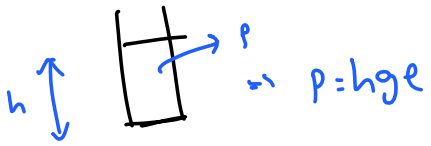
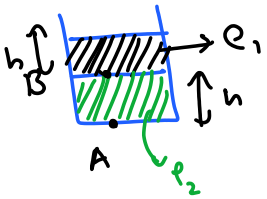
1102-PHY

Saturday, 2 November 2024 5:29 PM



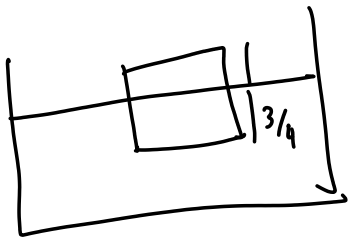
$\Rightarrow P = h\rho g$



$P_A = 2h\rho g$ ~~·~~

$P_A = h\rho_1 g + h\rho_2 g$

$P_B = h\rho_1 g$

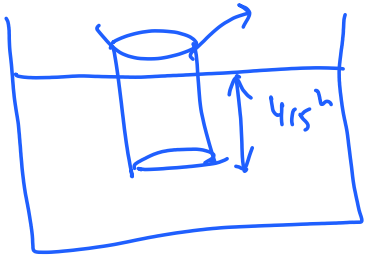


$\Rightarrow V_{disp} = a^3 \cdot \frac{3}{4}$

IL-7

$\frac{4}{5}V$ relative density = 0.7 (wood)

(1)

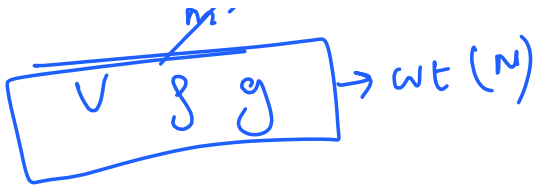


Find ρ_L of the liquid

$V = \frac{4}{5} V_{cube}$

wt. of the body = wt. of Liquid displaced

$m^3 \cdot \frac{kg}{m^3} \cdot g \Rightarrow$ wt (N)



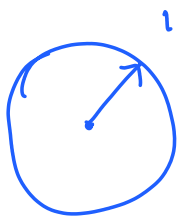
$$\cancel{V}(700)\cancel{g} = \frac{4}{\cancel{3}}\cancel{V}(\rho_l)\cancel{g}$$

$$\rho_l = \frac{700 \times 5}{4 \cancel{2}} \Rightarrow \frac{700 \times 5}{4} = \frac{3500}{4} = 875$$

$$\rho_l = 875 \text{ kg/m}^3$$

IL-2 :

(2)



$m = 0.038$ kg

$V = \frac{4}{3}\pi r^3$

$\rho = \frac{m}{V} \Rightarrow \rho = \frac{0.038}{V}$

relative density $= \frac{\rho}{\rho_w}$

$\Rightarrow \rho = \frac{0.038}{14.1 \times 10^{-3}} \frac{\text{kg}}{\text{m}^3}$

$V = \frac{\cancel{4}}{\cancel{3}} \cdot \frac{11}{7} \cdot \frac{\cancel{3}}{\cancel{2}} \cdot \frac{\cancel{3}}{\cancel{2}} \cdot \frac{\cancel{3}}{\cancel{2}} \Rightarrow \frac{1419}{\cancel{4}}$ 14.1 cm^3

$= \frac{3.8 \times \cancel{10^2}}{1.4 \times \cancel{10^2}} \frac{\text{kg}}{\text{b}}$

