CBCS SCHEME

USN | | | | | | | | | | 17MT53

Fifth Semester B.E. Degree Examination, Dec.2019/Jan.2020
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. Define Pascal's law and explain how it can be applied to a simple hydraulic jack. **(08 Marks)**

b. A hydraulic press has a ram of 30cm diameter and a plunger of 4.5cm diameter. Find the weight lifter by the hydraulic press when the force applied at the plunger is 500N. **(06 Marks)**

c. With a neat circuit diagram, explain the basic components of a hydraulic system. **(06 Marks)**

OR

2 a. Determine the volumetric efficiency of a gear pump of external diameter and internal diameter of gears 75mm and 50mm respectively and width of the gear teeth 50mm, if the actual discharge is 30LPM at 1800 rpm. **(06 Marks)**

b. Derive an expression for the volumetric displacement and theoretical flowrate of bent axis piston pump. **(08 Marks)**

c. Differentiate between positive displacement pump with dynamic pump. **(06 Marks)**

Module-2

3 a. Classify the motor and explain external gear motor with a neat sketch. **(10 Marks)**

b. Why cushioning is needed in a hydraulic cylinder? With a neat sketch, explain end cushioning in hydraulic cylinder. **(10 Marks)**

OR

4 a. With a neat sketch, explain the working principle of the solenoid actuation in Direction Control Valves (DCV's). **(10 Marks)**

b. Explain the following with neat sketch:
i) Pressure reducing valve ii) Unloading valve. **(10 Marks)**

Module-3

5 a. Define filter. With a neat sketch, explain the different locations of filters in a hydraulic system. **(08 Marks)**

b. Explain the factors which affects the sizing of the reservoirs with a neat sketch. **(08 Marks)**

c. List out the desirable properties of hydraulic oil. **(04 Marks)**

OR

6 a. What is an accumulator? With a neat sketch, explain the types of accumulators. **(10 Marks)**

b. Explain with a neat circuit diagram, the working of a regenerative circuit. **(10 Marks)**

Module-4

7 a. With a neat sketch, explain the design and construction features of 2/2 way ball and 3/2 way disc seat type of DC valves. **(10 Marks)**

b. Explain with a neat sketch, construction and operation of a quick exhaust valve to increase the actuation speed of a cylinder in a pneumatic system. **(10 Marks)**

OR

8 a. Symbolically represent the following:
- i) Single acting cylinder
- ii) Push button operated 3/2 DCV
- iii) Roller operated spring retracted 3/2 limit switch
- iv) Solenoid actuated and spring reset 5/2 valve
- v) Variable throttle valve. **(10 Marks)**

b. With a block diagram, explain 3 stages of preparation of compressed air. **(10 Marks)**

Module-5

9 a. With a neat circuit diagram, briefly explain the pressure controlled reversal without limit switch. **(10 Marks)**

b. Explain with a pneumatic circuit, the control of extension of a double acting cylinder using OR and AND logic gate. **(10 Marks)**

OR

10 a. Explain with a neat sketch, the working of an electrical relay. **(10 Marks)**

b. Explain the motion step diagram for a double acting cylinder. **(10 Marks)**

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