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**Question Paper Code : P 1420**

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2009.

Fifth Semester

Mechanical Engineering

ME 1305 — APPLIED HYDRAULICS AND PNEUMATICS

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

(Regulation 2004)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the advantages of fluid power?
2. State Pascal's Law.
3. When is Lobe pump preferred?
4. Why is end cushioning provided in hydraulic cylinder operations?
5. What is the purpose of synchronised hydraulic circuits?
6. What is the advantage of using intensifiers?
7. What are the functions of FRL unit?
8. What are the basic components of a pneumatic system?
9. How is the speed of a cylinder controlled in pneumatic system?
10. Mention the areas in a pneumatic system, which should be given higher importance during maintenance?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Discuss any four hydraulic principles used in hydraulic systems. (8)  
(ii) Discuss any four applications of fluid power. (8)

Or

- (b) (i) Discuss the steps involved in the selection of a pump for a hydraulic circuit.  
(ii) Discuss the working of piston motors with help of neat sketch. What are the practical situations where in Rotary actuators preferred over Linear actuators.
12. (a) (i) A gear pump has 75 mm outside diameter, 50 mm inside diameter and 25 mm width. If the volumetric efficiency is 95% at rated pressure, what is the actual flow-rate? The pump speed is 1200 rpm. (4)  
(ii) Explain with a neat diagram the construction and working of an unbalanced vane pump. (12)

Or

- (b) A pump has a displacement volume of  $100 \times 10^{-6} \text{ m}^3$ . It delivers  $1.5 \times 10^{-3} \text{ m}^3/\text{s}$  at 1000 rpm and  $70 \times 10^5 \text{ N/m}^2$  pressure. If the prime mover input torque is 120 N.m.  
(i) What is the overall efficiency of the pump? (3)  
(ii) What is the theoretical torque required to operate the pump? (3)  
(iii) Discuss any two types of cylinder mountings with neat diagrams. (10)
13. (a) (i) Discuss the construction and working of a solenoid actuated valve with a diagram. (8)  
(ii) Discuss the functioning of an unloading valve with a diagram. (8)

Or

- (b) (i) An accumulator is loaded with 400 kN weight. The ram has a diameter of 250 mm and a stroke of 6 m. Its friction may be taken as 2%. It takes 120 seconds to fall through its full stroke. Find the total work supplied and power delivered to the hydraulic appliance by the accumulator, when  $7.5 \times 10^{-3} \text{ m}^3/\text{min}$  is delivered by a pump, while the accumulator descends with the stated velocity. (10)
- (ii) Discuss the use of accumulators in hydraulic circuits. (6)
14. (a) (i) Discuss the construction and function of a Quick exhaust valve with a diagram. (6)
- (ii) Discuss in detail the considerations taken while designing pneumatic circuits. (10)

Or

- (b) (i) How is the economic cost of energy losses in pneumatic systems calculated? Explain. (6)
- (ii) Draw a pneumatic circuit diagram and explain its working for cylinder cycle timing system. (10)
15. (a) (i) A 75% efficient compressor delivers air at 680 kPa and a volume of  $7.60 \text{ m}^3/\text{min}$ . Calculate the cost of electricity per year if the efficiency of the electric motor driving the compressor is 95% and the compressor operates 2500 hr per year. The cost of electricity is Rs. 5.0/Kwh. (4)
- (ii) Discuss with a circuit diagram how the reciprocation of a cylinder is achieved by using pressure switches in pneumatic circuit. (12)

Or

- (b) (i) How is AND function achieved in a fluidic circuit? (4)
- (ii) Discuss the circuit for memory function in fluidics. (4)
- (iii) Discuss any eight common problems and their remedies in pneumatic circuits. (8)