Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 50887

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2023.

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. Name any four hydraulic fluids that are commonly used in fluid power system.

2. What is known as pump cavitation?

3. Draw the symbols for the following elements

   (a) 4/3 Tandem center valve

   (b) Hydraulic motor

4. Why is end cushioning provided in hydraulic cylinder operation?

5. State the function of pressure intensifier.

6. Write the purpose of using a fail safe circuit in any hydraulic system.

7. What is a Ladder diagram?

8. Discuss the working and function of FRL unit in Pneumatic system.

9. List any two common faults in an hydraulic system.

10. Mention the need for low cost automation with an example.

PART B — (5 × 13 = 65 marks)

11. (a) Differentiate in detail between a fixed displacement pump and a variable displacement pump.

Or

(b) Explain with neat sketch about working principle of basic hydraulic and pneumatic system.

12. (a) Explain the requirement of pressure control, directional control and flow control valves used in hydraulic systems.

Or

(b) Explain the construction and working of the following with neat sketches.

(i) Gear type motor (6)

(ii) Tandem cylinder (7)

13. (a) Draw neatly the meter in circuit used in hydraulics using appropriate ISO symbols and explain its working.

Or

(b) Draw neatly the sequencing circuit used in hydraulics using appropriate ISO symbols and explain its working.

14. (a) Explain the construction and operation of quick exhaust valve with neat sketch.

Or

(b) What are the advantages of fluidic systems? Explain them in detail.

15. (a) Describe the design of a hydraulic circuit used in milling machine?

Or

(b) Describe how the failure and trouble shooting processes are carried out in a Pneumatic system.

PART C — (1 × 15 = 15 marks)

16. (a) Design the accumulator circuit for the application of Emergency power sources and shock absorber in the hydraulic circuit.

Or

(b) Design the Hydraulic circuit for the following application as per given description,

At the end of a production line, work pieces are to be lifted from a conveyor belt and put down on a pallet. The lifting movement is to be performed using a hydraulic cylinder. To achieve shorter cycle times, fast motion sequences are required. Due to changing work piece weights, the residual stroke is to be performed independently of loads at strongly reduced velocity. The return stroke is to be performed as fast as possible.

The Component part used are listed below,

- Double acting cylinder with single sided piston rod
- 4/2 directional valve with solenoid actuation, spring return
- Direct operated pressure relief valve
- 2-flow control valve, adjustable for one direction of flow, largely independent of viscosity and pressure differential, with by-pass check valve.