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Industry 4.0 — Complete Syllabus

BTEUP Diploma in Mechanical Engineering (Production) • 6th Semester • Session 2026–27

Subject 6.3.5 (Theory) • Elective Pathway • Total 100 Marks • 3 Credits

About this document: Industry 4.0 is subject 6.3.5 of the 6th semester of the Diploma in Mechanical Engineering (Production). It is one of the five Elective Pathway options — a student picks any ONE of the five: Advanced Engineering Mathematics (6.3.1), Additive Manufacturing (6.3.2), Project Management (6.3.3), Finance Fundamentals (6.3.4) and Industry 4.0 (6.3.5). This document gives the complete unit-wise syllabus, the examination scheme and the reference books from the official curriculum.

Examination Scheme

Code	Paper	Type	L – P	Credits	Internal	External	Total
6.3.5	Industry 4.0	Theory	3 – 0	3	Theory 40	Theory 60 (3 hrs)	100
Industry 4.0 Total				**3**	**40**	**60**	**100**

What This Subject Aims To Do

To introduce the Fourth Industrial Revolution — smart factories built on AI, IoT, cloud, big data and automation — so that diploma students understand the technologies that are reshaping manufacturing and the jobs in it.

Unit-Wise Complete Topic List

Unit	Topic	Periods	Marks

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1	Introduction to Industry 4.0	8	12
2	Artificial Intelligence	8	12
3	Robotic Process Automation	8	12
4	Augmented and Virtual Reality	8	12
5	IoT, Sensors and Actuators	10	12

Total: 42 periods, 60 marks (external theory). Each of the five units carries 12 marks in the external theory paper, as per the suggested distribution of marks in the official syllabus.

Unit 1 — Introduction to Industry 4.0 (8 Periods, 12 Marks)

Topics: Need, reason for adopting Industry 4.0, definition, goals and design principles, technologies of Industry 4.0, Big Data, Artificial Intelligence (AI), Industrial Internet of Things, Cyber Security, Cloud, Augmented Reality.

In simple words: Why factories are going smart — the goals and design principles of Industry 4.0 and its core technologies: big data, AI, IIoT, cyber security, cloud and AR.

Unit 2 — Artificial Intelligence (8 Periods, 12 Marks)

Topics: Artificial Intelligence (AI): what and why, history of AI, foundations of AI, the AI environment, societal influences of AI, application domains and tools, associated technologies of AI, future prospects of AI, challenges of AI.

In simple words: What artificial intelligence is, where it came from, where it is used, and what it means for society — its promise and its challenges.

Unit 3 — Robotic Process Automation (8 Periods, 12 Marks)

Topics: Robotic Process Automation (RPA): introduction to RPA, need for automation, programming constructs in RPA, robots and softbots, RPA architecture and process methodologies, industries best suited for RPA, risks and challenges with RPA.

In simple words: How robotic process automation takes over repetitive computer work — its building blocks, architecture and the industries it suits best.

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Unit 4 — Augmented and Virtual Reality (8 Periods, 12 Marks)

Topics: Augmented Reality: definition, tools for Augmented Reality, HoloLens, advantages and challenges of AR, applications of AR in education, industries, Mixed Reality. Virtual Reality: definition, types of Head Mounted Displays, tools for Virtual Reality, applications of VR in education, industries, difference between VR and AR.

In simple words: Augmented, virtual and mixed reality — the tools, the headsets, and what each one does in education and industry.

Unit 5 — IoT, Sensors and Actuators (10 Periods, 12 Marks)

Topics: Evolution of IoT, definition and characteristics of IoT, architecture of IoT, technologies for IoT, developing IoT applications, applications of IoT, Industrial IoT, security in IoT, analog and digital sensors, interfacing temperature sensor, ultrasound sensor and infrared (IR) sensor with Arduino, interfacing LED and Buzzer with Arduino.

In simple words: The Internet of Things in practice — sensors, actuators and Arduino — and the security questions every connected device raises.

Learning Outcomes

- Study the concepts, goals, design principles, and enabling technologies of Industry 4.0.
- Explain the fundamentals, applications, societal impact, challenges, and future prospects of Artificial Intelligence.
- Analyze Robotic Process Automation concepts, architectures, programming constructs, and industrial use cases.
- Describe the Augmented Reality, Virtual Reality, and Mixed Reality technologies and their applications in education and industry.
- Design and develop basic IoT applications using sensors, actuators, and Arduino with an understanding of security issues.

Reference Books (as listed in the syllabus)

- Sudip Misra, Chandana Roy and Anandarup Mukherjee, Introduction to Industrial Internet of Things and Industry 4.0, Taylor & Francis India, 2021.
- Dr. Anand Kumar Singh and Dr. Manish Gangil, Industry 4.0, Shashwat Publication, 2022.
- Alasdair Gilchrist, Industry 4.0: The Industrial Internet of Things, 1st Edition, Apress, 2017.
- Dr. Kamlesh Lakhwani, Dr. Hemant Kumar Gianey, Joseph Kofi Wireko and Kamal Kant Hiran, Internet of Things (IoT), First Edition, BPB Publications, 2020.

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Source: IRDT Kanpur NEP-2020 curriculum for the Diploma in Mechanical Engineering (Production), updated and approved by the Board of Technical Education, U.P., Lucknow, in the C.D.C. meeting held on 16.07.2026.

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Topic lists follow the official syllabus; short explanations are the author's own plain-language summaries, not syllabus text. Please confirm with your own polytechnic for any local changes.

