LAKSHYA (JEE)

Electric Charges and Field

DPP-06

1. A cylinder of radius R and length L is placed in a uniform electric field E parallel to the cylinder axis. The total flux for the surface of the cylinder is given by

(a) $2\pi R^2 E$ (b) $\pi R^2 / E$

(c) $(\pi R^2 - \pi R) / E$ (d) Zero

2. A cube of side l is placed in a uniform field E, where $E = E\hat{i}$. The net electric flux through the cube

(a) Zero (b) $l^2 E$

(c) $4l^2 E$ (d) $6l^2 E$

3. A charge q is placed at some distance along the axis of a uniformly charged disc of surface charge density σ. The flux due to the charge q through the disc is ϕ. The electric force on charge q exerted by the disc is

(a) $\sigma\phi$ (b) $\frac{\sigma\phi}{4\pi}$

(c) $\frac{\sigma\phi}{2\pi}$ (d) $\frac{\sigma\phi}{3\pi}$

4. An electric field given b

$$\vec{E} = 4\hat{i} - 3(y^2 + 2)\hat{j}$$

pierces Gaussian cube of side 1 m placed at origin such that its three sides represents x, y and z axes. The net flux enclosed within the cube is

(a) 3 (b) 4

(c) 5 (d) zero

5. The electric $\vec{E}$ is given by $\vec{E} = a\hat{i} + b\hat{j}$ (where a and b is constant and $\hat{i}$, $\hat{j}$ are unit vector along x and y axis respectively), the flux passing through a square area of side l and parallel to y-z plane is

(a) bl^2

(b) al^2

(c) $\sqrt{(a^2 + b^2)}l^2$

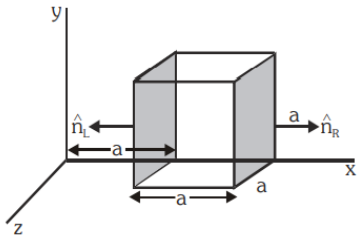
(d) $\sqrt{(a^2 - b^2)}l^2$

6. Consider an electric field $\vec{E} = (3\times10^3)\hat{i}$ (N/C). What is the flux through the square of 10 cm side, if the normal to its plane makes 60° angle with the X-axis?

7. The electric field in a region is given by $\vec{E} = \frac{3}{5}E_0\hat{i} + \frac{4}{5}E_0\hat{j}$ where $E_0 = 2 \times 10^3$ NC^{-1}. Find the flux due to this field through a rectangular surface of area 0.2 m^2 parallel to the Y-Z plane.

8. The electric field components of the field shown in figure are $E_x = \alpha x^{1/2}$, $E_y = E_z = 0$, in which $\alpha = 5$ N/C m$^{1/2}$. Calculate

(a) the flux ϕ_E through the cube, and



ANSWERS

1. **(d)**
2. **(a)**
3. **(a)**
4. **(a)**
5. **(b)**
6. **15 Nm^2/C**
7. **240 $Nm^2\ C^{-1}$**
8. **2.0 Nm^2/C**

Note - If you have any query/issue

Mail us at support@physicswallah.org