CHAPTERS 10 + 12

① $T_F = \frac{9}{5} T_C + 32$

② $T_K = T_C + 273.15$

③ Pressure $\bar{P} = \frac{F}{A}$

④ Gauge Pressure = $P_{in} - P_{out}$

⑤ $\Delta l = \alpha l . \Delta T$

⑥ $\Delta A = 2\alpha A . \Delta T$

⑦ $\Delta V = 3\alpha V . \Delta T = \beta V . \Delta T$

⑧ fraction $= \frac{\Delta x}{x} = \frac{\text{التغير في}}{\text{الأصل}}$

ثوا

$C^\circ \longrightarrow 0 \longrightarrow 100 \longrightarrow 100$

$F^\circ \longrightarrow 32 \longrightarrow 212 \longrightarrow 180$

$K^\circ \longrightarrow 273.15 \longrightarrow 373.15 \longrightarrow 100$

$T_\circ = 20c^\circ$ إذا ما كان في المسودة طول عين كذا

$1 atm = 1.013 \times 10^5 Pa$

القوانين والثوابت

10 + 12 تشابتر

أمثلة

Eg ⟶ 98.6 F° ⟶ C°

$T_f = \frac{9}{5} T_c + 32$

$98.6 = \frac{9}{5} T_c + 32$

$66.6 = \frac{9}{5} T_c \longrightarrow T_c = 37\,C^\circ$

E.g ⟶ 20 C° ⟶ F°

$T_f = \frac{9}{5} T_c + 32$

$= \frac{9}{5} \times 20 + 32$

$T_f = 68\,F^\circ$

E.g ⟶ P = 10 atm X = 0.1 m P_{out} = 1 atm

$F_{in} = P_{in} \times A = 1.013 \times 10^6 \times 1 \times 10^{-2}$

$= 1.013 \times 10^4\ N$

$F_{out} = P_{out} \times A = 1.013 \times 10^5 \times 1 \times 10^{-2}$

$= 0.1013 \times 10^4\ N$

$F_{net} = F_{in} - F_{out}$

$= (1.013 - 0.1013)\,10^4 = 0.9117 \times 10^4\ N$

$= 0.912 \times 10^4\ N$

5.

E.g → $l_1 = 1.28\,m$ $\quad T_1 = -12\,c^\circ$

$\alpha = 1.27 \times 10^{-5}\,K^{-1}$ $\quad T = 38\,c^\circ$

$\Delta T = 38 + 12 = 50\,c^\circ$

$\Delta l = \alpha l_1 \Delta T$

$= 1.27 \times 10^{-5} \times 1.28 \times 50$

$\Delta l = 81.28 \times 10^{-5}\,m.$

E.g → $T_1 = 10\,c^\circ$ $\quad \alpha = 1.27 \times 10^{-5}\,K^{-1}$

$T = 100\,c^\circ$

$\Delta A = 2\alpha A_1 \Delta T$

$= 2 \times 1.27 \times 10^{-5} \times 90\,A$

$\Delta A = 228.6 \times 10^{-5}\,A\ m^2$

fractional increase $= \frac{\Delta A}{A} = \frac{228.6 \times 10^{-5} A}{A}$

$= 228.6 \times 10^{-5} = 229 \times 10^{-5}\ m^2$

#DONE BABE <<<...!

Chapter -13- in a note alone ♥.

NOTE (13).

CHAPTER (11+15)

① $F = \eta A \frac{v}{y}$

② $\bar{v} = \frac{1}{2} v_{max}$

③ $\Delta P = \frac{8 \eta l \bar{v}}{r^2}$ ، $\bar{v} = \frac{\Delta P r^2}{8 \eta l}$

④ $P_{Power} = F \bar{v} = \Delta P A \bar{v} = \Delta P Q$

⑤ $R_f = \frac{\Delta P}{Q} = \frac{8 \eta l}{\pi r^4}$

⑥ $\gamma = \frac{F}{l}$ [each surface] ، $\gamma = \frac{F}{2l}$ [surface + opposite]

