GUJARAT TECHNOLOGICAL UNIVERSITY

BE-7 SEMESTER – OLD PAPER – S22 TO S26 – QUESTION BANK

Subject Name & Code: Industrial Internet of Things - 3171930

Chapter 1: Understanding Industrial Internet of Things (IIoT)

Repeated Questions:

1. IIoT Fundamentals and Architecture:

- **Q.** Define IIoT and list its benefits/significance. **(SUMMER 2022, 3 Marks; WINTER 2022, 3 Marks; WINTER 2023, 3 Marks; SUMMER 2024, 3 Marks; WINTER 2024, 3 Marks; SUMMER 2025, 3 Marks; WINTER 2025, 3 Marks; WINTER 2025, 4 Marks OR; SUMMER 2026, 3 Marks – also includes "Cyber Manufacturing Systems"; SUMMER 2026, 7 Marks)**
- **Q.** Explain the Architecture of IIoT / Industrial Internet of Things. **(WINTER 2022, 7 Marks; SUMMER 2023, 7 Marks; SUMMER 2025, 7 Marks)**

2. Cyber Manufacturing Systems and Real-life Examples:

- **Q.** What is Cyber Manufacturing System / Cyber Physical Production? Explain its relation to Industry 4.0. **(WINTER 2023, 7 Marks; WINTER 2024, 7 Marks; SUMMER 2025, 4 Marks; SUMMER 2026, 4 Marks)**
- **Q.** List real-life examples of IIoT in the Manufacturing Sector. **(SUMMER 2022, 4 Marks; WINTER 2023, 7 Marks; WINTER 2024, 4 Marks)**

3. Industrial Cyber-Physical Systems:

- **Q.** Explain the Foundations of Industrial Cyber-Physical Systems in different dimensions. **(SUMMER 2022, 7 Marks; SUMMER 2026, 4 Marks)**
- **Q.** Briefly explain an Application Map for Industrial Cyber-Physical Systems. **(SUMMER 2022, 7 Marks; SUMMER 2024, 7 Marks)**

4. Predictive Maintenance and Smart City:

- **Q.** Examine how predictive maintenance is done using IIoT. **(WINTER 2022, 4 Marks; WINTER 2025, 7 Marks OR)**
- **Q.** Discuss in detail Smart city application of IOT. **(SUMMER 2023, 7 Marks; WINTER 2025, 7 Marks OR)**

Other Important Questions:

1. IIoT and Industry 4.0 Concepts:

- **Q.** What is Industrial Internet of Things (IIoT)? What are the key components of an IIoT system? **(WINTER 2023, 7 Marks)**
- **Q.** What is IIoT for Smart manufacturing? **(SUMMER 2023, 3 Marks)**
- **Q.** What is the main objective of IIoT in manufacturing and other industrial process? **(WINTER 2025, 3 Marks)**
- **Q.** Discuss the IIoT in Manufacturing Sector. **(WINTER 2025, 7 Marks)**
- **Q.** Enlist the benefits of adopting an industry 4.0 model. **(WINTER 2025, 4 Marks)**
- **Q.** Explain the Pillars of the fourth industrial revolution in detail. **(WINTER 2025, 4 Marks OR)**
- **Q.** Explain the importance of smart manufacturing. **(WINTER 2025, 3 Marks)**

2. Cyber-Physical Systems Improvement and Innovation:

- **Q.** Explain categories of potential improvement for Industrial Cyber-Physical Systems. **(WINTER 2025, 7 Marks)**

- **Q.** What are the recommendations to improve the innovation ecosystem? **(WINTER 2025, 3 Marks OR)**
- **Q.** Briefly explain performance measurement for smart manufacturing. **(SUMMER 2026, 7 Marks)**

3. Smart Applications:

- **Q.** Explain smart parking system with architecture of system. **(SUMMER 2023, 7 Marks)**

Chapter 2: Modelling and System Engineering for CPS

Repeated Questions:

