GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Name & Code:

Industrial Automation- 3170925

Unit 1: Introduction to Industrial Automation

Repeated Questions:

1. **Define/What is Industrial Automation? Explain the need/requirement and advantages of Automation.**
   - Appeared in: S22 (Q1a, 03 marks), W22 (Q1a, 03 marks), S23 (Q1a, 03 marks), W23 (Q1a, 03 marks)
2. **Explain the Architecture of an Industrial Automation system with a block diagram.**
   - Appeared in: S25 (Q1b, 04 marks), W22 (Q2c, 07 marks)
3. **Compare MODBUS and PROFIBUS. / Explain the difference between Industrial bus systems: Modbus & Profibus.**
   - Appeared in: S24 (Q1a, 03 marks), W22 (Q3c, 07 marks), W23 (Q3b, 04 marks), W24 (Q1c, 07 marks)
4. **What is a PLC? Draw and explain the architecture/block diagram of a PLC and explain each block in detail.**
   - Appeared in: S22 (Q1c, 07 marks), S23 (Q4c, 07 marks), S24 (Q1b, 04 marks), S25 (Q1a, 03 marks)
5. **What do you mean by a SCADA system? Discuss its basic architecture and typical features.**
   - Appeared in: S22 (Q4c, 07 marks), S23 (Q4c, 07 marks), S24 (Q1c, 07 marks)

Other Important Questions:

6. **Explain the Automation Process with different components used in the Automation Process.**
   - Appeared in: W22 (Q1b, 04 marks), W24 (Q1b, 04 marks)
7. **Explain the role of PLC in Industrial Automation and also explain different components of PLC.**
   - Appeared in: W22 (Q1c, 07 marks), S23 (Q4a, 03 marks), W23 (Q1b, 04 marks)
8. **Define terms: SCADA, DCS, and PLC.**
   - Appeared in: W22 (Q3a, 03 marks), W24 (Q1a, 03 marks)
9. **List out the different types of Automation Process.**
   - Appeared in: W22 (Q2a, 03 marks)

10. **What is Automation and explain different types of automation systems?**
    - Appeared in: S22 (Q2c, 07 marks)
11. **Explain the role of computers in measurement and control.**
    - Appeared in: S22 (Q4b, 04 marks)
12. **Give a brief overview idea about PLC Communication and networking in Industrial Automation.**
    - Appeared in: S23 (Q4b, 04 marks), W22 (Q3b, 04 marks)
13. **Explain the role of PLC and SCADA in the Industrial Automation Process.**
    - Appeared in: W22 (Q2c-OR, 07 marks)
14. **List out the various programming languages used for PLC. Explain any two graphical languages of them in detail.**
    - Appeared in: S25 (Q1c, 07 marks)
15. **Write a short note on SCADA used in an Industrial Automation system.**
    - Appeared in: S25 (Q2b, 04 marks)

Unit 2: Automation Components (Sensors, Actuators, and Power Electronics)

Repeated Questions:

1. **Explain the construction, working principle, and application of LVDT.**
   - Appeared in: S23 (Q2c, 07 marks), S24 (Q2a, 03 marks)
2. **Explain the construction and operation of a magnetic flow meter with a diagram.**
   - Appeared in: S22 (Q3b, 04 marks), S23 (Q3b, 04 marks), S24 (Q5b, 04 marks)
3. **Differentiate between power MOSFET and IGBT.**
   - Appeared in: S22 (Q3a, 03 marks), S23 (Q2a, 03 marks)
4. **Explain the function of Actuators in process industries with a suitable example.**
   - Appeared in: S23 (Q3c, 07 marks), S25 (Q3b, 04 marks), W24 (Q2a, 03 marks)
5. **List out/Discuss various sensors used for temperature measurement.**
   - Appeared in: S23 (Q2b, 04 marks), S24 (Q2c, 07 marks)
6. **How is pH measurement done? Explain it in brief.**
   - Appeared in: S22 (Q3b, 04 marks), S23 (Q3b, 04 marks), W24 (Q2c, 07 marks)
7. **Explain RTD and thermocouple along with a temperature transmitter. / Explain the function of an RTD.**
   - Appeared in: S22 (Q3a, 03 marks), S23 (Q3a, 03 marks), S25 (Q2c, 07 marks)

Other Important Questions:

