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CIVIL ENGINEERING

16/ENG03/021

CARRY OVER STUDENT.

PHY102 ASSIGNMENT

(4) a) What is Magnetic flux

Magnetic flux is defined as a line in a Magnetic field along which a north pole tends to be driven. The lines can be drawn by;

1- Placing a sheet of cardboard over the Magnet and gently tapping the cardboard with lightly scattered iron filling on it; The filling arrange themselve in lines along the line of force.

2- Using plotting compass: the direction of the pointer needle helps in tracing the path.

b)

An electron with a rest mass of 9.11×10^{-31} kg moves in a circular orbit of radius 1.4×10^{-7} m in a uniform magnetic field of 3.5×10^{-1} Weber/meter square, perpendicular to the speed with which electron moves, find the cyclotron frequency of the moving electron.

Cyclotron frequency $= f = \frac{qB}{2\pi m}$

~~B~~ [illegible]

Given: $V = ma$

$m = 9.11 \times 10^{-31} kg$

$r = 1.4 \times 10^{-7} m$

Mag. field $= 3.5 \times 10^{-1} = B$

~~Webers~~ q = or energy $= 100 eV$

$100 \times 1.6 \times 10^{-19}$

Cyclotron frequency $= f = \frac{qB}{2\pi m}$

m

$v = f\lambda$

$\omega = 2\pi f$ $E = h\lambda$

$\omega = v/r$ $E = \frac{hc}{f}$

$2\pi f = v/r$

c?

$hf\lambda$

$\lambda = \frac{?}{c}$

$E = \frac{hc}{f}$

$W = \frac{v}{r} = \frac{qB}{m}$ also $\frac{mv^2}{r} = qBv$

$$f = \frac{qB}{2\pi m} = \frac{100 \times 1.6 \times 10^{-19} \times 3.5 \times 10^{-1}}{2 \times \pi \times 9.11 \times 10^{-31}}$$

$f = 9.783 \times 10^{11} Hz$

$= 978.3 \times 10^{9} Hz = \underline{978.3 GHz}$

(5) Biot-Savart law

Biot-Savart law states that it is a mathematical expression which illustrates the Magnetic field produced by a stable electric Current in the Particular electromagnetism of physics. It tells the magnetic field toward the magnitude, Length, direction, as well as closeness of the electric Current.

(6)

$$E = \frac{\mu_0 q}{4\pi r^2}$$

The equation gives us the magnitude of the magnetic field. magnetic field are vector and the created by Current-carrying wires. (Integrate with respect to dB and dL)

$$E = \frac{\mu_0 I dl}{4\pi r^2}$$

$$dB = \frac{\mu_0 I dl}{4\pi r^2}$$

$$dB = \frac{\mu_0 I dl \sin\theta}{4\pi r^2}$$

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

... tic field

μ_0 = Permeability of free-Space (1.26×10^{-7})
I = Current in the wire in amperes. A
r = Radius from the wire, In meters, m.

~~(6) Practical application of faraday's laws to the production of Sound by an electric guitar~~

(2)

	Electric field	electric field Intensity
(1)	electric field is a Vector field	electric field Intensity is its Magnitude (i.e magnitude of its vector field).
(2)	The region of force In which the electric force Can be experienced by the electric Charge.	The electric field Intensity strength is measured In terms of electric field Intensity.
(3)		

(26) $Q_1 = 8nC$

$Q_2 = 12nC$

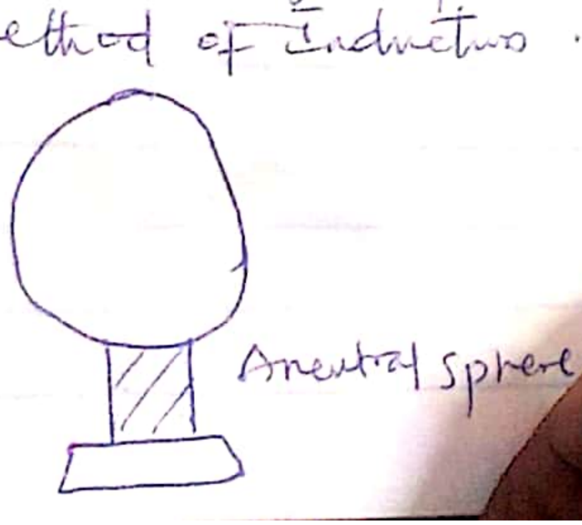
$E_1 = k\frac{|q_1|}{r^2} = \frac{8.99\times10^9 \times 8}{4^2}$

(1) Method of Induction

This method is simply a process by which an Insulated body (or neutral body) is given a positive or a negative charge by merely bringing it near a known charged body.

Negative charged sphere can be produced by method of induction.

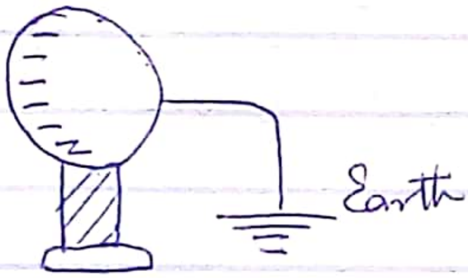
Diagram !



(1) Diagram II

Diagram IV

Diagram III



1(b) The values of the Individual Charges are not given

Let the values be q_1 and q_2

The Condition on the Combined charge of the Sphere gives us: $q_1 + q_2 = 5.0 \times 10^{-5} C$

$q_1 = q_2 , q_2 = q_1$

Parameters

$F = 1.0$

$q_1 + q_2 = 5.0 \times 10^{-5} C$

$r = 2.0 m$

$F = K \frac{q_1 q_2}{r^2} = 1.0 N$

$q_1 q_2 = (1.0) \frac{r^2}{K}$

$(1.0)(2.0)^2 8.99\times10^9 N\cdot m^2 C^2 = 4.449\times10^{-10} C^2$

Now we have

$q_2 = 5.0\times10^{-5} - q_1$

$q_1 q_2 = 4.449\times10^{-10}$

$q_1(5.0\times10^{-5} - q_1) = 4.449\times10^{-10}$

$(5.0\times10^{-5} - q_1) = 4.449\times10^{-10}$

$q_1^2 - (5.0\times10^{-5}C)q_1 + 4.449\times10^{-10} = 0$

Using quadratic formula

$$q_1 = \frac{(5\times10^{-5}) \pm \sqrt{(5\times10^{-5})^2 - 4(4.449\times10^{-10})}}{2}$$

$q_1 = 3.84\times10^{-5}C;$

$q_2 = 1.16\times10^{-5}C$