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B.E / B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, APRIL / MAY 2013

COMMON TO MECHANICAL AND MANUFACTURING ENGINEERING

V Semester (English and Tamil Medium)

ME 9303 Hydraulics and Pneumatics

(Regulation 2008)

Time: 3 Hours

Answer ALL Questions

Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. List the components of Hydraulic and Pneumatic systems.
2. What are the functions of hydraulic fluids?
3. Differentiate pressure compensated and non-pressure compensated pumps.
4. State the different types of cylinder mountings
5. What is a "meter-out" circuit? What are its limitations?
6. What are the factors to be considered while designing a hydraulic circuit?
7. What is a twin pressure valve?
8. Where pneumatics is preferred over hydraulics?
9. What are the important components of a hydraulic power pack?
10. What is meant by low cost automation?

Part – B (5 x 16 = 80 marks)

11. Draw and explain a hydraulic circuit diagram of a hydraulic system having a double acting cylinder which has a rapid approach speed, then a slow feed motion and at the end of the stroke the cylinder returns rapidly. (16)
12. a) i) With neat sketches explain the principle and operation of a vane pump. Derive an expression for the output of the vane pump. (12)
ii) A vane pump is to have a volumetric displacement of 120 cm^3 . It has a rotor diameter of 65.5 mm, a cam ring diameter of 89.9 mm and a vane width of 52.8 mm. What must be eccentricity? (4)

OR

- b) i) Explain with neat sketch the principle of operation of telescopic cylinder (8)
ii) A hydraulic motor has an 85 cm^3 volumetric displacement if it has a pressure valve setting for 75 bar and it receives oil from a $0.007 \text{ m}^3/\text{s}$ pump, find the motor speed, torque capacity and power capacity of the motor. (8)

13. a) Design a punching press with five working stations operated by five single acting cylinders connected to an intensifier. The cylinders require 18 mm travel and used to punch 18 mm diameter holes on sheet metals of 4 mm thick of mild steel whose strength is 375 MPa. Determine the oil pressure of the hydraulic system and length of the intensifying cylinder if the load piston area is 22000 mm², Ram piston area and small piston area of the intensifier are 16000 mm² and 1000mm². (16)

OR

- b) i) Explain a hydraulic press circuit which employs double pump unloading principle. (8)
ii) Draw a single cylinder continuous reciprocation circuit using suitable components and briefly explain. (8)
14. a) i) Describe with schematic sketch, the function and use of an "FRL" trio unit. (8)
ii) Explain with ANSI symbols
a) All the types of Actuators used in pneumatics.
b) Quick exhaust valve and Silencer (8)

OR

- b) i) Highlight the advantages of an Air-over oil circuit and explain it with a Suitable application. (8)
ii) Brief on an Electro hydraulic servo system used in Industries (8)
15. a) In machine tool automation, a component has to be clamped by extending a linear actuator "A". A drilling operation is to be done on the component by extending another linear actuator "B". After the actuator "B" completes drilling and retracts, the clamping cylinder "A" retracts and unclamps the work piece. For this cycle.
Sketch displacement – Event diagram showing sequence. (4)
Design sequential circuit using cascade technique and explain. (12)

OR

- b) i) Compare PLC and hardwired circuits. (4)
ii) Briefly explain the working of PLC with a block diagram. (6)
iii) Draw the PLC ladder diagram for the following sequence of operation A1B1B0A0. (6)