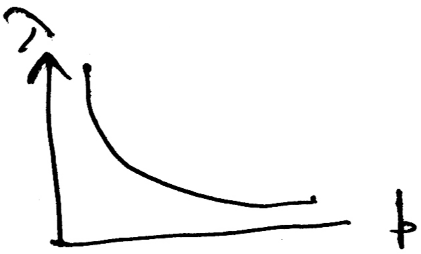
(1)

$P_0$ (P) $P = P_0 + \frac{4T}{R}$

bubble expands $\Rightarrow R\uparrow \Rightarrow P\downarrow$

(2) $\lambda = \frac{h}{p} \Rightarrow \lambda \propto \frac{1}{p} \Rightarrow$ Rectangular hyperbola




(3) $E = \frac{F}{m} \Rightarrow E = \frac{3}{60 \times 10^{-3}} = 50$ N/Kg

(4) correct & incorrect

(5) in $n^{th}$ second freely falling body will fall by $\frac{g}{2}(2n-1)$

so, $1^{st} : 2^{nd} : 3^{rd} : 4^{th}$ = 1 : 3 : 5 : 7

(6) No chang in freq in half wave rectifier.

(7) After long time speed will become constant (terminal velocity)

(8) Electric field lines will be ⊥ to equipotential surface.

(9) As $T \uparrow \Rightarrow R_{conductor} \uparrow$

& $R_{semiconductor} \downarrow$

(10)

$$^{22}_{11}Na \longrightarrow {}^{A}_{B}X + {}^{0}_{+1}e + \nu$$

$22 = A$

$11 = B + 1 \Rightarrow B = 10$

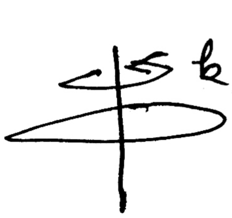
(11) $E_n = -(13.6)\left(\frac{1}{n^2}\right)$ First excited state $\Rightarrow n=2$

Second excited state $\Rightarrow n=3$

So, $\frac{E_2}{E_3} = \frac{9}{4}$

(13) Refractive index $= \sqrt{\mu_r \varepsilon_r} = \frac{c}{v}$

(12) $k = \sqrt{\frac{I}{M}}$



$k_1 = \sqrt{\frac{\frac{MR^2}{2}}{M}} = \frac{R}{\sqrt{2}}$

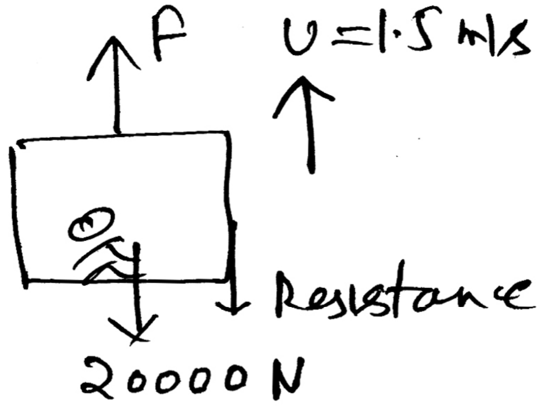
$\frac{k_1}{k_2} = \frac{\sqrt{2}}{1}$

$k_2 = \sqrt{\frac{\frac{MR^2}{4}}{M}} = \frac{R}{2}$

(14) $E = 100 \times 10^3 \times 60 \times 60$

$= 36 \times 10^7$ J

(15)




$F = 23000\,N$

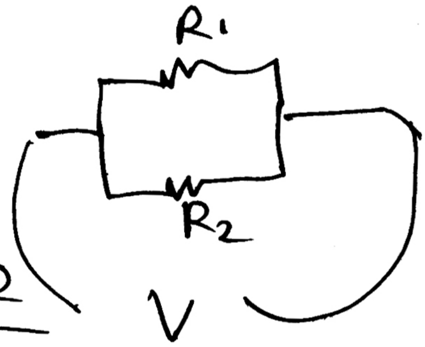
So, $P = Fv$

$= 23000 \times 1.5$

$= 34500$

(16)

