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

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

FIRST SEMESTER M.TECH DEGREE EXAMINATION (Regular), DECEMBER 2022

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. Draw and explain the basic components of a pneumatic system.
2. Explain the construction and operation of a piston type accumulator.
3. Describe the constructional details of a check valve.
4. List various types of Hydraulic Servo valves.
5. Design a logic 'OR' operation using 3/2 DCV and shuttle valve.
6. Draw a pneumatic circuit for the control of a double acting cylinder.
7. Enumerate 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 piston pump. (4)
   b) Draw the ISO symbols of (i) hydraulic motor (ii) pneumatic motor (iii) hydraulic pump and (iv) pneumatic pump. (2)

OR

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

MODULE II

11. a) Draw the constructional details of a manually operated 3/2 DCV (Normally Closed). (3)
    b) Explain the operation of a double acting cylinder with neat diagrams. (3)

OR

12. a) Explain the construction and operation details of any two types of valve cushioning. (4)
    b) Draw the ISO symbols of (i) solenoid actuated 5/2 DCV (ii) pilot (2)

operated 4/2 DCV (iii) check Valve (iv) manually operated 3/2 DCV

MODULE III

13. a) Explain about the working of 3/5 valves. (4)
    b) Discuss 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 reducing valve. (3)

MODULE IV

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

OR

16. a) Draw the flow 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+B+A-B- cylinder sequencing using cascade method. (4)

OR

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

MODULE VI

19. a) Draw the block diagram of a programmable logic controller. Explain about ladder programming with a suitable example. (4)
    b) Share your ideas on electrical control of pneumatic circuits in fluid power industries. (2)

OR

20. a) With the help of neat schematic diagrams, explain the control of a double acting pneumatic cylinder using relay logic and explain about different electrical components used in the system with its symbols. (4)
    b) Describe various applications of timers in electro hydraulic systems. (2)

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