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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 (10 Marks)
ii) Quick acting coupling.

Module-2

- 3 a. With a neat sketch, explain the working of external gear pump. (06 Marks)
- b. Explain : i) Pumping theory (06 Marks)
ii) Theoretical torque of hydraulic pump
- 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 (06 Marks)
ii) Mounting arrangements.
- 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)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. $42+8=50$, will be treated as malpractice.

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 :
 i) Pump unloading
 ii) Counterbalancing. (08 Marks)
- c. Write short notes on :
 i) Synchronizing circuit
 ii) Pressure compensated FCV. (04 Marks)

Module-4

- 7 a. Write short notes on :
 i) Choice of working medium
 ii) 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 :
 i) Shuttle valve
 ii) Double acting cylinder. (10 Marks)
- b. With a schematic diagram, explain the end position cushioning. (10 Marks)

Module-5

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

OR

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

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