1. Model Based System Engineering and Supervisory Control:

- **Q.** Explain the importance of Model based System Engineering in IIoT. **(SUMMER 2022, 7 Marks; SUMMER 2024, 7 Marks; SUMMER 2025, 7 Marks; WINTER 2025, 7 Marks OR)**
- **Q.** Explain Synthesis of Supervisory Controller with a suitable example. **(SUMMER 2022, 3 Marks; SUMMER 2024, 7 Marks; SUMMER 2026, 7 Marks OR)**

2. Evaluation and Hybrid Models:

- **Q.** Discuss Evaluation model for assessments of cyber physical production systems. **(WINTER 2023, 7 Marks; SUMMER 2025, 7 Marks; WINTER 2025, 7 Marks)**
- **Q.** List down different Hybrid Models of the Uncontrolled System of AGVs. Explain any X models. **(SUMMER 2022, 7 Marks; SUMMER 2024, 4 Marks; SUMMER 2025, 7 Marks)**

3. Cyber Physical Engineering and Health Management:

- **Q.** What is Cyber Physical Engineering (CPE) and its role/modeling challenges? **(WINTER 2023, 3 Marks; WINTER 2024, 7 Marks)**
- **Q.** Write short note on Prognostics, Health Management and Control. **(SUMMER 2022, 4 Marks; WINTER 2025, 4 Marks)**

Other Important Questions:

1. Systems Engineering and Modelling:

- **Q.** What is model-based engineering and how can it be used to develop supervisory controllers for cyber physical systems? **(WINTER 2023, 7 Marks)**
- **Q.** Explain System lifecycle process. **(WINTER 2022, 4 Marks)**
- **Q.** Define systems engineering. **(SUMMER 2026, 3 Marks)**
- **Q.** What do you understand by modelling of CPS or CMS? **(SUMMER 2026, 3 Marks OR)**
- **Q.** Explain synthesis-based development of coordination control for modelling of CPS. **(SUMMER 2026, 4 Marks OR)**

2. Cyber Physical Engineering Challenges and Tools:

- **Q.** Explain simplified model of SystemC kernel. **(SUMMER 2024, 4 Marks)**
- **Q.** Discuss the challenges and limitations of modeling in Cyber-Physical Engineering. **(WINTER 2024, 7 Marks)**
- **Q.** Briefly explain integrated cyber physical electronics production systems. **(SUMMER 2026, 7 Marks OR)**

Chapter 3: Architectural Design Patterns for CMS and IIoT

Repeated Questions:

1. CPS-based Manufacturing:

- **Q.** Explain how CPS-based manufacturing aligns with Industry 4.0 / its benefits and challenges. **(WINTER 2023, 3 Marks; WINTER 2023, 4 Marks; WINTER 2024, 3 Marks)**
- **Q.** Explain CPS in context to enhance the resiliency of production facilities. **(WINTER 2023, 3 Marks; WINTER 2024, 7 Marks)**

2. Knowledge Bases and IIoT Networking:

- **Q.** Explain the concept of integrating knowledge bases, databases, and machine vision. **(WINTER 2023, 4 Marks; WINTER 2024, 7 Marks)**
- **Q.** Discuss the role of IIoT in communication and networking in manufacturing. **(WINTER 2024, 4 Marks; WINTER 2024, 4 Marks – Benefits; SUMMER 2026, 7 Marks)**

3. CPS Autonomy:

- **Q.** Discuss different components for CPS Autonomy. **(SUMMER 2022, 7 Marks; WINTER 2025, 7 Marks)**
- **Q.** Explain the possible solutions for achieving CPS Autonomy in Smart Factories. **(SUMMER 2022, 7 Marks; SUMMER 2025, 7 Marks; WINTER 2025, 7 Marks OR)**

4. Network Reliability and Routing:

- **Q.** Explain the importance of redundancy in network reliability. **(SUMMER 2022, 3 Marks; WINTER 2025, 3 Marks)**
- **Q.** Explain in brief the challenges for Routing and Addressing in the IIoT. **(SUMMER 2022, 4 Marks; SUMMER 2025, 4 Marks; WINTER 2025, 4 Marks)**

