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15MT53

Fifth Semester B.E. Degree Examination, Feb./Mar.2022 Hydraulics and Pneumatics

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. With a neat circuit diagram, explain the basic components of the hydraulic system. (06 Marks)
b. A hydraulic press has a ram of 40 cm diameter and a plunger of 5.5 cm diameter. Find the maximum weight of the load that will be balanced by the press when a force of 600 N is applied on the plunger. (06 Marks)
c. List out important advantages of the hydraulic system. (04 Marks)

OR

- 2 a. With a neat sketch, explain the construction and working of external gear pump. (06 Marks)
b. Determine the volumetric efficiency of a gear pump of external diameter and internal diameter of gears 75 mm and 50 mm respectively and width of the gear teeth 50 mm, if the actual discharge is 30 LPM at 1800 rpm. (06 Marks)
c. List out the factors influencing in selection of pump. (04 Marks)

Module-2

- 3 a. Derive an expression for the theoretical torque developed in an axial piston motor of bent axis. (08 Marks)
b. A hydraulic motor has a displacement of 125 cm³ operating at a pressure of 100 bar and speed of 1800 rpm. If the actual flow rate of the motor is 0.004 m³/s and actual torque delivered by the motor is 250 N-m, find the
(i) Volumetric efficiency.
(ii) Mechanical efficiency.
(iii) Overall efficiency.
(iv) Theoretical power delivered by motor. (08 Marks)

OR

- 4 a. List out the main functions of pressure control valve. (04 Marks)
b. With a neat sketch, explain the direct acting pressure relief valve. (06 Marks)
c. With a neat circuit diagram, explain the by-pass type of pressure compensation for light and heavy loads. (06 Marks)

Module-3

- 5 a. With a neat circuit diagram, explain the controlling of a double acting cylinder for extension and retraction position by using 4/2 Direction Control Valves (DCV's). (08 Marks)
b. What is accumulator? With a neat sketch, explain the types of accumulators. (08 Marks)

OR

- 6 a. Briefly explain any five important desirable properties of hydraulic oil. (05 Marks)
b. Define filters. With a neat sketch, explain the different locations of filters in a hydraulic system. (06 Marks)
c. Explain the factors which affect the sizing of the reservoir. (05 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.

Module-4

- 7 a. Explain the important applications and limitations of pneumatic system. (06 Marks)
b. Write a short note on FRL unit. (04 Marks)
c. With a neat sketch, explain the construction and working of a cushioned cylinder. (06 Marks)

OR

- 8 a. With a neat circuit diagram, explain the direct and indirect control of pneumatic system. (10 Marks)
b. Explain with a neat sketch and graphic symbol, the working of a quick exhaust valve. (06 Marks)

Module-5

- 9 a. Explain how a shuttle valve and twin pressure valve functions as 'OR' and 'AND' gates in pneumatic systems. (08 Marks)
b. With a neat circuit diagram, explain the time-dependent retraction of double acting cylinder without limit switches. (08 Marks)

OR

- 10 a. With a neat sketch, explain the working principle of the solenoid actuation in DCV's. (08 Marks)
b. Explain the applications of an electro mechanical relay with a neat sketch. (08 Marks)
