NAME : OHIRI EBUBECHUKWU . E

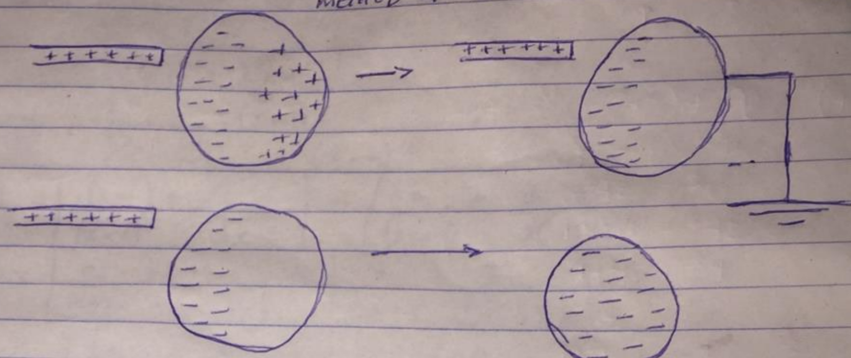
MATRIC NO : 19 / ENG09 / 015

COURSE : PHY 102

DEPT : AERONAUTICAL ENGINEERING

METHOD OF INDUCTION OF NEGATIVE CHARGE

1a)



INDUCED NEGATIVE CHARGES

b) $F = \frac{kq_1q_2}{r^2}$ $q_1 + q_2 = 5\times10^{-5}$ $q_1 \cdot q_2 = 4.4\times10^{-10}$

$1.0 = \frac{9\times10^9 q_1q_2}{2^2}$

$q_1q_2 = \frac{1.0\times2^2}{9\times10^9} = 4.4\times10^{-10}$

Equation 1

$\frac{4.4\times10^{-10}}{q_1} + q_1 = 5\times10^{-5}$

$4.4\times10^{-10} + q_1^2 = 5\times10^5 q_1$

$q_1^2 - 5\times10^5 q_1 + 4.4\times10^{-10} = 0$

$q_1 = 3.8\times10^{-5}$ or 1.1×10^{-5}

Equation 2

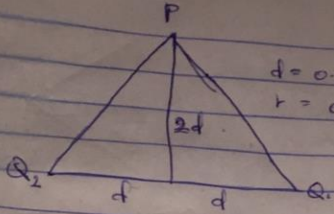
$\frac{4.4\times10^{-10}}{q_2} + q_2 = 5\times10^{-5}$

$4.4\times10^{-10} + q_2^2 = 5\times10^{-5} q_2$

$q_2^2 - 5\times10^{-5} q_2 + 4.4\times10^{-10} = 0$

$q_2 = 1.1\times10^{-5}$ or 3.8×10^{-5}

c)



$d = 0.5m$

$r = 0.25m$

$$F = \frac{9 \times 10^9 \times (8 \times 10^{-6})^2}{d^2} = 5.76 \times 10^{-1} N$$

$$q = \frac{F \times r}{R} = -11 \mu c$$

2a)

Electric Field	Electric Field intensity
This is a region of space in which an electric charge will experience an electric Force	this is defined as the Force per unit charge. $E = F(N) / q_0 (C)$

b)

$$\mathcal{E}_1 = \frac{9 \times 10^9 \times 8 \times 10^{-9}}{7^2} = 1.5 N/c \qquad E_{net} = 12 + 1.5 = 13.5 N/c$$

$$\mathcal{E}_2 = \frac{9 \times 10^9 \times 12 \times 10^{-7}}{3^2} = 12 N/c$$

4) a) Magnetic flux is the imaginary charge that Carries Force of the magnetic intensity or Current for attracting or repelling objects or other magnet.

b) $m = 9.11 \times 10^{-31} kg$, $B = 3.5 \times 10^{-1} T$, $q = 1.6 \times 10^{-19} C$

Cyclotron Frequency, $\omega = \frac{qB}{m} = \frac{1.6 \times 10^{-19} \times 3.5 \times 10^{-1}}{9.11 \times 10^{-31}}$

$= 6.15 \times 10^{10}$ rad/s

3) BIOT - SAVART LAW

this states that in a magnetic field $\vec{dB}$ at point P associated with a length $\vec{dL}$ of a wire Carrying a steady ~~[illegible]~~ Current I.

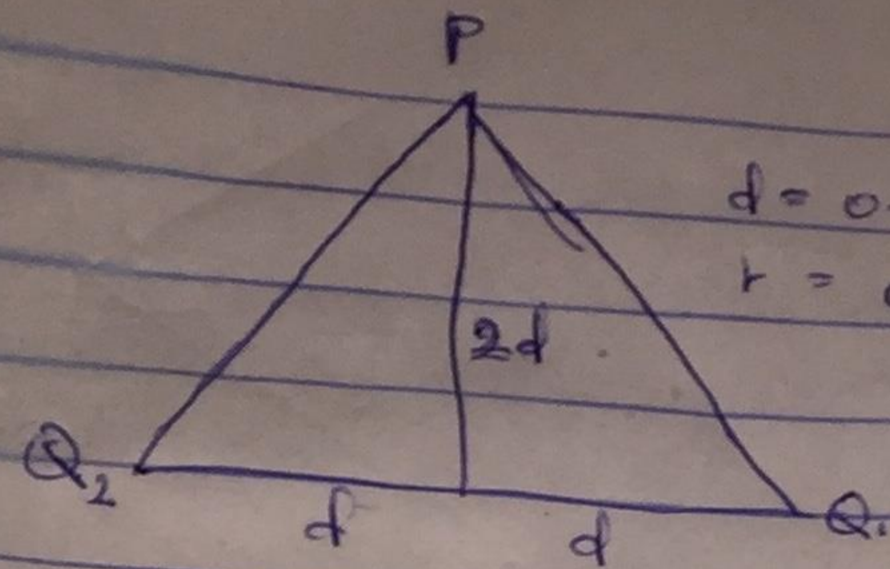
b) $$\frac{\mu_0 I}{4\pi} \int_{-a}^{a} \frac{dl \sin\varphi}{r^2} = B = \frac{\mu_0 I}{4\pi} \int_{-a}^{a} \frac{dl \sin(\pi - \varphi)}{x^2 + y^2}$$

$$B = \frac{\mu_0 I}{4\pi} \int_{-a}^{a} \frac{1}{(x^2+y^2)^{3/2}}\, dy = B = \frac{\mu_0 I}{4\pi x}\left(\frac{2a}{(x^2+y^2)^{1/2}}\right)$$

$$= B = \frac{\mu_0 I}{2\pi R}$$

QED //

c)



$d = 0.5m$

$r = 0.25$

$$F = \frac{9 \times 10^9 \times (8 \times 10^{-6})^2}{d^2} =$$

$$q = \frac{F \times r}{R} = -11\mu c$$

2a) Electric Field

This is a region of space in which an electric charge will experience an electric force

b)

$$E_1 = \frac{9 \times 10^9 \times 8 \times 10^{-9}}{7^2}$$