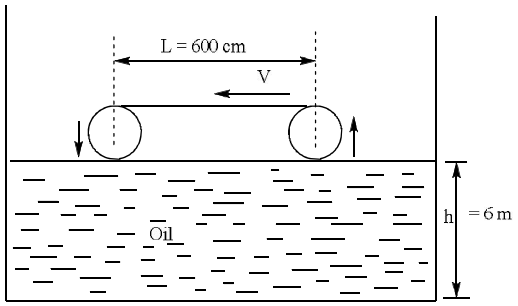
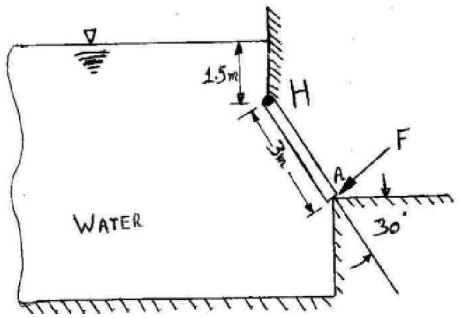
Q1. The belt moves at steady velocity V = 5 m/sec, and skims the top of a tank of oil of viscosity 0.5 N s/m^2 as shown. If the belt width is 200 cm, assuming a linear velocity profile on the oil, the power required to drive the belt is _____ watt

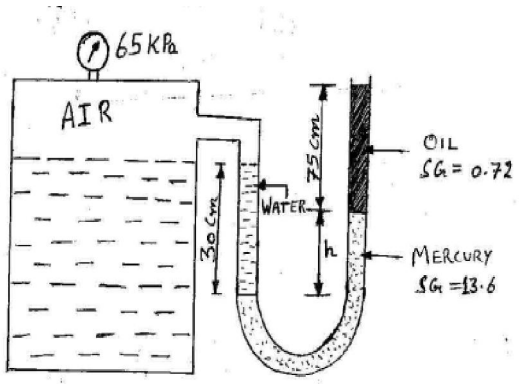


Q2. The gate shown in hinged at H. The gate is 3m wide normal to plane of the diagram. Calculate the force required at A to hold the gate closed

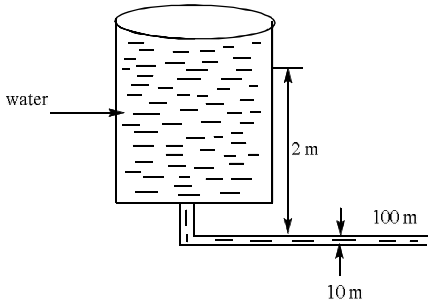


Q3. Two plates arranged parallel to each other and a gap of 0.5 cm is maintained between plates. The gap is filled with an oil of viscosity $\mu = 0.5\,NS/m^2$. If upper plate is moved with a velocity of 0.8 m/sec, the lower plate starts moving with a velocity of 0.3 m/sec due to oil filled in the gap. The shear stress developed on the top plate is _____ N/m^2

Q4. The gage pressure of air in tank shown in figure is measured to be 65 kPa. Determine the differential height of h of mercury column. h = _____ m



Q5. A 2.m high tank is initially filled with water. The tank water surface is open to the atmosphere, and a sharp edged 10 cm diameter orifice at the bottom drains to the atmosphere through a horizontal 100m long pipe. If the total irreversible head loss of system is determined to be 1.5 m. velocity at pipe exit is _____ m/sec



Q6. What is discharge for laminar flow through a pipe of diameter 40 mm having cent-line velocity of 1.5 m/sec

(a) $\frac{3\pi}{59} m^3/sec$ (b) $\frac{3\pi}{2500} m^3/sec$

(c) $\frac{3\pi}{5000} m^3/sec$ (d) $3\pi/10000\, m^3/sec$

Q7. In a 3 – D in compressible flow, the velocity component in the x and y directions are $u = 2x^2 + z^2 + 6$ and $y = y^2 + 2z^2 + 7$ .The velocity component in z direction is.

a) $2xz + 2yz + f(x,y)$

b) $2xz + 4yz + f(x,y)$

c) $4xz + 2yz + f(x,y)$

d) $-4xz - 2yz + f(x,y)$

Q8. The boundary layer over a plate is described by $\frac{u}{U_\infty} = \left[\sin(\pi y / 2\delta)\right]$. Momentum thickness $\theta =$ _____ [in terms of boundary layer thickness δ]

(a) $0.137\,\delta$ (b) $0.246\,\delta$

(c) $0.3\,\delta$ (d) $0.12\,\delta$

Q9. Fluid flow rate Q, can be measured with the help of a venturi tube, in which the difference of two

pressures, ΔP, measured at an upstream point and at the smallest crossection of the tube is used. If a relation $[\Delta P \propto Q^n]$ exits, then n is equal to:-

(a) 2 (b) 4

(c) ½ ¼

Q10. An orifice meter having an orifice of diameter d is fitted in a pipe of diameter D. For this orifice meter, what is the coefficient of discharge C_d?

a) A function of Reynold number only

b) A function of [d/D] only

c) A function of both [d/D] and Reynold number

d) Independent of [d/D] and Reynold number