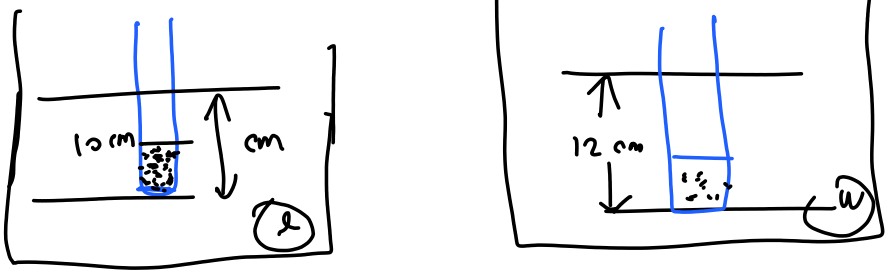
$= 2.69$

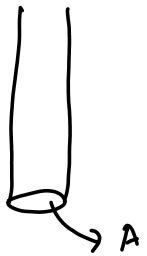
$V = 14.1 \text{ cm}^3$

$= 14.1 \times \left(\frac{1}{10}\right)^3 \text{ m}^3$

$= 14.1 \times 10^{-3}\ m^3$

③ IL-9 →





$V = 12A$

$h_1 = 10\ cm$

$V = 10A$

$\text{relative density} = \frac{\rho}{\rho_w}$

$$W_{\text{in air}} = (10A)\,\rho_l g = (12A)\,\rho_w g$$

$$\frac{\rho_l}{\rho_g} = \frac{12A}{10A}$$

$$\rho_l/\rho_g = 1.2$$

IL → 10

→ $\rho_{obj} = 4000\ kg/m^3$

(4) • 20 N in air is 4

• find the wt. in water

$$R.D = \frac{\rho}{\rho_w} \rightarrow V(4000)g = 20\ N$$

$$V(1000)g = F_b$$

$W_{air} = 20\ N$

$R.D = \frac{\rho}{\rho_w}$

$$W_{water} = V(4000)g - V(1000)g$$

$$R.P = \frac{Vg\rho}{Vg\rho_w} = \frac{W_{air}}{Vg(\rho - \rho_w)}$$

$$= \frac{W_{air}}{V\rho g - V\rho_w g}$$

$$= \frac{W_{air}}{W_{air} - F_b} = R.P$$

$$R.D = \frac{W_{air}}{W_{air} - W_{water}} \Rightarrow \frac{20\,N}{}$$

$$R.D = \frac{Wt.\ air}{Ap.\ loss.\ of\ wt} = \frac{W_{air}}{W_{air} - W_{water}}$$

$$4 = \frac{20}{20 - W_{water}} \Rightarrow (20 - W)4 = 20$$

$$20 - 5 = W$$

$$W = 15\,N$$

- If a body wts 20 N in air and wts 15 N in water. Find the relative density of the body. (5)

$$\Rightarrow R.D = \frac{20}{20 - 15}$$

R.D = 4

IL → II

$V s_s g = 80$

→ 80 g in air

$V \rho_s g - V \rho_l g = 30$

→ 50 g in liquid

~~30 g = wt. of water disp~~

R.D of Liquid → 1.5 ⇒ $\frac{\rho_l}{\rho_w}$ $\frac{\rho_s}{\rho_w}$ (1500)

~~(30 g = V s g)~~

~~30 = V ρ~~

R.D of SOLID ? (specific gravity)

$V \rho_s g = V \rho_l g$ $\frac{\rho_s}{\rho_s - 1500} = \frac{8}{3}$

Wt. of the solid = Wt. of Liquid displaced

~~80~~

$3\rho_s = 8(\rho_s - 1500)$

$3\rho_s = 8\rho_s - 1500(8)$

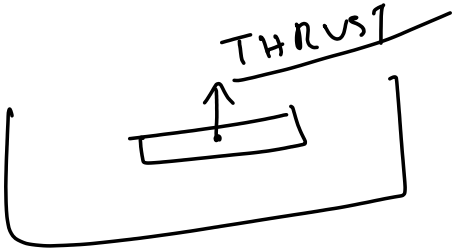
300

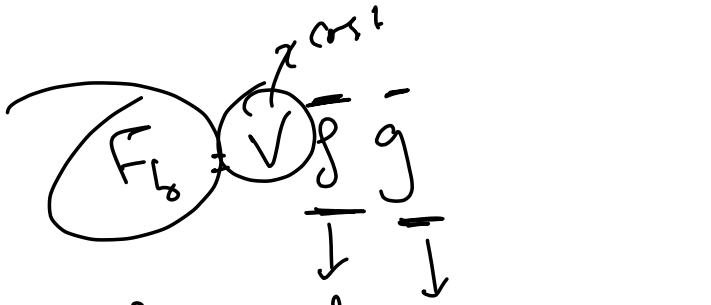
~~1500~~ (8) = 5 ρ_s

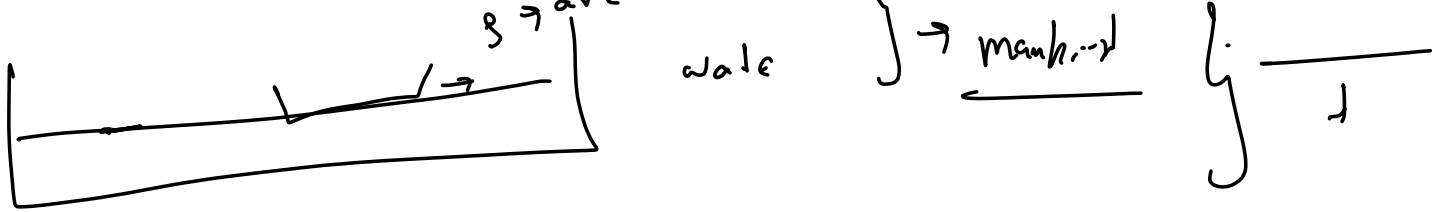
2400 = ρ_s

$\rho_s / \rho_w = 2.4$

RE-DO → PROBLEM



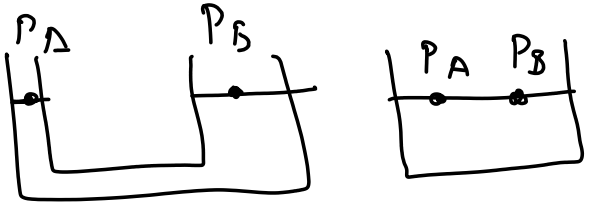




(arsenal) ?.

