

DEPARTMENT OF MECHATRONICS VI SEMESTER B.TECH. (OPEN ELECTIVE) END SEMESTER EXAMINATIONS APRIL/MAY 2024 SUBJECT: Hydraulics and Pneumatics (MTE 4303)

(Date: 10/05/2024)

Time: 3 Hours

MAX. MARKS: 50

Instructions for the Candidates:

Answer ALL questions.

Q. No		Μ	CO	PO	LO	BL
1A	Illustrate the working of time delay valve	4	1	1,2	1,2	2
1B	Describe the working of piston type air compressor	4	1	1,2	1,2	2
1C	Illustrate the working of inductive proximity sensor	2	1	1,2	1,2	2
2A	Design the pneumatic control circuit for the sequence A+B+B-A-	4	2	2,3,5,9	2,3,4,5,16	3
28	An electrically heated welding rail is pressed onto a rotatable cold drum by a double acting cylinder and welds a continuous plastic sheet into pieces of tubing. The forward stroke is triggered by means of a push button. The maximum cylinder force is set at 4 bar via a pressure regulator with pressure gauge (This prevents the welding rail damaging the metal drum). The return stroke is not initiated until the forward end position has been acknowledged and the pressure in the piston area has reached 3 bar. The supply air is restricted for the movement of the cylinder. Restarting is only possible when the retracted end position has been reached and a time of t = 2 seconds has elapsed. Reversing a 5/2 way valve with selector switch causes the control to be switched to continuous cycle. Design the electro-pneumatic or Pneumatic control circuit for this application in the paper industry.	4	2	2,3,5,9	2,3,4,5,16	3
2C	Discuss the construction details of 5/2 Direction control valve	2	2	2,3,5,9	2,3,4,5,16	2
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3A	Explain the structure of hydraulic system and compare its merits with pneumatic control system	4	3	1,2	1,2	2



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38	A pump supplies oil at 20 gallons/min to a 50 mm diameter double acting hydraulic cylinder. If the load acting during the extending and retracting stroke is 5000 N and diameter of rod is 25 mm, find: (a) Hydraulic pressure during extension stroke (b) The piston velocity during extension stroke (c) The cylinder kW capacity during extension stroke (d) Hydraulic pressure during return stroke (e) The piston velocity during return stroke (f) The cylinder kW capacity during return stroke	3	3	1,2	1,2	3
3C	Illustrate the construction and working of electric-type pressure sensor	3	1	1,2	1,2	2
4 A	With the help of vertical switching point, soft cool briquettes are to be fed to an upper or lower conveyor according to the selection. The destination of the swivelling slide (upper or lower) is decided by means of a valve with selector switch. The upward motion of the double acting cylinder is to take place in 3 seconds and the downward motion in 2.5 seconds. In the initial position, the cylinder assumes the retracted end position. Design the suitable pneumatic circuit for this application. Fig. 4A Conveyor system	4	2	2,3,5,9	2,3,4,5,16	3
4B	The double acting hydraulic cylinder has to extend rapidly for stamping application in the sheet metal industry. The cylinder has to return automatically after stamping. Design the electro-hydraulic circuit making suitable assumptions for the controls.	4	4	2,3,5,9	2,3,4,5,16	3
4 C	Discuss the working of piston type accumulator with neat diagram	2	3	1,2	1,2	2
5A	Describe the construction and working of counter balance valve and also design the hydraulic circuit to demonstrate the use of this valve for regulating the speed of the vertically mounted double acting cylinder	4	4	2,3,5,9	2,3,4,5,16	3
5B	Design the hydraulic circuit for controlling the double acting cylinder using accumulator as an emergency power source in the system	4	4	2,3,5,9	2,3,4,5,16	3
5C	Illustrate the construction and working of one way flow control valve	2	3	1,2	1,2	2