



Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)



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VI SEMESTER B.TECH (MECHATRONICS ENGINEERING)

END SEMESTER EXAMINATIONS, JULY 2016

SUBJECT: HYDRAULICS AND PNEUMATICS [MME 334]

REVISED CREDIT SYSTEM

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

- * Answer ANY FIVE FULL questions.
- ✤ Missing data may be suitably assumed.
- ✤ Relevant neat sketches have to be drawn where ever necessary.
- **1A.** Sketch and explain the working of a lobe pump and a gerotor pump.
- **1B.** Draw the graphic symbols for the following four pump types: fixed displacement, variable **2** displacement, pressure compensated and bi-directional.
- **1C.** With a relevant hydraulic circuit explain how to raise and lower a large weight using a four- **4** way DCV with a tandem neutral.
- **2A.** Explain the function of up counter and down counter.
- **2B.** Two cylinders are used to transfer parts from a magazine onto a chute as shown in figure. When a push button is pressed, the first cylinder extends. Pushing the part from the magazine and positions it in preparation for transfer by the second cylinder onto the out feed chute. Once the part is transferred, the first cylinder retracts, followed by the second. Confirmation of all extended and retracted positions are required. Draw the displacement time diagram and a pneumatic circuit for the execution of the same.



2C. What is the purpose of a sequence valve? Describe its operation with suitable application **2** circuit.

3A. In an assembly station components are to be put together. By pressing two push button switches the device is advanced and the components are assembled. After releasing the push button switches, the device is returned to its start position. Develop a electro pneumatic circuit for this application



- 3B. 3 Clarify the operation principle of a vane pump with neat sketch. 3C. 3 Explain the operation of a gas-charged bladder accumulator with a neat sketch? 4A. 4 Describe the difference between meter-in and meter-out flow control with related circuits. **4B.** Describe the operation of a shell and tube heat exchanger. Why are many small, bronze tubes 3 used instead of a large one? 4C. With relevant sketches show the working principle of full flow filter and proportional flow 3 filter. 2 5A. List the advantages of a pilot-operated PRV over a direct-acting PRV. 5B. Mentioning the advantages explain the construction and working feature of a reed proximity 4 switch. **5C.** Cylinder A (1.0) extends and brings a job under the stamping cylinder B (2.0). Cylinder B 4 then extends and stamps the job. Cylinder A can return back only after cylinder B has retracted fully. Draw an electro-pneumatic control circuit has to be developed for realizing the control task. 2 6A. What is a hydraulic ram? What are the advantages of its construction? Two double-acting pneumatic cylinders, A and B in a process industry should extend together 4 6B. at the same time to open two different valves. On the return stroke too, both the cylinder piston rods retract at the same time. The starting is by a detent switch. Both the cylinders are of the same size with the same stroke length. In terms of notation: $\left[\frac{A+}{B+}\right] \left[\frac{A-}{B-}\right]$. The cycle is to go on till the detent start-up switch is pressed again. Draw the electro-pneumatic circuit. 3
- 6C. With a neat sketch explain the working principle of a flexible diaphragm compressor.

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