

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI • EXAMINATION – SUMMER 2013****Subject Code: 162004****Date: 29-05-2013****Subject Name: Hydraulic and Pneumatic Systems****Time: 10.30 am - 01.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) (1) State the advantages of hydraulic systems **03**
 (2) Describe following properties of hydraulic fluid **04**
 (1) Viscosity (2) Aging (3) Lubricity (4) Bulk Modulus.
 (b) (1) State the effect of temperature and pressure on viscosity of fluid. **03**
 (2) In Bramah's press (Fig-1) $F_1=60$ kN, $D_1=100$ mm, $S_1=60$ mm, $D_2=200$ mm. **04**
 Find F_2 and S_2 .
- Q.2** (a) (1) Explain briefly fire resistant fluids **03**
 (2) Explain why and where Filters are provided to a hydraulic system. **04**
 (b) (1) Why positive displacement pumps are used in hydraulic systems. **03**
 (2) Give classification of Hydraulic pumps. **04**
- OR**
- (b) (1) Arrange following pumps in order of increasing order of making noise – **03**
 External gear, Internal gear and Piston pump.
 (2) What is the difference between a variable displacement pump and a fixed **04**
 displacement pump? When do the users prefer a variable displacement pump?
- Q.3** (a) Describe construction and operation of Wobble plate axial piston pump. Also **07**
 give the expression of discharge.
 (b) A hydraulic pump supplies 600 lpm oil to a 100mm diameter double acting **07**
 hydraulic cylinder. If the load is 15 kN (Extending and Retracting) and rod
 diameter is 40mm. Find the hydraulic pressure, piston velocity and cylinder
 power (kW) during Extending and Retracting stroke.
- OR**
- Q.3** (a) Describe construction and operation of Radial piston pump. Also explain **07**
 mechanism provided to vary flow rate.
 (b) Design and explain operation of the following: **07**
 (1) High- Low system as applied to hydraulic press.
 (2) Fail safe circuit.
 (3) Regenerative circuit.
- Q.4** (a) (1) Give difference between Meter-in and Meter-out circuit. **03**
 (2) Give difference between Closed centre and tandem centre 4/3 DC Valve. **04**
 (b) In a hydraulic power pack of CNC machining centre bladder accumulator is **07**
 provided to supply instantaneously large flow rate. Every 20 sec the single
 acting cylinder 100/40-200mm stroke carries out a single forward working
 stroke within 01 sec. Force of 50 kN is to be provided during working stroke.
 Estimate,
 (1) Pump pressure and flow rate.
 (2) Accumulator volume.
 (3) Minimum and maximum pressure, and
 (4) Accumulator pre-charge pressure.

OR

- Q.4 (a)** (1) What is the service unit in Pneumatic system? Why it is provided? Clearly mention the functions of each unit of service unit. Draw detailed and simplified symbols of service unit. **05**
 (2) Can speed control be achieved by cushioning? Justify. **02**
(b) Explain construction and operation of, (1) Quick Exhaust valve(2) Shuttle valve **07**
 (3) Twin pressure valve.
- Q.5 (a)** (1) Compare air motor with electric motor **03**
 (2) Explain construction and operation of Time Delay Valve. Illustrate its application by a typical Pneumatic circuit. **04**
(b) (1) Which gas is used in gas charged accumulator? Why? **03**
 (2) Two cylinders are used to transfer parts from a magazine onto a chute. 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 part is transferred, the first cylinder retracts, followed by the second. Design Pneumatic circuit by CASCADE method. Refer Fig 2. for Displacement-step diagram. **04**

OR

- Q.5 (a)** (1) What is Hydrostatic transmission? Give its applications. **03**
 (2) A clamping cylinder is to develop a force of 0.5 tones at normal line pressure of 6 bar. Calculate its diameter considering 5% losses. **04**
(b) (1) Describe any one unconventional compressor. **03**
 (2) Design a Pneumatic circuit by INTUTIVE method. **04**
 Plastic parts are to be placed in a holding fixture and stamped pneumatically. The cylinder 1A pushes the holding fixture under the stamping cylinder 2A. After the stamping operation, the stamping cylinder 2A returns immediately to its initial position. The cylinder 1A returns. Refer Fig 3. for Displacement-step diagram.

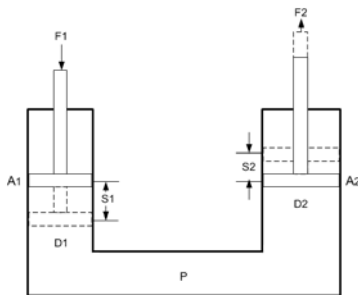


Fig1

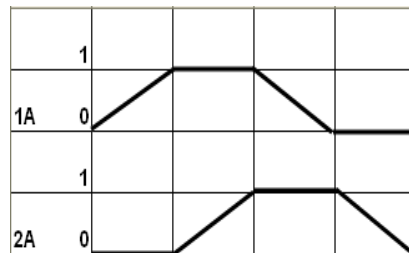


Fig2

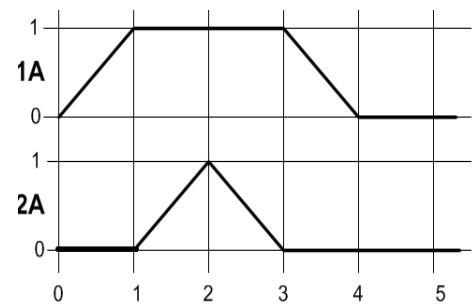


Fig3