حالة واحدة — سطح والعكس

⑦ $h = \frac{2 \gamma \cos\theta}{\rho r g}$ $[F \cos\theta = W]$

E.g → $y = 1\times10^{-3}\,m$ $A = 4\times10^{-2}\,m^2$ $v = 0.2\,m/s$

$\eta_{air} = 1.8\times10^{-9}\,Pa.s$

$F = \eta A \frac{v}{y}$

$= 1.8\times10^{-5} \times 4\times10^{-2} \times \frac{2\times10^{-1}}{1\times10^{-3}}$

$= 14.4\times10^{-5}\,N$

E.g → $r_{inner} = 4\times10^{-3}\,m$ $Q = 1\times10^{-6}\,m^3/s$

$\eta = 2.084\times10^{-3}\,Pa.s$ $l = 0.1\,m$

① $\bar{v} = \frac{Q}{A} = \frac{1\times10^{-6}}{3.14\times16\times10^{-6}} = 0.0199$

$= 1.99\times10^{-2}\,m/s$

② $v_{max} = 2\bar{v} = 3.98\times10^{-2}\,m/s$

③ $\Delta P = \frac{8\eta l \bar{v}}{r^2} = \frac{8\times2.084\times10^{-3}\times10^{-1}\times1.99\times10^{-2}}{16\times10^{-6}}$

$= 2.07\,Pa.$

④ $P = F\bar{v} = \Delta P A \bar{v} = 2.07\times3.14\times16\times10^{-8}\times1.99$

$= 207\times10^{-8}\,W$

E.g → $r = 1.3\times10^{-2}\,m$ $l = 0.2\,m$ $Q = 1\times10^{-4}\,m^3/s$

$\eta = 2.084\times10^{-3}\,Pa.s$

① $R_f = \frac{8\eta l}{\pi r^4} = \frac{8\times2.084\times10^{-3}\times2\times10^{-1}}{3.14\times2.8561\times10^{-8}}$

$= 3.72\times10^{4}\,Pa.s/m^3$

② $\Delta P = R_f Q = 3.72 \times 10^4 \times 10^{-4} = 3.72\ Pa$

E.g → wire, $l = 3.5 \times 10^{-2}\ m$, $\delta = 22 \times 10^{-3}\ N/m$

$F = 2\delta l = 2 \times 22 \times 10^{-3} \times 3.5 \times 10^{-2} = 154 \times 10^{-5}\ N$

E.g → wire, $l = 10^{-1}\ m$, $m_1 = 1\ g$, $\delta = 7.28 \times 10^{-2}\ N/m$

① $F = 2\delta l = 2 \times 7.28 \times 10^{-2} \times 10^{-1} = 14.56 \times 10^{-3}\ N$

② $F = g(m_1 + m_2) \rightarrow 14.6 \times 10^{-4} = 10^{-3} + m_2$

$1.46 \times 10^{-3} - 1 \times 10^{-3} = m_2$

$m_2 = 0.46 \times 10^{-3}\ kg.$

E.g → $r = 1.75 \times 10^{-2}\ m$ $F = 1.6 \times 10^{-2}\ N$ ($L = 2\pi r$)

$\delta = \frac{F}{l} = \frac{1.6 \times 10^{-2}}{2 \times 3.14 \times 1.75 \times 10^{-2}} = 0.146\ N/m$

E.g → $r = 5 \times 10^{-5}\ m$, $\theta \simeq 0$, $\rho = 10^3\ kg/m^3$

$h = \frac{2\delta \cos\theta}{\rho g r}$ $\delta = 7.28 \times 10^{-2}\ N/m$

$= \frac{2 \times 7.28 \times 10^{-2}}{10^4 \times 5 \times 10^{-5}} = 0.3\ m$

E.g → $r = 2.5 \times 10^{-5}\ m$ $\theta \simeq 0$ $\rho = 10^3\ kg/m^3$ $\delta = 7.28 \times 10^{-2}$

$h = \frac{2\delta \cos\theta}{\rho g r} = \frac{2 \times 7.28 \times 10^{-2}}{10^4 \times 2.5 \times 10^{-5}} = 0.58\ m.$

*Done Babe !

