IV

Industrial IoT: Big Data Analytics and Software Defined Networks: SDN in IIoT-Part I, Part II, Data Center Networks, Industrial IoT, Industrial IoT: Security and Fog Computing - Fog Computing in IIoT security in IIoT-Part I, Part II, Industrial IoT- Application Domains

UNIT-V

Industrial IoT- Application Domains: Healthcare, Power Plants, Inventory Management & Quality Control, Plant Safety and Security (Including AR and VR safety applications), Facility Management. Industrial IoT- Application Domains: Oil, chemical and pharmaceutical industry, Applications of UAVs in Industries, Real case studies.

Learning outcomes:

1. Understand the basic principles of sensing, actuation, and communication in IIoT.
2. Identify the various layers of IIoT and their functions in industrial processes.
3. Analyze the business models and reference architecture of IIoT.

4. Apply big data analytics and machine learning techniques to extract insights from IIoT data.
5. Evaluate the security risks and techniques associated with IIoT and fog computing.

List of practical:

- 1) Implementing sensing and actuation techniques in IIoT devices.
- 2) Designing and implementing a IIoT network using appropriate communication protocols.
- 3) Developing a IIoT application using machine learning and data science techniques.
- 4) Analyzing IIoT data using big data analytics tools.
- 5) Implementing fog computing techniques for IIoT security.
- 6) Developing an IIoT-based solution for a specific application domain (e.g., healthcare, power plants, inventory management)

Reference books:

- [1]. Bhawani Shankar Chowdhry, Habib-ur-Rehman, Anwar Ali Shah G. Syed, "Internet of Things and Big Data Analytics for Smart Generation", Springer, 2021.
- [2]. Eric Bauer, Thierry Broussard, Denis Havlik, "Industrial IoT Technologies and Applications", Wiley, 2019.
- [3]. Raj Kamal, "Internet of Things: Architecture and Protocols", McGraw Hill, 2019.
- [4]. Tanuja Mahapatra, Jitendra Kumar Rout, N. R. Das, "Cybersecurity in the Industry 4.0 Era: Techniques and Strategies for Prevention, Detection, and Recovery", CRC Press, 2020.
- [5]. Nirbhay Kumar, Amit Kumar Singh, "Industrial Internet of Things: Challenges and Opportunities", CRC Press, 2018.