

Reg. No. :

Question Paper Code : 20867

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2022.

Fifth / Sixth Semester

Mechanical Engineering

ME 8694 – HYDRAULICS AND PNEUMATICS

(Common to : Manufacturing Engineering / Mechanical Engineering (Sandwich) /
Robotics and Automation)

(Regulations 2017)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State Pascal's Law.
2. What happens to the viscosity of a fluid when it gets hotter?
3. Name the various methods for controlling/operating the direction control valve.
4. Draw the symbolic representation of single acting and double acting cylinder.
5. What is the function of pressure intensifier in hydraulic systems?
6. Why accumulator is used in the hydraulic fluid power system?
7. Name the various equipments used for controlling the air contamination.
8. Mention any two advantages of using air as a fluid medium over oil.
9. List down the common causes of hydraulic system break down.
10. Write short notes on how oil leakage can be prevented in hydraulic power systems?

PART B — (5 × 13 = 65 marks)

11. (a) A hydraulic pump delivers oil at 60 bar, 120 l/min into a circuit laid on the horizontal plane. There are four elbows ($K = 0.75$), one globe valve fully open ($K = 10$), and a direction control valve (pressure drop = 3 bar) with the inside diameter of the pipe as 30 mm. The total length of the straight run pipe is 20m and the specific gravity of the oil is 0.9. The kinematic viscosity of the oil is $0.0001 \text{ m}^2/\text{s}$. Determine the pressure at the exit point of the pipe.

Or

- (b) Explain in detail about construction, working principles, and theoretical discharge of various types of axial and radial piston pumps with a neat sketch.
12. (a) Explain in detail about construction and working principle of a simple pressure relief valve with its sectional representation and suitable hydraulic circuit (symbolic representation).

Or

- (b) Explain in detail about the construction and working principle of various types of the cylinders. Also, write short notes on cylinder cushioning.
13. (a) Citing an industrial application (symbolic circuit), illustrate the construction and working of pressure intensifier.

Or

- (b) Design and explain the working of regenerative circuits.
14. (a) Elaborate on the construction and working of filter, regulator, and lubricator in a pneumatic FRL unit with suitable sketches.

Or

- (b) Citing an industrial application (symbolic circuit), illustrate the construction and working principle of a pneumatic two-hand safety module.
15. (a) Sketch the hydraulic circuit used for the operation of a shaping machine and explain the same.

Or

- (b) (i) A pump is delivering insufficient oil to the system. State any four possible causes and remedial actions. (7)
- (ii) List the general points to be taken into consideration during the installation of components in pneumatic system. (6)

PART C — (1 × 15 = 15 marks)

16. (a) In a press shop, the stamping operation is to be performed using a stamping machine as shown in Fig.1. Before stamping, the workpiece has to be clamped under the stamping station. Then stamping tool comes and performs the stamping operation. The workpiece must be unclamped only after stamping operation. Find the sequence and design a pneumatic circuit using a suitable method.

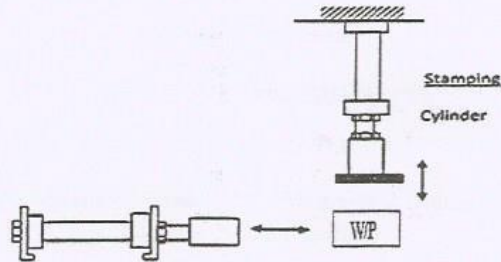


Fig. 1

Or

- (b) Device a robot system that can be used for picking and placing glass bottles of a soft drink processing industry with suitable elements.