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B.E / B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, APR / MAY 2014

MECHANICAL ENGINEERING

Fifth Semester

**ME 372/MN375/ME 9303 HYDRAULICS & PNEUMATICS
(Regulation 2002/2004/2008)**

(Common to Mechanical and Manufacturing Engg)

Time : 3 Hours

Answer ALL Questions

Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. Draw the symbols for the following fluid power elements.
(i) 4/3 tandem (spring) centered DCV (ii) Bidirectional hydraulic motor
2. What is low cost automation?
3. State the reason why piston pumps provides more efficiency than other pumps ?
4. Justify the following statement as true or false with adequate reason.
"The velocity of forward stroke of a double acting cylinder is faster than the return stroke".
5. Differentiate between a solenoid dcv and proportional dcv with respect to function aspect.
6. Differentiate between functions of Diffuser and Baffle plate in a reservoir
7. What is the function of a quick exhaust valve?
8. Draw any two logic circuits with the help of two 3/2 dcvs.
9. What is a travel step diagram?
10. Draw a electropneumatic diagram for the following situation
A Double acting can be operated from any one of the two position and an emergency switch to break the circuit to avoid any untoward incident in between the stroke..

Part – B (5 x 16 = 80 marks)

11. i) List and explain the different properties of hydraulic fluids (10)
ii) A 60 mm cylinder is connected to another cylinder of 140 mm diameter and the system is filled with oil. A force of 200 N is applied to the small cylinder piston. Calculate the output force at the large cylinder. (6)
12. a) (i) Explain in detail how cylinders are specified. (8)
(ii) A double acting cylinder is hooked up to reciprocate. The relief valve setting is 100 bars. The piston area is 0.020 m^2 and the rod area is 0.0050 m^2 . If the pump flow is $0.020 \text{ m}^3/\text{s}$, find the cylinder speed and load carrying capacity during the extension and retraction stroke.

OR

- b) (i) With neat sketches explain the construction principle, operation of a variable displacement vane pump. Derive an expression for its output. (10)

(ii) A pump delivers 30 l/min against a system pressure of 300 bars at a driven speed of 1440 rpm. If the input power is 10 KW and the machine efficiency of the pump is 85% calculate the pump displacement. (6)

13. a) a)(i) Classify the pressure control valves and explain in detail the principle and operation of a counterbalance valve. (10)
(ii) Draw any two circuits to show how flow control valve is used to control the speed of an actuator for different load condition. (6)

OR

- b)(i) With neat sketches explain the working of any two accumulators. Draw also any two circuits of its use in hydraulics. (8)
(ii) What is synchronization? Draw and explain any two circuits. (8)

14. a) a) Draw a cascade method of circuit for the following problem. Metal sheets are to be flanged on a pneumatically operated bending tool. After clamping the component by means of a single acting cylinder, it is bent over by a double acting cylinder and subsequently finish bent by another double acting cylinder C. The operation is initiated by a manual push button. (16)

OR

- b) (i) Classify the filters used in Pneumatics .With a neat sketch explain the functioning of any one. (8)
(ii) Explain with a neat sketch the functioning of single stage servo valve. (8)

15. a) (i) With a block diagram explain the various parts of PLC and with an example explain how relay ladder diagram is converted in to a PLC ladder diagram. (8)
(ii) Draw an electropneumatic ladder diagram for the problem (8)

Clamping of a work piece must be possible by hand from two points. A signal input device must be used to provide the start signal for clamping. The drilling spindle must be retracted when it reaches its front end position. The drilling operation must only be possible when the clamping cylinder has reached its from end position.

OR

- b) Write short notes on any two of the following: (2x8=16)
(i) Direction control valves.
(ii) Trouble shooting of actuators
(iii) Flip flop.