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: **21RA201**

Course Name: **Industrial Automation**

Max. Marks: **60** **Duration: 3 Hours**

PART A

(Answer all questions. Each question carries 3 marks)

1. List the five various levels of automation.
2. How can ball screws and guideways in CNC machines improve the productivity?
3. List the different categories of material transport.
4. Explain the significance of Part Families in relation to fully automated production lines.
5. What are the key characteristics of discrete manufacturing industries?
6. List the various unit operations in process industries
7. What is Lean production system and list a few strategies to address the current issues in manufacturing industries.
8. What are the traditional areas in production planning and control (PPC)?

PART B

(Answer one full question from each module, each question carries 6 marks)

MODULE I

9. Write short notes on (a) Continuous transfer and (b) Intermittent transfer and prepare an analysis of its merits and demerits. (6)

OR

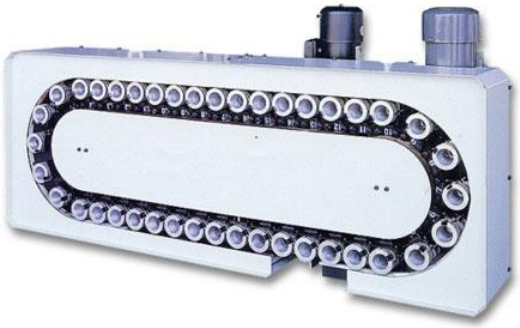
10. Explain the preferable automation migration strategy and its advantages. (6)

MODULE II

11. Write short notes on the basic components of a CNC machine and list at least two differences between an NC and CNC machine. (6)

OR

12. Identify the type of tool changer given in the figure and prepare short notes on the same.



(6)

MODULE III

13. An AGVS has an average loaded travel distance per delivery of 300 ft. The average empty travel distance is not known. The required number of deliveries/hr is fifty. The Load and unload times are each 0.5 min and the AGV speed is 200 ft/min. Anticipated traffic factor = 0.85 and availability = 0.95. Develop an equation that relates the number of vehicles required to operate the system as a function of the average empty travel distance. (6)

OR

14. Briefly explain any two material storage system strategies. Also, analyze its individual merits and demerits. (6)

MODULE IV

15. What are the various components of a Flexible Manufacturing System (FMS)? Also list its benefits. (6)

OR

16. A manufacturing industry has to produce 1800 parts during a work schedule of 30 hours per week. Based on the surface roughness, the parts are grouped into 40 categories. Each category has to be processed at different workstations and the lot size per category is 45 parts. The set-up time for each category requires 1 hour. The average machine cycle time for each part is 15 minutes. Assuming the machine availability as 100% and each category has a similar surface roughness requirement, estimate the number of workstations required during a week. (6)

MODULE V

17. List the various capabilities of a Computer process control and explain any two in detail. (6)

OR

18. Explain the significance of Remote Terminal Unit (RTU) in Distributed Control System (DCS) architecture. (6)

MODULE VI

19. Prepare a brief write-up to illustrate the significance of material delivery in "just-in-time" production. (6)

OR

20. What is Poka – Yoke principle of automation? Prepare a few strategies to address the current issues in manufacturing industries. (6)

****