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10ME73

Seventh Semester B.E. Degree Examination, June/July 2014
Hydraulics and Pneumatics

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. With a neat block diagram, explain the structure of hydraulic power system. **(06 Marks)**

b. With the help of neat sketch, explain the principle of operation of internal gear pump. **(06 Marks)**

c. A pump having a displacement of 14 cm^3/rev is driven at 1440 rpm and operates against a maximum pressure of 150 bar. The volumetric efficiency is 0.9 and the overall efficiency is 0.80, calculate (i) The pump delivery in LPM (ii) The input power required at the pump shaft in kW. (iii) The drive torque at the pump shaft. **(08 Marks)**

2 a. With a neat sketch, explain the second class lever system used with hydraulic cylinders to drive load. **(06 Marks)**

Explain with a neat sketch the operation of swash plate piston motor in the hydraulic system. **(08 Marks)**

A hydraulic motor having a displacement of 500 ml per revolution, operates at a speed of 75 rpm and is required to develop an output torque of 1200 N-m. The volumetric and mechanical efficiencies of motor are 0.9 and 0.94 respectively. Determine
(i) Pressure drop over the motor (ii) Input flow (iii) Overall efficiency. **(06 Marks)**

3 a. Classify and explain the direction control valves based on the neutral position with symbol. **(06 Marks)**

b. What is pressure compensation? Explain with a neat sketch the working of pressure compensated flow control valve. **(10 Marks)**

c. Draw the hydraulic symbol for the following hydraulic control valves:
(i) Simple pressure relief valve (ii) Four way, three position tandem centre solenoid operated DCV (iii) Pressure reducing valve (iv) Shuttle valve. **(04 Marks)**

4 a. Explain with a neat circuit diagram, Two-handed safety control system. **(10 Marks)**

b. What are the factors affecting synchronization in movement of fluid power ram? Describe any one circuit used in synchronization. **(10 Marks)**

PART – B

5 a. Sketch and explain the constructional features of reservoir system. **(10 Marks)**

b. With the help of suitable circuit, explain the following :
(i) Suction line filtering (ii) Pressure line filtering. **(10 Marks)**

6 a. State five disadvantages of using air instead of hydraulic oil. **(05 Marks)**

b. Explain the construction of double acting cylinder used in pneumatics with neat sketch. **(05 Marks)**

c. Sketch and explain a cushion assembly for a pneumatic cylinder. **(10 Mark**

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7 a. Explain supply air throttling and exhaust air throttling with neat circuit diagram. **(10 Marks)**

b. With the aid of circuit diagram, based on "AND" logic function, using two pressure valve, briefly explain the working principle of the circuit. **(10 Marks)**

8 a. List and explain the different types of electrical devices used in control of fluid power system. **(06 Marks)**

b. Write short notes on :
(i) Air filters (ii) Air driers. **(06 Marks)**

c. With the aid of a circuit, explain how the sequencing of two pneumatic cylinders can be done by using solenoids, limit switches and valves. **(08 Marks)**

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