

Register No.: ..... Name: .....

**SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)**

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

**SECOND SEMESTER M.TECH DEGREE EXAMINATION (Regular), MAY 2023****ROBOTICS AND AUTOMATION****(2021 Scheme)****Course Code: 21RA202****Course Name: Programmable Logic Control and Computer Numerical Control****Max. Marks: 60****Duration: 3 Hours****PART A*****(Answer all questions. Each question carries 3 marks)***

1. Differentiate between open loop logic controller and closed loop logic controller
2. With suitable logic describe PLC load operation.
3. Define PROFIBUS.
4. State the advantages of NC systems.
5. Define interpolation. Give the importance of interpolation in CNC.
6. Define simple contour programming.
7. List the parameters involved in APT programming.
8. State the importance of DNC software.

**PART B*****(Answer one full question from each module, each question carries 6 marks)*****MODULE I**

9. Define synchronous logic controller with neat diagram. Compare it with asynchronous type. (6)

**OR**

10. A chemical process has three Pressure sensors at point P, whose outputs are P1, P2 and P3. Assume two quite different voltage levels depending on whether the pressure is less than or at least as great as  $p_1$ ,  $p_2$  or  $p_3$ , respectively ( $p_1 < p_2 < p_3$ ). Zero is assigned to the voltage level corresponding to a pressure lower than  $p$ , and value 1 to the level corresponding to a pressure higher than or equal to  $p$ . Design a Combinational logic controller to generate a binary signal that assumes the value 1 if the pressure lies between  $p_1$ , and  $p_2$ , or is greater than or equal to  $p_3$ , and the value 0 otherwise. (6)

**MODULE II**

11. a) Compare PLC with Relay Logic. (3)  
b) Implement a program which executes the expression (3)  
a' b' c + a c' + a b.

**OR**

12. a) Explain PLC ladder programming with an example. (3)  
b) Define conditional instructions in PLC with suitable example. (3)

**MODULE III**

13. Explain the different types of timers in PLC with neat necessary diagrams. (6)

**OR**

14. a) Explain about the basic relay instructions with example. (3)  
b) What are the comparison instructions used in PLC? (3)

**MODULE IV**

15. Explain about open loop and closed loop NC systems with suitable diagrams. (6)

**OR**

16. Discuss about the design considerations of NC machine tools with an example. (6)

**MODULE V**

17. Explain in detail linear and circular interpolation. (6)

**OR**

18. Explain about CNC software interpolator with flow chart. (6)

**MODULE VI**

19. Demonstrate with a proper block diagram the working of distributive numerical control. (6)

**OR**

20. Explain the working of computer aided programming with a functional block diagram. (6)

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