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Question Paper Code: 31576

B.E. / B.Tech. DEGREE EXAMINATION, NOVEMBER 2015

Fifth Semester

Mechanical Engineering

01UME506 – APPLIED HYDRAULICS AND PNEUMATICS

(Regulation 2013)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1. When hydraulics is preferred over pneumatics? Why?

2. Name three fire resistant hydraulic fluids.

3. Why the centrifugal pump is not used in the fluid power system?

4. How is single acting cylinder retracted?

5. Draw the hydraulic symbol for 3 position - 4 way tandem center lever operated spring centered direction control valve.

6. What is an intensifier and when is it used in hydraulic circuit?

7. What is the purpose of a quick exhaust valve in a pneumatic circuit?

8. Differentiate meter-in and meter-out speed control circuits.

9. What is fluidics?

10. List any three causes for low pressure in hydraulic circuits.

PART - B (5 x 16 = 80 Marks)

11. (a) (i) List the advantages of fluid power system over a mechanical system. (6)

    (ii) A hydraulic pump delivers oil at a pressure of 50 *bar*, 100 *l/ min* into a circuit laid on a horizontal plane. There are three elbows (*K*=0.75), two check valves (*K*=4), one globe valve fully open (*K*=10) with the inside diameter of the pipe is 30 *mm*. The total length of the straight run pipe is 15 *m* and the specific gravity of the oil is 0.85. The kinematic viscosity of the oil is 0.0001 *m²/s*. Determine the pressure at the exit point of the pipe. (10)

Or

    (b) Discuss the properties which a hydraulic fluid should possess. (16)

12. (a) Draw and explain the construction and working of a bent axis type piston pump. Derive the theoretical discharge of the pump. (16)

Or

    (b) (i) The specification of the gear pump is given below:
             Outside diameter of the gear = 80mm
             Inside diameter of the gear = 60mm
             Gear width = 20mm
             Speed of the pump = 1600 rpm
             Volumetric efficiency = 88%
             Mechanical efficiency = 90%
             Calculate the (1) actual discharge (2) overall efficiency. (8)

    (ii) With a sketch, illustrate the working of a cylinder cushioning mechanism. (8)

13. (a) With the help of a circuit, describe the application of the pressure reducing valve. (16)

Or

    (b) (i) With a simple sketch, explain the working of a 4/2 direction control valve. (6)

    (ii) With a suitable circuit, illustrate the application of accumulator as auxiliary power source. (10)

14. (a) (i) Explain the working principle of a pneumatic pressure regulator. (8)

    (ii) What is meant by synchronization of cylinder motion? Illustrate any one method to achieve it. (8)

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Or

(b) In a pneumatic drilling circuit, cylinder *A* is used to clamp the work piece and cylinder *B* is used for drilling. The sequence of operations is: work piece is clamped, drilled, drill retracted and work piece is unclamped. Design a pneumatic sequencing circuit using cascade method. (16)

15. (a) (i) With a block diagram, describe the working of an electro hydraulic servo system. (12)

   (ii) Compare electro-hydraulic servo valves and proportional hydraulic valves. (4)

Or

(b) (i) An electro-hydraulic circuit uses two pressure switches and a solenoid operated direction control valve for continuous reciprocation of the hydraulic cylinder. Develop circuit with a suitable ladder diagram. (10)

   (ii) Draw the layout of PLC construction and write about the elements of it. (6)

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