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**DEPT.: CIVIL ENGINEERING**

**MATRIC NO.: 19/ENG03/009**

**COURSE CODE: PHY 102**

**COVID-19 HOLIDAY ASSIGNMENT**

* i) Electric field is aregion of space in which an electric charge will experience an electric force.

ii) Electric field intensity is the measure of the strength of electric field at any point.

* 
1. P E1 = 9 x 109 x 8 x 10-9 = 1.5 N/C

 72

E2 = 9 x 109 x 12 x 10-9 = 12 N/C

 32

 Enet = 12 + 1.5 = 13.5 N/C

1. Q E1 = 9 x 10-9 x 8 x 10-9 = 8N/C

 32

 E2 = 9 x 109 x 12 x 10-9 = 4.32N/C

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|  |  |  |  |
| --- | --- | --- | --- |
| VECTOR | ANGLE | X-component | Y-component |
| E1 = 8 N/C | 90o | E1x = 8 x cos 90o = 0 | E1y = 8 x sin 90o = 8 |
| E2 = 4.32 N/C | 36.87o | E2x = 4.32 x cos 36.87 = -3.46 | E2y = 4.32 x sin 36.87 = 2.59 |
|  |  | $ε$x = -3.46 N/C | $ε$y = 10.59 N/C |

 E = $√$(-3.46)2 + ( 10.59)2 = 11.14 N/C

1. dQ
* Volume charge density, $ρ$ = dV dQ = $ρ$dV

 dQ

* Surface charge density,$σ$ = dA  dQ = $σ$dA

 dQ

* Linear charge density, $ γ$ = dL dQ = $γ$dL

 b.) Electric potential difference can be defined as the work done per unit charge against electrical forces when a charge is transported from one point to the other.

VB - VA = W (AB) Ag

 qo

 c,)

 

 Q1 = 10 $μ$C Q2 = 2$μ$C

[ ]

 1 Q1 x Q2

 V= 4$π$EO r1 r2

 0 = 10 x 10-6 - 2 x 10-6

 9 x 10 9 r1 r2

 2r = 10r2 ; r1 = 5r2

 From the diagram above, the position of v = 0 along the x – axis is 5m from Q1 = 10 $μ$C and 1m from Q2 = 2$μ$C.

1. a) Magnetic flux can be defined as the strength of the magnetic field which can be represented by line of forces. It is represented by the symbol $φ$=B.dA

b) m = 9.11 x 10-31kg, r= 1.4 x 10-7m, B = 3.5 x 10-1 weber/meter 2

 Cyclotron frequency = angular speed

 w = v = qB

r m

 qB 1.6 x 10-19 x 3.5 x 10-1

 w = m = 9 x 10-31

w = 62222.2222 T-1

 c) The following parameters were given to us

 i) Mass of the electron = 9.11 x 10-31kg

 ii) Magnetic field of 3.5 x 10-1 weber/meter 2

iii) Radius of 1.4 x 10-7m

 and we were asked to find the cyclotron frequency which is likely the same thing as angular speed. It is called cyclotron frequency because it is a frequency of an accelerator called cyclotron.

 Recall that angular speed is given as w after substituting we have

 w = 1.6 x 10-10 x 3.5 x 10-1

 9x 10-31

 = 62222.2222 T-1

1. a) The Biot-Savart law is an equation that describes the magnetic field created by a current-carrying wire, and allows you to calculate its strength at various points.

b) Section of a straight current carrying conductor

( )

 $φ$oI 2a

 β = 4$η$x (x2 + a2) ^ ${1}/{2}$

When the length 2a of the conductor is very great in comparison to distance x from point P, we consider it infinitely long. That is a is much larger than x,

 (x2 + a2) ^ ${1}/{2}$ $≅$ a as a ∞

 $φ$oI

 β = 2$η$x

In a physical situation, we have axial symmetry about y- axis. Thus, at all points in a circle of radius r, around the conductor, the magnitude of β is

 $φ$oI

 β = 2$η$r (i)

Equation (i) defines the magnitude of the magnetic field of flux density β near a long, straight current carrying conductor.