K. K. Wagh Institute of Engineering Education & Research, Nashik

(An Autonomous Institute From A.Y. 2022-23)

WINTER-2025	
Exam Seat No.:	
Academic Year:2025-2026	Semester:IV
Class:SY	Program:B.Tech
Branch Code:ROB	Pattern:2022
Name of Course:Hydraulics and Pneumatics	Course Code:ROB222013
Max. Marks:60	Duration:2.30 Hrs.

Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains 2 page(s).
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.
4. Draw the neat labelled diagrams, wherever necessary.
5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question.

		Marks	CO
Question No. 1			
1a)	Define 'fluid power'. List three main advantages and three main limitations of using fluid power systems. What factors are considered when selecting a fluid for a hydraulic system?	(6)	CO1
Question No. 2			
2a)	With a neat sketch, explain the construction and working of an external gear pump. Define 'Theoretical Torque' and 'Volumetric Efficiency' for a hydraulic motor.	(6)	CO2
Question No. 3			
3a)	Explain the working of an automatic cylinder reciprocating system using two sequence valves (or limit switches) with a clear circuit diagram.	(8)	CO3
	OR		
3b)	Describe a hydraulic safety circuit designed for overload protection using a pressure relief valve.	(8)	CO3
3c)	Explain how the speed of a hydraulic motor can be controlled using a pressure-compensated flow control valve.	(8)	CO3
	OR		
3d)	With a suitable circuit, explain how a gas-charged accumulator can be used for shock absorption (damping) in a hydraulic system.	(8)	CO3
Question No. 4			
4a)	What is the primary problem that the Cascade design method solves in pneumatic circuits? Outline the basic steps of this method.	(8)	CO4
	OR		
4b)	List and briefly describe four common industrial applications of pneumatic control systems, explaining why pneumatics is a good choice for them.	(8)	CO4
4c)	Design a pneumatic circuit using AND/OR logic gates for a simple "clamping and drilling" operation.	(8)	CO4
	OR		

4d)	Explain in detail the function of the 'Regulator' and the 'Lubricator' components within a standard FRL unit.	(8)	CO4

Question No. 5

5a)	Explain the principle of operation of a pilot-assisted, solenoid-controlled 5/2 directional control valve used in electro-pneumatics.	(8)	CO5

OR

5b)	Outline the general steps to be followed in troubleshooting any fluid power system, starting from observing the symptoms to confirming the fix.	(8)	CO5
5c)	Compare the use of traditional relay-based control systems with PLC-based systems for automating a hydraulic press. Highlight differences in flexibility, wiring, and troubleshooting.	(8)	CO5

OR

5d)	Develop a PLC ladder logic program for a sequencing operation: When a 'Start' button is pressed, Cylinder A extends. When Cylinder A is fully extended (hits limit switch LS1), Cylinder B extends.	(8)	CO5

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