Electrostatics :-

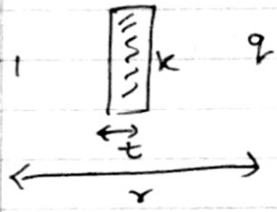
1) $F = \dfrac{1}{4\pi\varepsilon_0}\dfrac{q_1 q_2}{r^2}$ $\qquad \dfrac{1}{4\pi\varepsilon_0} = 9 \times 10^9$

$\varepsilon_0 = 8.85 \times 10^{-12}$

* $\left[\dfrac{F_{vac}}{F_{med}} = \dfrac{\varepsilon}{\varepsilon_0} = k\right]$ (dielectric constant)

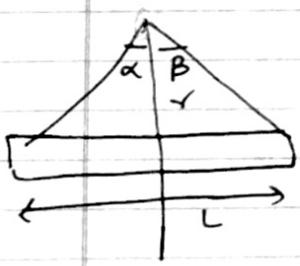
$K_{min} = 1 \qquad k_{max} = \infty$

* For CGS $\dfrac{1}{4\pi\varepsilon_0} = 1$ $\boxed{\text{in CGS}}$



then $\therefore F = \dfrac{1}{4\pi\varepsilon}\dfrac{q_1 q_2}{(r - t + t\sqrt{k})^2}$

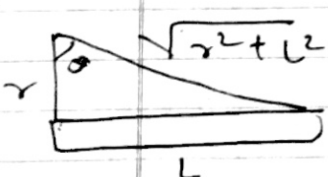
2)



$\alpha = \beta$

$F_x = 0$

$F_y = \dfrac{q\lambda}{4\pi\varepsilon_0 r^2}(2\sin\alpha)$

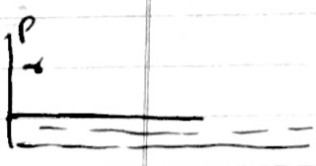


$F(x) = \dfrac{q\lambda}{4\pi\varepsilon_0 r}(1 - \cos\beta)$

$F_y = \dfrac{q\lambda}{4\pi\varepsilon r}[0 + \sin\theta]$

$F_x = 0$

$F_y = \dfrac{2q\lambda}{4\pi\varepsilon_0}$



$F(x) = \dfrac{q\lambda}{4\pi\varepsilon_0 r}$

$F_y = \dfrac{q\lambda}{4\pi\varepsilon_0 r}$

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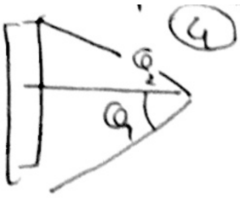
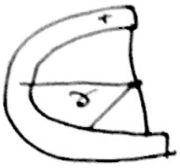


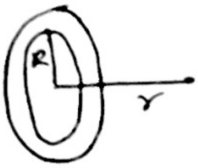
$$E_x = \frac{\lambda}{4\pi\varepsilon_0 r}(\sin\theta_1 + \sin\theta_2)$$

$$E_y = \frac{\lambda}{4\pi\varepsilon_0 r}[\cos\theta_1 - \cos\theta_2]$$



$$E_y = 0$$
$$E_x = \frac{\lambda}{2\pi\varepsilon_0 r}$$

$$E_x = E_y = \frac{\lambda}{4\pi\varepsilon_0 r}$$



$$E_x = \frac{kqr}{\sqrt[3]{R^2+r^2}} \qquad E_y = 0$$

(5) :- $\Delta V = \dfrac{\Delta U}{q}$ i) $1\ J/c = 1$ volt

$$\bar{E} = \frac{\delta v_x}{x}\hat{i} - \frac{\delta v}{y}\hat{j} - \frac{\delta v}{z}\hat{k}$$

(6) For $E=0$ then $\phi = 0$

If $\phi = 0$ then not compulsory $E=0$

In side conductor $E=0$

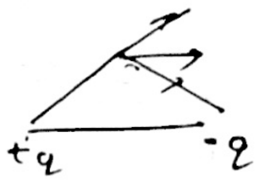
Electrostatic pressure $= \frac{1}{2}\varepsilon_0 E^2 k$

(7) Electric dipole ($-$ to $+$) $\bar{P} = q(2l)$

$$+q \xleftrightarrow{2l} -q$$

$\therefore \tau = \bar{P} \times \bar{E}$

$$E_{axial} = \frac{1}{4\pi\varepsilon_0}\frac{(2P)}{r^3} \qquad E_{eq} = \frac{-kP}{r^3}$$



$$V = \frac{P}{4\pi\varepsilon_0 r^2} \qquad V_{eq} = 0$$

(8) $W = PE(\cos\theta_1 - \cos\theta_2)$

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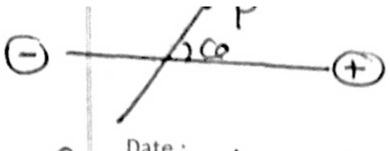
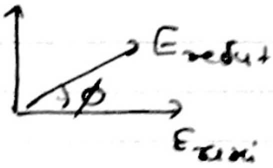


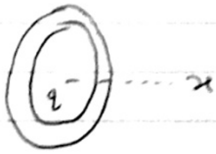
$E_{axial} = \frac{1}{4\pi\varepsilon_0}\frac{2P\cos\theta}{r^3}$ $\quad V_{ax} = \frac{-2kP}{r^2}$

General $= \frac{1}{4\pi\varepsilon_0}\frac{P}{r^3}\sqrt{4-3\sin^2\theta}$. $\quad V_{eq} = 0$

$\tan\phi = \frac{1}{2}\tan\theta$



$T = 2\pi\sqrt{\frac{MR^3}{kqQ}}$



Electric field at the centre of Hollow hemisphere

$E = \frac{\sigma}{4\varepsilon_0}$

Infinite sheet $E = \frac{\sigma}{2\varepsilon_0}$

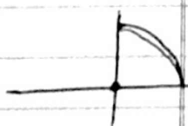
If $v \parallel a_g$ & anti — straight $\quad v = \frac{qE}{m}t$

$v \nparallel a_g$ projectile — parabola.

$\Delta U = -\int E \cdot ds \times q \quad [V_i - V_f = Ed\cos\theta]$

Charge move towards lower potential energy not potential

dipole direction −ve to +ve



$P/x = 2\lambda R^2$

$P/x = \lambda R^2$

E at general dipole $= \frac{kP}{r^3}\sqrt{3\cos^2\theta+1}$

$T = PE\sin\theta$

$T = 2\pi\sqrt{\frac{ml^2}{2PE}}$

symmetric cavity $\quad E = \frac{kQ\,(r^3 - R_1^3)}{r^2\,(R_2^3 - R_1^3)}$

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