Reg. No. :

Question Paper Code: 52912

M.E. DEGREE EXAMINATION, DECEMBER 2015

Elective

CAD / CAM

15PCD503 - DESIGN OF HYDRAULIC AND PNEUMATIC SYSTEMS

(Regulation 2015)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - $(5 \times 1 = 5 \text{ Marks})$

1. Find the relation to calculate the volumetric displacement of vane pump

(a) $V_D = (\pi/2)(D_C - D_R) e L$	(b) $V_D = (\pi/4)(D_C + D_R)^2 e L$
(c) $V_D = (\pi/2)(D_C + D_R) e L$	(d) $V_D = (\pi/4)(D_C - D_R)^2 e L$

- 2. Which one is not a two way valve?
 - (a) Shuttle valve (b) Check valve (c) 2/2 valve (d) Pilot check valve

3. An accumulator is basically ______, in which hydraulic fluid is retained under pressure from an external source

- (a) Energy storage reservoir (b) Force storage reservoir
- (c) Pressure storage reservoir (d) Power storage reservoir
- 4. What is the function of muffler?
 - (a) To remove the moisture from air
 - (b) To regulate the pressure of compressed air
 - (c) To remove the foreign matters
 - (d) To control the exhaust air noise

5. Fault finding chart is also known as.

(a) Tree-branching chart	(b) Fish bone chart
(c) Fault chart	(d) None of the above

PART - B
$$(5 \times 3 = 15 \text{ Marks})$$

- 6. Describe any four desirable characteristics of hydraulic pumps.
- 7. What is the difference between pilot operated and direct operated pressure relief valves?
- 8. What is meant by "meter-in" circuit? State its limitation.
- 9. What are the functions of FRL unit?
- 10. Mention the areas in a pneumatic system and which should be given higher importance during maintenance?

PART - C (5 x
$$16 = 80$$
 Marks)

- 11. (a) (i) Derive an expression for volumetric displacement of a vane pump and determine the same for it with following data: Rotor dia. = 50 mm; Cam ring dia. = 75 mm; Vane width = 50 mm and eccentricity = 8 mm. (10)
 - (ii) What are the advantages and disadvantages of oil hydraulic system over other methods?(6)

Or

- (b) (i) Discuss the working of piston motors with a help of a neat sketch. What are the practical situations where in rotary actuators preferred over linear actuators? (8)
 - (ii) Explain any four hydraulic principles used in fluid power systems. (8)
- 12. (a) (i) Explain the working of a pilot operated pressure relief valve with neat sketch. (10)
 - (ii) Draw the fluid power symbols for the following:
 - (1) Four port three position solenoid operated spring centered DCV
 - (2) Pressure reducing valve
 - (3) Pressure compensated variable FCV
 - (4) Lever type actuated DCV. (6)

Or

(b) (i) Write brief notes on various types of direction control valves. (8)

52912

- 13. (a) (i) A hydraulic cylinder is used for an industrial application. It has been decided to use an accumulator as a leakage compensator. Design a circuit to fulfill these requirements.
 (8)
 - (ii) Explain the hydraulic operation of Forklift equipment with a neat sketch. (8)

Or

- (b) (i) Describe a hydraulic circuit for synchronizing two cylinders with flow control valve.
 (8)
 - (ii) Design a hydraulic sequence circuit for a milling machine with one cylinder for operating the power vice jaw and the other for controlling the cutter travel.(8)
- 14. (a) (i) Highlight the advantages of an air-over-oil circuit and explain it with a suitable application. (8)
 - (ii) Develop a continuous single cylinder reciprocation circuit for pneumatic system using limit switches and relays.(8)

Or

- (b) Three pneumatic cylinders A, B and C are used in an automatic sequence of operation. Cylinder 'A' extends, Cylinder 'B' retracts, Cylinder 'C' retracts and then Cylinder 'A' retracts, Cylinder 'C' extends and Cylinder 'B' extends. Develop a pneumatic circuit by cascade method.
- 15. (a) (i) Explain the principle of low cost automation. (6)
 - (ii) Explain the working principle of a PLC with a neat block diagram. What are the advantages of PLC? (10)

Or

- (b) (i) How contamination of oil in hydraulic system takes place? How is it analyzed and reduced? (10)
 - (ii) What are the selection criteria for pneumatic components? (6)

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