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# MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

*A Constituent Institution of Manipal University*

**VII SEMESTER B.TECH. (MECHATRONICS ENGINEERING)**
**END SEMESTER EXAMINATIONS, DEC 2017**
SUBJECT: **HYDRAULIC AND PNEUMATIC SYSTEMS**
**REVISED CREDIT SYSTEM**

Time: 3 Hours MAX. MARKS: 50

**Instructions to Candidates:**

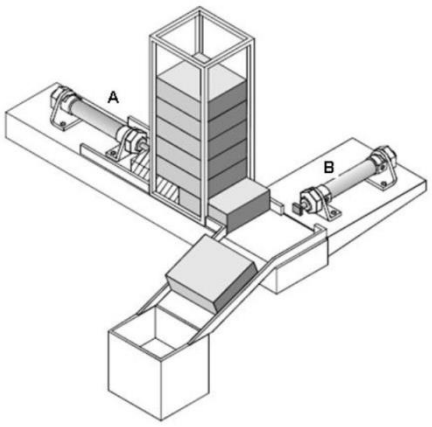
- Answer **ALL** the questions.
- Draw neat sketches using scale and pencil where ever

**1A** How does an external gear pump differ from an internal gear pump? What types of gears are generally used in gear pumps? Explain. 3

**1B** With relevant sketches show the working principle of full flow filter and proportional flow filter. 4

**1C** An input cylinder with diameter 30 mm is connected to an output cylinder with a diameter of 80 mm. A force of 1000 N is applied to the input cylinder. What is the output force? How far would we need to move the input cylinder to move the output cylinder by 100 mm? 3

**2A** 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. 4




**2B** With a neat sketch explain the construction and typical application of a quick exhaust valve. 3

**2C** Clarify the working and application of a "regenerative neutral". 3

**3A** Design an electro-pneumatic circuit for a double acting cylinder to perform a continuous to and fro motion. The cylinder has to stop automatically after performing 50 cycles of operations. 3

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| **3B** | Describe the difference between meter-in and meter-out flow control with related circuits. | 4 |
| **3C** | A pump having a mechanical efficiency of 0.92 and a displacement of 0.00002 $m^3$/rev is to be used in a system with a maximum operating pressure of 15,000 kPa. What is the required driving torque? | 3 |
| **4A** | Cylinder A (1.O) extends and brings a job under the stamping cylinder B (2.0). Cylinder B 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. | 4 |
| **4B** | Describe the operation of a shell and tube heat exchanger. Why are many small bronze tubes used instead of a large one? | 3 |
| **4C** | Explain the construction and working of a time delay valve. | 3 |
| **5A** | Enumerating the common parts, explain the construction of a hydraulic reservoir with a neat sketch. | 3 |
| **5B** | Mention the use, advantages and disadvantages of the different forms of location of the filter in a hydraulic system with neat sketches. | 3 |
| **5C** | Name a type of flow control valve used in fixed displacement pump circuit to reduce the energy consumption compare to other types of FCV. Explain its working principle with a sketch. State its disadvantage. | 4 |