Q2

$\rho = 10^3 \, kg \cdot m^{-3}$ $\quad m = 80 \, kg$

$V = ?!$ $\quad \rho = \frac{m}{V}$

$V = \frac{m}{\rho} = \cancel{10^3 \times 8 \, kg \cdot m^{-3} \times kg}$

$= \frac{80}{10^3} \frac{\cancel{kg}}{\cancel{kg}} m^3$

$\boxed{V = 80 \times 10^{-3} \, m^3}$

$1 \, m^3 = 10^3$ litres

$80 \times 10^{-3} \, m^3 = X$

$\boxed{V = 80 \text{ litres}}$

Q3

Cerebrospinal density = $1007\ kg \cdot m^{-3}$

$m_{cs} = ?!$ $V_{cs} = ?!$

where $V_{cs} = V_{blood}$ of mass = 50 g

and $\rho_{blood} = 1060\ kg \cdot m^{-3}$

$\therefore V_{blood} = \frac{m}{\rho} = \frac{\cancel{1060}\ 50 * 10^{-3}}{1060}$

$\boxed{V_{blood} = 47 * 10^{-6}\ m^3} = V_{cs}$

$m_{cs} = V_{blood} * \rho$

$= 47 * 10^{-6} * 1007\ kg \cdot m^{-3} * m^3$

$= 0.0473\ kg$

$\boxed{m_{cs} = 47.3 g}$

Q4

$\rho_{water} = 1\times10^{3}\ kg.m^{-3}$

$h = ??$

$P_{absolute} = 2\ atm$

- **Solution:**

$$P_{absolute} = P_{Gauge} + P_{atm}$$

$$2 = \rho g h + 1$$

$$2 - 1 = 10^{3}\times10\ h$$

$$1\ atm = \left(10^{4}\ kg.m^{-3}\times\frac{m}{s^{2}}\right) h$$

$$101.3\times10^{3}\ \frac{\cancel{kg}}{\cancel{s^{2}}\,m} = 10^{4}\ \cancel{kg}.\frac{\cancel{m}^{-2}}{\cancel{s^{2}}}$$

$$h = \frac{101.3\times10^{3}}{10^{4}}\ m$$

$$\boxed{h = 10.1\ m}$$

$1\ atm = 101.3\times10^{3}\ \frac{N}{m^{2}}$

$= \frac{101.3\times10^{3}\ kg\,m}{s^{2}m^{2}}$

$= 101.3\times10^{3}\ \frac{kg}{s^{2}\,m}$

c) $P_{absolute} = 5 \, atm$

$$P_{abs} = P_{Gauge} + P_{atm}$$

$$5 - 1 = \rho g h$$

$$4 \, atm = \left(10^4 \, kg \cdot \frac{m^{-2}}{s^2}\right) h$$

$$4 * 101.3 * 10^3 * \frac{\cancel{kg}}{\cancel{s^2} \cdot \cancel{m}} = \left(10^4 \, \cancel{kg} \cdot \frac{\cancel{m^{-2}}}{\cancel{s^2}}\right) h$$

$$\boxed{h = 40.1 \, m}$$

Q5

$h = 1.7\,m$

$\rho = 1060\ kg \cdot m^{-3}$

$P = \rho g h$

$= 1060 \times 1.7 \times 10$

$P_{bottom} = 18.020 = 18\,kPa$

$\therefore P_{top} = 0$

$\boxed{\Delta P = 18\,kPa}$

Q6 c

if systolic pressure = 120 mm Hg

diastolic pressure = 8 mm Hg

* Note that 760 mm Hg = 101.3 Kpa = 1atm

find systolic and diastolic in unit of Pa (SI unit)

systolic ⇒ 120 mmHg ⟶ X

760 mmHg ⟶ $101.3 * 10^3$ Pa

$$X = \frac{120 * 101.3 * 10^3}{760} = 15995 \approx 16000 \text{ Pa}$$

$$\text{diastolic} = \frac{80 * 101.3 * 10^3}{760} = 10700 \text{ Pa}$$

Q9

$P_{net} = P_{in} + P_{atm} - P_{out}$

$= \text{systolic} - \text{absolute} + \text{atm}$

$P_{net} = 15.3 - \underset{109kPa}{\cancel{101.33}} + 101.3kpa$

$P_{net} = 7.66 \times 10^3 \text{ pa}$

$F_{net} = 7.66 \times 10^3 \times 10^{-4}$

$= \underline{0.76 \text{ N}}$

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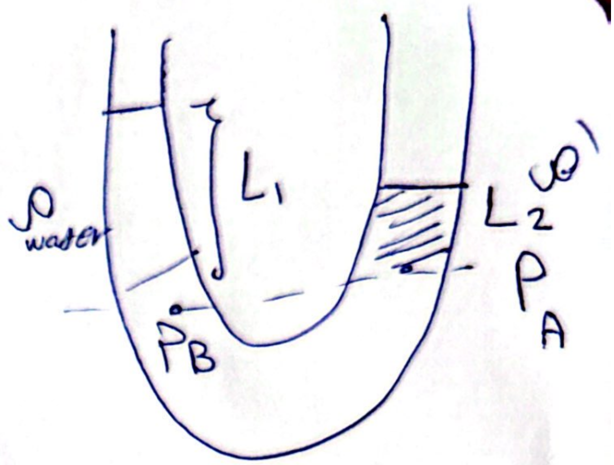
Q10

$\rho_{water} = 10^3 \ kg.m^{-3}$

$L_1 = 8.9 cm$

$\rho' = ??$

$L_2 = 3.5 \ cm$



Solution :-

$$P_A = P_B$$

$$\rho' g L_2 = \rho_{water} g L_1$$

$$\rho' = \frac{\rho_{water} L_1}{L_2}$$

$$= \frac{10^3 \ kg.m^{-3} * 8.9 \ \cancel{cm}}{3.5 \ \cancel{cm}}$$

$$\boxed{\rho' \approx 2542 \ \frac{kg}{m^3}}$$