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Seventh Semester B.E. Degree Examination, June/July 2023

Fluid Power Systems

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Define Pascal's law. State the applications of fluid power systems. (05 Marks)
- b. Explain the various components used in fluid power system and its symbol. (10 Marks)
- c. In the hydraulic press shown in Fig.Q.1(c), a force of 100N is exerted on the small piston. Determine the upward force on the large piston. The area of the small piston is $50 \times 10^2 \text{ mm}^2$, and the area of larger piston is $500 \times 10^2 \text{ mm}^2$. Also find the distance moved by the large piston if the small piston moves by 100mm. (05 Marks)

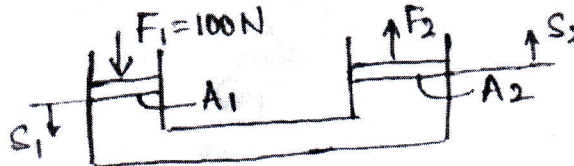


Fig.Q.1(c)

OR

- 2 a. List and explain any five desirable properties of fluids in hydraulic system. (05 Marks)
- b. What are seals? Briefly explain the functions of seals. (05 Marks)
- c. How filters are different from strainers? With a neat sketch explain the working of in-line filter and pressure line filter. (10 Marks)

Module-2

- 3 a. Classify hydraulic pumps. With a neat sketch explain the construction and working of balanced vane pump. (10 Marks)
- b. What are accumulators? Explain the working of spring loaded accumulator with a neat sketch. (05 Marks)
- c. A pump having a displacement volume of $25 \text{ cm}^3/\text{rev}$ is driven at 1390 rpm and operates against a maximum pressure of 250 bar. The volumetric efficiency is 0.85 and mechanical efficiency is 0.8. Calculate the pump delivery in LPM and the drive torque at the pump shaft. (05 Marks)

OR

- 4 a. Briefly explain the construction and working of single acting cylinder. (05 Marks)
- b. With a neat sketch, explain the working of gear motor. (05 Marks)
- c. A hydraulic motor has a displacement of 164 cm^3 and operates with a pressure of 70 bars and a speed of 2000 rpm. If the actual flow rate consumed by the motor is $0.006 \text{ m}^3/\text{s}$ and the actual torque delivered by the motor is 170N-m, find: i) Volumetric efficiency ii) Mechanical efficiency iii) Overall efficiency iv) Actual power delivered by motor. (10 Marks)

Module-3

- 5 a. Briefly explain the working of a shuttle valve with a neat sketch. (05 Marks)
 b. With a neat sketch, explain the working of pressure relief valve. (05 Marks)
 c. Describe meter in circuit and meter out circuit for controlling the speed of cylinder with the help of sketch. (10 Marks)

OR

- 6 a. Explain with a circuit diagram the control of single acting hydraulic cylinder. (05 Marks)
 b. With a neat sketch explain the hydraulic regenerative circuit. (05 Marks)
 c. What are flow control valves? With a neat sketch explain the working of pressure compensated flow control valves. (10 Marks)

Module-4

- 7 a. Explain cylinder cushioning with a neat sketch. (05 Marks)
 b. Explain the characteristics of compressed air. (05 Marks)
 c. Explain the following with a neat sketch:
 i) Magnetic type rodless cylinder
 ii) Cable operated rodless cylinder. (10 Marks)

OR

- 8 a. Sketch and explain double vane limited rotary actuator. (05 Marks)
 b. Differentiate between hydraulic system and pneumatic system. (05 Marks)
 c. With a neat sketch explain the following:
 i) Quick exhaust valve
 ii) Twin pressure valve. (10 Marks)

Module-5

- 9 a. With a neat circuit diagram, explain the supply air throttling and exhaust air throttling. (10 Marks)
 b. Explain the AND function of controlling the single acting cylinder with a neat circuit. (10 Marks)

OR

- 10 a. With the help of suitable electro pneumatic circuit explain the control of a double acting cylinder using a single limit switch. (10 Marks)
 b. Explain the sequencing of two cylinders A and B using cascading method circuit for the cylinder sequence $A^+B^+B^-A^-$. (10 Marks)

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