8. **List out the various sensors used for pressure measurement.**
   - Appeared in: S23 (Q2b, 04 marks)
9. **List different Pressure and Temperature Sensors used in Automation.**
   - Appeared in: W22 (Q2b, 04 marks)
10. **List different sensors used for pressure, force, flow, and level in Automation.**
    - Appeared in: S25 (Q3b, 04 marks)
11. **List out & explain in detail the sensors for temperature, pressure, force, displacement, speed & flow.**
    - Appeared in: W23 (Q2c, 07 marks)
12. **Explain different pressure measurement transducers with a neat diagram.**
    - Appeared in: S24 (Q2c-OR, 07 marks)
13. **Define terms: Transducer, Sensor, Transmitter. Write any two examples of each.**
    - Appeared in: S25 (Q2a, 03 marks)
14. **Distinguish between a transducer and a sensor.**
    - Appeared in: W23 (Q2a, 03 marks)
15. **Explain any one Displacement Transducer with a neat diagram.**
    - Appeared in: S22 (Q1b, 04 marks)
16. **List the different types of speed-measuring devices. Explain with neat sketches the construction and working of any one/two of them.**
    - Appeared in: S22 (Q2c-OR, 07 marks), W24 (Q2c-OR, 07 marks)
17. **Explain the role of Power Electronics Devices in Automation including DIAC & TRIAC. / Explain the role of DIAC, TRIAC in automation.**
    - Appeared in: W22 (Q3c, 07 marks), S24 (Q3b, 04 marks)
18. **Explain the usage of various power electronics devices in industrial automation.**
    - Appeared in: S25 (Q2c-OR, 07 marks)
19. **Explain the working of DC and AC servo drives for motion control. / Discuss the difference between AC Servo Motor and DC Servo Motor.**
    - Appeared in: W22 (Q4b, 04 marks), S25 (Q4b, 04 marks), W24 (Q2b, 04 marks)
20. **Enlist various applications of AC/DC servo motor drives as actuators.**
    - Appeared in: S24 (Q2b, 03 marks)

Unit 3: Programmable Logic Controllers (PLC)

Repeated Questions:

1. **Develop a ladder diagram for a DOL (Direct-On-Line) starter to start an electric motor.**
   - Appeared in: S22 (Q3c, 07 marks), S23 (Q2c-OR, 07 marks), S24 (Q4b, 04 marks), W24 (Q3c, 07 marks)
2. **Develop a ladder diagram for a Star-Delta starter to start an electric motor.**
   - Appeared in: S24 (Q3c, 07 marks), S25 (Q3c, 07 marks), W24 (Q3c, 07 marks)
3. **Explain the factors affecting PLC selection and PLC installation.**
   - Appeared in: S24 (Q3a, 03 marks), W22 (Q4c, 07 marks)
4. **Explain the advantages and features of Sequential Flow Chart (SFC) over a Ladder Diagram.**
   - Appeared in: S24 (Q3b, 04 marks)
5. **Explain elements of a ladder diagram and its application.**
   - Appeared in: S22 (Q2a, 03 marks), S23 (Q3a, 03 marks), W24 (Q3a, 03 marks)
6. **Develop a ladder diagram to make AND logic and OR logic with Boolean expression and circuit diagram.**
   - Appeared in: S22 (Q3c, 07 marks), S23 (Q3c, 07 marks), W24 (Q3a, 03 marks)
7. **Develop a ladder diagram to make NAND, EX-NOR, and NOR logic with symbol and truth table.**
   - Appeared in: S24 (Q3c, 07 marks)

Other Important Questions:

8. **List out various programming languages used in PLC.**
   - Appeared in: S24 (Q3a, 03 marks), W24 (Q5a, 03 marks)
9. **Give the comparison of FBD (Function Block Diagram) and Ladder Language for PLC Programming.**
   - Appeared in: W22 (Q3b, 04 marks)
10. **Draw the layouts of PLC input and output modules and explain each in detail. / Explain in detail the input-output module used in PLC.**
    - Appeared in: W23 (Q2b, 04 marks), S23 (Q4b, 04 marks), S22 (Q4b, 04 marks)
11. **Explain Analog and Digital input and output modules used in PLC.**
    - Appeared in: W24 (Q4b, 04 marks)
12. **Explain the difference between fixed PLC and modular PLC.**
    - Appeared in: S25 (Q3a, 03 marks)
13. **What are the basic differences between PLC On-delay timer and Off-delay timer? / How the PLC Off-Delay Timer works.**
    - Appeared in: W24 (Q3b, 04 marks)
14. **Draw the timing diagram of a retentive timer. Draw the timing diagram and write PLC ladder logic equivalent of ON Delay and Dual OFF Delay timer.**
    - Appeared in: W23 (Q2c-OR, 07 marks)
15. **Draw and explain the PLC ladder diagram for automatic bottle filling plant.**
    - Appeared in: W23 (Q3c, 07 marks), W24 (Q5c, 07 marks)
16. **Draw and explain the PLC ladder diagram for automatic Traffic Control Lights.**
    - Appeared in: W23 (Q3c, 07 marks), W24 (Q4c, 07 marks)
17. **Draw and explain a ladder diagram to control a high-level switch and low-level switch for water level control for an overhead tank. / Draw and explain the ladder diagram & module wiring for a water level controller.**

- Appeared in: S24 (Q4c, 07 marks), W23 (Q4c, 07 marks), W24 (Q4c, 07 marks)

