

Register No.: Name:

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

FIFTH SEMESTER B.TECH. DEGREE EXAMINATION (S), FEBRUARY 2024

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. Differentiate between fixed, programmable, and flexible automation.
2. Explain the concept of machine cells in cellular manufacturing. Mention any three objectives of machine cells.
3. What are synchros and list their applications?
4. Explain the construction of RVDT with suitable sketches.
5. Explain the application of AGVs.
6. Define any three material transporting equipment.
7. What is a flow control valve? Mention its types.
8. What is a relay? Mention its components.
9. What are the different inputs and outputs used in PLC?
10. What are NO and NC contacts in PLC? Sketch the symbols.

PART B

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

MODULE I

11. a) Explain different types of automated transfer lines used in an industry with the help of neat sketches. (7)
b) What is group technology? Explain production flow analysis with necessary steps. (7)

OR

12. a) Explain the FMS component. (7)
b) What are Machine cells? Explain the types of group technology machine cells with figures. (7)

MODULE II

13. a) Explain the basic components of a hydraulic system with the help of a block diagram. (7)
b) Differentiate fluid power system and fluid transport system. (7)

OR

14. a) Explain the construction and working of LVDT with necessary figures. (7)
- b) Explain the construction of a single-acting cylinder with its figure. Also, application of single-acting cylinder. (7)

MODULE III

15. a) Explain the design considerations in material handling. (7)
- b) What is CNC? Also, describe any of its four advantages. (7)

OR

16. a) What is AGVs? Explain any of its two types with sketches. (7)
- b) Explain the working of the AC stepper motor with a sketch. (7)

MODULE IV

17. a) With a neat sketch explain a single actuator electro-pneumatic circuit. (7)
- b) Explain the construction and working of a single stage proportional control valve with its diagram. (7)

OR

18. a) With a neat sketch explain any 3 types of pressure relief valves. (7)
- b) Design A+B+B-A- cylinder sequence using Karnaugh Veitch mapping. (7)

MODULE V

19. a) What is a counter? Explain the Up counter and Down counter with its symbols used in the ladder diagram. (7)
- b) Describe on-delay timer and off-delay timer with suitable figures. (7)

OR

20. a) A double acting cylinder is used to perform pressing operation. Cylinder has to move forward when the PB1 button is pressed and return for a set time of 20 seconds before it automatically returns to initial position. Limit switch S2 is used for end sensing of the forward motion of the cylinder. Draw the pneumatic circuit, PLC wiring diagram and ladder diagram to implement this task. (8)
- b) Design a ladder logic program for the following process: A temperature control system consists of three thermostats. The system operates two heating units. The thermostats are set at 70°C, 75°C and 80°C. Below 70°C, two heaters are on. The temperature between 70°C and 75°C causes one heater to be on. (6)

Above 80°C, there is a safety shutoff for two heaters in case one stays on by mistake. A master switch turns the system on and off.
