Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S5 (R,S) Examination November 2025 (2019 Scheme)

Course Code: RAT305

Course Name: INDUSTRIAL AUTOMATION

Max. Marks: 100 Duration: 3 Hours

PART A

(Answer all questions; each question carries 3 marks) Marks

1		Differentiate between mechanization and automation.	3
2		Explain the types of production system.	3
3		Differentiate between absolute encoder and incremental encoder.	3
4		State the functions of machine vision system.	3
5		Define the terms flow rate, routing and scheduling in material handling.	3
6		Explain the concept of automatic gauging and size control systems.	3
7		Classify the different types of control valves	3
8		Explain the construction and working of a single acting cylinder.	3
9		Illustrate the ladder diagram of a half adder circuit.	3
10		Compare the different types of counters used in PLCs.	3

PART B

(Answer one full question from each module, each question carries 14 marks)

Module -1

11	a)	Explain the basic elements of an automated system	7
	b)	Differentiate between in-line and segmented in-line automated flow line structures.	7
12	a)	Describe the different types of automation with examples.	7
	b)	Explain the concept of computer integrated manufacturing	7

Module -2

13	a)	Explain the construction and working of different proximity sensors.	10

b) List out any three advantages and disadvantages of LVDT 4

14 a) State the need and use of electrical actuators in Automation industry 7

b) Explain the importance of calibration in sensors with suitable examples 7

Module -3

15 a) Describe the process of material handling and identification in the production system. 7

b) Outline the advantages of automatic pallet changers. 7

16 a) Summarize the different material transport equipment used. 7

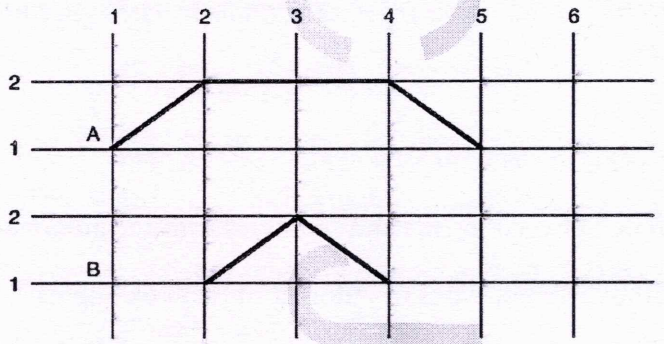
b) Compare the construction and working of a servo motor and a stepper motor. 7

Module -4

17 a) Explain the OR function realization using 3/2 DCVs. 5

b) Consider a simple operation where a double-acting cylinder is used to transfer parts from a magazine. The cylinder is to be advanced either by operating a push button or by a foot pedal. Once the cylinder is fully advanced, it is to be retracted to its initial position. A 3/2-way roller lever valve is to be used to detect the full extension of the cylinder. Design a pneumatic circuit for the above-mentioned application. 9

18 a) If the movement diagram for a two cylinder (A & B) pneumatic system is given in the figure below, draw the pneumatic circuit diagram for the same using cascade method. 10



b) Describe the classification of direction control valves based on the methods of valve actuation. 4

Module -5

19	a)	Explain different types of timers used in the ladder diagram	5
	b)	A Double acting cylinder is used to perform forward and return motion. Pneumatic cylinder is advanced by pressing push buttons PB1. Cylinder is returned by pressing push button PB2. Draw the electro-pneumatic circuit and PLC ladder diagram to implement this task.	9
20	a)	Explain the construction and working of VFD	5
	b)	Consider the movement of parts over a conveyor belt. Out of every set of 1000 parts, one part is taken out for quality check by diverting the part to another section through a solenoid valve operated gate. This must be completed in 10 sec after which the conveyor restarts. Implement automation of this process in PLC using ladder diagrams.	9

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