

Register No.: Name:

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

FIFTH SEMESTER B.TECH DEGREE EXAMINATION (Regular), DECEMBER 2022 ROBOTICS AND AUTOMATION

(2020 SCHEME)

Course Code: 20RBT305

Course Name: Industrial Automation

Max. Marks: 100

Duration: 3 Hours

PART A

(Answer all questions. Each question carries 3 marks)

1. What are the methods adopted to group parts in to part families?
2. Enumerate the tests of flexibility.
3. Explain the need of calibration with any one method.
4. Compare hydraulic and pneumatic Actuators.
5. List out the functions of material handling System.
6. Explain how adaptive control is differentiated from conventional feedback control.
7. Draw the ISO symbol for the following
 - i) Double pilot operated 5/2 direction control valve.
 - ii) Shuttle valve.
8. What is a flow control valve? Mention its types.
9. Draw the ladder diagram for the following logic functions.
 - i. XOR
 - ii. NAND
 - iii. NOR
10. Illustrate the significance of Internal Relays in PLC program.

PART B

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

MODULE I

11.
 - a) With neat sketch explain different types of automated transfer lines used in an industry (8)
 - b) Outline the role of CIM in automated manufacturing (6)

OR

12.
 - a) What is group technology? Explain production flow analysis with necessary steps. (8)

- b) Describe flexible manufacturing systems. What are its different components? (6)

MODULE II

13. a) Explain the working of an optical absolute encoder. How the number of tracks and sectors of absolute encoder is related to the resolution of the encoder? (8)
- b) Explain the construction and working of LVDT with necessary figures. (6)

OR

14. a) Illustrate different types of strain gauges. (7)
- b) Explain automated inspection. Describe its different types. (7)

MODULE III

15. a) Differentiate between AS/RS and carousel storage system. (8)
- b) Explain the working of an AC servomotor. (6)

OR

16. a) Enumerate different types of conveyors used in manufacturing industry with necessary diagrams. (8)
- b) With a block diagram explain elements of CNC Machine (6)

MODULE IV

17. a) Design a pneumatic circuit for A+B+B-A- sequencing using cascade method. (8)
- b) With neat sketches explain the basic electrical devices used in electro pneumatic control. (6)

OR

18. a) With a neat sketch explain any 3 types of pressure relief valves. (6)
- b) Explain basic principle and operation of hydraulic system. (8)

MODULE V

19. a) Two motors are to be controlled in a sequence. The second motor starts 30 seconds after the starting of first motor by a push switch. Develop a PLC ladder diagram for the following cases and describe the circuit. (6)
- (i) Case (A): Only one motor operates at a time.
- (ii) Case (B): Both the motor gets off together after 50 seconds
- b) What is a counter? Explain the Up counter and Down counter with its symbols used in the ladder diagram. (8)

OR

20. a) Double acting cylinder is used to perform continuous to and fro (8)

motion. Cylinder has to move forward when PB1 button is pressed and once to and fro reciprocation starts it should continue till stop button PB2 is pressed. Limit switches are used for end position sensing. Draw the pneumatic circuit, PLC wiring diagram and ladder diagram to implement this task.

- b) Describe On-delay timer and Off-delay timer with suitable figures. (6)