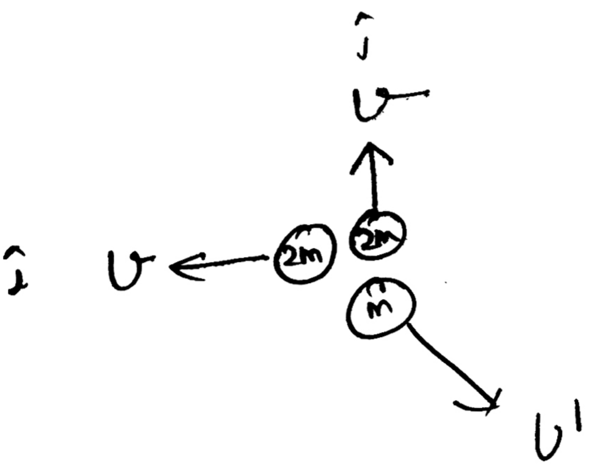
$H = \frac{V^2}{R} t$




$\frac{H_1}{H_2} = \frac{\frac{V^2}{R_1} t}{\frac{V^2}{R_2} t} = \frac{R_2}{R_1} = \frac{2}{1}$

(17) $V_{max} = \sqrt{2}\, V_{rms}$

(18)



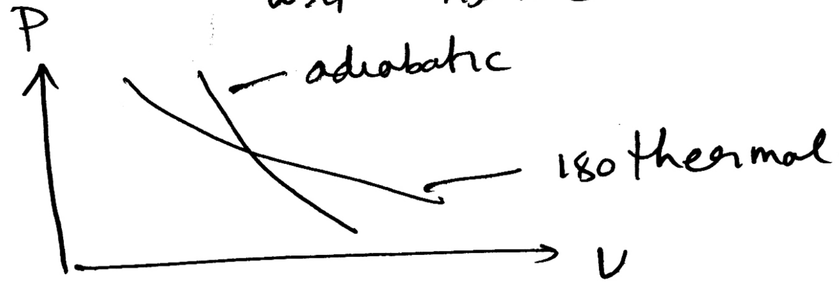

$m\vec{v'} + 2mv\hat{j} + 2mv\hat{i} = 0$

$\vec{v'} = -2(\hat{i} + \hat{j})v$

$|\vec{v'}| = 2\sqrt{2}\, v$

(19) $v = \sqrt{\frac{T}{\mu}} \Rightarrow \frac{v_i}{v_f} = \sqrt{\frac{T_i}{T_f}} = \frac{1}{\sqrt{2}}$

(20) Adiabatic P-V curve will be relatively vertical wrt isothermal




(21) $\omega = \omega_0 + \alpha t$

$$\alpha = \frac{\omega - \omega_0}{t} = \left(\frac{3120 - 1200}{16}\right)\left(\frac{2\pi}{60}\right)$$

↑ to convert rpm → rad/s

$$= 4\pi$$

(22) Plane angle & Solid angle have unit but not dimension.

(23) (a) & (c) → both forward biased.

(24) in "$l$" length no. of fringes $= \dfrac{l}{\dfrac{D\lambda}{d}}$ ← fringe width

so, no. of fringes $\propto \dfrac{1}{\lambda}$

$$\frac{n_1}{n_2} = \frac{\lambda_2}{\lambda_1} \Rightarrow$$

$$\Rightarrow \frac{8}{n_2} = \frac{400}{600} \Rightarrow n_2 = 12$$

(25) $eV_s = h\nu - h\nu_0$

so $e\dfrac{V_s}{2} = h\nu - h\nu_0$

$eV_s = \dfrac{h\nu}{2} - h\nu_0$

$\Rightarrow \nu_0 = \dfrac{3\nu}{2}$

As per momentum this question is incorrect as if incident frequency is ~~more~~ less than thresold freq then no electron will be emitted

(26) $\phi = BA \Rightarrow \phi = 0.5 \times (1\times1) = 0.5$ Weber

(27) $V = \dfrac{1}{4\pi\varepsilon_0}\dfrac{Q}{R} \Rightarrow V \propto \dfrac{1}{R}$

