



**AUTUMN END SEMESTER EXAMINATION-2023**

**3<sup>rd</sup> Semester B.Tech**

**INDUSTRY 4.0 TECHNOLOGIES**

**EX20001**

1078

**(For 2023 (L.E), 2022 & Previous Admitted Batches)**

Time: 3 Hours

Full Marks: 50

*Answer any FIVE questions.*

*Question paper consists of three SECTIONS i.e. A, B and C.*

*Attempt minimum one question each from each Section.*

*The figures in the margin indicate full marks.*

*All parts of a question should be answered at one place only.*

**SECTION-A**

1. (a) Explain the "Machine Learning" concept and provide two real-world examples of machine learning used to solve industrial requirements. How does machine learning contribute to the field of artificial intelligence? [5]  
(b) What is Cyber-Physical Systems (CPS)? Provide two examples of how CPS technology is used to address real-world challenges. Discuss the key characteristics that distinguish CPS from traditional systems and the importance of their integration in our modern world. [5]
2. (a) How Internet of service is transforming industries or improving the delivery of services. Discuss potential challenges associated with IoS adoption and how they can be addressed. [5]  
(b) Discuss the role of edge computing, cloud platforms, and real-time analytics in optimizing IIoT architecture for industrial applications. Additionally, consider the scalability and security challenges associated with IIoT architecture and how they can be addressed. [5]

## SECTION-B

3. (a) Analyze the key drivers and transformative impacts of each of the four Industrial Revolutions. [5]
- (b) Examine the practical applications and benefits of the Industrial Internet of Things (IIoT) in the oil and gas industry. Provide specific examples of IIoT use cases in upstream, midstream, and downstream operations, and discuss how IIoT technologies are enhancing efficiency, safety, and sustainability in this sector. [5]
4. (a) Analyze the cyber security challenges associated with the increased digitalization and connectivity of the energy and smart grid systems in Industry 4.0. Discuss the importance of cyber security measures, including encryption, access control, and intrusion detection, to safeguard critical energy infrastructure from cyber threats. [5]
- (b) Analyze the concept of the value chain in the manufacturing industry. Provide a detailed breakdown of the primary activities and support activities within the manufacturing value chain. [5]
5. (a) Discuss the impact of digitalization on workplace productivity, collaboration, and employee well-being. Consider both the advantages and potential challenges associated with the integration of digital tools in human workspaces. [5]
- (b) Discuss a specific real-world application of smart factory technology in manufacturing. Describe how this application leverages advanced technologies like the Internet of Things (IoT), data analytics, and automation to enhance production processes, increase efficiency, or improve quality. [5]



## SECTION-C

6. (a) Evaluate the primary challenges that industries face when adapting to Industry 4.0, the fourth industrial revolution. [5]
- (b) Evaluate the futuristic opportunities and the anticipated economic impact of Industry 4.0 on various sectors of the global economy. Discuss how the integration of advanced technologies like IoT, artificial intelligence, and automation is expected to transform industries, create new business models, and drive economic growth. [5]
7. (a) Imagine a scenario where block-chain technology is leveraged within Industry 4.0 to enhance both cyber security and data integrity. In this context, discuss a hypothetical use case where a block-chain-based system significantly improves the security and trustworthiness of critical data or processes. [5]
- (b) Imagine you are a technology innovator tasked with creating a novel sensing and computing-based solution for a specific Industry 4.0 application. Describe your visionary concept and its potential impact on the industry. Discuss how this solution leverages advanced sensors and computing technologies, and how it can transform traditional manufacturing processes, supply chain management, or any other relevant domain. [5]

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