Other Important Questions:

1. CPS Architecture and Smart Automation:

- **Q.** Explain detail Architecture of CPS-based manufacturing. **(SUMMER 2025, 3 Marks)**
- **Q.** Explain Knowledge base data base in Smart Automation. **(SUMMER 2025, 7 Marks)**
- **Q.** What is automatization? **(SUMMER 2026, 3 Marks)**
- **Q.** Explain interoperability in smart automation with a suitable example. **(SUMMER 2026, 4 Marks)**
- **Q.** Explain service-oriented architecture for CPS with a suitable example. **(SUMMER 2026, 3 Marks)**

2. Production and Integration:

- **Q.** Explain Orchestrated Production in brief. **(SUMMER 2022, 3 Marks)**
- **Q.** Write short note on: Miniaturization and Function Integration. **(SUMMER 2022, 4 Marks)**

Chapter 4: Artificial Intelligence and Data Analytics for Manufacturing

Repeated Questions:

1. Big Data and Condition Monitoring:

- **Q.** Explain the relation between IIoT and Big Data / Benefits of Big Data & ML in manufacturing. **(SUMMER 2023, 4 Marks; WINTER 2024, 7 Marks; SUMMER 2025, 4 Marks)**
- **Q.** What is condition monitoring? Explain its importance. **(SUMMER 2024, 3 Marks; WINTER 2024, 7 Marks; SUMMER 2025, 4 Marks – combined with Big Data)**

2. Digital Production and Quality Control:

- **Q.** What is digital production, and how does it relate to CPS? **(WINTER 2023, 7 Marks; WINTER 2024, 3 Marks; SUMMER 2026, 7 Marks OR)**
- **Q.** How can CPS be used to improve quality control in manufacturing? / List examples. **(WINTER 2023, 7 Marks; WINTER 2024, 3 Marks)**

3. Artificial Intelligence and Big Data Applications:

- **Q.** Define Artificial intelligence. Distinguish between AI and Machine Learning. **(WINTER 2022, 3 Marks; SUMMER 2025, 3 Marks; WINTER 2025, 3 Marks OR)**
- **Q.** Describe in details any 3 Applications of AI in INDUSTRY 4.0 (IIOT). **(WINTER 2022, 7 Marks; WINTER 2025, 7 Marks)**
- **Q.** Enlist the applications of big data platforms in CPSs. **(WINTER 2022, 4 Marks; WINTER 2025, 4 Marks OR)**

Other Important Questions:

1. Machine Learning and Big Data:

- **Q.** What is machine learning related to IIOT? **(SUMMER 2024, 3 Marks)**
- **Q.** What is big data, and how is it used with machine learning in CPS? **(WINTER 2023, 4 Marks)**
- **Q.** Define (i) Big data, (ii) Machine learning **(SUMMER 2026, 3 Marks OR)**

2. Data Analytics and Smart Data:

- **Q.** Discuss the requirements and challenges for Data Quality in data analytics in CPS Machine tools. **(SUMMER 2025, 7 Marks)**
- **Q.** Write short note on Industrial Smart Data & Smart Services. **(SUMMER 2026, 7 Marks)**
- **Q.** Explain predictive analytics for manufacturing systems. **(SUMMER 2026, 4 Marks)**

3. Machine Vision and Knowledge Base:

- **Q.** Write short note on: Machine Vision with neat sketch. **(SUMMER 2025, 4 Marks)**
- **Q.** Define (i) Knowledge Base, (ii) Machine vision **(SUMMER 2026, 3 Marks)**

4. CPS Applications:

- **Q.** Write briefly about applications of CPS in machine tools. **(SUMMER 2026, 4 Marks OR)**

Chapter 5: Evaluation of Workforce and Human Machine Interaction

Repeated Questions:

1. Augmented Reality:

- **Q.** Discuss the role of Augmented Reality in IIoT. / Define AR and its industrial applications. **(WINTER 2022, 3 Marks; SUMMER 2023, 3 Marks; WINTER 2024, 3 Marks; SUMMER 2025, 3 Marks; WINTER 2025, 3 Marks; WINTER 2025, 4 Marks)**

