

Register No.: Name:

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

FOURTH SEMESTER B.TECH DEGREE EXAMINATION (R), MAY 2024

(2020 SCHEME)

Course Code : 20RBT282

Course Name: Introduction to Industrial Automation

Max. Marks : 100

Duration: 3 Hours

PART A

(Answer all questions. Each question carries 3 marks)

1. Brief the flexible manufacturing system. List the tests of flexibility.
2. Differentiate between fixed, programmable, flexible automation.
3. Explain the construction of RVDT with suitable sketches.
4. Explain the working of a limit switch.
5. Enumerate the design considerations of the material handling system.
6. Sketch and explain working of an AC servomotor.
7. Describe the different actuation mechanisms in direction control valves.
8. Draw the ISO symbol for the following.
 - i) Double pilot operated 5/2 direction control valve.
 - ii) Shuttle valve.
9. Draw the ladder diagram for the following logic functions.
 - i. XOR
 - ii. NAND
 - iii. NOR
10. Differentiate between off-line and on-line inspections.

PART B

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

MODULE I

11. a) Explain how group technology is used in designing manufacturing cells. (7)
- b) Explain different types of Flexible Manufacturing System layout with neat sketch. (7)

OR

12. a) Outline the role of Computer Integrated Manufacturing in automated manufacturing. (8)
- b) An automated transfer line has 30 stations and an ideal cycle time of 2.0 min. Probability of a station failure is $p=0.02$, and the average downtime when a breakdown occurs is 15 min. Determine (a) average production rate R_p and (b) line efficiency E . (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? (7)
- b) Outline the construction and working of LVDT with necessary figures. (7)

OR

14. a) Differentiate between hydraulic and pneumatic system. (7)
- b) Explain the construction and working of linear and rotary potentiometers with appropriate sketches. (7)

MODULE III

15. a) Explain the different types of conveyors used for automated material handling. (8)
- b) Differentiate between Automatic Storage/Retrieval System and Carousel storage system. (6)

OR

16. a) List the components of CNC and explain any four components. (6)
- b) Summarize Automated Guided Vehicle? Explain any of its two types with sketches. (8)

MODULE IV

17. a) With neat sketches explain any 3 types of pressure relief valves. (9)
- b) With diagrams explain sequential control of single acting cylinder. (5)

OR

18. a) Classify and explain different types of flow control valves. (7)
- b) With suitable sketches summarize the basic electrical devices used in electro pneumatic control. (7)

MODULE V

19. a) Components are to be stamped using stamping machine. A double acting cylinder is used to push the die attached down to a fixture one (7)

second after push button is pressed. The die is to return to the initial position upon reaching sufficient stamping pressure as sensed by a pressure switch. Develop an electro-pneumatic control circuit and ladder to implement the control task for the stamping operation.

- b) Explain computerized coordinate measuring machine. (7)

OR

20. a) With the help of a neat block diagram describe PLC architecture. (7)
b) Explain laser interferometer. (7)
