MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

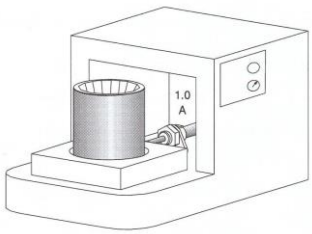
DEPARTMENT OF MECHATRONICS
VI SEMESTER B.TECH. (OPEN ELECTIVE)
END SEMESTER EXAMINATIONS APRIL/MAY 2024
SUBJECT: Hydraulics and Pneumatics (MTE 4303)

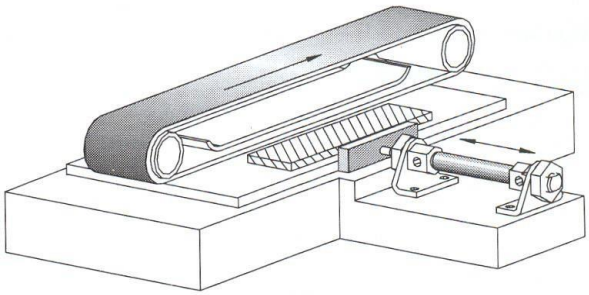
(Date:)

Time: 3 Hours **MAX. MARKS: 50**

Instructions for the Candidates:

- Answer **ALL** questions.

Q. No		M	CO	PO	LO	BL
1A	Illustrate the working of air lubricator	**4**	1	1,2	1,2	2
1B	Describe the working of pneumatic air pressure sensor	**4**	1	1,2	1,2	2
1C	Discuss the working of relay	**2**	1	1,2	1,2	2
2A	Design the pneumatic control circuit for the sequence /A+B+C+/ /B-A-C-/	**4**	2	2,3,5,9	2,3,4,5,16	3
2B	After the liquid paint colors have been poured together into a bucket, they are mixed in by the vibrating machine. When a push button has been pressed, the extended cylinder retracts completely and executes a to and fro movement in the rear stroke range. The oscillating is limited to the retracted end position by a roller lever valve as well as a second roller lever valve in the central position. The frequency of oscillating is adjustable within its limits by setting a pressure regulator controlling the amount of air supply. Set an operating pressure of p = 4 bar. After a specified interval, the oscillator is switched off. The double acting cylinder extends completely and actuates the third roller lever valve. Set a vibration time of t = 5 seconds. Design the electro-pneumatic or Pneumatic control circuit for this application in the paper industry.  Fig. 2B vibrating machine	**4**	2	2,3,5,9	2,3,4,5,16	3
2C	Illustrate the construction details of dual pressure valve	**2**	2	2,3,5,9	2,3,4,5,16	2
3A	Explain the structure of pneumatic system and compare its merits with hydraulic control system	**4**	3	1,2	1,2	2

3B	A hydraulic cylinder is to compress a car body in 10 seconds. The operation requires a stroke of 3 m and a force of 40,000 N. If a 7.5 N/mm^2 pump has been selected, find the following: i) Required piston area and piston diameter. ii) The necessary pump flow. iii) The hydraulic power capacity in kW	**4**	3	1,2	1,2	3
3C	Describe the construction and working of inductive proximity sensor	**2**	1	1,2	1,2	3
4A	Using a sliding table a plank of wood is to be pushed under a belt sanding machine. By pressing a push button switch the sliding table with the plank of wood positioned on it is pushed under the belt sanding machine. By pressing another push button switch the sliding table is returned to its start position. By using 3/2 single solenoid direction control valve design the pneumatic control for this application.  Fig. 4A belt sanding machine.	**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
4C	Explain the working of diaphragm type accumulator with neat diagram	**2**	3	1,2	1,2	2
5A	Discuss the construction and working of unloading valve and also design the hydraulic circuit to demonstrate the use of this valve for unloading the high flow pump in the circuit.	**4**	4	2,3,5,9	2,3,4,5,16	3
5B	Describe the construction and working of indirect acting pressure relief valve	**4**	3	1,2	1,2	2
5C	Illustrate the construction and working of vane pump	**2**	3	1,2	1,2	2