CHAPTER (16 + 17).

(1) $F = \frac{k q_1 q_2}{r_2}$, $k = \frac{1}{4\pi\epsilon}$.

(2) $E = \frac{f}{q} = \frac{KQ}{r^2}$

(3) $V = \frac{U}{q} = \frac{KQ}{r}$ [volt / unit]

(4) $\bar{I} = \frac{\Delta Q}{\Delta t}$ [average] , $I = \frac{dQ}{dt}$ [instantaneous].

(5) $R = \frac{V}{I} = \frac{\rho l}{A}$

(6) $\sigma = \frac{1}{\rho}$

CHAPTER 23, 24, 30, 31

(1) $u = \frac{c}{v} \rightarrow n_1 v_1 = n_2 v_2$

(2) $f = \frac{v}{\lambda}$ $\frac{n_1}{n_2} = \frac{v_2}{v_1} = \frac{\lambda_2}{\lambda_1}$

(3) $n_1 \sin\theta_1 = n_2 \sin\theta_2$

(4) $\frac{1}{f} = (n-1)\left(\frac{1}{r_1} + \frac{1}{r_2}\right)$

(5) $\frac{1}{f} = \frac{1}{s} + \frac{1}{s'}$

(6) magnification $= \frac{s'}{s} = \frac{h'}{h}$

E.g → $\lambda = 5\times10^{-7}\,m$ $\quad n_{glass} = 1.5$ $\quad n_{air} = 1$

① $v = \frac{c}{n} = \frac{3\times10^8}{1.5} = 2\times10^8\ m/s$

② $\frac{n_1}{n_2} = \frac{\lambda_2}{\lambda_1} \rightarrow \frac{1}{1.5} = \frac{\lambda_2}{5\times10^{-7}} \rightarrow \lambda_2 = \frac{5\times10^{-7}}{1.5}$

$\lambda_2 = 3.3\times10^{-7}\,m$

E.g → $n_1 = 1$ $\quad \theta_1 = 30$ $\quad n_2 = 1.33$

$n_1 \sin\theta_1 = n_2 \sin\theta_2$

$\frac{1}{2} = 1.33 \sin\theta_2$

$\sin\theta_2 = 0.375$ $\quad \theta_2 = 22°$

E.g → $n_{glass} = 1.5$

① convex, $r_1 = 0.1m$, $r_2 = 0.2\,m$

$\frac{1}{f} = (n-1)\left(\frac{1}{r_1} + \frac{1}{r_2}\right) = (1.5-1)\left(\frac{1}{0.1} + \frac{1}{0.2}\right)$

$= \frac{1}{2} \times \frac{3}{0.2} = \frac{3}{0.4}$ $\quad \boxed{f = \frac{0.4}{3}}$

② Plane, concave, $r_2 = 4\,m$

$\frac{1}{f} = (n-1)\left(\frac{1}{r_1} + \frac{1}{r_2}\right) \rightarrow (1.5-1)\left(\frac{1}{\infty} - \frac{1}{4}\right)$

$= \frac{1}{2} \times \frac{-1}{4} = \frac{-1}{8}$ $\quad \boxed{f = -8}$

Eg → $f = 0.1m$ $\quad s_1 = 0.5m$ $\quad s_2 = 0.08\,m$

$\frac{1}{f} = \frac{1}{s} + \frac{1}{s'} \rightarrow \frac{1}{s'} = \frac{1}{0.1} - \frac{1}{0.5} = \frac{4}{0.5}$

$s' = \frac{0.5}{4} = 0.125\,m$

$\frac{1}{f} = \frac{1}{s} + \frac{1}{s'} \rightarrow \frac{1}{s'} = \frac{1}{0.1} - \frac{1}{0.08} = \frac{-0.2}{0.08} \rightarrow s' = -0.4\,m$