Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**B. E. - SEMESTER – VI • EXAMINATION – WINTER 2012**

**Subject code: 162004 Date: 05/01/2013**

**Subject Name: Hydraulic & Pneumatic System**

**Time: 02.30 pm - 05.00 pm Total Marks: 70**

## Instructions:

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

**Q.1** **(a)** Draw a schematic of a bent axis axial piston pump. Explain briefly its function and give an expression for its geometric volume. **07**

**(b)** State and explain four main center conditions of 4/3 spool type direction control valve. Draw hydraulic symbols of each position for 4/3 solenoid operated spring centered direction control valve. **07**

**Q.2** **(a)** What is the service unit in pneumatic system? Why is it provided? Clearly mention functions of each unit of service unit. Draw detailed and simplified symbols of service unit. **07**

**(b)** Compare 2-way flow control valve and 3-way flow control valve in terms of power losses for Meter-in circuit and Meter-out circuit. Give the equations for the power losses in each case. **07**

**OR**

**(b)** Draw the hydraulic circuit for a vertical cylinder in such a way that the cylinder while extending or retracting does not fall when the power cuts. Show equations of power loss during retraction of the vertical cylinder. **07**

**Q.3** **(a)** An injection moulding machine is operated with the help of hydraulic power pack. Bladder accumulator is provided to supply instantaneous large flow. The cylinder 150/50=300 mm stroke carries out one forward and one return stroke within 2 sec. The cycle repeats after 15 sec. The force of 110 kN is to be provided during forward stroke. Estimate (1) Pump pressure and discharge (2) Accumulator volume (3) pre-charge pressure, minimum pressure and maximum pressure. **07**

**(b)** (i) Differentiate between pressure reducing valve and pressure relief valve. **04**

(ii) Why correct rating of a hydraulic filter is essential in hydraulic system? **03**

**OR**

**Q.3** **(a)** Which are the different types of valves used in oil hydraulic systems? State their functions. Give specifications of a Direction Control valve. **07**

**(b)** (i) Design & explain operation of the following High-low circuit as applied to hydraulic press. **04**

(ii) What is the influence of following properties of hydraulic fluid on hydraulic systems? **03**

(1) Bulk modulus (2) Heat Dissipation (3) Rust formation

**Q.4** **(a)** Explain the methods used to identify filter size and efficiency. **07**

**(b)** (i) Explain construction and operation of shuttle valve, twin pressure valve and quick exhaust. Draw pneumatic symbols of its. **04**

(ii) State salient functions of oil reservoir. Draw hydraulic symbol of a power pack. **03**

**OR**

**Q.4** **(a)** Differentiate between unbalanced fixed displacement vane pump and balanced fixed displacement vane pump. **07**

**(b)** (i) Why is a pressure relief valve used in a hydraulic system? State the basic types of pressure relief valves. **04**

(ii) What is the effect of cylinder cushioning on the cylinder motion? **03**

**Q.5** **(a)** Design and develop a sequence circuit using cascade method for the following sequence: **07**

A + B + B − C + C − A −

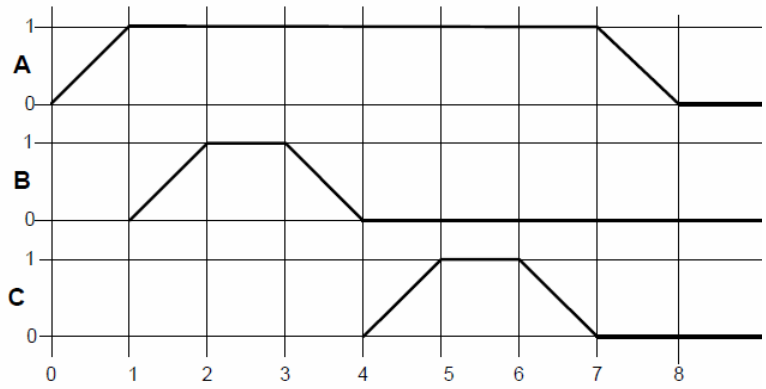


Fig.1

**(b)** Draw the suitable sequencing circuit to control the movement of the drill and the clamp in the automated drilling machine. Explain the important elements used in the circuit and the salient points of this circuits. **07**

**OR**

**Q.5** **(a)** What is the need of fire resistant fluid? Explain different fire resistant fluids with their grades? **07**

**(b)** (i) Explain briefly the principal of operation of external gear pump. **04**

(ii) Discuss the different methods of mounting hydraulic cylinders. **03**

**********