

UDOFIA, ETIMBUK VICTORY.....19/MHS01/410.....MBBS.....PHY 102 ASSIGNMENT

UDOFIA, ETIMBUK VICTORY
19/MHS01/410

Section A (1.2)
Finding a negatively charged plane by electrostatic induction.

Initially charged rod is brought near a neutral conducting sphere. Induction causes the left side of the sphere to be positive.

As a result, some positive charges are induced on the upper side of the sphere. The positive charges are attracted to the grounded wire on the sphere and side to side.

The lower side of the sphere has been removed by the wire. Only negatively charged particles remain on the sphere.

When the rod is pulled away, only negatively charged particles remain and they spread throughout the sphere.

Calc of 1D
From eqn 21.1
 $E = \frac{\sigma}{2\epsilon_0}$
SI: $\sigma = 0.01 \text{ C/m}^2$
 $E = \frac{0.01}{2 \times 8.85 \times 10^{-12}} = 5.65 \times 10^8 \text{ N/C}$
After solving qualitatively, charge is $1.0 \times 10^{-10} \text{ C}$
 $\Rightarrow B = 3.0 \times 10^{-10} \text{ C}$ and $B = 3.0 \times 10^{-10} \text{ C}$ and $V = 10 \text{ V}$

Calc of 10
1. $E = \frac{\sigma}{2\epsilon_0}$
 $\sigma = 2\epsilon_0 E = 2 \times 8.85 \times 10^{-12} \times 10 = 1.77 \times 10^{-10} \text{ C/m}^2$
2. $Q = \sigma A = 1.77 \times 10^{-10} \times 10^{-2} = 1.77 \times 10^{-12} \text{ C}$
3. $V = \frac{Q}{C} = \frac{1.77 \times 10^{-12}}{1.77 \times 10^{-12}} = 1 \text{ V}$

Calc of 3A
1. $E = \frac{\sigma}{2\epsilon_0}$
 $\sigma = 2\epsilon_0 E = 2 \times 8.85 \times 10^{-12} \times 10 = 1.77 \times 10^{-10} \text{ C/m}^2$
2. $Q = \sigma A = 1.77 \times 10^{-10} \times 10^{-2} = 1.77 \times 10^{-12} \text{ C}$
3. $V = \frac{Q}{C} = \frac{1.77 \times 10^{-12}}{1.77 \times 10^{-12}} = 1 \text{ V}$

Section 10
Magnetic flux through a surface is a scalar quantity. It is the dot product of the magnetic field and the area vector.

Calc of 3B
1. $E = \frac{\sigma}{2\epsilon_0}$
 $\sigma = 2\epsilon_0 E = 2 \times 8.85 \times 10^{-12} \times 10 = 1.77 \times 10^{-10} \text{ C/m}^2$
2. $Q = \sigma A = 1.77 \times 10^{-10} \times 10^{-2} = 1.77 \times 10^{-12} \text{ C}$
3. $V = \frac{Q}{C} = \frac{1.77 \times 10^{-12}}{1.77 \times 10^{-12}} = 1 \text{ V}$