18. **Explain PLC communication with field devices and SCADA using various networking protocols.**
    - Appeared in: S25 (Q3c, 07 marks)
19. **List out advantages & disadvantages of PLC for Industrial automation. / Explain the benefit of using PLC for industrial applications. Explain the disadvantage of PLC over other microcontrollers.**
    - Appeared in: W23 (Q4b, 04 marks), S22 (Q5b, 04 marks)
20. **State the applications of PLC.**
    - Appeared in: W22 (Q4a, 03 marks)

Unit 4: Distributed Control System (DCS)

Repeated Questions:

1. **Explain the features and advantages of DCS systems.**
   - Appeared in: S22 (Q4a, 03 marks), S23 (Q5b, 04 marks), S24 (Q4a, 03 marks), W24 (Q4a, 03 marks)
2. **Draw and explain the block diagram of DCS. Explain its features and advantages.**
   - Appeared in: W22 (Q4c, 07 marks), S25 (Q4c, 07 marks)
3. **Explain the Communication configuration of DCS.**
   - Appeared in: S24 (Q5a, 03 marks), W22 (Q5a, 03 marks)
4. **Compare PLC and DCS system. / Write the difference between PLC & DCS.**
   - Appeared in: W23 (Q3a, 03 marks), S23 (Q4a, 03 marks), S22 (Q4a, 03 marks), S25 (Q5a, 03 marks)
5. **Explain about software configuration of DCS.**
   - Appeared in: W23 (Q5a, 03 marks), S25 (Q4b, 04 marks)

Other Important Questions:

6. **Define term DCS. List at least six applications of DCS. / State any five applications of DCS.**
   - Appeared in: W23 (Q4b, 04 marks), S25 (Q4a, 03 marks), W24 (Q4a, 03 marks)
7. **Explain advantage and Limitation of DCS.**
   - Appeared in: W23 (Q3b, 04 marks)
8. **Explain DCS integration with PLC and Computers.**
   - Appeared in: W22 (Q5a, 03 marks)
9. **Explain in detail about DCS Communication and networking in Industrial Automation.**
   - Appeared in: S25 (Q4c, 07 marks)
10. **Discuss about the various types of displays that can be achieved using DCS for efficient monitoring of plant parameters.**
    - Appeared in: S22 (Q4c, 07 marks)
11. **Explain different types of timers available in DCS.**
    - Appeared in: S24 (Q5b, 04 marks)
12. **List out the various programming languages used for DCS.**
    - Appeared in: S25 (Q4a, 03 marks)

Unit 5: Robotics and Advanced Topics (IoT & Industry 4.0)

Repeated Questions:

1. **Explain the basic construction and configuration of a robot for industrial applications.**
   - Appeared in: W22 (Q4a, 03 marks), W23 (Q5a, 03 marks), S25 (Q5b, 04 marks)
2. **Explain the working principle of a pick and place robot. / Explain Pick and place robot in brief.**
   - Appeared in: S22 (Q5c, 07 marks), S23 (Q5c, 07 marks), S24 (Q5c, 07 marks)
3. **Explain the working of a welding robot. / Explain Welding robot in brief.**
   - Appeared in: S22 (Q5c, 07 marks), S23 (Q5c, 07 marks), S24 (Q5c, 07 marks)
4. **What is Industry 4.0 revolution? / Explain Industry 4.0 revolution in brief.**
   - Appeared in: S24 (Q5a, 03 marks), W22 (Q4b, 04 marks), S23 (Q5b, 04 marks), S25 (Q5b, 04 marks), W24 (Q5a, 03 marks)
5. **What do you mean by IoT? How it is useful in industrial automation?**
   - Appeared in: S22 (Q5a, 03 marks), S23 (Q5a, 03 marks), W24 (Q5b, 04 marks)
6. **Draw and explain the major components of the Internet of Things (IoT) in industrial automation. Also, list out its applications.**
   - Appeared in: S24 (Q4c, 07 marks), W23 (Q5c, 07 marks), W22 (Q5c, 07 marks)

Other Important Questions:

7. **Discuss the significance and application of pick and place and welding robots for industrial applications.**
   - Appeared in: W23 (Q5c, 07 marks), S25 (Q5c, 07 marks), W24 (Q5b, 04 marks)
8. **Explain the major configurations of Industrial Robots.**
   - Appeared in: S22 (Q5a, 03 marks), S23 (Q5a, 03 marks), W24 (Q5c, 07 marks)
9. **What is a robot? & Explain Basic construction and configuration of robots.**
   - Appeared in: S22 (Q5b, 04 marks)
10. **How can robots help achieve better performance in industrial automation?**
    - Appeared in: S25 (Q5a, 03 marks)
11. **Explain in detail about the usage of the Internet of Things in industrial automation with any one suitable example.**
    - Appeared in: S25 (Q5c, 07 marks)

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