

- N. B. : (1) Question number 1 is **compulsory**.  
 (2) Solve any **Three** questions from remaining **five** questions.  
 (3) **Assume** suitable data if required.  
 (4) Assumptions made should be stated clearly.



1. Attempt any **five** :-
- (a) Explain pressure head and how pressure head is measured? 5  
 (b) Explain major and minor losses in pipes. 5  
 (c) Differentiate between (i) Steady flow and unsteady flow (ii) Laminar flow and turbulent flow. 5  
 (d) With the help of neat sketch explain the working of check valve. 5
2. (a) A 400 mm diameter shaft is rotating at 200 r.p.m. in a bearing of length 120 mm. If the thickness of oil film is 1.5 mm and dynamic viscosity of oil is 0.7 N.S./m<sup>2</sup>, determine (i) Torque required to overcome friction in bearing (ii) Power utilised in overcoming viscous resistance. 10  
 (b) With the help of neat sketches explain the working of any two speed control circuits. Give their applications, advantages and limitation. 10
3. (a) A vertical venturimeter carries a liquid of relative density 0.8 and has inlet and throat diameters of 150 mm and 75 mm respectively. The pressure connection at the throat is 150 mm above that at the inlet. If the actual rate of flow is 40 litres/sec and  $C_d = 0.96$ , calculate the pressure difference between inlet and outlet in KN/m<sup>2</sup>. Sketch the arrangement. 10  
 (b) Explain the circuit for the control of a double acting cylinder with the help of a suitable directional control valve for the following 10  
 (i) Piston extension (ii) Piston retraction (iii) Hold Piston.
4. (a) A circular plate 1.5 m diameter is submerged in water with its greatest and least depth below the surface being 2 m and 0.75 respectively. Sketch the arrangement and determine the 10  
 (i) total pressure on one face of the plate  
 (ii) position of centre of pressure.  
 (b) (i) Explain with neat sketch working of pressure reducing valve. 5  
 (ii) Enlist desirable properties of hydraulic fluid. 5
5. (a) Two pipes of diameter 400 mm and 200 mm each are 300 m long. When the pipes are connected in series, if the discharge from pipe is 0.10 m<sup>3</sup>/s, find the loss of head incurred. What would be the loss if pipes are connected parallel for the same discharge. Take friction factor = 0.0075 for each pipe. 10

- (b) Explain with the help of neat sketch the operation of external gear pump. Draw performance characteristics. 10
6. (a) A fluid of viscosity 8 poise and specific gravity 1.2 is flowing through a circular pipe of diameter 100 mm. The maximum shear stress at the pipe wall is  $210 \text{ N/m}^2$ . Find (i) pressure gradient (ii) The average velocity and (iii) Reynold's number of flow. 10
- (b) Write short notes on any two :- 10
- (i) Working of sequence valve
  - (ii) Desirable properties of hydraulic fluid
  - (iii) Working of regenerative circuit
  - (iv) Variable drive speed consisting of variable capacity pumps and fixed capacity motors.

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