

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

Fourth Semester B.Tech (Minor) Degree Examination June 2024 (2022 Admission)

**Course Code: RAT282****Course Name: INTRODUCTION TO INDUSTRIAL AUTOMATION**

Max. Marks: 100

Duration: 3 Hours

**PART A***(Answer all questions; each question carries 3 marks)*

Marks

- |    |  |   |
|----|--|---|
| 1  | Explain the need for AI and expert systems in Computer Integrated Manufacturing?             | 3 |
| 2  | Explain the principles of Transfer Lines?  | 3 |
| 3  | Describe the use of electrical actuators in industrial automation?                           | 3 |
| 4  | Explain the working of any one non-contact temperature measurement system?                   | 3 |
| 5  | Describe the need for automated tool changers?   | 3 |
| 6  | List the different types of standard guide ways based on the geometry?                       | 3 |
| 7  | Explain the different actuation mechanisms in Directional Control Valves?                    | 3 |
| 8  | Explain how a pressure relief valve controls the maximum operating pressure?                 | 3 |
| 9  | Draw the ladder diagram for the following logic functions?<br>(i) XOR gate<br>(ii) NAND gate | 3 |
| 10 | With suitable example explain latching in PLC Ladder logic?                                  | 3 |

**PART B***(Answer one full question from each module, each question carries 14 marks)***Module -1**

- |    |  |   |
|----|--|---|
| 11 | a) Explain how group technology is used in designing manufacturing cells?            | 8 |
|    | b) Explain the advantages of Mechanization and Automation in manufacturing industry? | 6 |
| 12 | a) Explain the features of Flexible Manufacturing System?                            | 8 |
|    | b) Describe how the manufacturing flexibility is tested?                             | 6 |

**Module -2**

- |    |   |   |
|----|---|---|
| 13 | a) Compare the construction and working of linear potentiometer and rotary potentiometer with appropriate sketches? | 8 |
|----|---|---|

- b) With neat sketches explain the working of (i) Photoelectric sensors (ii) Thermoelectric sensors? 6
- 14 a) What is strain gauge? Explain the function of strain gauge with practical application.? 8
- b) Give practical examples of design and implementation of sensor system? 6

**Module -3**

- 15 a) Explain the working of CNC system with the help of a block diagram? 6
- b) Explain the effect of preloading and characteristics of ball screw based linear Devices? 8
- 16 a) Explain various design considerations in material handling? 8
- b) With neat sketches explain adaptive control of machine tools? 6

**Module -4**

- 17 a) Design a pneumatic circuit for A+B+ B-A- sequencing operation using Karnaugh- Veitch method? 8
- b) Discuss in detail about single and multiple actuator system? 6
- 18 a) With a neat sketch describe the working of an on-delay timer in an electro pneumatic circuit? 6
- b) Illustrate a clear diagram showing the basic components of a pneumatic system? 8

**Module -5**

- 19 a) Describe in detail about timers and counters in PLC? 6
- b) Explain about various blocks in machine vision systems with neat diagrams? 8
- 20 a) Demonstrate the role of CMM in automated manufacturing? 6
- b) Create a clear sketch illustrating the basic components of a PLC? 8

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