INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

IOT AND INDUSTRY 4.0

II SEMSTER: CAD/CAM

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
BCCD07	Elective	3	-	-	3	40	60	100
Contact Classes: 48	**Tutorials Classes: Nil**	**Practical Classes: Nil**				**Total Classes: 48**		
Pre requisites: Artificial Intelligence								

I. COURSE OVERVIEW:

Industry 4.0 concerns the transformation of industrial processes through the integration of modern technologies such as sensors, communication, and computational processing. Technologies such as Cyber-Physical Systems (CPS), Internet of Things (IoT), Cloud Computing, Machine Learning, and Data Analytics are considered to be the different drivers necessary for the transformation. Industrial Internet of Things (IIoT) is an application of IoT in industries to modify the various existing industrial systems. IIoT links the automation system with enterprise, planning and product lifecycle.

II. COURSE OBJECTIVES:
The students will try to learn:
    I.   The basics of Industry 4.0 and Business model and impact of IIoT.
    II. the concepts of virtual reality, lean manufacturing.
    III. To gain knowledge of various sensors and actuators.
    IV. To analyze the various data transmission technologies.

III. COURSE OUTCOMES:
After successful completion of the course, students should be able to:

CO1 Explain Smart Business Perspective, Cyber security, Impacts of Industry 4.0.
CO2 Understand the basics of the Industrial Internet of Things.
CO3 Analyze various key technologies.
CO4 Implement various sensors and actuators.
CO5 Understand different industrial transmission technologies and IIOT applications in real life

IV. COURSE CONTENT:
MODULE -I: Industry 4.0 Basics (09)
Industry 4.0 Basics: Industrial revolution: Phases, Evolution of Industry4.0, Environmental impacts of industrial revolution, Applications, Design requirements, Drivers of Industry4.0, Sustainability Assessment of industries, Smart Business Perspective, Cyber security, Impacts of Industry 4.0.

MODULE -II: Industrial Internet of Things (09)
Industrial Internet of Things- Basics: IIoT and Industry 4.0, IIC, Industrial Internet Systems, Design of industrial internet systems, Impact of industrial internet, Benefits of industrial internet, Industrial sensing, Industrial Processes, Features of IIoT for industrial processes, Industrial plant–The future architecture, Digital Enterprise

Business Models and Reference Architecture of IIoT: Definition of a business model, Business models of IIoT, Industrial Internet Reference Architecture

MODULE -III: Key Technology (09)

Key Technologies: Off-site Technologies, Cloud Computing, Fog Computing Key Technologies: On-site Technologies, Augmented Reality, Virtual Reality, Smart factories, Lean manufacturing system, Big Data and Advanced Analytics.

MODULE -IV: Sensors and Actuators (09)

Sensors: Various sensor types and their underlying working principles, Characteristics of Sensors – Resolution, calibration, accuracy and others, Sensor Categories – Thermal, Mechanical, Electrical, Optical and Acoustic sensors.

Actuators: Thermal, Hydraulic, Pneumatic, Electro mechanical Actuator

MODULE -V: Industrial Data Transmission and IOT Applications (09)

Industrial Data Transmission and Acquisition: Architecture of various data transmission technologies like Foundation Fieldbus, Profibus, Highway Addressable Remote Transducer (HART), Interbus, Bitbus, Digital STROM, Controller Area Network, and other recent and upcoming Technologies. Distributed Control System, SCADA and PLC System.

IOT Applications: IoT Applications on Industrial automation, Factories and Assembly line, Plant Security and Safety, Transportation, Agriculture, Healthcare, Home Automation, Oil, Chemical and Pharmaceutical Industry and others.

V. TEXT BOOKS:
1. Introduction to Industrial Internet of Things and Industry 4.0 by Sudip Misra, Chandana Roy, Anandarup Mukherjee, CRC Press.
2. Vijay Madisetti, Arshdeep Bahga, Ïnternet of Things, "A Hands on Approach", University Press.
3. Dr. SRN Reddy, RachitThukral and Manasi Mishra, "Introduction to Internet of Things: A practical Approach", ETI Labs.

VI. REFERENCE BOOKS:
1. Adrian McEwen, "Designing the Internet of Things", Wiley.
2. Raj Kamal, "Internet of Things: Architecture and Design", McGraw Hill.
3. Cuno Pfister, "Getting Started with the Internet of Things", O Reilly Media.

VII. WEB REFERENCES:
1. http:// nptel.ac.in/courses/112/106/112106130/

VIII. E-TEXT BOOK:
1. www.elsevier.com/books/advanced-applied-finite-element-methods/ross/978-1-898563-51-8.

VIII. MATERIALS ONLINE
1. Course template
2. Tutorial question bank
3. Assignments
4. Model question paper – I
5. Model question paper – II
6. Lecture notes
7. PowerPoint presentation