

CBCS SCHEME

18MT54

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021 Hydraulics and Pneumatics

Time: 3 hrs.

Max. Marks: 100

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

Module-1

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

OR

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

Module-2

- Give the complete classification of Hydraulic actuators and motors. (04 Marks)
 - A hydraulic motor operating at 75 bar pressure has a volumetric displacement of $175\text{cm}^3/\text{rev}$. It runs at 2000 rpm to deliver a torque of 175 N-m, while using a flow rates of 375 Lpm. Determine the volumetric, mechanical and overall efficiencies. Also determine the actual delivered power. (08 Marks)
 - Explain the working of Double acting cylinder and Piston – type semi rotary actuator. (08 Marks)

OR

- The system shown in the Fig. Q4(a), has a hydraulic cylinder with a suspended load W. The cylinder piston and rod diameters are 60 mm and 30 mm respectively. The pressure relief valve is set to operate at 5000 Kpa. Determine pressure P2 for a constant cylinder speed, if
i) $W = 10\text{KN}$; ii) $W = 0$; iii) If the C_v of FCV is $0.75\text{Lpm}/\sqrt{\text{KPa}}$, determine the cylinder speeds for the above two loading cases. Take the specific gravity of the hydraulic oil = 0.9. (10 Marks)

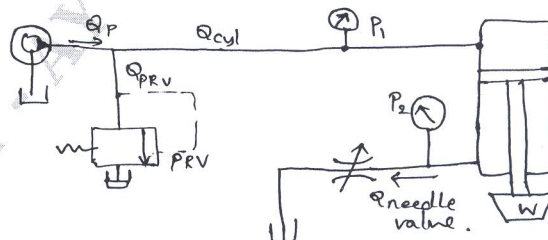


Fig. Q4(a)

- b. With neat sketches, explain Pilot operated check valve and Push button actuated poppet valve. (10 Marks)

Module-3

- 5 a. With a neat sketch, explain the working of cylinder sequencing circuit. (10 Marks)
b. With neat sketches, explain Dead – weight and Spring loaded accumulator. (10 Marks)

OR

- 6 a. With neat sketches, explain the temperature control methods in hydraulic system. (10 Marks)
b. List the desirable properties of hydraulic fluids. (04 Marks)
c. What are the types of Reservoir system? What are the functions of a Reservoir system? (06 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 a neat sketch, explain how OR function and AND function are generated in Pneumatic systems. (12 Marks)
b. Explain Pressure dependent control circuit in Pneumatic application. (08 Marks)

OR

- 10 a. With a neat sketch, explain Solenoid Operated DC valve. (08 Marks)
b. Explain two cylinder coordinated motion control with a neat hydraulic circuit. (12 Marks)
