

CBCS SCHEME

18MA72

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Seventh Semester B.E. Degree Examination, Jan./Feb. 2023 Hydraulic Circuits and Program Logic Controllers

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. List advantages and disadvantages of hydraulic systems. (10 Marks)
b. Explain Pascal's law using an example of hydraulic jack. (10 Marks)

OR

- 2 a. Explain the properties of hydraulic fluids. (08 Marks)
b. Mention the types of hydraulic fluids. (02 Marks)
c. Explain : i) Pipes and hoses
ii) Quick acting coupling. (10 Marks)

Module-2

- 3 a. With a neat sketch, explain the working of external gear pump. (06 Marks)
b. Explain : i) Pumping theory
ii) Theoretical torque of hydraulic pump (06 Marks)
c. A pump having displacement of 14cm^3 is driven @ 1440 rpm and operates against a maximum pressure of 150 bar. The volumetric efficiency is 0.9 and overall efficiency is 0.8.
Find : i) Pump delivery (LPM)
ii) Input power (KW)
iii) Output torque of the pumps (N-m). (08 Marks)

OR

- 4 a. With a neat sketch, explain the working of balanced vane pump. (06 Marks)
b. Explain : i) Selecting pump factors
ii) Mounting arrangements. (06 Marks)
c. A vane pump has a volumetric displacement of 82cm^3 and has a rotor diameter of 5cm, a cam ring diameter of 7.5cm, and vane width of 4cm. The speed is assumed to be 1500rpm.
Find :
i) Eccentricity
ii) Displacement
iii) Discharge. (08 Marks)

Module-3

- 5 a. With neat sketch, explain 4/3 - way solenoid operated DCV. (08 Marks)
b. With a diagram, explain :
i) Pressure relief valve
ii) Pressure reducing valve. (08 Marks)
c. Give a symbolic representation of :
i) Lever operated 5/3 - way DCV
ii) One -way check DCV
iii) One - Way FCV
iv) Solenoid operated 4/3 - DCV. (04 Marks)

OR

- 6 a. With neat sketch, explain the working of manually operated 4/3 – way DCV using double acting cylinder. (08 Marks)
- b. With a neat circuit, explain : (08 Marks)
- Pump unloading
 - Counterbalancing.
- c. Write short notes on : (04 Marks)
- Synchronizing circuit
 - Pressure compensated FCV.

Module-4

- 7 a. Write short notes on : (10 Marks)
- Choice of working medium
 - FRL unit. (10 Marks)
- b. With a neat circuit, explain the structure of pneumatic control system. (10 Marks)

OR

- 8 a. Write short notes on : (10 Marks)
- Shuttle valve
 - Double acting cylinder. (10 Marks)
- b. With a schematic diagram, explain the end position cushioning.

Module-5

- 9 a. Explain the following : (10 Marks)
- SCADA
 - Ladder logic. (10 Marks)
- b. List down the functions of PLC and explain them briefly.

OR

- 10 a. Explain the following : (10 Marks)
- Block diagram of PLC
 - Types of PLC.
- b. List the differences between industrial automation and information technology. Explain them by giving examples. (10 Marks)
