WS-18 For 7th class

Teark

(1) Given $A = 10\ cm^2$

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

$= 10^{-3}\ m^2$

$M = 40\ kg$

$P = \frac{F}{A} = \frac{Mg}{2A}$

$= \frac{40 \times 10}{2 \times 10^{-3}} = 2 \times 10^5\ N/m^2$

(2) Given $\rho_{atm} = 1.29\ kg/m^3$

$P_{atm} = \rho g h$

$\Rightarrow 1.05 \times 10^5 = 1.29 \times 10 \times h$

$\Rightarrow 1.05 \times 100 \times 10^3 = 12.9\ h$

$\Rightarrow h = \frac{105 \times 10^3}{12.9}$

$\Rightarrow h = 8\ km$

(3) Answer From Pressure formula $P = \frac{F}{A}$; $l = d$

$\Rightarrow \rho g (h_1 - h_2) = \frac{ma}{A}$

$\Rightarrow \rho g (h_1 - h_2) = \frac{\rho\, Vd\, a}{A}$

$\Rightarrow g(h_1 - h_2) = \frac{A\, l\, a}{A}$

$\Rightarrow g(h_1 - h_2) = da$

$\Rightarrow h_1 - h_2 = \frac{da}{g}$

(4) According to Pascal's law

$P_1 = P_2$

$\Rightarrow \frac{F_1}{A_1} = \frac{F_2}{A_2}$

$\Rightarrow F_2 = \frac{F_1}{A_1} \times A_2$

$\Rightarrow \frac{5}{1} \times 10 = 50\ N$

(5) From def of

$S.G_1 = \frac{\rho_l}{\rho_w}$

$\Rightarrow \frac{\rho_s}{\rho_w} = \frac{h_s}{h_w} = \frac{10}{2.5}$

Acc to Pascal's law

$P_A = P_B$

$\Rightarrow \frac{\rho_s}{\rho_w} = 0.8$

$\Rightarrow \rho_w g h_w = \rho_s g h_s$

$\Rightarrow \rho_w h_w = \rho_s h_s$

(6) Acc to Pascal's law

$P_A = P_B$

$\Rightarrow \rho_w g h_w + \rho_{Hg} g h_{Hg_A} = \rho_{Hg} g h_{Hg_B}$

$\Rightarrow \rho_w h_w + \rho_{Hg} h_{Hg_A} = \rho_{Hg} h_{Hg_B}$

$\Rightarrow \rho_w h_w = \rho_{Hg} h_{Hg_B} - \rho_{Hg} h_{Hg_A}$

$\Rightarrow \rho_w h_w = \rho_{Hg} [h_{Hg_B} - h_{Hg_A}]$

$\Rightarrow \rho_w h_w = \rho_{Hg} (2\ cm)$

$\Rightarrow h_w = \frac{\rho_{Hg}}{\rho_w} \times 2$

$\Rightarrow h_w = 13.6 \times 2$

$= 27.2\ cm$

$\simeq 27\ cm$

(7) (8) Acc to Pascal's law

$P_A = P_B$

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

Since Both A & B are having same area

$A_A = A_B$

$\therefore F_A = F_B$

(8) $\rho_l = 3.4\ gm/cm^3$

$h_{Hg} = 70\ cm.$

$P_l = P_{Hg}$

$\Rightarrow \rho_l g h_l = \rho_{Hg} \times g \times h_{Hg}$

$\Rightarrow 3.4\ h_l = 13.6 \times 70$

$\Rightarrow h_l = \frac{13.6 \times 70}{3.4}$

$\Rightarrow h_l = 4 \times 70$

$\Rightarrow h_l = 280\ cm.$

(9) Given $r_1 = 3cm$; $r_2 = 4cm$

According to Pascal's law

$P_1 = P_2$

$\Rightarrow \frac{F_1}{A_1} = \frac{F_2}{A_2}$

$\Rightarrow \frac{F_1}{F_2} = \left[\frac{A_1}{A_2}\right] = \left[\frac{\pi r_1^2}{\pi r_2^2}\right]$

$\Rightarrow \frac{F_1}{F_2} = \left[\frac{3^2}{4^2}\right] = \frac{9}{16}$

$\frac{F_1}{F_2} = \frac{h_1}{h_2} \frac{A_1}{A_2} = \frac{3}{2} \times \frac{1}{2}$

$\frac{F_1}{F_2} = \frac{3}{4}$

(10) From def of Pressure

$P = \rho g h$

$\Rightarrow \frac{F}{A} = \rho g h$

$\Rightarrow F = \rho g h A$

(16) $P_{atm} = \rho g H$

$= 10^3 \times 9.8 \times 0.7$

$P_{atm} = 6.86 \times 10^3 N/m^2$

$= 0.0686 \times 10^5 N/m^2$

$= 0.0686$ atm.

(17) $P_{guage} = 6.9 \times 10^5$ Pa.

$M = 90$ kg.

