NIRMA UNIVERSITY

Institute:	Institute of Technology
Name of Programme:	Minor in Smart Automation (Disciplinary) Offered by B.Tech. in Electronics and Instrumentation Engineering
Semester:	V
Course Code:	3EI201DC24
Course Title:	Industrial Internet of Things (IIoT)
Course Type:	Core Course - I under Minor (Disciplinary)
Year of Introduction:	2024-25

L	T	Practical component				C
		LPW	PW	W	S	
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Course Learning Outcomes (CLOs):

At the end of the course,the students will be able to –

1. understand the fundamentals of the industrial Internet of things **(BL2)**
2. realize the importance of data security **(BL3)**
3. select the sensor, actuators and IoT hardware **(BL4)**
4. develop the ability to design IoT applications for various applications. **(BL4)**

Unit	Contents	Teaching hours (Total 45)
Unit- I	**Introduction to industrial IoT (IIoT) systems** IIoT-Introduction, Various Industrial Revolutions, Industry 4.0 revolutions, Support System for Industry 4.0, Smart Factories.	**05**
Unit- II	**Sensor and control devices for IIoT** Platforms for data acquisitions, different types of sensors and actuators, Programmable Controllers, Embedded PCs, Wireless sensor nodes, IoT Hub systems.	**10**
Unit-III	**IIoT data monitoring and control** Cloud computing, real-time dashboard for data monitoring, data analytics, Predictive Maintenance, Case study	**10**
Unit-IV	**IIoT- security** Industrial IoT: Security and Fog Computing - Cloud Computing in IIoT, Fog Computing in IIoT, Security in IIoT.	**10**
Unit-V	**Industrial IoT- applications** Factory Automation, Process Automation, Healthcare, Power Plants, Inventory Management & Quality Control, Plant Safety and Security, Facility Management.	**10**

Self Study:

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

Laboratory Work:
This shall consist of at least 10 practicals based on the above syllabus.

Suggested Reading:

1. Industry 4.0: The Industrial Internet of Things Alasdair Gilchrist , Apress
2. The Concept Industry 4.0 An Empirical Analysis of Technologies and Applications in Production Logistics, Bartodziej, Christoph Jan, Springer
3. Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems, Dr. OvidiuVermesan, Dr. Peter Friess, River Publishers

Suggested List of Experiments (not restricted to the following):
(Only for Information)

1.	Setting up a Raspberry Pi and connecting to a network.	**(02 Hrs)**
2.	Familiarization with GPIO pins and control hardware through GPIO pins.	**(02 Hrs)**
3.	Speed Control of motors using PWM with an embedded controller.	**(02 Hrs)**
4.	Dashboard design for temperature, humidity, light and distance	**(02 Hrs)**
5.	Web based hardware control	**(02 Hrs)**
6.	Connect IoT devices through the cloud using as IoT protocol such as MQTT.	**(02 Hrs)**
7.	Controlling IoT devices using Arduino.	**(02 Hrs)**
8.	Create a wireless network of sensors using Zigbee.	**(02 Hrs)**
9.	Project-I	**(04 Hrs)**
10.	Project-II	**(04 Hrs)**

L = Lecture, T = Tutorial, P = Practical, C = Credit

w.e.f. the academic year 2024 - 25 and onwards