$\Rightarrow$ smaller ~~have~~ have larger potenhal

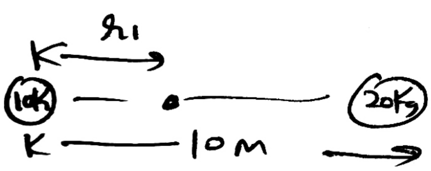
(28) $J = \sigma E$, $R = \dfrac{l}{\sigma A}$

$J = \dfrac{l}{RA}E = \dfrac{10\times10}{10\times\pi\times\left(\frac{10^{-2}}{\sqrt{\pi}}\right)^2}$

$= 10^5\ A/m^2$

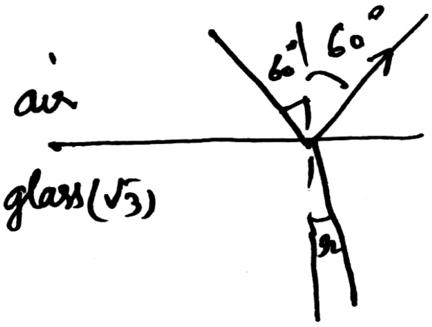
(29) $B = \mu_0 n i = 4\times3.14\times10^{-7}\times\dfrac{100}{10^{-3}}\times1$

$= 12.56\times10^{-2}\ T$

(30) 


$r_1 = \dfrac{20}{10+20}\times10 = \dfrac{20}{3}\ m$

(31)




$$\frac{\sin 60}{\sin r} = \frac{\sqrt{3}}{1} \Rightarrow r = 30°$$

so angle b/w reflected ray & refracted ray $90°$

(32) $MLT^{-2}A^{-2} \longrightarrow$ magnetic permeability

(33) slope of straight line v-t graph gives velocity

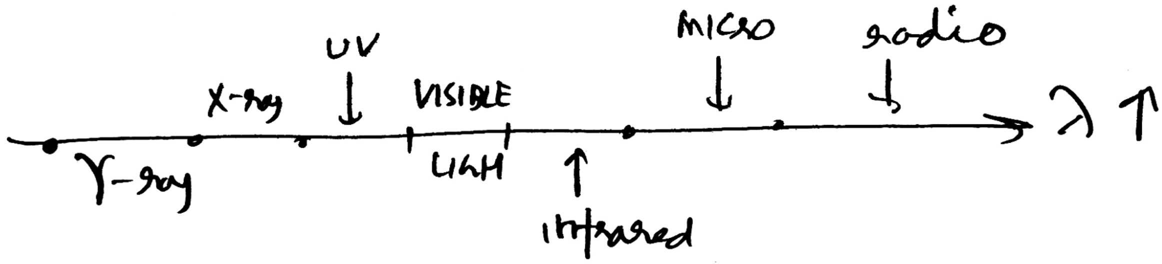
$$\frac{v_1}{v_2} = \frac{\tan 30°}{\tan 45°} = \frac{1}{\sqrt{3}}$$

(34)

$$\frac{1}{f} = (\mu - 1)\left(\frac{2}{R}\right) = (1.5-1)\left(\frac{2}{20}\right) = \frac{1}{20}$$

$$P = \frac{100}{f(cm)} = +5\ D$$

(35)




(36) $R = R_0 (A)^{1/3}$

$$\frac{R_1}{R_2} = \left(\frac{125}{64}\right)^{1/3} = \frac{5}{4}$$

(37) $\sin c = \frac{U_{denser}}{U_{rarer}} \Rightarrow \sin c = \frac{1.5}{2} = 0.75$

(38) $(\varepsilon_{in})_{max} = NBA\omega$ in a rotating coil

$= 1000 \times 2 \times 10^{-5} \times 3.14 \times (10)^2 \times 2$

$i_{max} = \frac{(\varepsilon_{in})_{max}}{R} = 1A$

(39) conceptual.

