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

Question Paper Code : 51646

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2014.

Fifth Semester

Mechanical Engineering

ME 2305/ME 55/ME 1305/080120027/10122 ME 506 — APPLIED HYDRAULICS AND PNEUMATICS

(Common to Mechatronics Engineering and Mechanical and Automation Engineering)

(Also common to 080120027 – Hydraulics and Pneumatics Systems)

(Regulation 2008/2010)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. What is the importance of Reynolds number?

2. Write the Darcy's equation.

3. What is a balanced vane pump?

4. Sketch the pressure Vs flow plot of positive and non-positive pumps.

5. What is chattering in pressure valves?

6. What is the function of accumulators?

7. What is the function of quick exhaust valve?

8. What is the condition to be satisfied while grouping in Cascade method?

9. What are fluidic devices?

10. What are ladder diagrams?

PART B — ($5 \times 16 = 80$ marks)

11. (a) (i) Enumerate and briefly discuss the properties and factors considered for selection of oils. (12)

(ii) List the advantages of hydraulic systems. (4)

Or

(b) (i) Briefly discuss the various types of oils used in power hydraulic systems. (8)

(ii) Briefly discuss the operation of a manually operated hydraulic Jack. (8)

12. (a) (i) With a sketch, explain the working of vane pump showing how the discharge can be varied. (12)

(ii) Sketch the plots showing pump performance. (4)

Or

(b) (i) With a suitable sketch describe the cushioning mechanism used in linear actuators. (8)

(ii) Stating the application of rotary actuators, discuss the working of gear motor with a sketch. (8)

13. (a) (i) Explain the operation of a pressure compensated flow control valve, with a suitable sketch. (10)

(ii) Sketch an unloading circuit and explain its working. (6)

Or

(b) (i) Sketch a circuit to demonstrate the use of accumulator as leakage compensator and explain its working. (10)

(ii) With a circuit explain the working of an intensifier used in pressing operation. (6)

14. (a) (i) Briefly describe the construction and functioning of filter regulator and lubricator. (8)

(ii) Sketch a typical Pneumo-hydraulic circuit and explain its operation. (8)

Or

(b) Design a circuit for the sequence $A^+, B^+, B^-, A^-, C^+, C^-$ (where A, B, C stand for cylinders, '+' indicates extension and '–' retraction of respective cylinders), using cascade method explain its working. (16)

15. (a) (i) Sketch and explain the operation of a proportional valve. (8)

(ii) With a block diagram describe the functioning of an electrohydraulic servo system. (8)

Or

(b) (i) Design an etectro-pneumatic circuit for effecting the sequence A1B1A0B0 (where A, B stand for cylinders, 1 indicates extension and 0 retraction of respective cylinders) explain its working. Provide an auto/manual selector module and an emergency stop.(12)

(ii) Briefly explain the functioning of a PLC. (4)

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