(9)

PASCALS LAW: ⇒



$$P_A = \frac{F_A}{A_A}$$

$$P_B = \frac{F_B}{A_B}$$

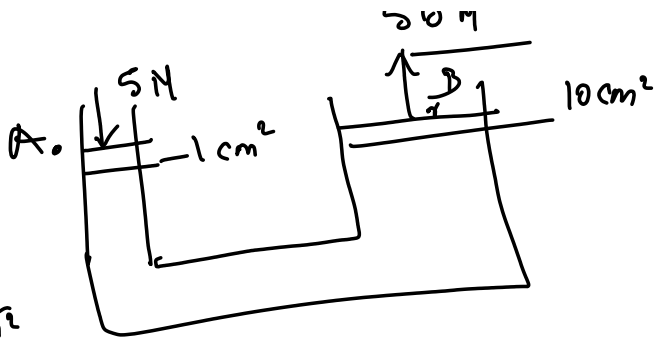
$$\frac{F_A}{A_A} = \frac{F_B}{A_B}$$

→ Area of C.S of two arms of Hydraulic press are

$1\ cm^2$ and $10\ cm^2$.

Force 5 N → in thinner arm

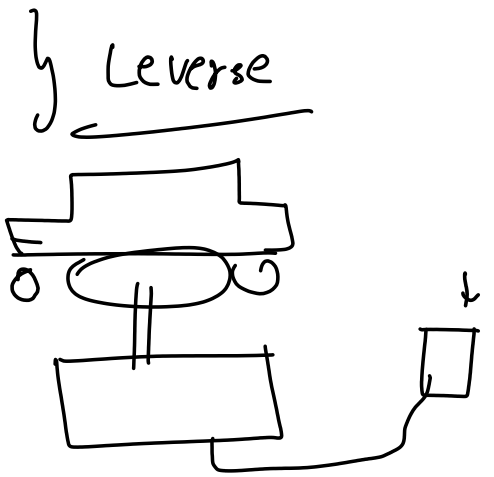
What should be the force in THICKER ARM



$F_A = P_B$

$\frac{5\ N}{1\ cm^2} = \frac{F}{10\ cm^2}$

$F = 5 \times 10 = 50N$



SOLVED PROBLEMS

(P1)

15 N air

$\rho_{body} = ?$ 12 N water

$\Rightarrow \Delta W = 3N$

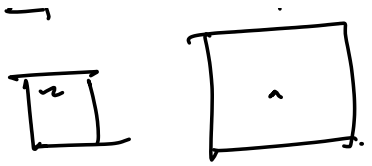
$R.D_{body} = \frac{15}{3} 5$

$\rho_{bod} = 5 \times 1000$

$= 5000$ kg/m³

$\Lambda W \quad \Delta W$

P2



↓ Won wt

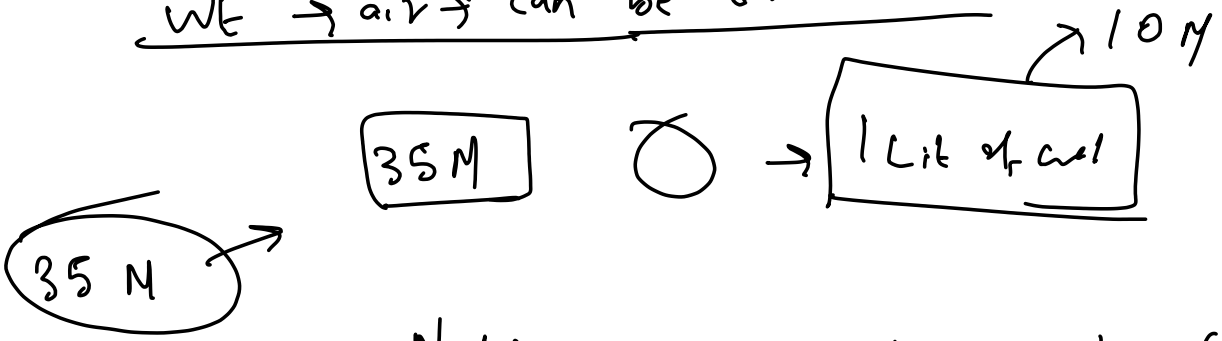
↓ Loss of wt

Should it be necessary to have same wt in AIR?

