



# CBCS SCHEME

18MT54

## Fifth Semester B.E. Degree Examination, June/July 2024 Hydraulics 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. State Pascal's law. Explain the components of a hydraulic system with a neat diagram. (08 Marks)
- b. A hydraulic pump has a displacement volume of  $120\text{cm}^3$ . Its actual flow rate is  $0.0015\text{m}^3/\text{s}$  at 900 rpm and 75bar. If the actual torque input by the prime mover to the pump is 150Nm. Determine the overall efficiency of the pump. Also find the theoretical torque input to the pump for its operation. (06 Marks)
- c. Explain External Gear pump, with a neat diagram. (06 Marks)

OR

- 2 a. With a neat sketch, explain Vane pump. (06 Marks)
- b. What is Pump? Explain Pumping theory and its classification. (08 Marks)
- c. For the hydraulic jack a force of 100kg is exerted on the small piston. Determine the upward force on the large piston. The diameter of the small piston is 5cm and the diameter of the large piston is 15cm further if the small piston moves by 10cm, how far will the large piston move? Assume that oil is incompressible. (06 Marks)

### Module-2

- 3 a. Explain any two of the mechanics of hydraulic cylinder loading with a neat sketch. (10 Marks)
- b. In a hydraulic operation, the cylinder is required to extend against a load of 60kN and retract against a load of 6kN. If the cylinder bore diameter and rod diameter are 60mm and 20mm respectively, determine pressure for each stroke. (10 Marks)

OR

- 4 a. Explain with neat sketch, the working of any two types of check valves or directional valves. (10 Marks)
- b. Explain the construction and operation of a simple needle valve. (10 Marks)

### Module-3

- 5 a. Define filter, with neat sketch, explain the different location of filters in a Hydraulic system. (08 Marks)
- b. What is an Accumulator and explain any one type accumulating with neat sketch. (08 Marks)
- c. Explain with neat sketch working of single acting Hydraulic cylinder. (04 Marks)

OR

- 6 a. Explain with neat sketch the working of a regenerative circuit diagram. (08 Marks)
- b. Explain with neat sketch the working of a sequencing circuit. (08 Marks)
- c. List out the desirable properties of hydraulic oil. (04 Marks)

**Module-4**

- 7 a. Define Pneumatic system. Mention the advantages, limitations and applications of it. (10 Marks)  
b. Explain End position cushioning and Pneumatic actuator. (10 Marks)

OR

- 8 a. With neat sketch, explain 5/2 DC spool valve. (10 Marks)  
b. Explain Direct and Indirect actuation of pneumatic cylinder, with neat sketch. (10 Marks)

**Module-5**

- 9 a. With neat circuit diagram, explain the pressure controlled reversal without limit switch. (10 Marks)  
b. With neat circuit diagram explain the working of sequential control of two double acting cylinder using logic gates. (10 Marks)

OR

- 10 a. Explain cascade method of pneumatic circuit design. (10 Marks)  
b. Explain the motion step diagram for a double acting cylinder. (10 Marks)

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