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

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

FIRST SEMESTER M.TECH DEGREE EXAMINATION (Regular), DECEMBER 2023

ROBOTICS AND AUTOMATION

(2021 Scheme)

Course Code: 21RA103

Course Name: Fluid Power Automation

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

PART A

(Answer all questions. Each question carries 3 marks)

1. Enumerate the advantages of pneumatics over hydraulics.
2. Explain the construction and operation of an accumulator.
3. Compare ball seat valves and disc seat valves.
4. List various types of hydraulic servo valves.
5. Explain the method of direct control of a single acting cylinder.
6. Draw a pneumatic circuit for the control of a double acting cylinder.
7. Describe the advantages of PLC over relay logic.
8. Illustrate the operation of an ON-delay timer with neat sketches.

PART B

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

MODULE I

9. a) Using neat diagrams, describe the working of a vane pump. (4)
   b) Differentiate volumetric efficiency and mechanical efficiency in the case of pumps. (2)

OR

10. a) Give a brief comparison between hydraulic and electric motors. (3)
    b) Explain the operation of vane motor. (3)

MODULE II

11. a) Justify the relevance of power packs in a hydraulic circuit. (3)
    b) Explain the operation of a telescopic cylinder with neat diagrams. (3)

OR

12. a) Explain the construction and operation details of any two types of accumulators (4)
    b) Draw the ISO symbols of (i) solenoid actuated 4/2 DCV (ii) pilot operated 3/2 DCV (iii) check valve (iv) manually operated 2/2 DCV (2)

MODULE III

13. a) Explain about the working of hand operated 3/2 DCV. (4)
    b) Describe about the design requirements to be made on early design stages of a spool valve. (2)

OR

14. a) Describe about the valve sizing of flow control valves. (3)
    b) Illustrate the working of a pressure limiting valve. (3)

MODULE IV

15. a) Explain the working of an electro hydraulic servo valve. (3)
    b) What are the three lap conditions in the electro hydraulic servo valves? Explain in detail. (3)

OR

16. a) Draw the pressure characteristics of a servo valve. (3)
    b) Compare and explain proportional valves and servo valves. (3)

MODULE V

17. a) Explain in detail about speed control of cylinders using meter in circuits. (2)
    b) Design a hydraulic circuit for generating A+A-B+B- cylinder sequencing using cascade method. (4)

OR

18. a) Design a hydraulic circuit for generating A+A-B+B- cylinder sequencing using KV Map Method. (4)
    b) What are the different steps involved in the design of Pneumatic cylinder sequencing circuits using KV map method? Explain. (2)

MODULE VI

19. a) Draw the architecture of a programmable logic controller. explain about ladder programming with a suitable example. (4)
    b) Identify the electrical control of hydraulic circuits in fluid power industries. (2)

OR

20. a) Develop an electropneumatic circuit for direct control of a single acting cylinder. (4)
    b) Describe various applications of counters in electro hydraulic systems. (2)

****