$R.D_{obj1} = \frac{W_{air1}}{\Delta W}$ $R.D_{obj2} = \frac{W_{air2}}{\Delta W}$

Wt → air → can be different

P3



$35 - 10 \Rightarrow$ 25 N

1000 L = 1000 kg

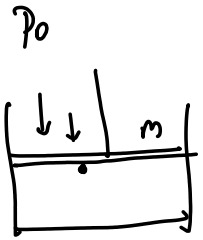
1 L = 1 kg

1 L ⇒ ~~10 N~~

~~Ans~~ 10 N

P4 ✓

P5



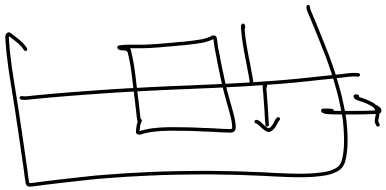
A

p_0

$$p_A = p_0 + \frac{m \cdot g}{A}$$

P6

$0.25 \Rightarrow$  $\rho_s = 250\ kg/m^3$



$0.81 \rightarrow \rho_l = 810\ kg/m^3$

$1 - 0.3$

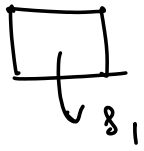
0.69

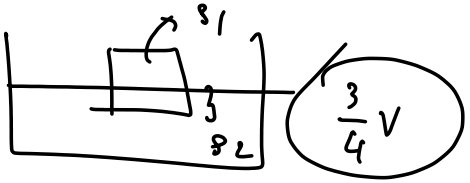
wt of wood = wt of water displaced

$$\forall \rho_s g = (f \forall) \rho_l g$$

$$\frac{\rho_s}{\rho_l} = f \Rightarrow \frac{250}{810} = (0.31) = f$$

p7





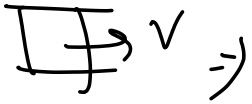
$\rho_2 = \frac{4}{3}\rho_1$

$V \rho_1 g = \left(\frac{3}{4}V\right) \rho_2 g$

$\Rightarrow \rho_1 \times \frac{4}{3} = \rho_2$

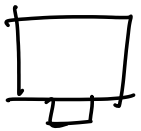
p8

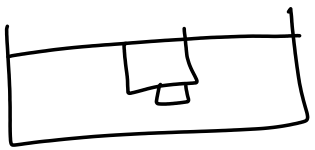
wood → mass 25g



$\Rightarrow$

wood with-metal → Mass 5g with volume 2cm3





volume of the wood?

$$\rho = \frac{25}{V}$$

$$\rho_m = \frac{25+5}{V+2}$$

$$V\left(\frac{25}{V}\right) g$$

$$V \; \rho \; g$$

$$\frac{30\ g}{V+2} = \rho$$

$$\rightarrow \quad \boxed{\rho = \rho_{water}}$$

$$\frac{1000\ kg}{m^3} \Rightarrow \frac{g}{cm^3}$$

$$\frac{30}{V+2} = 1$$

$$\frac{1000\ (1000\ g)}{(100\ cm)^3} = \frac{10^6\ g}{(10^2)^3\ cm^3}$$

$$= 1\ g/cm^3$$

$$30 = V+2$$

$$\boxed{V = 28\ cm^3}$$

Q9 →

$m = 5\ kg$

$V = 2 \times 10^{-4}\ m^3$

$F_b \Rightarrow V \times \rho \times g$

$V \rho g$

$2 \times 10^{-4} \times 1000 \times 10$

$\Rightarrow 2N$

$\frac{1}{4} \times 10^{-3}$ ~~7~~

Q10 → mass = 5 kg → Mark in N.S. → F_b

$\Rightarrow 5 \times 10 = 50N$

P11

$m = 5\ kg$

$\rho_s = 5000\ kg/m^3$

Immersed

$V_s \rho_s = \text{mass}$

$V_s (5000) = 5$

$V_s = \frac{5}{5000} \Rightarrow \frac{1}{1000}\ m^3 = 10\ M$

Upthrust = Vol disp * ρ_{fl} x g

$= \left(\frac{1}{1000}\right) \times 1000 \times 10$

P14

1000 g packed 500 cm^3

$\rho = \frac{1000g}{500\ cm^3} = 2\ g/cm^3$

$1\ g/cm^3 = \frac{m}{500}$

$m = 500\ g$

$S = \frac{500}{200}$ $2.5\ g/cm^3$

$200\ cm^3$

P18 $500\ g$ $350\ cm^3$

ILL (8) ✓ SEC-A (18) ✓

SEC-B (P5)

$L_1 \rightarrow (12)$ $L_2 \rightarrow (4)$

L5 (4) L4 (3)
L5 (2)