SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(AUTONOMOUS)

QUESTION BANK

Year / Semester: II MBA IV Semester **Regulation: R22**

Subject and Code: Industry 4.0 -22AUD241

SYLLABUS

UNIT – I : Introduction to Industry 4.0 and Technologies

Industry 4.0 – Need – Reason for Adopting Industry 4.0 – Definition – Goals and Design Principles

UNIT – II : Technologies of Industry 4.0

Big Data – Artificial Intelligence (AI) – Industrial Internet of Things (IIoT) – Cyber Security – Cloud – Augmented Reality (AR) – Mixed Reality (MR)

UNIT – III : Big Data

Data Terminologies – Big Data Definitions – Essentials of Big Data in Industry 4.0 – Merits and Advantages – Big Data Components – Big Data Characteristics – Big Data Processing Frameworks – Big Data Applications – Big Data Tools – Big Data Roles – Learning Platforms

UNIT – IV : Internet of Things (IoT)

Introduction to IoT – Architecture of IoT – Technologies for IoT – Security in IoT

UNIT – V : Applications of IoT

Applications of IoT – Manufacturing – Healthcare – Education – Aerospace and Defense – Agriculture – Transportation and Logistics – Impact of Industry 4.0 on Society – Impact on Business, Government, People

Prepared by Mr. S.L. Sai Venkat

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S.No.	CO	Questions	BT
Unit I: (Introduction to Industry 4.0 and Technologies)			
1	1	**a)** Analyze the need for Industry 4.0 in modern manufacturing systems. (5 M) **b)** Examine the key factors driving organizations toward adopting Industry 4.0. (5 M)	L4
2	1	a) Apply the concept of Industry 4.0 to explain how digital transformation enhances business efficiency. (5 M) b) Illustrate how small and medium enterprises can benefit from adopting Industry 4.0. (5 M)	L3
3	1	a) Break down the goals of Industry 4.0 and relate them to industrial competitiveness. (5 M) b) Analyze how design principles help in achieving Industry 4.0 objectives. (5 M)	L4
4	1	a) Apply Industry 4.0 principles to improve productivity and quality in a chosen industry. (10 M)	L3
5	1	a) Critically evaluate the challenges faced by developing nations in implementing Industry 4.0. (5 M) b) Suggest measures to overcome barriers to digital transformation. (5 M)	L5
6	1	**a)** Analyze how Industry 4.0 impacts business models and value chains.(5 M) b) Examine the role of innovation in sustaining Industry 4.0 adoption. (5M)	L4
7	1	a) Demonstrate how Industry 4.0 technologies support lean manufacturing and smart factories. (10 M)	L3
8	1	a) Evaluate the ethical and social implications of automation under Industry 4.0. (10 M)	L5
9	1	a) Compare traditional industrial systems with Industry 4.0 systems. (5 M) b) Analyze how connectivity and data analytics transform decision-making. (5 M)	L4
10	1	a) Use real-world examples to show how Industry 4.0 principles enhance operational excellence. (10 M)	L3

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Unit II: (Technologies of Industry 4.0)			
1	**2**	a) Analyze how Big Data Analytics drives informed decision-making in Industry 4.0. (5 M) b) Examine the relationship between data volume, velocity, and value. (5 M)	**L4**
2	**2**	a) Apply Artificial Intelligence (AI) in predictive maintenance within smart industries. (5 M) b) Demonstrate how AI enhances automation and product customization. (5 M)	**L3**
3	**2**	a) Analyze the role of IIoT in integrating devices and machines. (5 M) b) Compare how IIoT differs from traditional industrial networking. (5 M)	**L4**
4	**2**	a) Apply Cyber Security strategies to protect smart manufacturing systems. (10 M)	**L3**
5	**2**	a) Evaluate the importance of Cloud Computing in enabling scalable Industry 4.0 solutions. (5 M) b) Judge how cloud integration supports collaborative industrial ecosystems. (5 M)	**L5**
6	**2**	a) Analyze how Augmented Reality (AR) improves training and maintenance operations. (5 M) b) Examine the advantages and limitations of Mixed Reality (MR) applications. (5 M)	**L4**
7	**2**	a) Demonstrate how IoT and AI technologies combine to create smart production lines. (10 M)	**L3**
8	**2**	a) Evaluate the potential risks and benefits of using AI and Big Data in industrial operations. (10 M)	**L5**
9	**2**	a) Compare Cyber Security and Cloud Security challenges in connected industries. (5 M) b) Analyze strategies to mitigate data breaches in smart factories. (5 M)	**L4**
10	**2**	a) Apply AR and MR technologies to enhance quality inspection and virtual collaboration. (10 M)	**L3**

