

Register No.: Name:

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

SIXTH SEMESTER B.TECH DEGREE EXAMINATION (R), MAY 2023**ROBOTICS AND AUTOMATION****(2020 SCHEME)****Course Code : 20RBT332****Course Name: Fluid Power Automation****Max. Marks : 100****Duration: 3 Hours****PART A*****(Answer all questions. Each question carries 3 marks)***

1. State pascal law and explain the working of hydraulic lift.
2. Explain the function of pump in hydraulic system and discuss their types.
3. Define FRL Unit.
4. Explain why end cushioning is provided in hydraulic cylinder operations.
5. Distinguish between solenoid valve and proportional control valve.
6. Explain the construction of an electrohydraulic servo valve.
7. What is a Karnaugh Map? Explain the rules of K-Map.
8. Describe the working mechanism of a single-acting cylinder in pneumatics.
9. Define scan cycle in PLC.
10. Explain the role of relays in hydraulic and pneumatic circuits.

PART B***(Answer one full question from each module, each question carries 14 marks)*****MODULE I**

11. a) Explain the working of external gear pump and describe its performance measure in detail. (8)
- b) Describe any four applications of fluid power system. (6)

OR

12. a) Explain the working principle and construction of vane pump with a diagram. (10)
- b) Briefly describe about single acting hydraulic cylinders. (4)

MODULE II

13. Describe the working principle of three types of hydraulic accumulators. (14)

OR

14. a) With a neat sketch explain the working of pressure reducing valve. (8)

- b) Distinguish between check valve and shuttle valve with neat figures. (6)

MODULE III

15. a) Explain electro hydraulic servo valve with a neat diagram. (10)
b) Draw and explain flow curve for a servo valve. (4)

OR

16. Determine the system accuracy for a servo system containing the following characteristics. (14)
- $G_{SV} = 2.46 \text{ cm}^3/\text{s}$.
 $G_{CYL} = 0.031 \text{ cm}/\text{cm}^3$.
Cylinder area = 32.3 cm^2 .
 $H = 1.57 \text{ V}/\text{cm}$.
 $V_{OIL} = 819 \text{ cm}^3$.
Mass of load = 450 Kg.
System deadband = 4 mA.
Bulk Modulus of oil = 1200 Mpa.

MODULE IV

17. Design and draw a hydraulic circuit for the A+ B+ B- A- sequencing operation and explain it. (14)

OR

18. With the help of the truth table and ladder diagram, explain the half-adder combinational circuit. (14)

MODULE V

19. a) Explain the working principle of a PLC with neat block diagram and list out the advantages of PLC? (7)
b) When a Car enters the hall, a certain sequence is to be followed automatically. Steps are, 1) Soaping, 2) Washing, 3) Rinsing and 4) Drying. Develop this process sequence in PLC using ladder diagram programming. (7)

OR

20. a) What is a PLC Counter? With help of neat ladder diagram explain how counters work in PLC. (10)
b) Differentiate between T-ON and T-OFF timer. (4)
