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Fifth Semester B.E. Degree Examination, Dec.2023/Jan.2024

Fluid Power Engineering

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. With a neat sketch, explain structure of hydraulic system. (10 Marks)
- b. Define Pascal law with an example. (04 Marks)
- c. Give some applications of hydraulic system. (06 Marks)

OR

- 2 a. Explain the desirable properties of a Hydraulic fluids. (08 Marks)
- b. Explain the different types of seals used in hydraulic system. (06 Marks)
- c. For a simple hydraulic jack as shown in Fig.Q.2(c) has the following data Force (F_1) = 100N, Area (A_1) = 50cm², Area (A_2) = 500cm², Stroke (S_1) = 10cm, find Stroke (S_2). Also find energy input and energy output. (06 Marks)

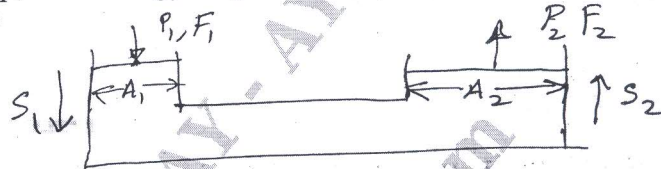


Fig.Q.2(c)

Module-2

- 3 a. With a neat sketch, explain unbalanced vane pump and derive the expression for volumetric displacement. (10 Marks)
- b. Find the flow rate in ltr/sec that an axial piston pump delivers at 1000rpm. The pump has 9 no's 15mm diameter pistons arranged on a 125mm diameter piston circle. The offset angle is set at 10° and the volumetric efficiency is 94%. (10 Marks)

OR

- 4 a. Give the classification hydraulic actuators with a neat sketch, explain limited rotation hydraulic actuator. (10 Marks)
- b. A hydraulic motor has a volumetric displacement of 8×10^{-5} m³. If it has a pressure rating of 310 bar and it receives oil at 0.038m³/min theoretically. Find: i) Motor speed ii) Torque iii) Power. (10 Marks)

Module-3

- 5 a. With a neat sketch, explain solenoid actuated 4/3 spool valve. Draw its symbol. (10 Marks)
- b. With a neat sketch, explain spring loaded relief valve. (10 Marks)

OR

- 6 a. With a neat sketch, explain needle and Globe type flow control valves. (06 Marks)
- b. With a neat circuit diagram, explain double pump hydraulic system used in punching operation. (10 Marks)
- c. Draw the symbols for the following: (04 Marks)
 - i) Variable displacement unidirectional pump
 - ii) Limited rotation motor
 - iii) Cylinder with cushion
 - iv) Gas loaded accumulator.

Module-4

- 7 a. What are the advantages and limitations of pneumatic power system? (08 Marks)
b. With a neat sketch, explain FRL unit. (08 Marks)
c. Write a neat sketch explain single acting type pneumatic cylinder. (04 Marks)

OR

- 8 a. What are the different types of control valves used in pneumatic system? With a neat sketch, explain quick exhaust valve. (10 Marks)
b. With a neat sketch explain static and dynamic seals used in pneumatic system. (05 Marks)
c. With a symbol explain rodless cylinder. (05 Marks)

Module-5

- 9 a. With a neat sketch, explain indirect actuation of pneumatic cylinder. (10 Marks)
b. With a circuit diagram, explain OR and AND gates used in pneumatic system. (10 Marks)

OR

- 10 a. With a circuit diagram, explain signal elimination method. (10 Marks)
b. With a circuit diagram explain pilot operated 3/2 valve. (10 Marks)

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