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S.No.	CO	Questions	BT
		Unit III: (Big Data)	
1	**3**	**a)** Analyze the *importance of Big Data* in the context of Industry 4.0. (5 M) **b)** Examine how Big Data supports *data-driven decision-making* in industries. (5 M)	**L4**
2	**3**	**a)** Apply Big Data tools to explain how large-scale data can be processed efficiently. (5 M) **b)** Demonstrate how organizations use Big Data to gain *competitive advantage.* (5 M)	**L3**
3	**3**	**a)** Break down the *components and characteristics* of Big Data. (5 M) **b)** Analyze how these components influence data processing frameworks. (5 M)	**L4**
4	**3**	Apply Big Data applications to real-world industries such as healthcare or manufacturing. (10 M)	**L3**
5	**3**	a) Evaluate the advantages and limitations of Big Data analytics in smart manufacturing. (5 M) b) Judge the ethical concerns associated with data privacy and usage. (5 M)	**L5**
6	**3**	a) Analyze the role of Big Data platforms in improving industrial performance. (5 M) b) Examine how data frameworks like Hadoop and Spark transform industrial operations. (5 M)	**L4**
7	**3**	Demonstrate how learning platforms and data analytics enhance employee training and innovation. (10 M)	**L3**
8	**3**	Evaluate how Big Data integration contributes to business sustainability and innovation. (10 M)	**L5**
9	**3**	a) Compare different Big Data roles in managing industrial data ecosystems. (5 M) b) Analyze how data engineers and data scientists collaborate for better insights. (5 M)	**L4**
10	**3**	Apply Big Data analytics to improve supply chain efficiency in manufacturing or logistics. (10 M)	**L3**

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S.No.	CO	Questions	BT
Unit IV: (Internet of Things (IoT))			
1	4	a) Analyze the *fundamental components* of IoT architecture. (5 M) b) Examine how IoT enables connectivity and automation in Industry 4.0. (5 M	L4
2	4	Apply IoT technologies to improve *production monitoring* and *resource optimization.* (10 M)	L3
3	4	a) Break down the *layers* of IoT architecture and explain their functions. (5 M) b) Analyze how sensors and networks contribute to IoT performance. (5 M)	L4
4	4	Apply IoT concepts to *smart homes, healthcare, or agriculture* applications. (10 M)	L3
5	4	a) Evaluate the *security challenges* in IoT-based systems. (5 M) b) Propose solutions to enhance *data protection* in IoT environments. (5 M)	L5
6	4	a) Analyze how IoT and Cloud Computing integrate to form smart ecosystems. (5 M) b) Examine the impact of IoT technologies on real-time decision-making. (5 M)	L4
7	4	Demonstrate the role of IoT in predictive maintenance and asset management. (10 M)	L3
8	4	Evaluate the ethical and privacy implications of IoT data collection and usage. (10 M)	L5
9	4	a) Compare the features of wired and wireless IoT networks. (5 M) b) Analyze how network protocols affect IoT performance. (5 M)	L4
10	4	Apply IoT to create a smart campus or smart transportation model. (10 M)	L3

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S.No.	CO	Questions	BT
Unit V: (Applications of IoT**)**			
1	**5**	a) Analyze how IoT transforms manufacturing and production processes. (5 M) b) Examine the role of smart sensors in predictive maintenance. (5 M)	**L4**
2	**5**	Apply IoT technologies to improve healthcare delivery and patient monitoring. (10 M)	**L3**
3	**5**	a) Analyze how IoT applications are reshaping the education sector. (5 M) b) Examine the integration of IoT in aerospace and defense systems. (5 M)	**L4**
4	**5**	Apply IoT innovations to improve agriculture productivity and resource management. (10 M)	**L3**
5	**5**	a) Evaluate how IoT impacts transportation and logistics efficiency. (5 M) b) Judge the economic and environmental benefits of IoT-based transport systems. (5 M)	**L5**
6	**5**	a) Analyze the impact of Industry 4.0 on global business operations. (5 M) b) Examine how IoT supports digital transformation in organizations. (5 M)	**L4**
7	**5**	Apply IoT technologies to enhance smart city governance and urban planning. (10 M)	**L3**
8	**5**	Evaluate the social and ethical implications of IoT deployment in daily life. (10 M)	**L5**
9	**5**	a) Compare the impact of IoT on government operations with that on private businesses. (5 M) b) Analyze the benefits of IoT in public safety and emergency services. (5 M)	**L4**
10	**5**	Apply IoT principles to design a smart environment that supports sustainability and public well-being. (10 M)	**L3**

Note: L1-Remembering, L2-Understanding, L3-Applying, L4-Analyzing, L5-Evaluating, and L6-Creating

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Text Books:

1. Industry 4.0: The Industrial Internet of Things Paperback, 1/e, Alasdair Gilchris, 2017.
2. Handbook of Industry 4.0 and SMART Systems, Diego Galar Pascual, Pasquale Daponte, Uday Kumar, 2020.

Instruction to Faculty Members:

The Six Levels of Bloom's Taxonomy:

1. **Remembering:** Retrieving, recognizing, and recalling relevant knowledge from long-term memory (e.g., list, define, name, locate).
2. **Understanding:** Constructing meaning, explaining ideas, or concepts (e.g., summarize, interpret, classify, compare).
3. **Applying:** Using information in new situations or implementing procedures to solve problems (e.g., solve, use, demonstrate, implement).
4. **Analyzing:** Breaking material into constituent parts, determining how the parts relate to one another and to an overall structure (e.g., contrast, categorize, distinguish, diagram).
5. **Evaluating:** Making judgments based on criteria and standards through checking and critiquing (e.g., judge, critique, justify, defend, argue).
6. **Creating:** Putting elements together to form a coherent or functional whole; reorganizing elements into a new pattern or structure (e.g., design, construct, develop, formulate).