

GUJARAT TECHNOLOGICAL UNIVERSITY

BE-7 SEMESTER – OLD PAPER – S22 TO S25 – QUESTION BANK

Subject Name & Code:

Industrial Internet of Things- 3171930

Chapter 1: Understanding Industrial Internet of Things (IIoT)

Repeated Questions:

1. **Define IIoT and list its benefits/significance.**
 - **Appeared in:** WIN 24 (03 Marks), SUM 25 (03 Marks), SUM 24 (03 Marks), WIN 23 (03 Marks), WIN 22 (03 Marks), SUM 22 (03 Marks).
2. **Explain the Architecture of IIoT / Industrial Internet of Things.**
 - **Appeared in:** SUM 25 (07 Marks), WIN 22 (07 Marks), SUM 23 (07 Marks).
3. **What is Cyber Manufacturing System / Cyber Physical Production? Explain its relation to Industry 4.0.**
 - **Appeared in:** SUM 25 (04 Marks), WIN 24 (07 Marks), WIN 23 (07 Marks).
4. **List real-life examples of IIoT in the Manufacturing Sector.**
 - **Appeared in:** WIN 24 (04 Marks), WIN 23 (07 Marks), SUM 22 (04 Marks).

Other Important Questions:

- Explain the Foundations of Industrial Cyber-Physical Systems in different dimensions. (SUM 22 - 07 Marks)
- Briefly explain an Application Map for Industrial Cyber-Physical Systems. (SUM 24 - 07 Marks, SUM 22 - 07 Marks)
- What is Industrial Internet of Things (IIoT)? What are the key components of an IIoT system? (WIN 23 - 07 Marks)
- Examine how predictive maintenance is done using IIoT. (WIN 22 - 04 Marks)
- What is IIoT for Smart manufacturing? (SUM 23 - 03 Marks)
- Discuss in detail Smart city application of IOT. (SUM 23 - 07 Marks)
- Explain smart parking system with architecture of system. (SUM 23 - 07 Marks)

Chapter

Repeated Questions:

1. **Explain the importance of Model based System Engineering in IIoT.**
 - **Appeared in:** SUM 25 (07 Marks), SUM 24 (07 Marks), SUM 22 (07 Marks).
2. **Explain Synthesis of Supervisory Controller with a suitable example.**
 - **Appeared in:** SUM 24 (07 Marks), SUM 22 (03 Marks).
3. **Discuss Evaluation model for assessments of cyber physical production systems.**
 - **Appeared in:** SUM 25 (07 Marks), WIN 23 (07 Marks).
4. **List down different Hybrid Models of the Uncontrolled System of AGVs. Explain any X models.**
 - **Appeared in:** SUM 25 (07 Marks), SUM 24 (04 Marks), SUM 22 (07 Marks).

Other Important Questions:

- What is Cyber Physical Engineering (CPE) and its role/modeling challenges? (WIN 24 - 07 Marks, WIN 23 - 03 Marks)
- What is model-based engineering and how can it be used to develop supervisory controllers for cyber physical systems? (WIN 23 - 07 Marks)
- Explain System lifecycle process. (WIN 22 - 04 Marks)
- Explain simplified model of SystemC kernel. (SUM 24 - 04 Marks)
- Discuss the challenges and limitations of modeling in Cyber-Physical Engineering. (WIN 24 - 07 Marks)
- Write short note on Prognostics, Health Management and Control. (SUM 22 - 04 Marks)

Chapter 3: Architectural Design Patterns for CMS and IIoT

Repeated Questions:

1. **Explain how CPS-based manufacturing aligns with Industry 4.0 / its benefits and challenges.**
 - **Appeared in:** WIN 24 (03 Marks), WIN 23 (03 Marks), WIN 23 (04 Marks).
2. **Explain the concept of integrating knowledge bases, databases, and machine vision.**
 - **Appeared in:** WIN 24 (07 Marks), WIN 23 (04 Marks).
3. **Explain CPS in context to enhance the resiliency of production facilities.**
 - **Appeared in:** WIN 24 (07 Marks), WIN 23 (03 Marks).
4. **Discuss the role of IIoT in communication and networking in manufacturing.**
 - **Appeared in:** WIN 24 (04 Marks), WIN 24 (04 Marks - Benefits)

Other Important Questions:

- Explain detail Architecture of CPS-based manufacturing. (SUM 25 - 03 Marks)
- Discuss different components for CPS Autonomy. (SUM 22 - 07 Marks)
- Explain the possible solutions for achieving CPS Autonomy in Smart Factories. (SUM 25 - 07 Marks, SUM 22 - 07 Marks)
- Explain the importance of redundancy in network reliability. (SUM 22 - 03 Marks)
- Explain in brief the challenges for Routing and Addressing in the IIoT. (SUM 25 - 04 Marks, SUM 22 - 04 Marks)
- Explain Knowledge base data base in Smart Automation. (SUM 25 - 07 Marks)
- Explain Orchestrated Production in brief. (SUM 22 - 03 Marks)
- Write short note on: Miniaturization and Function Integration. (SUM 22 - 04 Marks)

