10ME73

Seventh Semester B.E. Degree Examination, Dec.2015/Jan.2016
Hydraulics & Pneumatics

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions, selecting atleast TWO questions from each part.*

PART – A

1   a. With a neat sketch, explain the hydraulic circuit and the laws pluged to develop the circuit. **(08 Marks)**
    b. Explain the working and design of a vane pump. **(07 Marks)**
    c. A pump has a displacement volume of $120 cm^3$. It delivers 1.5×10^{-3} m^3/s at 1440 RPM and 60 bar. If the prime mover input torque is 130 N-m and overall efficiency 88%, find Q_p - theoretical discharge of the pump ; η_v – Volumetric efficiency of the pump η_m – Mechanical efficiency of the pump ; η_o – overall efficiency. **(05 Marks)**

2   a. With a neat sketch, derive the expression for first class lever system used with hydraulic cylinder to drive load. **(07 Marks)**
    b. A pump supplies oil at 0.0016 m^3/s at a 40mm diameter double acting hydraulic cylinder. If the load is 500N and the rod dia is 20mm, find i) cylinder KW power during the extending stroke   ii)   cylinder KW power during the retraction stroke   iii)   pressure during extension and retraction stroke   iv)   piston velocity during extension and retraction stroke. **(05 Marks)**
    c. A hydraulic cylinder has to move a table of weight 13kN. Speed of the cylinder is to be accelerated upto a velocity of 0.13m/s in 0.5 seconds and brought to a stop within a distance of 0.02m. Assume co-efficient of sliding friction as 0.15 and cylinder bore diameter as 50mm. Calculate the surge pressure. **(08 Marks)**

3   a. Write the symbols representing various center flow paths for two position four way valves. **(06 Marks)**
    b. Explain the operational features of the compound pressure relief valve. **(08 Marks)**
    c. Explain the construction and operation of a simple needle valve and also explain the expression for the flow rate through flow control valve. **(06 Marks)**

4   a. Explain the concept of Meter in and Meter out circuit. List the advantages and limitations of each of the circuit. **(12 Marks)**
    b. Explain regenerative circuit with a neat diagram and deduce regenerative speed of the cylinder. **(08 Marks)**

PART – B

5   a. What are the various functions performed by the hydraulic fluid and list its desirable properties and types of hydraulic fluid. **(10 Marks)**
    b. Explain Beta ratio and Beta efficiency. **(04 Marks)**
    c. Explain the common location of mounting filters in the hydraulic system. **(06 Marks)**

6   a. Explain the laws for a perfect gas that governs the compressible nature of air.   **(06 Marks)**
    b. Explain the basic structure of pneumatic system with its components.   **(06 Marks)**
    c. Explain briefly with a neat sketch 3/2 way spool type direction control valve.   **(08 Marks)**

7   a. Explain a typical pneumatic circuit with OR logic using shuttle valve.   **(10 Marks)**
    b. With a neat diagram, explain the construction and the functioning of the spool valve or quick exhaust valve employed in pneumatic system.   **(10 Marks)**

8   a. With a the neat circuit diagram, explain Electropneumatic control of a double acting cylinder using a 4/2 solonoid actuated spring return cylinder.   **(10 Marks)**
    b. Explain the cylinder pneumatic circuit and its motion control diagram.   **(10 Marks)**

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