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## SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

**FIFTH SEMESTER B.TECH DEGREE EXAMINATION (S), FEBRUARY 2023**  
**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 types of FMS based on the number of machines in the system.
2. Explain the concept of machine cells in cellular manufacturing. Mention any three objectives of cellular manufacturing.
3. Explain the following sensor specifications with their figures.
  - (i) Hysteresis
  - (ii) Non linearity
4. Explain the construction of RVDT with suitable sketches.
5. Define the following:
  - (i) Flow rate
  - (ii) Routing
  - (iii) Scheduling
6. Define any three material transporting equipment.
7. What is a relay? Mention its components.
8. What are directional control valves? Draw the symbol of spring centered lever actuated 4/3 control valve.
9. What are the advantages of PLC over electromagnetic relays?
10. What are the different inputs and outputs used in PLC?

### PART B

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

#### MODULE I

11. a) Explain the tests of flexibility. (4)  
b) What are the major elements of CIM? Sketch CIM wheel (10)

**OR**

12. a) Explain the FMS component. (8)  
b) Explain different types of FMS layouts with its sketch. (6)

**MODULE II**

13. a) Differentiate fluid power system and fluid transport system. (6)  
b) Explain the basic components of a hydraulic system with the help of a block diagram. (8)

**OR**

14. a) Explain the construction and working of a linear potentiometer and rotary potentiometer with appropriate sketches. (8)  
b) Explain the need for calibration with any one method. (6)

**MODULE III**

15. a) Differentiate crane and hoist. (6)  
b) What is CNC and describe any of its four advantages? (8)

**OR**

16. a) What are the components of CNC and Explain any four components (8)  
b) What are AGVs? Explain any of its two types with sketches. (6)

**MODULE IV**

17. a) What are electro-pneumatic circuits? Explain any of its 2 components. (4)  
b) Components are to be stamped using a stamping machine. A double-acting cylinder is used to push the die attached down to a fixture one second after the push button is pressed. The die is to return to the initial position upon reaching a sufficient stamping time of two seconds. This automatic cycle should stop after 5 cycles. The start button should reset the counter. Develop an electro-pneumatic control circuit to implement the control task for the stamping operation. (10)

**OR**

18. a) Explain the construction and working of a single-stage proportional control valve with its diagram. (7)  
b) Design A+B+B-A- cylinder sequence using karnaughveitch mapping. (7)

**MODULE V**

19. a) What is a counter? Explain the Up counter and Down counter with their symbols used in the ladder diagram. (8)

- b) With the help of a neat block diagram explain PLC architecture. (6)

**OR**

20. a) What are the needs for a PLC? Also, what are the selection criteria of PLC? (7)
- b) Describe the On-delay timer and Off-delay timer with suitable figures. (7)

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