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18MT54

Fifth Semester B.E. Degree Examination, June/July 2023
Hydraulic and Pneumatics

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain with a neat sketch, the basic components and important segments of hydraulic power systems. **(10 Marks)**
   b. Define Pascal's law and explain any one of its application with neat sketch. **(06 Marks)**
   c. In a hydraulic press forge, the input cylinder has a diameter of 50 mm and the output cylinder has a diameter of 200 mm. A force of 3 kN is applied at the input cylinder. What is the force at the output cylinder? The forging operation needs the plates to be moved by 120 mm. What is the movement required at the input cylinder? **(04 Marks)**

OR

2 a. With a neat sketch, explain the pumping theory. **(06 Marks)**
   b. Classify the pumps and explain construction and working of external gear pump with a neat sketch. **(08 Marks)**
   c. A pump has a displacement volume of 98.4 cm^3. It delivers 0.00152 m^3/s of oil at 1000 rpm and 70 bars. If the prime mover input torque is 124.3 Nm.
   (i) What is the overall efficiency of the pump?
   (ii) What is theoretical torque required to operate the pump? **(06 Marks)**

Module-2

3 a. Explain with a neat sketch working linear actuator for single acting cylinder and double acting cylinder. **(10 Marks)**
   b. A hydraulic motor operating at 75 bar pressure, has a volumetric displacement of 175 cm^3/rev. The motor runs at 200 rpm to deliver a torque of 175 Nm, while using a flow rate of 375 rpm. Determine the volumetric, mechanical and overall efficiencies. Also determine the actual power delivered by the motor. **(10 Marks)**

OR

4 a. Classify hydraulic control valves. Explain with neat sketch working of check valve, and give its graphical representation. **(10 Marks)**
   b. What is pressure compensation? Explain with a neat sketch the working of pressure compensated flow control valve. **(10 Marks)**

Module-3

5 a. With a neat sketch, explain controlling of single and double acting cylinders. **(10 Marks)**
   b. Explain with neat sketch meter-in and meter-out circuits. **(10 Marks)**

OR

6 a. Explain any five desirable properties of a hydraulic fluid. **(10 Marks)**
   b. What are the functions of reservoir system? Explain briefly with neat sketch construction of reservoir system. **(10 Marks)**

Module-4

7   a. With their schematic representations, briefly classify air cylinders. (08 Marks)
    b. With a neat sketch, explain end position cushioning in pneumatic cylinder. (06 Marks)
    c. With a neat sketch, explain vane type air motor. (06 Marks)

OR

8   a. Explain with a neat sketch direct and indirect actuation of cylinder in a pneumatic circuit. (10 Marks)
    b. With a neat sketch, explain speed control of single and double acting cylinder using quick exhaust valve. (10 Marks)

Module-5

9   a. With a neat sketch, explain typical circuit using OR logic and AND logic. (10 Marks)
    b. Explain with a net sketch pressure dependent control circuit. (10 Marks)

OR

10 a. Explain with a neat sketch motion control diagram for a 2-cylinder pneumatic circuit. (10 Marks)
    b. Explain the working of solenoid operated directional control valve with neat sketch. (10 Marks)

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