

- Q-4** **Attempt all questions** **(14)**
- (a) Derive Darcy's weisbatch equation for loss of head due to friction in a pipe line. 05
- (b) Find the discharge over a rectangular weir of length 100 m. The head of water over the weir is 1.5 m. The velocity of approach is given as 0.5 m/s. Take $C_d = 0.60$. 05
- (c) Explain the principle of impulse-momentum. 04
- Q-5** **Attempt all questions** **(14)**
- (a) Explain with sketch the relationship between the absolute pressure, atmospheric pressure and gauge pressure. 07
- (b) The space between tow square flat parallel plates is filled with oil. Each side of the plate of 60 cm. the thickness of the oil film is 12.5 mm. The upper plate, which moves at 2.5 m/s requires a force of 10 kg to maintain the speed. Determine: (i) The dynamic viscosity of the oil in poise, and (ii) The kinematic viscosity of the oil in stokes if the specific gravity of the oil is 0.95. 07
- Q-6** **Attempt all questions** **(14)**
- (a) Derive continuity equation for 2-D incompressible flow in Cartesian form stating the assumption made and principle involved. 07
- (b) A cylinder 1.6 meter diameter, 1.3 meter long and weighing 500 kg floats in sea water with its axis vertical. A 50 kg load is placed centrally at the top of the buoy. If the buoy is to remain in stable equilibrium, find the maximum permissible height of the centre of gravity of the load above the top of the buoy. Specific weigh of sea water is 1025 kg/m^3 . 07
- Q-7** **Attempt all questions** **(14)**
- (a) Give classification of notches and weirs. Derive equation for the flow over a triangular notch. 07
- (b) Find the maximum power transmitted by a jet of water discharging freely out of nozzle fitted to a pipe 300 m long and 10 cm diameter with co-efficient of friction as 0.01. The available head at the nozzle is 90 m. 07
- Q-8** **Attempt all questions** **(14)**
- (a) Obtain an expression for the force exerted by a jet of water on a fixed vertical plate in the direction of the jet. 07
- (b) Calculate the discharge through a rectangular orifice 2 m wide and 1.6 m deep fitted to a water tank. The water level in the tank is 2.7 m above the top edge of the orifice. Take coefficient of discharge = 0.62 07

