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Question Paper Code: 92011

M.E. DEGREE EXAMINATION, DECEMBER 2013.

Elective

CAD / CAM

01PCD 503 - DESIGN OF HYDRAULIC AND PNEUMATIC SYSTEMS

(Regulation 2013)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. Name the six basic components required in a hydraulic system.
2. State Pascal's law and Explain with an example.
3. What is the function of relief valve in a hydraulic system?
4. What is a pressure reducing valve? What is its purpose?
5. What is the difference between a mechanical-hydraulic and an electro hydraulic servo valve?
6. How do a pneumatic actuator differ from hydraulic actuators?
7. What is a limit switch? How does it work?
8. What are moving part logic devices?
9. Name four causes of low or erratic pressure.
10. Name the three basic types of filtering methods.

PART – B (5 x 14 = 70 Marks)

11. (a) Explain the factors considered in the selection of pumps. (14)

Or

- (b) With neat sketch explain the construction and operation of internal gear pump. (14)

12. (a) (i) Explain the principle and operation of solenoid operated directional control valves. (7)

(ii) With neat sketch explain the construction and operation of shuttle valve. (10)

Or

(b) With neat sketch explain the construction and operation of pressure reducing valve. (14)

13. (a) Draw any two circuits using accumulator for different applications. (14)

Or

(b) (i) List the need and application of synchronizing circuits. (4)

(ii) With simple sketches, explain the various types of synchronizing circuits. (10)

14. (a) Consider an automatic drilling machine with three cylinders. The complete cycle is as follows: Cylinder A extends to clamp the work piece, then cylinder B extends to drill the hole and then retracts. Cylinder A then retracts to unclamp the work piece. Cylinder C extends and retracts to remove the work piece from table. Design a control circuit applying the step-counter method. (14)

Or

(b) (i) What are the steps involved in step-counter method of circuit design? (7)

(ii) What are the steps involved in KV Map method of circuit design? (7)

15. (a) How the electro hydraulic circuits are controlled by PLC? Explain it using circuit diagram? (14)

Or

(b) Explain the methodology adopted to install and maintain a pneumatic power pack. (14)

PART – C (1 x 10 = 10 Marks)

16. (a) Design and develop a sequential circuit using cascade method for the following Sequence: $A^+ A^- B^+ B^-$. (10)

Or

(b) Hydraulic pump delivers oil at 60 bar, 120 Lpm into a circuit laid on a horizontal plane. There are four elbows ($k=1.75$), one globe valve fully open ($k=10$) and a direction control valve (pressure drop=3 bar) with the inside diameter of the pipe as 30 mm. The total length of the straight run pipe is 20 m and the specific gravity of the oil is 0.9. Kinematic viscosity of the oil is $0.0001 \text{ m}^2/\text{s}$. Determine the pressure in bar at exit point of the pump? (10)