

A 1386

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2007.

Sixth Semester

Mechanical Engineering

ME 341 — HYDRAULIC AND PNEUMATIC CONTROL

(Common to Mechatronics Engineering)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. List different types of pumps used in hydraulics?
2. Draw the symbols for a time delay valve and one-way flow control valve?
3. Distinguish between meter-in and meter-out hydraulic circuits
4. What is quick exhaust in pressure regulation how is it represented in symbol?
5. Why is filter required in hydraulic systems? Generally where is it placed?
6. What is latching? How is it achieved in fluid power circuits?
7. Distinguish between hydraulic and pneumatic systems
8. Differentiate between convention fluid power systems and Electro-fluidic systems
9. What are the functions and constituents of air service unit?
10. What is PLC?

11. (a) (i) Compare the advantages and limitations of hydraulic, pneumatic and electrical systems. (6)
- (ii) Derive an expression for volumetric displacement of a vane pump and hence determine the same for a vane pump with following details :

Rotor dia = 50 mm, Cam ring dia = 75 mm, Vane width = 50 mm
eccentricity = 8 mm. (6 + 4)

Or

- (b) Discuss features of Direction control valves, Pressure regulation valves, Flow control valves and multiple input logic valves (4 × 4 = 16)

12. Explain following industrial hydraulic systems with circuits :

- (a) (i) Sequencing system.
(ii) Press mechanism.

Or

- (b) (i) Accumulator circuit
(ii) Forklift (16)

13. Write down circuits for either of following problems :

- (a) A Plastic processing station consists of gluing two plastic parts. Gluing is done for specific time to get a good joint. A double acting cylinder is used, which extends only when both push buttons are pressed simultaneously to ensure complete safety of the operator. The cylinder should retract automatically after a preset time. The cylinder extension is to be slow/adjustable while as retraction is quick. (16)

Or

- (b) What is displacement-step or travel-step diagram? Draw a displacement-step diagram for cylinders operating in sequence A+, B+, C+, C-, B-, A-. Write a cascaded pneumatic circuit for the above problem. (16)

14. (a) (i) What is advantage of using Electro-hydraulics/Electro-pneumatics?
Discuss the elements of such a system. (8)
- (ii) What is a relay? Explain with a sketch working of a relay. (8)

Or

- (b) Solve Problem Q13 (b) for designing an electro-pneumatic system. (16)

15. (a) (i) Distinguish between PLC, microcontroller and microprocessor?
Explain the constituents of an industrial PLC. (8)
- (ii) Explain the use of ladder diagram is representation of PLC control
using a case study. (8)

Or

- (b) (i) How contamination of Oil in hydraulic systems takes place? How is
it analyzed and reduced? (8)
- (ii) What is Low cost Automation? Discuss with a case study. (8)
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