01119211 8 Physics
Tawhidul Islam A
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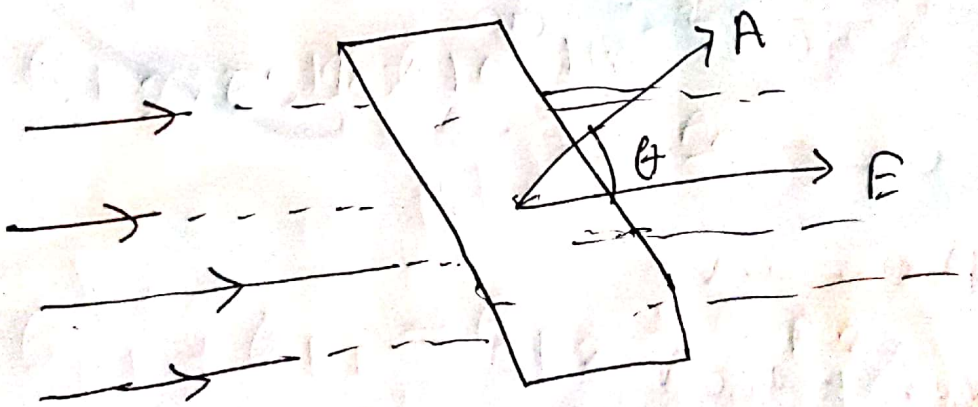
Qsn 1

The number of electric lines of force that intersect a given area which is the property of an electric field is called electric flux



$$\phi = EA \cos\theta$$

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Qm 5:

(i)

$E = 3.0 \text{ mN/C}$

$a = 11 \text{ cm} = 0.11 \text{ m}$

Now,

$\phi_{flux} = \oint \vec{E} \cdot d\vec{A}$

$\vec{E} = 3 \cdot \text{m N/C}$

$= 0.003 \text{ N/C}$

Now,

$\phi_{flux} = -\oint 0.03 \times dA$

~~$\phi_{flux} = \oint 0.03$~~

$\phi_{flux, dine} = -0.03 \times \pi (0.11)^2$

$\phi_{flux, dine} = -1.14 \times 10^{-4} \text{ Nm}^2/\text{C}$

$\phi_{flux, net} = -1.14 \times 10^{-4} \text{ N m}^2/\text{C}$

Ans.

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(ii)

Charge $q = 1.8\,\mu C$.

$$\phi = \frac{q}{\varepsilon_0}$$

$$\phi = \frac{1.8 \times 10^{-6}}{8.85 \times 10^{-12}}$$

$$= 2.034 \times 10^{5}\ Nm^{-2}$$

Ans

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Qsn 2.

$k = 9 \times 10^9$

$e = 1.6 \times 10^{-19}$

$r = 0.5 \times 10^{-15}$ m

~~$E = \frac{kq}{r^2}$~~

$$\vec{E} = \frac{1}{4\pi\varepsilon_0} \frac{\vec{a}}{r^2}$$

$$= (9 \times 10^9) \times \frac{1.6 \times 10^{-19}}{(0.5 \times 10^{-15})^2}$$

$$= 5.76 \times 10^{21} \text{ NC}^{-1}$$

Ans:

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Qn 4 .

(i)

+4 C +8 C

$$Q_{B1} + Q_{R1} = Q_{B2} + Q_{R2}$$

$$+4 + 8 = 10 + Q_{R2}$$

$$Q_{R2} = +2C$$

(ii)

$$Q_{B1} + Q_{R1} = Q_{B2} + Q_{R2}$$

$$4 + 8 = -10 + Q_{R2}$$

$$Q_{R2} = 22C$$

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Qn 3

$P = q.L$

$= 2 \times (0.78 \times 10^{-9})$

$= 1.56 \times 10^{-19}$ cm

Parallel (i)

$T = PE \sin 0^\circ$

$= 0$ Ans

perpendicular. (ii)

$T = PE \sin 90^\circ$

$= (1.56 \times 10^{-19}) \times (3.4 \times 10^{6}) \times 1$

$= 5.304 \times 10^{-13}$ Nm

Ans

iii

$T = PE \sin 180^\circ$

$= 0$ Ans

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(iv)

$$T_{max} = PE\sin(90^\circ)$$

$$= (1.56 \times 10^{-19}) \times (3.4 \times 10^{6}) \times 1$$

$$= 5.304 \times 10^{-13}\ Nm$$

(v)

$$V = -\vec{P} \cdot \vec{E}$$

$$= -PE\cos\theta$$

$$= -PE\cos 90^\circ$$

$$= 0$$

Ans