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Question Paper Code	13473
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B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2025

Fourth Semester

Mechanical and Automation Engineering

20MUPC401 - FLUID POWER AUTOMATION

Regulations - 2020

Duration: 3 Hours

Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

	Marks	K – Level	CO
1. Pascal's Law states that: (a) Flow rate is constant (b) Pressure in a fluid is transmitted equally in all directions (c) Fluids have no mass (d) All of the above	1	K1	CO1
2. Pneumatic systems typically operate using: (a) Water (b) Hydraulic oil (c) Compressed air (d) Steam	1	K1	CO1
3. Which of the following is a type of positive displacement pump? (a) Centrifugal pump (b) Axial flow pump (c) Gear pump (d) Jet pump	1	K1	CO2
4. Which actuator type is used for rotary motion? (a) Linear actuator (b) Servo valve (c) Pneumatic motor (d) Proportional valve	1	K1	CO2
5. What type of circuit is used to synchronize two cylinders? (a) Meter-in circuit (b) Counterbalance circuit (c) Sequencing circuit (d) Bleed-off circuit	1	K1	CO3
6. What type of hydraulic circuit is best suited for providing fast cylinder extension and slow retraction? (a) Meter-in circuit (b) Meter-out circuit (c) Regenerative circuit (d) Intensifier circuit	1	K1	CO3
7. What is the function of a quick exhaust valve? (a) Reduce pressure (b) Increase flow (c) Rapid cylinder retraction (d) Lubricate air	1	K1	CO4
8. Which of these is not a pneumatic control element? (a) Muffler (b) Solenoid valve (c) Flow control valve (d) Reservoir	1	K1	CO4
9. What is the maximum number of cylinders that the Cascade method can efficiently control in a pneumatic circuit? (a) 1 cylinder (b) 2 cylinders (c) 3 cylinders (d) More than 3 cylinders	1	K1	CO5
10. What is the main advantage of digital hydraulics? (a) Simplicity (b) Continuous flow control (c) High power loss (d) Low responsiveness	1	K1	CO6

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

11. Compare and contrast the advantages of pneumatic systems over hydraulic systems.	2	K2	CO1
12. Outline any four benefits of fluid power automation.	2	K2	CO1
13. Identify factors to be considered when selecting a hydraulic pump for a specific application.	2	K3	CO2
14. What is the purpose of a power pack?	2	K1	CO2
15. Apply the purpose of an Intensifier circuit in hydraulics, and where is it typically used?	2	K3	CO3
16. Justify the use of a Regenerative circuit over a standard hydraulic circuit.	2	K2	CO3
17. Describe the operation and application of a flow control valve in hydraulic circuits.	2	K2	CO4
18. What are the common types of direction control valves used in hydraulic systems?	2	K1	CO4
19. Infer the function of a Shift Register in a pneumatic sequencing circuit.	2	K2	CO5
20. What is a sequencing circuit?	2	K1	CO5

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| 21. Define latching in PLC-based control. | 2 | K1 | CO6 |
| 22. List out the applications of using double solenoid valve in electro-pneumatic circuit design. | 2 | K1 | CO6 |

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

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| 23. a) (i) Explain Pascal's Law and its applications in hydraulic systems. | 6 | K2 | CO1 |
| (ii) Discuss the key properties of fluids used in hydraulic systems. | 5 | K2 | CO1 |

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| b) (i) Discuss the benefits and impact of automation on manufacturing industries. | 6 | K2 | CO1 |
| (ii) Compare hydraulic and pneumatic systems with suitable examples. | 5 | K2 | CO1 |

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| 24. a) Construct and explain a gear pump with neat sketch. Derive the expression for its theoretical discharge. | 11 | K3 | CO2 |
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| b) Develop and explain the working of various types of actuators with its applications. | 11 | K3 | CO2 |
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| 25. a) Design a meter in, meter out circuit, and explain its working and applications. | 11 | K3 | CO3 |
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| b) Design and explain a pneumatic sequencing circuit using the cascade method for controlling two cylinders. Provide a clear circuit diagram. | 11 | K3 | CO3 |
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| 26. a) Organize the types, construction, and operation of pressure control valves. Explain their role in maintaining system safety and performance. | 11 | K3 | CO4 |
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| b) Model the construction and operation of an air control valve. Discuss how these valves are used to regulate airflow to pneumatic actuators. | 11 | K3 | CO4 |
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| 27. a) With neat sketches, explain the working principle of servo valves and proportional valves. Highlight the key differences between them and their applications. | 11 | K3 | CO5 |
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| b) Design a PLC-based ladder diagram for a pick-and-place application using two cylinders, using latching for continuous operation. | 11 | K3 | CO5 |
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| 28. a) Explain digital hydraulics and its advantages and disadvantages. | 11 | K2 | CO6 |
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| b) Explain about the electro-pneumatic circuit using single-solenoid valves for the control of two cylinders. Illustrate the circuit with a neat diagram. | 11 | K2 | CO6 |
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