Reg. No. : E N G G T R E E . C O M

Question Paper Code : 41379

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2024.

Fourth/Fifth/Sixth Semester

Mechanical Engineering

ME 3492 — HYDRAULICS AND PNEUMATICS

(Common to : Automobile Engineering/Mechanical Engineering (Sandwich))

(Regulations 2021)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Describe the term volumetric efficiency and mechanical efficiency.
2. Why are the hydraulic system is preferred for heavy work than pneumatic system.
3. Draw the ANSI symbol for bidirectional fixed displacement unidirectional motor and variable displacement bidirectional motor.
4. What are the advantages of double acting cylinder over a single acting cylinder?
5. Describe the hydraulic accumulator and its type.
6. Why are non-separator type gas loaded accumulator not preferred in hydraulic systems?
7. Illustrate about cascade method.
8. Discuss the need of lubricator unit in the pneumatic system.
9. What are the important components of a hydraulic power pack?
10. If a pump is delivering insufficient or no oil, what are all the possible causes and also give remedies for them.

PART B — (5 × 13 = 65 marks)

11. (a) (i) Explain the pumping theory with suitable sketch. (6)

(ii) Explain the working of Lobe pump with suitable sketch. (7)

Or

(b) Discuss the following :

(i) Balanced vane pump. (6)

(ii) Unbalanced vane pump. (7)

12. (a) Explain the following with neat sketch.

(i) Poppet valve. (6)

(ii) Pilot operated check valve. (7)

Or

(b) Explain with neat sketch about the following :

(i) Unloading valve (6)

(ii) Sequence valve (7)

13. (a) Design and explain the working of a regenerative circuit.

Or

(b) Draw and explain the Counterbalance circuit used in the hydraulic circuit.

14. (a) Design a pneumatic circuit for the following sequence using cascade method A+B+B-A- where the + cylinder extraction and – cylinder retraction.

Or

(b) Design a pneumatic circuit using cascade method for the sequence A+A-B+B- and explain its working principle.

15. (a) Tabulate the various faults, probable causes and also the remedial actions for the following hydraulic system components.

(i) Pump (4)

(ii) DC valve (3)

(iii) Hydraulic motors (3)

(iv) Hydraulic cylinders (3)

Or

(b) Explain in detail about how the failure and trouble shooting is carried out in pneumatic system.

PART C — (1 × 15 = 15 marks)

16. (a) (i) Design a pneumatic cascade circuit for the following sequence of operation :

A+B+B-C+C-A-. (10)

(ii) Also develop the travel-step diagram for the above sequence of operation. (5)

Or

(b) Design the hydraulic circuit and explain with neat sketch for the application of hand operated hydraulic jack.