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B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2008.

Fifth Semester

(Regulation 2004)

Mechanical Engineering

ME 1305 — APPLIED HYDRAULICS AND PNEUMATICS

(Common to B.E. (Part-Time) Fourth Semester Regulation 2005)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. List any four advantages of using the fluid power system.
2. What is Viscosity Index? What do you infer from V.I. Number of an oil?
3. Name any four hydraulic fluids that are commonly used.
4. What is pump cavitation? How can you avoid it?
5. Draw the ANSI symbol for (a) Pilot operated check valve (b) Shuttle valve.
6. What is the use of a temperature switch?
7. How can you specify an air compressor?
8. What is meant by an air – over – oil system?
9. Define the terms 'Lap' and 'Null' with respect to servo valves.
10. State 'Coanda effect'.

PART B — (5 × 16 = 80 marks)

11. (a) (i) List out the advantages and disadvantages of hydraulic power system. (8)
- (ii) What are the functions of a fluid in any fluid power systems? (4)
- (iii) What are the required properties of a good hydraulic fluid? (4)

Or

- (b) Write short notes on the following :
- (i) Laminar and turbulent flow (8)
- (ii) Energy losses in valves and fittings (3)
- (iii) Darcy's equation. (5)
12. (a) (i) How much hydraulic power would a pump produce when operating at 125 bars and delivering 1.25 litres per second of oil? What power rated electric motor would be selected to drive this pump if its overall efficiency is 88%? (8)
- (ii) What are the factors to be considered in selection of a pump? (8)

Or

- (b) (i) Explain with neat sketch, the principle and operation of Telescopic cylinder. (10)
- (ii) With respect to hydraulic motors, Define the following terms : (6)
- (1) Volumetric efficiency
- (2) Mechanical efficiency
- (3) Overall efficiency.
13. (a) (i) Explain the sequencing of two double-acting cylinders with a neat circuit. (8)
- (ii) With a neat sketch describe the construction and operation of a pressure compensated flow control valve. (8)

Or

- (b) (i) With a neat sketch, explain how two hydraulic cylinders motion can be synchronized. (8)
- (ii) Make a circuit, showing an intensifier in a punching press application. (8)
14. (a) (i) A rotary vane air motor has a displacement volume of 80 cm^3 and operates at 1750 rpm using 700 KPa gauge pressure air. Calculate the standard m^3/min rate of consumption and KW power output of the motor. Assume the temperature remains constant. (10)
- (ii) Explain the function of an air pressure regulator with neat sketch. (6)

Or

- (b) Develop an electropneumatic circuit by cascade method for the following sequence : $A^+B^+B^-A$ where A and B stand for cylinders, (+) indicates extension and (-) retraction of cylinders. (16)
15. (a) (i) Draw and explain the working of proportional pressure reducing valve. (8)
- (ii) What is mean by ladder programming? (3)
- (iii) Draw the basic standard symbols that are used in ladder diagram? Also show rungs in a ladder diagram. (5)

Or

- (b) (i) Describe various selection criteria for pneumatic components. (6)
- (ii) List out any four operating problems associated with pumps and valves and the corresponding possible causes and suitable remedy for each problem. (10)