

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

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

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

B.Tech S4 (Minor) Degree Examination May 2025 (2023 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  | What are the types of Automation?  | 3 |
| 2  | Explain programmable Automation?   | 3 |
| 3  | Explain any two situations when pneumatic actuators are preferred over hydraulic actuators?                  | 3 |
| 4  | With the help of a diagram describe the working of linear variable differential transformer?                 | 3 |
| 5  | Differentiate between storage capacity and storage density with reference to performance of storage systems? | 3 |
| 6  | Discuss in detail about the pallet changers?   | 3 |
| 7  | Describe the functioning of hydraulic system with the help of block diagram?                                 | 3 |
| 8  | Describe the concept of cushioning in pneumatic cylinders?   | 3 |
| 9  | What advantages does a PLC have over electromechanical relay control?  | 3 |
| 10 | Explain the importance of internal relays in PLC programming?  | 3 |

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

- |    |   |   |
|----|---|---|
| 11 | a) Explain the need for AI and expert systems in Computer Integrated Manufacturing? | 8 |
|    | b) Describe the following types of automated flow lines                             | 6 |
|    | (i) Segmented in-line type  |   |
|    | (ii) Carousel assembly  |   |
| 12 | a) Explain the necessity of automation and its classification?                      | 6 |
|    | b) Explain different types of FMS layout?   | 8 |

**Module -2**



- 13 a) Explain the working of an optical absolute and incremental encoder? 8  
 b) Explain how the number of tracks and sectors of absolute encoder is related to the resolution of the encoder? 6

- 14 a) Describe the working of a mechanical resolver? 7  
 b) Explain the working of a Seebeck effect based thermal transducer? 7

#### Module -3

- 15 a) Sketch and explain the working of a servomotor? 7  
 b) Discuss in detail the types of Automated Guided Vehicles and its application 7  
 16 a) What are the things to be noted while selecting the drives for CNC machines? 8  
 b) Explain the working of any one type of stepper motor with neat sketch? 6

#### Module -4

- 17 a) Explain basic components of a pneumatic system with a neat sketch? 6  
 b) Describe the working of an on-delay timer in an electro pneumatic circuit with a neat sketch? 8  
 18 a) Explain the different types of flow control valves with necessary diagrams? 6  
 b) Compare the construction and working of a single acting cylinder and a double acting cylinder? 8

#### Module -5

- 19 a) Differentiate on line and off line inspection? 6  
 b) A pump is to be used to fill two storage tanks. The pump is manually started by the operator from a start/stop station. When the first tank is full, the control logic must be able to automatically stop flow to the first tank and direct flow to the second tank through the use of sensors and electric solenoid valves. When the second tank is full, the pump must shut down automatically. Develop a ladder diagram to process the sequence.? 8  
 20 a) Describe various non-contact inspection methods? 6  
 b) Illustrate a ladder circuit for the following i) Latching ii) Full Subtractor 8

\*\*\*