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Seventh 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. Explain Pressure Compensated Vane Pump, with a neat figure. (08 Marks)
- b. Explain the working of Internal gear pump, with a neat figure. (08 Marks)
- c. Derive an expression for theoretical displacement of a Axial Piston Pump. (04 Marks)

OR

- 2 a. Explain how bent axis motor differs with axial motor with schematic sketches. (10 Marks)
- b. A hydrostatic transmission operating at 10MPa has the following data :

| Hydraulic pump | Hydraulic motor |
|--------------------------|-----------------------|
| $V_D = 100 \text{ cm}^3$ | $V_D = ?$ |
| $\eta_{vol} = 90\%$ | $\eta_{vol} = 92\%$ |
| $\eta_{mech} = 85\%$ | $\eta_{mech} = 87\%$ |
| $N = 1500 \text{ rpm}$ | $N = 700 \text{ rpm}$ |

Find the i) Displacement of the motor ii) Output torque to motor. (10 Marks)

Module-2

- 3 a. Explain with a neat sketch, the working of a simple pressure relief valve and compound pressure relief valve. (10 Marks)
- b. Explain with a neat sketch, Non Pressure Compensated FVC and Pressure Compensated FCV. (10 Marks)

OR

- 4 a. List various actuation method for DCVs, briefly explain any three. (10 Marks)
- b. With the neat sketch, explain the following :
 - i) $\frac{4}{2}$ DCV spool type
 - ii) $\frac{4}{3}$ DCV spool type
 - iii) $\frac{3}{2}$ DCV spool type
 - iv) $\frac{3}{2}$ DCV spring loaded spool type. (10 Marks)

Module-3

- 5 a. What is the principle and purpose of a representative circuit? Explain the working of a typical regenerative circuit, with a neat sketch. (10 Marks)
- b. What is an Accumulator? Explain with a neat circuit diagram, the use of accumulator as
 - i) Leakage compensator circuit
 - ii) Shock absorber leakage. (10 Marks)

OR

- 6 a. Explain the following with neat sketch :
 - i) Control of single acting cylinder
 - ii) Control of double acting cylinder. (06 Marks)

- b. Explain the difference between meter in a meter out circuit, with a sketch. (06 Marks)
- c. Explain hydraulic cylinder sequencing circuit with a neat sketch. (08 Marks)

Module-4

- 7 a. Write notes about service properties of hydraulic fluids. (06 Marks)
- b. What are the undesirable effects of solid contaminations? (06 Marks)
- c. Explain with neat sketches, the working of full – flow and By – pass filter. (08 Marks)

OR

- 8 a. Describe the structure of Pneumatic control, with a block diagram. (07 Marks)
- b. Explain the working of cylinder cushioning, with a neat sketch. (07 Marks)
- c. Describe any two basic mounting arrangements of Pneumatic actuators. (06 Marks)

Module-5

- 9 a. Classification of Pneumatic valves. Explain. (05 Marks)
- b. Explain OR and AND logic gates, with a neat sketch. (10 Marks)
- c. Write a short note on Time Delay Valve. (05 Marks)

OR

- 10 a. Explain the following electrical contactors of switches used in Electro Pneumatic system :
 - i) Push button ii) Limit switch iii) Pressure switch iv) Temperature switch. (08 Marks)
- b. Explain three basic types of FCV with suitable diagram. (06 Marks)
- c. Explain the difference between Check valve and Shuttle Valve. (06 Marks)

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