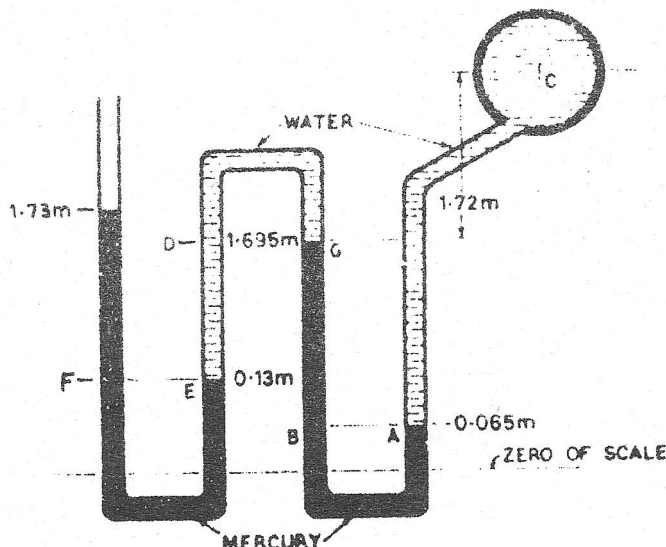


- N.B.** (1) Question No. 1 is compulsory.
 (2) Attempt any four questions out of remaining six questions.
 (3) Assume suitable data wherever required.
 (4) Assumptions made should be clearly stated.

1. (a) Elaborate the difference between dynamic viscosity and kinematic viscosity. 4
 Find the kinematic viscosity in stokes of a liquid whose specific gravity is 0.95 and viscosity is 0.011 poise.
- (b) Differentiate between :— 4
 - (i) Rotational and irrotational flow
 - (ii) Laminar and turbulent flow.
- (c) Explain the following terminologies with reference to a pressure relief valve :— 4
 - (i) Cracking pressure
 - (ii) Pressure over-ride.
- (d) Write a short note on 5/2 – Directional control valve. 4
- (e) Explain the function of simple check valve with ISO symbol. 4
2. (a) A thin plate of very large area is placed in a gap of height 'h' with oils of viscosities ' μ_1 ' and ' μ_2 ' on the two sides of the plate. The plate is pulled at a constant velocity V. Calculate the position of plate so that :— 10
 - (i) the shear force on the two sides of the plate is equal
 - (ii) the force required to drag the plate is minimum.
 Assume viscous flow and neglect all end effects.
- (b) Explain constant torque loading and constant power loading with regard to the combination of variable capacity pump and fixed motor. Plot the performance curves. 10
3. (a) A square plate 4 m x 4 m hangs in water from one of its corners and its centroid lies at a depth of 8 m from the free water surface. Work out the total pressure on the plate and locate the position of centre of pressure with respect to the plate centroid. 10
- (b) Explain with a neat sketch the operation of regenerative circuit. Derive the relationship between extend and retract speeds and thrusts in terms of piston area and rod area. 10
4. (a) For a compound manometer shown in the figure below, what is the gauge pressure at 'C' if the manometric fluid is mercury and the fluid in the pipe and in the tubing which connects the two U-tubes is water ? 10



- (b) Explain with neat sketch working of the most efficient hydraulic circuit out of :— 6
- Meter-In
 - Meter-Out
 - Bleed-Off.
- (c) Develop a formula for capillary rise of fluid having surface tension σ and contact angle θ between two concentric glass tubes of radii r_o and r_i . 4
5. (a) State and derive Bernoulli's equation. List the assumptions also. 10
- (b) Explain with a neat sketch the operation of balanced vane pump. How is hydraulic balancing achieved in the pump ? Draw the performance characteristics of the pump. 10
6. (a) A venturimeter is to be fitted in a pipe 0.25 m diameter where the pressure head is 7.6 m of flowing liquid and the maximum flow is $8.1 \text{ m}^3/\text{min}$. Find the least diameter of the throat to ensure that the pressure head does not become negative :—
Take $C_d = 0.96$. 10
- (b) Enumerate relative merits and demerits of hydraulic and pneumatic system. 6
- (c) Give ISO symbols for the following :— 4
- Bidirectional variable displacement motor
 - Pressure switch
 - Pressure reducing valve
 - Double acting cylinder with variable cushion at both ends.
7. (a) Two reservoirs have a constant difference of levels of 70 m and are connected by a 250 mm diameter pipe which is 4 km long. The pipe is tapped mid-way between the reservoirs and water is drawn at the rate of $0.04 \text{ m}^3/\text{s}$. Assuming friction factor = 0.04, determine the rate at which water enters the lower reservoir. 10
- (b) Explain the working of the valves given below with neat sketches :— 10
- Sequence Valve
 - Counter balance valve.

