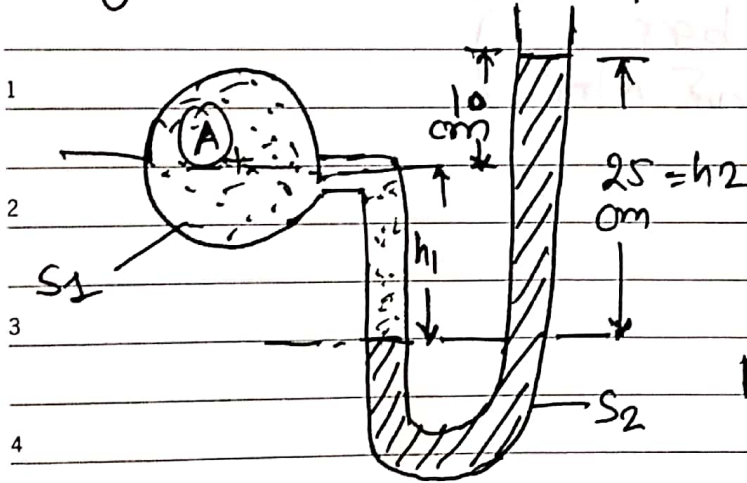


Ex: 3 For pressure measurement of oil having sp. gravity = 0.8 in flowing through pipe used the 'u' type manometer. The right limb of manometer is open to the atmosphere & left limb is connected to the pipe. The right limb of the manometer having mercury sp. gravity = 13.6 which surface is 10 cm. above the centre line of the pipe. If both limbs of mercury difference is 25 cm. So, find the pressure measurement of oil in absolute pressure.



$$S_1 = 0.8$$

$$S_2 = 13.6$$

$$h_1 = 25 - 10 = 15 \text{ cm} = 0.15 \text{ m}$$

$$h_2 = 25 \text{ cm} = 0.25 \text{ m}$$

$$\text{LHS} = \text{RHS.}$$

$$\frac{P_A}{\rho g} + h_1 S_1 = h_2 S_2$$

$$\therefore \frac{P_A}{\rho g} + (0.15 \times 0.8) = (0.25 \times 13.6)$$

$$\therefore \frac{P_A}{9810} + 0.12 = 3.4$$

$$\therefore \frac{P_A}{9810} = 3.4 - 0.12$$

$$\therefore P_A = 3.28 \times 9810$$

$$\therefore P_A = 32176.8 \text{ N/m}^2.$$

$$\text{(Also)} \therefore P_A = 0.3217 \times 10^5 \text{ N/m}^2 \checkmark$$

(This is Gauge pressure) P_{gauge}

Now, To find Absolute pressure.

$$\therefore P_{\text{Absolute}} = P_{\text{atm}} + P_{\text{gauge}}$$

$$= 1.01325 \times 10^5 + 0.3217 \times 10^5$$

$$= (1.01325 + 0.3217) \times 10^5$$

$$\text{Ans: } \boxed{P_{\text{abs}} = 1.3332 \times 10^5 \text{ N/m}^2}$$

(where :-

$$\Rightarrow P_{\text{atm}} = 1.01325 \text{ bar.}$$

$$= 1.01325 \times 10^5 \text{ N/m}^2)$$