**Q. Code:428343**

**Reg. No.** | | | | | | | | | | | | | |

# B.E. / B.TECH. DEGREE EXAMINATIONS, MAY 2024

Third Semester

## MN22301 – INTRODUCTION TO INDUSTRIAL AUTOMATION

*(Mechanical Engineering)*

**(Regulation 2022)**

**TIME: 3 HOURS** **MAX. MARKS: 100**

| COURSE OUTCOMES | STATEMENT | RBT LEVEL |
|---|---|---|
| **CO 1** | Appraise the role of various elements available in automation process. | **3** |
| **CO 2** | Describe the working of sensors and transducers used in automation. | **3** |
| **CO 3** | Explain the architecture of various microcontrollers and embedded systems used in automation. | **3** |
| **CO 4** | Categorize the different levels of automation and material handling systems. | **3** |
| **CO 5** | Describe the integration of various elements of automation in real time applications. | **3** |

### PART- A (20 x 2 = 40 Marks)

(Answer all Questions)

| | | CO | RBT LEVEL |
|---|---|---|---|
| **1.** | Automated manufacturing system not suitable for repetitive tasks-True/False. Justify. | **1** | **3** |
| **2.** | Recognize the various levels of industrial automation and indicate the level that the sensors and actuators belong to. | **1** | **3** |
| **3.** | Increased flexibility is a one of the strategies in automation - True/False. Justify. | **1** | **3** |
| **4.** | How the advanced automation functions help to ensure the safety of human workers? | **1** | **3** |
| **5.** | Distinguish between transducer and sensor. | **2** | **2** |
| **6.** | List any four factors considered for selection of industrial sensors. | **2** | **2** |
| **7.** | Distinguish between static and dynamic characteristics of sensors. | **2** | **2** |
| **8.** | Response time and time delay time of sensors are belonging to static characteristics. True/False. Justify. | **2** | **3** |
| **9.** | Match the following: | **3** | **3** |

Address bus: Transfer the information

Data bus: Carries and control the address of the memory

Control bus: Used to identify the memory location

| | | | |
|---|---|---|---|
| **10.** | CPU in the microprocessor used to store the data – True/False. Justify. | **3** | **3** |
| **11.** | Embedded system is a customized microcontroller - True/False. Justify. | **3** | **3** |
| **12.** | Distinguish between serial communication and parallel communication. | **3** | **2** |
| **13.** | What type of automation system is recommended for batch production? Justify. | **4** | **3** |
| **14.** | How automated flow lines improve the productivity? | **4** | **2** |
| **15.** | What kind of activities are carryout in the field level of automation system? | **4** | **2** |
| **16.** | Automated Guided Vehicle is fall under machine automation - True/False. Justify | **4** | **3** |
| **17.** | Link line concept used to link the workstations using links – True/False. Justify. | **5** | **3** |
| **18.** | What is the role of industrial robots in automation? | **5** | **2** |
| **19.** | What type of simulation is essential for implementing the automation – Machine simulation/Process simulation. Justify. | **5** | **3** |
| **20.** | How bar codes are used in the industrial automation? | **5** | **2** |

## PART- B (5 x 10 = 50 Marks)

| | | Marks | CO | RBT LEVEL |
|---|---|---|---|---|
| **21. (a)** | Identify the different layers of automated grocery packaging system. Explain the function of each layer. | **(10)** | **1** | **3** |
| | **(OR)** | | | |
| **(b)** | What are the six benefits of automation system? Discuss in detail, how the automated system is more efficient compared to conventional system. | **(10)** | **1** | **3** |
| **22. (a)** | Distinguish between accuracy and precision of sensors. Explain with suitable example. | **(10)** | **2** | **3** |
| | **(OR)** | | | |
| **(b)** | Recommend the suitable sensor for finding the liquid level and explain its working principle with suitable diagram and example. | **(10)** | **2** | **3** |

| | | | | |
|---|---|---|---|---|
| **23. (a)** | Discuss the elements and working of embedded system applied to control the washing machine. | **(10)** | **3** | **3** |
| | **(OR)** | | | |
| **(b)** | How the microcontrollers are used in the television assembly line? Explain in detail with suitable diagrams. | **(10)** | **3** | **3** |
| **24. (a)** | What are the different levels of automation to implement the Industry 4.0 in the car manufacturing industry? Explain with suitable diagram. | **(10)** | **4** | **3** |
| | **(OR)** | | | |
| **(b)** | Recommend the suitable material handling system to transport the semi-finished products between the different work stations of car engine block finishing operations and explain the same with suitable diagram. | **(10)** | **4** | **3** |
| **25. (a)** | Discuss the challenges in implementing the partial automation in manufacturing industry and discuss the advantages of partial automaton. | **(10)** | **5** | **3** |
| | **(OR)** | | | |
| **(b)** | Discuss the procedure for implementing the ASRS system in food processing industries. | **(10)** | **5** | **3** |

## PART- C (1 x 10 = 10 Marks)

(Q.No.26 is compulsory)

| | | Marks | CO | RBT LEVEL |
|---|---|---|---|---|
| **26.** | With suitable sketch, discuss how the automation is implemented in the vertical machining center? | **(10)** | 4 | **5** |

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