Chapter 4: Artificial Intelligence and Data Analytics for Manufacturing

Repeated Questions:

1. **Explain the relation between IIoT and Big Data / Benefits of Big Data & ML in manufacturing.**
 - **Appeared in:** SUM 25 (04 Marks), WIN 24 (07 Marks), SUM 23 (04 Marks).
2. **What is condition monitoring? Explain its importance.**
 - **Appeared in:** WIN 24 (07 Marks), SUM 24 (03 Marks), SUM 25 (04 Marks - combined with Big Data).
3. **What is digital production, and how does it relate to CPS?**
 - **Appeared in:** WIN 24 (03 Marks), WIN 23 (07 Marks).
4. **How can CPS be used to improve quality control in manufacturing? / List examples.**
 - **Appeared in:** WIN 24 (03 Marks), WIN 23 (07 Marks).

Other Important Questions:

- Define Artificial intelligence. Distinguish between AI and Machine Learning. (SUM 25 - 03 Marks, WIN 22 - 03 Marks)
- Discuss the requirements and challenges for Data Quality in data analytics in CPS Machine tools. (SUM 25 - 07 Marks)
- What is big data, and how is it used with machine learning in CPS? (WIN 23 - 04 Marks)
- What is machine learning related to IIOT? (SUM 24 - 03 Marks)
- Describe in details any 3 Applications of AI in INDUSTRY 4.0 (IIOT). (WIN 22 - 07 Marks)
- Enlist the applications of big data platforms in CPSs. (WIN 22 - 04 Marks)
- Write short note on: Machine Vision with neat sketch. (SUM 25 - 04 Marks)

Chapter 5: Evaluation of Workforce and Human Machine Interaction

Repeated Questions:

1. **Discuss the role of Augmented Reality in IIoT. / Define AR and its industrial applications.**
 - **Appeared in:** WIN 24 (03 Marks), SUM 25 (03 Marks), SUM 23 (03 Marks), WIN 22 (03 Marks).
2. **Enlist Strategies to support user intervention. / Discuss importance of user intervention.**
 - **Appeared in:** WIN 24 (03 Marks), WIN 24 (04 Marks), WIN 23 (03 Marks).
3. **Discuss the relationship between workers and CPS. / What kind of improvement needs to be carried out by workers?**
 - **Appeared in:** WIN 24 (04 Marks), SUM 22 (07 Marks).

Other Important Questions:

- What are the system requirements for HMI? (SUM 23 - 04 Marks)
- How does HMI relate to IIOT technology? (SUM 24 - 04 Marks)
- Explain Strategies for User-Driven Cyber-Physical Systems. (SUM 23 - 07 Marks)
- Explain following: (i) Priority Management (ii) Automated Maintenance. (SUM 23 - 07 Marks)
- Discuss the characteristics of CPS in Manufacturing. (SUM 23 - 03 Marks)
- Discuss Human Dimension of Cyber-Physical Systems. (SUM 23 - 07 Marks)
- Discuss the importance of standards in smart manufacturing. (SUM 22 - 04 Marks)
- Write down the classification of Intelligent Objects in the Machining Process. (SUM 22 - 03 Marks)

Chapter 6: Application of IIoT

Repeated Questions:

1. **What is smart metering? Explain its applications related to IIoT/CPS.**
 - **Appeared in:** WIN 24 (07 Marks), SUM 25 (07 Marks), SUM 24 (04 Marks).
2. **Explain the concept of Home Automation with a suitable example.**
 - **Appeared in:** SUM 24 (04 Marks), WIN 23 (04 Marks).
3. **Explain the concept of Body Area Networks.**
 - **Appeared in:** SUM 25 (03 Marks), SUM 22 (03 Marks).

Other Important Questions:

- List down the applications of IIoT in the real-time world. (SUM 25 - 04 Marks, SUM 22 - 04 Marks)
- Design and explain architecture to implement IOT for health care in a hospital. (WIN 22 - 07 Marks)
- What is city automation, and how does it relate to CPS? (WIN 23 - 04 Marks)
- Discuss smart health using IoT. (SUM 23 - 04 Marks)
- Explain Performance Indicators of: Overall Systems Architecture, Production Operation, Changing Production Systems. (SUM 22 - 07 Marks)
- What is Cloud Computing? Benefits of Cloud Computing. (WIN 22 - 03, 04 Marks)
- Explain M2M Interaction and interface standards. (SUM 23 - 07 Marks)
- Design a Virtual Machine to manage the control room of COVID DISASTER MANAGEMENT. (WIN 22 - 07 Marks)
