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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belgaum)

Seventh Semester, B.E. - Mechanical Engineering

Semester End Examination; Dec. - 2014

Hydraulics and Pneumatics

Time: 3 hrs

Max. Marks: 100

Note: Answer any FIVE full questions selecting at least TWO full questions from each part.

PART - A

1. a. Differentiate between fluid transport and fluid power systems. 4
- b. Explain the construction and working of an internal gear pump. 10
- c. Find the actual flow rate that an axial piston pump delivers at 1000 rpm. The pump has nine 15 mm diameter pistons arranged on a 125 mm diameter piston circle. The offset angle is set at 10° and the volumetric efficiency is 94% 6
2. a. Differentiate between the following:
 - (i) First class and third class lever system for hydraulic cylinders. 8
 - (ii) Telescopic and tandem cylinders.
- b. Give the classification of hydraulic actuators with the help of a neat sketch; illustrate the construction of any one type of limited rotation actuator. (No explanation required). 6
- c. A Hydraulic motor has a displacement of $1.64 \times 10^{-5} \text{ m}^3/\text{rev}$ and operated at a hydraulic pressure of 75 bars, and a speed of 2000 rpm. If the actual flow rate consumed by the motor is 0.6 litres /sec and actual torque delivered by the motor is 18.5 Nm. Find volumetric efficiency, mechanical efficiency and overall efficiency. 6
3. a. Differentiate between the following:
 - (i) Check Valve pilot check valve 8
 - (ii) Pressure relief valve and pressure unloading valve
- b. List, along with symbols, any six actuation methods for directional control valves. 6
- c. Briefly explain how a pressure sequence valve can be used to actuate two double acting cylinders in a sequential manner. 6
4. a. Design a hydraulic circuit employing a.d.a. cylinder to operate a hoist to lift loads to certain height. Use a counter balance valve to ensure safe handling of the load against gravity. 10
- b. What is the function of a hydraulic accumulator? Explain how an accumulator can be used in a hydraulic circuit to absorb shocks during the emergency closure of the pressure line. 10

PART - B

- 5 a. List any six desirable properties of hydraulic oil. 6
- b. List the types of filters and strainers used in hydraulic system and explain any one type of filter. 6
- c. List any four most common causes of hydraulic system breakdown and the corresponding trouble shooting. 8
- 6 a List any four major advantages of pneumatic systems over hydraulic systems. 4
- b. With the help of a neat sketch explain how end position cushioning is done for pneumatic cylinders. 8
- c. Explain the construction and working of a rotary cylinder. 8
- 7 a. What is memory valve? Explain how it can be incorporated in the indirect control of a double acting pneumatic cylinder. 8
- b. Explain how a pneumatic circuit employing 'AND' logic could be used for the opening and closing of a bus door. The door should open only upon receiving input signals from both the passenger and driver, but should close after receiving a signal from the driver. 8
- c. What is a time delay valve? 4
- 8 a. Explain how 'Cascading' method can be used for sequential control of two double acting pneumatic cylinders. 10
- b. With the help of an electrical circuit diagram explain an electrical relay circuit that can be employed for a double solenoid DCV 6
- c, Write a note on FRL unit. 4

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