$N = 1000 \quad r = 10m \quad \omega = 2\, rad/s$

(38) $B = 2 \times 10^{-5}\, T \quad R = 12.56$

$i = \frac{e_{max}}{R} = \frac{NBA\omega}{R} = \frac{1000 \times 2 \times 10^{-5} \times \pi \times 10^{2} \times 2}{12.56}$

$\Rightarrow 1 \times 1$ (2)

(39) (1)

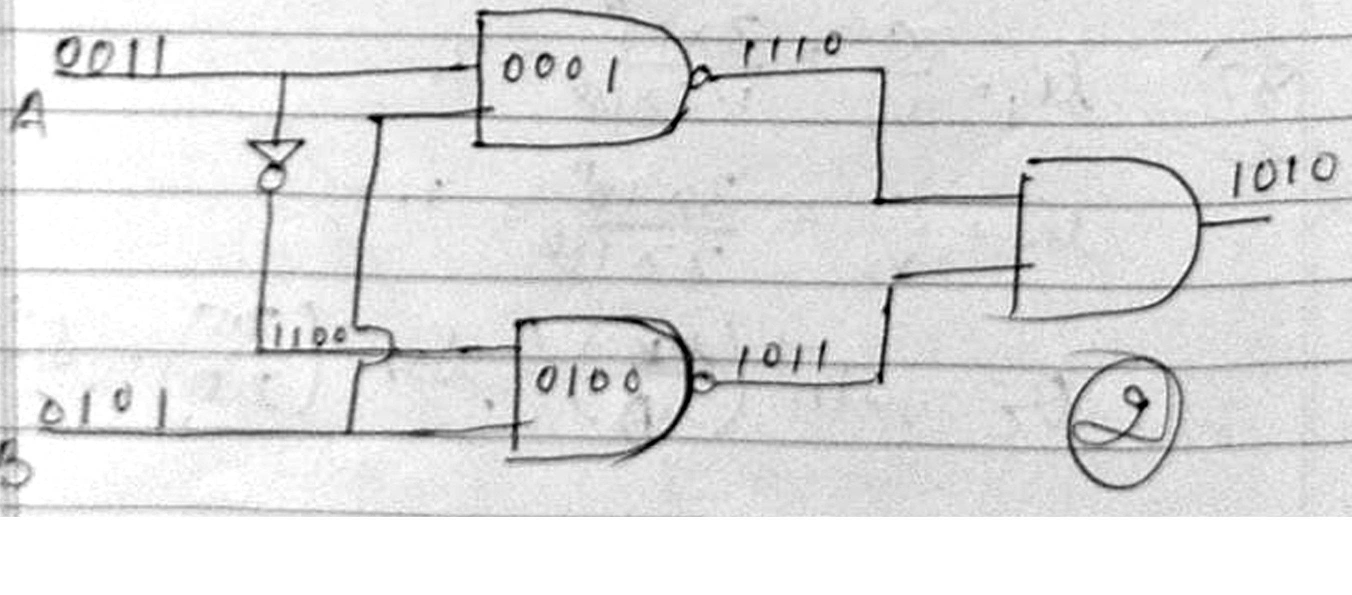
(40) (2).

(41) $L = 55.3 \quad b = 25$

Area $= 55.3 \times 25 \Rightarrow 1382.5$

Min no. of significant fig in L & b = 2

So Ans $14 \times 10^{2}$ (3)

(42)
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Date / /
Page No.

(43) If intermolecular forces vanish then water becomes ideal gas. Then from ideal gas equation

$$PV = nRT$$

$$V = \frac{nRT}{V} \Rightarrow \frac{m}{M}\frac{RT}{P}$$

$$\Rightarrow \frac{4.5\times10^3}{18} \times \frac{8.314\times273}{10^5} = 5.6\ m^3$$

(3)

(44). (1) should be approximately equal & small.

