

Elective IV : Open Elective Industrial Internet of Things	
Teaching Scheme: 3Hrs/Week	Examination Scheme: Insem : 30Marks End Sem : 70 Marks
Course Objectives:	
<ul style="list-style-type: none"> • Introduce how IoT has become a game changer in the new economy where the customers are looking for integrated value • Bring the IoT perspective in thinking and building solutions • Introduce the tools and techniques that enable IoT solution and Security aspects 	
Course Outcomes	
<ul style="list-style-type: none"> • Describe IOT,IIOT • Understand, design and develop the real life IoT applications using off the shelf hardware and software • Understand various IoT Layers and their relative importance • Study various IoT platforms and Security • Realize the importance of Data Analytics in IoT • Understand the concepts of Design Thinking 	
UNIT 1: Introduction	
6Hrs	
Introduction to IOT, What is IIOT? IOT Vs. IIOT, History of IIOT, Components of IIOT - Sensors, Interface, Networks, People & Process, Hype cycle, IOT Market, Trends & future Real life examples, Key terms – IOT Platform, Interfaces, API, clouds, Data Management Analytics, Mining & Manipulation; Role of IIOT in Manufacturing Processes Use of IIOT in plant maintenance practices, Sustainability through Business excellence tools Challenges & Benefits in implementing IIOT	
UNIT 2 : Architectures	
6Hrs	
Overview of IOT components ; Various Architectures of IOT and IIOT, Advantages & disadvantages, Industrial Internet - Reference Architecture; IIOT System components: Sensors, Gateways, Routers, Modem, Cloud brokers, servers and its integration, WSN, WSN network design for IOT	
UNIT 3: Sensor and Interfacing	
6Hrs	
Introduction to sensors, Transducers, Classification, Roles of sensors in IIOT , Various types of sensors , Design of sensors, sensor architecture, special requirements for IIOT sensors, Role of actuators, types of actuators. Hardwire the sensors with different protocols such as HART, MODBUS-Serial & Parallel, Ethernet, BACNet , Current, M2M etc	
UNIT 4: Protocols and Cloud	
6Hrs	
Need of protocols; Types of Protocols, Wi-Fi, Wi-Fi direct, Zigbee, Z wave, Bacnet, BLE, Modbus, SPI , I2C, IIOT protocols –COAP, MQTT,6lowpan, lwm2m, AMPQ IIOT cloud platforms : Overview of cots cloud platforms, predix, thingworks, azure etc. Data analytics, cloud services, Business models: Saas, Paas, Iaas.	
UNIT 5: Privacy, Security and Governance	
6Hrs	

Introduction to web security, Conventional web technology and relationship with IIOT, Vulnerabilities of IoT, Privacy, Security requirements, Threat analysis, Trust, IoT security tomography and layered attacker model, Identity establishment, Access control, Message integrity, Non-repudiation and availability, Security model for IoT, Network security techniques Management aspects of cyber security

UNIT 6: IOT Analytics and Applications

6Hrs

IOT Analytics : Role of Analytics in IOT, Data visualization Techniques, Introduction to R Programming, Statistical Methods.

Internet of Things Applications : Smart Metering, e-Health Body Area Networks, City Automation, Automotive Applications, Home Automation, Smart Cards, Plant Automation, Real life examples of IIOT in Manufacturing Sector

Text Books:

1. Daniel Minoli, "Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications", ISBN: 978-1-118-47347-4, Willy Publications
2. Bernd Scholz-Reiter, Florian Michahelles, "Architecting the Internet of Things", ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer

Reference Books:

1. Hakima Chaouchi, "The Internet of Things Connecting Objects to the Web" ISBN : 978-1-84821-140-7, Willy Publications
2. Olivier Hersent, David Boswarthick, Omar Elloumi, The Internet of Things: Key Applications and Protocols, ISBN: 978-1-119-99435-0, 2 nd Edition, Willy Publications
3. Inside the Internet of Things (IoT), Deloitte University Press
4. Internet of Things- From Research and Innovation to Market Deployment; By Ovidiu & Peter; River Publishers Series
5. Five thoughts from the Father of the Internet of Things; by Phil Wainwright - Kevin Ashton
6. How Protocol Conversion Addresses IIoT Challenges: White Paper By RedLion.