



CBCS SCHEME

15ME72

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

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Discuss the advantages and disadvantages of fluid power. (04 Marks)
- b. What are the four primary functions of a hydraulic fluid? (04 Marks)
- c. Name three ways in which hydraulic fluid becomes contaminated and explain construction and working of any two devices with neat sketch to control the contamination. (08 Marks)

OR

- 2 a. State Pascal's law and mention its applications. (03 Marks)
- b. Classify seals used in fluid power systems and mention their applications. (03 Marks)
- c. A hydraulic ram of diameter 0.4 m of a press is used to lift load of 32 kN using a plunger of diameter 50 mm with a stroke length of 5 cm as shown in Fig.Q2(c).



Fig.Q2(c)

Find the Force (F) to be applied on the plunger and the displacement of the load. (10 Marks)

Module-2

- 3 a. What is a positive displacement pump? In what way it differs from centrifugal pump? (04 Marks)
- b. Sketch and explain the construction and operation of variable displacement vane pump. Derive the expression for the maximum volumetric displacement. (12 Marks)

OR

- 4 a. Sketch and explain the operation of single cushioned double acting cylinder. (08 Marks)
- b. 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 170 Nm, find :
(i) Volumetric efficiency (ii) Mechanical efficiency
(iii) Overall efficiency (iv) Actual KW delivered by the motor (08 Marks)

Module-3

- 5 a. What are the functions of FCV, DCV and PCV? (03 Marks)
- b. Sketch the sectioned view and graphical symbol of 4/2 way DCV and explain its operations. (06 Marks)
- c. Draw the sectioned view and symbol of pilot operated pressure relief valve and explain its operation, mention its importance in hydraulic system. (07 Marks)

OR

- 6 a. Sketch schematic diagram and symbol of pressure sequence valve and explain its operation. (07 Marks)
b. Design the automatic cylinder reciprocating circuit using pressure sequence valve. List the components required and explain its operation for one complete cycle. (09 Marks)

Module-4

- 7 a. Sketch the symbol and sectioned view of 3/2 way puppet valve and explain its operation. (06 Marks)
b. Sketch any five preferred cylinder mountings and mention their applications. (10 Marks)

OR

- 8 a. Sketch the symbol and sectioned view of time delay valve and explain its operation. (06 Marks)
b. What is FRL unit? Sketch and explain the operations of each of its components. (10 Marks)

Module-5

- 9 a. Design a pneumatic circuit to actuate a double acting cylinder only if a work piece is inserted in the workpiece retainer, a guard is lowered and operator presses the push button valve. Upon release of the push button or if the guard is no longer in its lower position, the cylinder is to retract to the initial position. List the components, sketch the circuit and explain one complete cycle of operation. (10 Marks)
b. With a neat sketch explain the solenoid control of direction control valve. (06 Marks)

OR

- 10 a. With a neat sketch, explain the construction and working of electrical relay. (06 Marks)
b. Design a electro-pneumatic circuit to actuate dual-cylinder in the following sequence :
(i) Cylinder 1 extends
(ii) Cylinder 2 extends
(iii) Both cylinders retracts
(iv) Cycle is ended
Sketch the circuit and ladder diagram and explain the operation for one cycle. (10 Marks)