(45) Resonance frequency.

$$\nu_1 = f_0 = \frac{1}{2\pi\sqrt{LC}} = \frac{1}{2\pi\sqrt{10\times10\times10^{-6}}} \Rightarrow \frac{100}{2\pi} = \frac{50}{\pi}$$

$$\omega = 2\pi\nu \Rightarrow \nu = \frac{100}{2\pi} = \frac{50}{\pi}$$

(1)

(46) $$V_c = \frac{C_1V_1 + C_2V_2}{C_1+C_2} \Rightarrow \frac{900\times100+0}{1800} = 50\ \text{Volt}$$

$$U = \frac{1}{2}(C_1+C_2)V_c^2$$

$$\Rightarrow \frac{1}{2}\times1800\times10^{-12}\times50\times50 = 2.25\times10^{-6}\ J$$

(2)

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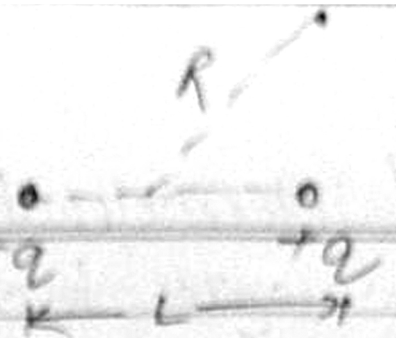
Page No.

(47) for $R >> L$



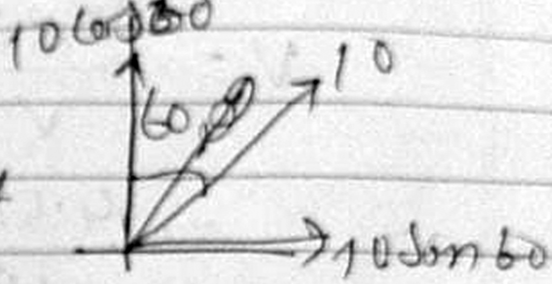

system form an electric dipole

$E = \frac{1}{4\pi\epsilon} \cdot \frac{p}{R^3}\sqrt{1+3\cos^2\theta} \rightarrow E \propto \frac{1}{R^3}$ (1)

(48) $u_x = 10\sin 60$

$= 5\sqrt{3} = \text{constant}$

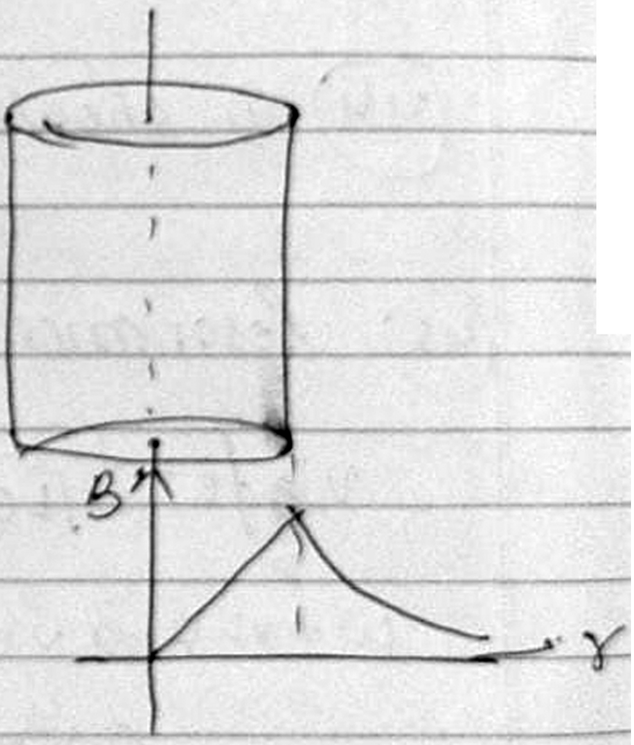
(1)




(49) $B_{in} \propto r$

$B_{out} \propto \frac{1}{r}$

(2)




(50) $T = 2\pi\sqrt{\frac{l}{g}} \Rightarrow T_1 = \frac{2\pi}{\sqrt{g}} \times 11$

$T_2 = \frac{2\pi}{\sqrt{g}} \times 10$

LCM of $T_1$ & $T_2 = \frac{2\pi}{\sqrt{g}} \times 11 \times 10$

So No of vibration by shorter pendulum $= \frac{LCM}{T_2}$

$= 11$ (4)