$P_{guage} = \frac{F}{A}$

$\Rightarrow A = \frac{F}{P_g} = \frac{Mg}{P}$

$\Rightarrow A = \frac{90 \times 10}{6.9 \times 10^5} = \frac{9}{6.9} \times 10^{-5}$

$A = 1.304 \times 10^{-3} m^2$

(18) Given $h = 0.76$m of Hg

$P_{atm} = \rho g h$

$= 13.6 \times 10^3 \times 9.8 \times 0.76$

$= 1.01 \times 10^5$ Pa

(19) $P_{atm} = 1.05 \times 10^5 N/m^2$

$P_{atm} = \rho_w g h_w$

$1.05 \times 10^5 = 10^3 \times 9.8 \times h_w$

$\Rightarrow h_w = \frac{105}{9.8}$

$= 10.71$ m of water

LTask

(1) Given

$\rho = 1.29$ kg/m^3

$P_{atm} = \rho g h$

$\Rightarrow 1.01 \times 10^5 = 1.29 \times 10 \times h$

$\Rightarrow 1.01 \times 10^5 = 12.9 h$

$\Rightarrow h = \frac{101 \times 10^3}{12.9} = 8013$ m

(2) $P_{Total} = P_{atm} + \rho g h$

$= 1.013 \times 10^5 + 10^3 \times 10 \times 10$

$= 1.013 \times 10^5 + 10^5$

$\Rightarrow 2.013 \times 10^5$

$\Rightarrow 2$ atm

(3) Given $A_1 = 5 cm^2 = 5 \times 10^{-4} m^2$

depth $d = 3$m

$P = \frac{F}{A} \Rightarrow F = PA$

$\Rightarrow F = \rho d g A = 10^3 \times 3 \times 5 \times$

$= 15 \times 10^{-1}$ kgf

(4) Given $h = 40$cm

$P_w = P_L$. [Acc to Pascal's law]

$\Rightarrow \rho_w g h_w = \rho_L g h_L$

$\Rightarrow 1 \times 40 = \rho_L \times 31 \Rightarrow \rho_L = \frac{40}{31} = 1.2$

(5) Given $P_g = 270$ kPa

$\Rightarrow \rho g h = 270 \times 10^3$

$\Rightarrow 10^3 \times 9.8 \, h = 270 \times 10^3$

$\Rightarrow h = \frac{270}{9.8} = 27.55$m

(6) Given $P = 200$ kPa

$P_{Total} = P_{atm} + P_{guage}$

$= 1.013 \times 10^5 + 200 \times 10^3$

$\Rightarrow 101.3 \times 10^3 + 200$ kPa

$\Rightarrow (101.3 + 200)$ kPa

$= 301.3$ kPa.

(7) Given $P_{atm} = 1.01 \times 10^5$ Pa.

$l \times b = 140$cm $\times 80$cm

$P = \frac{F}{A} \Rightarrow F = PA$

$\Rightarrow F = 1.01 \times 10^5 \times 140 \times 10^{-2} \times 80 \times 10^{-2}$

$= 1.01 \times 10^5 \times 3200 \times 10^{-4}$

$= 3.23 \times 10^4$ N

(8) on mouth $D_1 = 20$cm

$r_1 = 1$cm

$F_1 = 1.2$ kgf

on Bottom $D_2 = 10$cm

$r_2 = 5$cm

Acc to Pascal's law

$P_{Neck} = P_{bottom}$

$\Rightarrow \frac{F_1}{A_1} = \frac{F_2}{A_2}$

$\Rightarrow F_2 = \frac{F_1}{A_1} A_2$

$\Rightarrow F_2 = \frac{F_1}{\pi r_1^2} \pi r_2^2$

$\Rightarrow F_2 = 1.2 \times 5^2$

$= 30$ kgf

(16) $P_1 = 10$cm $\quad P_2 = 30$cm

$r_1 = 5$cm $\quad r_2 = 15$cm

$P_{in} = P_{out}$

$\Rightarrow \frac{F_1}{A_1} = \frac{F_2}{A_2}$

$\Rightarrow F_1 = A_1 \frac{F_2}{A_2}$

$\Rightarrow F_1 = \pi r_1^2 \frac{F_2}{\pi r_2^2}$

$\Rightarrow F_1 = \frac{5^2 \times 1.44 \times 10^4}{15^2} = \frac{1}{9} \times 1.44 \times$

$= 160$ N.

(17) From (16)th Problem

$F_{out} = 1.44 \times 10^4 N$

$P_{in} = \frac{P_{out}}{A} = \frac{1.44 \times 10^4}{\pi r_2^2}$

$\Rightarrow P_{in} = \frac{1.44 \times 10^4}{3.14 \times (15 \times 10^{-2})^2}$

$\Rightarrow P_{in} = 2.038 \times 10^5 Pa$

$P_{in} = 2.038$ atm

(18) $P_T = P_{atm} + \rho g h$

$= 1.05 \times 10^5 + 10^3 \times 9.8 \times 7$

$\Rightarrow 1.05 \times 10^5 + 68.6 \times 10^3$

$\Rightarrow 1.05 \times 10^5 + 0.686 \times 10^5$

$\Rightarrow 1.794 \times 10^5 N/m^2$

(19) From Given data

$A = 60 \times 10^{-2} \times 50 \times 10^{-2}$

$= 3000 \times 10^{-4} m^2$

$F = PA$

$= 1.05 \times 10^5 \times 3000 \times 10^{-4}$

$\Rightarrow 1.05 \times 0.3$

$\Rightarrow 3.15 \times 10^4 N.$