COURSE HANDOUT

Foundations of Internet of things and Industry 4.0 (COM-802(C))

CSE-8th SEMESTER

ACADEMIC YEAR (2024-25)

Mr. Anil Gupta

Assistant Professor

Computer Science Engineering

Computer Science and Engineering

Model Institute of Engineering & Technology (Autonomous)

Kot Bhalwal, Jammu - 181122

www.mietjmu.in

Course Code	Course Name	Cd	L	T	P	Marks Sessional	Course Code		
COM-802(C)	Foundations of Internet of things and Industry 4.0	4	3	1	0	50	COM-802(C)		

COURSE OUTCOMES

At the end of the course the student will be able to:	
CO1	Understand the demand concept as the basis of economic activity.
CO2	Articulate the various laws of production in both short and long run work for designing the optimum level output.
CO3	Analyze the various types of market structures.
CO4	Interpret the various pricing methods and strategies.
CO5	Evaluate the various macroeconomic concepts affecting the overall economy and undertake economic analysis.

Section A

Unit 1: Introduction: Sensing & actuation, Industry 4.0: Globalization and Emerging Issues, The Fourth Revolution, LEAN Production Systems, Smart and Connected Business Perspective, Smart Factories. **(9 Hrs**

Unit 2: Industry 4.0: Cyber Physical Systems and Next Generation Sensors, Collaborative Platform and Product Lifecycle Management, Augmented Reality and Virtual Reality, Artificial Intelligence, Big Data and Advanced Analysis. Cybersecurity in Industry 4.0, Basics of Industrial IoT: Industrial Processes, Industrial Sensing & Actuation, Industrial Internet Systems. **(9 Hrs.)**

Unit 3: Industrial IoT: Business Model and Reference Architecture: IIoT-Business Models, IIoT Reference Architecture, Industrial IoT- Layers: IIoT Sensing, IIoT Processing, IIoT Communication, Industrial IoT- Layers: IIoT Communication, IIoT Networking. **(9 Hrs.)**

Section B

Unit 4: Industrial IoT: Big Data Analytics and Software Defined Networks: IIoT Analytics - Introduction, Machine Learning and Data Science, Data Management with Hadoop, Industrial IoT: Big Data Analytics, Software Defined Networks: SDN in IIoT, Data Center Networks, Industrial IoT: Security and Fog Computing: Cloud Computing, Security in IIoT, Industrial IoT- Application Domains: Factories and Assembly Line, Food Industry. **(9 Hrs.)**

Unit 5: Industrial IoT- Application Domains: Healthcare, Power Plants, Inventory Management & Quality Control, Plant Safety and Security (Including AR and VR safety applications), Facility Management, Oil, chemical and pharmaceutical industry, Applications of UAVs in Industries, Real case studies like Milk Processing and Packaging Industries, Manufacturing Industries. **(9 Hrs.)**

Textbooks

S.No	Name of the Books	Name of the Author	Publisher Name	Edition (Pub.Yr.)
1	Introduction to Industrial Internet of Things and Industry 4.0	S. Misra, C. Roy, and A. Mukherjee	CRC Press	1st (2020)
2	Industry 4.0: The Industrial Internet of Things	Alasdair Gilchrist	Apress	1st (2019)

Reference Books

S.No	Name of the Books	Name of the Author	Publisher Name	Edition (Pub.Yr.)
1	Managerial Economics	Craig H Peterson,Cris Lewis, Sudhir K Jain	Pearson Education	4th (2005)

