



Kot Bhalwal, Jammu

Model Institute of Engineering  
& Technology (Autonomous)  
Course Handout

## COURSE HANDOUT

Foundations of Internet of Things and Industry 4.0 (ECE-802C)

ECE-8<sup>TH</sup> SEMESTER

ACADEMIC YEAR (2023-24)

**Dr. Satyendra Kumar Singh**

Assistant Professor

Department of Electrical Engineering



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Dr. Arun K. Gupta Teaching-Learning Centre

Version 1.1



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Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Sessional	Final Exam	Total
ECE-802C	Foundations of Internet of Things and Industry 4.0	Core	3	2	1	0	50	150	150

### COURSE OUTCOMES

At the end of the course the student will be able to:	
CO1	Describe the importance of Industry 4.0 for meeting future societal needs.
CO2	Develop critical understanding on cyber-physical systems amalgamating sensors, AI, Big Data analytics and cyber security and their applications.
CO3	Explain the architecture of Industrial Internet-of-Things.
CO4	Evaluate the structure operations of Industrial Internet-of-Things through supporting technologies such as SDNs and Big Data Analytics.
CO5	Appraise the diverse application of Industry 4.0 and related management concepts.

#### Unit-I

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

(9 Hours)

#### Unit-II

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 Hours)

#### Unit-III

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 Hours)

#### Unit-IV

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 Hours)

#### 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, Oil, chemical and pharmaceutical industry, Applications of UAVs in Industries, Real case studies like Milk Processing and Packaging Industries, Manufacturing Industries.

(9 Hours)

### Textbooks

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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.	Introduction to IoT	S. Misra, A. Mukherjee, and A. Roy	Cambridge University Press	1st(2020)

#### Reference Books

S.No	Name of the Books	Name of the Author	Publisher Name	Edition (Pub.Yr.)
1	<b>Industry 4.0 The Industrial Internet of Things</b>	<b>Alasdair Gilchrist</b>	<b>APress</b>	<b>1st(2020)</b>

#### COURSE PLAN

Unit-I Introduction to Managerial Economics		
S.No	Topics	Recommended Books
1	Introduction: Sensing	Book 1, Ch.1
2	Introduction: actuation	Book 1, Ch.1
3	Industry 4.0: Globalization and Emerging Issues	Book 1, Ch.1
4	The Fourth Revolution	Book 1, Ch.2
5	LEAN Production Systems	Book 1, Ch.2
6	Smart and Connected Business Perspective	Book 2, Ch.2
7	Smart Factories	Book 2, Ch.2
Unit-II Production Theory		
8	Industry 4.0: Cyber Physical Systems	Book 2, Ch.10
9	Next Generation Sensors	Book 1, Ch.2
10	Collaborative Platform	Book 1, Ch.1
11	Collaborative Product Lifecycle Management	Book 2, Ch.11
12	Augmented Reality and Virtual Reality	Book 2, Ch.11
13	Artificial Intelligence,.	Book 1, Ch.3
14	Big Data and Advanced Analysis	Book 2, Ch.2
15	Cyber security in Industry 4.0	Book 1, Ch.3
16	Basics of Industrial IoT	Book 1, Ch.4
17	Industrial Processes, Industrial Sensing & Actuation	Book 1, Ch.4
18	Industrial Internet Systems	Book 1, Ch.4
Unit- III Market Structures		
19	Industrial IoT: Business Model	Book 1, Ch.13
20	Industrial IoT: Reference Architecture	Book 1, Ch.13
21	IIoT-Business Models, IIoT Reference Architecture	Book 1, Ch.13
22	Industrial IoT- Layers	Book 1, Ch.13
23	IIoT Sensing, IIoT Processing	Book 1, Ch.13



24	IIoT Communication	Book 1, Ch.4
25	IIoT Networking	Book 1, Ch.5
<b>Unit-IV Pricing of Goods and Services</b>		
26	Industrial IoT: Big Data Analytics	Book 2, Ch.3
27	Software Defined Networks	Book 1, Ch.4
28	IIoT Analytics - Introduction, Machine Learning	Book 1, Ch.4
29	Data Science	Book 2, Ch.3
30	Data Management with Hadoop	Book 1, Ch.3
31	Industrial IoT: Big Data Analytics	Book 2, Ch.3
32	Software Defined Networks	Book 1, Ch.3
33	SDN in IIoT, Data Center Networks	Book 2, Ch.3
34	Industrial IoT: Security and Fog Computing	Book 1, Ch.4
35	Cloud Computing, Security in IIoT	Book 1, Ch.4
36	Industrial IoT- Application Domains	Book 2, Ch.3
37	Factories and Assembly Line, Food Industry	Book 2, Ch.3
<b>Unit-V Macroeconomics</b>		
38	Industrial IoT- Application Domains	Book 1, Ch.8
39	Healthcare, Power Plants, Inventory Management	Book 1, Ch.2
40	Quality Control, Plant Safety and Security	Book 1, Ch.8
41	Including AR and VR safety applications	Book 1, Ch.13
42	Facility Management, Oil, chemical industry	Book 2, Ch.8
43	pharmaceutical industry	Book2, Ch. 8
44	Applications of UAVs in Industries	Book 1, Ch.8
45	Real case studies like Milk Processing and Packaging Industries	Book 2, Ch.8
46	Manufacturing Industries	Book2, Ch. 8

#### ADDITIONAL WEB RESOURCES

1.	<b>MOOC:</b> Introduction to Industry 4.0 and Industrial Internet of Things <a href="https://onlinecourses.nptel.ac.in/noc20_cs69/preview">https://onlinecourses.nptel.ac.in/noc20_cs69/preview</a>
2.	<b>NPTEL:</b> Video lectures on Introduction to Industry 4.0 and Industrial Internet of Things by Prof. Sudip Misra, IIT Kharagpur <a href="https://onlinecourses.nptel.ac.in/noc20_cs69/preview">https://onlinecourses.nptel.ac.in/noc20_cs69/preview</a>

#### 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**

Tuesday (12:05 PM - 12:55 PM)

Thursday (12:05 PM - 12:55 PM)

- **Contact Information**

[satyendra.ece@mietjammu.in](mailto:satyendra.ece@mietjammu.in)