2. User Intervention, Workers and User-Driven CPS:

- **Q.** Enlist Strategies to support user intervention. / Discuss importance of user intervention. **(WINTER 2023, 3 Marks; WINTER 2024, 3 Marks; WINTER 2024, 4 Marks)**
- **Q.** Discuss the relationship between workers and CPS. / What kind of improvement needs to be carried out by workers? **(SUMMER 2022, 7 Marks; WINTER 2024, 4 Marks)**
- **Q.** Explain Strategies for User-Driven Cyber-Physical Systems. **(SUMMER 2023, 7 Marks; SUMMER 2026, 7 Marks OR)**

Other Important Questions:

1. Human Machine Interface:

- **Q.** What are the system requirements for HMI? **(SUMMER 2023, 4 Marks)**
- **Q.** How does HMI relate to IIOT technology? **(SUMMER 2024, 4 Marks)**

2. CPS Characteristics and Human Dimension:

- **Q.** Explain following: (i) Priority Management (ii) Automated Maintenance. **(SUMMER 2023, 7 Marks)**
- **Q.** Discuss the characteristics of CPS in Manufacturing. **(SUMMER 2023, 3 Marks)**
- **Q.** Discuss Human Dimension of Cyber-Physical Systems. **(SUMMER 2023, 7 Marks)**
- **Q.** Discuss the changes in skill sets required for the workers in smart factories. **(SUMMER 2026, 4 Marks)**

3. Standards and Intelligent Objects:

- **Q.** Discuss the importance of standards in smart manufacturing. **(SUMMER 2022, 4 Marks)**
- **Q.** Write down the classification of Intelligent Objects in the Machining Process. **(SUMMER 2022, 3 Marks)**

Chapter 6: Application of IIoT

Repeated Questions:

1. Smart Metering and Home Automation:

- **Q.** What is smart metering? Explain its applications related to IIoT/CPS. **(SUMMER 2024, 4 Marks; WINTER 2024, 7 Marks; SUMMER 2025, 7 Marks; SUMMER 2026, 3 Marks OR)**
- **Q.** Explain the concept of Home Automation with a suitable example. **(WINTER 2023, 4 Marks; SUMMER 2024, 4 Marks; SUMMER 2026, 4 Marks OR)**

2. Body Area Networks:

- **Q.** Explain the concept of Body Area Networks. **(SUMMER 2022, 3 Marks; SUMMER 2025, 3 Marks)**

3. IIoT Applications and Cloud Computing:

- **Q.** List down the applications of IIoT in the real-time world. / What are the real-time applications of IIoT? **(SUMMER 2022, 4 Marks; SUMMER 2025, 4 Marks; WINTER 2025, 4 Marks)**
- **Q.** What is Cloud Computing? Benefits of Cloud Computing. **(WINTER 2022, 3 Marks; WINTER 2022, 4 Marks; WINTER 2025, 3 Marks OR)**

Other Important Questions:

1. Smart City and Smart Health:

- **Q.** What is city automation, and how does it relate to CPS? **(WINTER 2023, 4 Marks)**
- **Q.** Write short note on: IoT for city automation. **(SUMMER 2026, 7 Marks OR)**
- **Q.** Discuss smart health using IoT. **(SUMMER 2023, 4 Marks)**
- **Q.** Design and explain architecture to implement IOT for health care in a hospital. **(WINTER 2022, 7 Marks)**
- **Q.** Design a Virtual Machine to manage the control room of COVID DISASTER MANAGEMENT. **(WINTER 2022, 7 Marks)**

2. Performance and Communication:

- **Q.** Explain Performance Indicators of: Overall Systems Architecture, Production Operation, Changing Production Systems. **(SUMMER 2022, 7 Marks)**
- **Q.** Explain M2M Interaction and interface standards. **(SUMMER 2023, 7 Marks)**

****