COURSE PLAN		
Unit 1: Introduction to Industry 4.0		
S.No	**Topics**	**Recommended Books**
1	Sensing & Actuation Introduction to sensing and actuation technologies in the context of Industry 4.0.	Book 1, Ch.1
3	Sensing & Actuation	Book 1, Ch.1
4	Introduction to sensing and actuation technologies in the context of Industry 4.0.	Book 2, Ch.2
5	Industry 4.0: Globalization and Emerging Issues	Book 2, Ch.2
6	Exploration of the impact of globalization on Industry 4.0 and addressing emerging issues.	Book 2, Ch.2
7	The Fourth Revolution	Book 2, Ch.2
Unit-II Industry 4.0 Technologies		
8	Cyber Physical Systems and Next Generation Sensors	Book 1, Ch.2
9	Understanding the integration of cyber-physical systems and advancements in sensors.	Book 1, Ch.2
10	Understanding the integration of cyber-physical systems and advancements in sensors.	Book 1, Ch.1
11	Collaborative Platform and Product Lifecycle Management	Book 2, Ch.2
12	Exploring collaborative platforms and their role in product lifecycle management.	Book 2, Ch.2
13	Augmented Reality and Virtual Reality	Book 2, Ch.2
14	Applications and impact of augmented and virtual reality in Industry 4.0.	Book 2, Ch.2
15	Artificial Intelligence, Big Data, and Advanced Analysis	Book 2, Ch.2
UnitIII- Industrial IoT Business Model and Reference Architecture		
16	Industrial IoT Business Model and Reference Architecture	Book 2, Ch.2

17	IIoT-Business Models	Book 2, Ch.2
18	Examining different business models within the Industrial Internet of Things (IIoT) ecosystem.	Book 2, Ch.2
19	IIoT Reference Architecture	Book 2, Ch.2
20	Understanding the reference architecture of IIoT for scalable and interoperable solutions.	Book 2, Ch.2
21	Industrial IoT Layers: Sensing, Processing, Communication	Book 2, Ch.2
Unit-IV: Industrial IoT - Big Data Analytics and Software Defined Networks		
22	Introduction to analytics in the context of Industrial IoT.	Book 2, Ch.3
23	Machine Learning and Data Science	Book 1, Ch.4
24	Applications and principles of machine learning and data science in IIoT.	Book 1, Ch.4
25	Data Management with Hadoop	Book 2, Ch.3
26	Understanding data management using Hadoop in IIoT.	Book 1, Ch.3
27	Software Defined Networks: SDN in IIoT	Book 2, Ch.3
28	Exploring the role of Software Defined Networks in Industrial IoT.	Book 1, Ch.3
Unit-V Industrial IoT Application Domains		
29	Healthcare, Power Plants, Inventory Management & Quality Control Applications and benefits of IIoT in healthcare, power plants, inventory management, and quality control.	Book 2, Ch.8
30	Plant Safety and Security (Including AR and VR Safety Applications)	Book 1, Ch.8
31	Exploring IIoT applications in ensuring safety and security, including AR and VR safety measures.	Book 2, Ch.8
32	Facility Management	Book 1, Ch.8
33	Implementing IIoT for efficient facility management.	Book 2, Ch.8
34	Oil, Chemical, and Pharmaceutical Industry	Book2, Ch. 8
35	Specific applications and case studies of IIoT in the oil, chemical, and pharmaceutical sectors.	Industrial IoT & Industry 4.0 Case Study Report 2023 (iot-analytics.com)

ADDITIONAL WEB RESOURCES

1.	**MOOC: Introduction to Industry 4.0** Industrial Internet of Things (IIoT) | Coursera
2.	**NPTEL:** Video lectures on industry 4.0 by by Prof. Sudip Misra. Dr. Sudip Misra is a Professor in the Department of Computer Science and Engineering at the Indian Institute of Technology Kharagpur. NPTEL : NOC | Introduction to Industry 4.0 and Industrial Internet of Things (nptel.ac.in)

GRADING AND ASSESSMENT

- **Sessional Test**: 20 marks
- **Assignment**: 20 marks

- **Attendance**: 10 marks
- **Final Examination**: 100 marks

COURSE POLICIES

- **Attendance**: Minimum 75% attendance is mandatory to appear in the final examination of the course.
- **Academic Integrity**: MIET's academic integrity policies apply. Plagiarism will not be tolerated.
- **Late Submissions**: Assignments and projects must be submitted by the specified timelines.

FACULTY INFORMATION

- **Office Hours**

  Monday (12:05 PM - 12:55 PM)
  Friday (12:05 PM - 12:55 PM)

- **Contact Information**
  anil,cse@mietjammu.in