

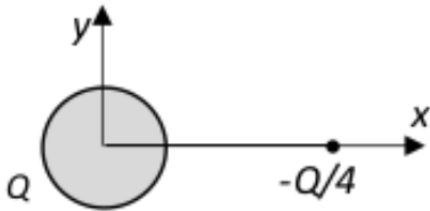
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Tutorial Set-2

1. A conducting plate of thickness d and with parallel surfaces is placed in a uniform electric field $\vec{E} = E_0 \hat{k}$ such that the surfaces are parallel to the $x - y$ plane. What is the surface charge density on the surface of the conductor?
2. Can the following vector function represent an electrostatic field? Give reasons for your answer:

$$\vec{F}_1 = x^2 \hat{i} + 3xz^2 \hat{j} - 2xz \hat{k}$$

3. A point charge with $q = 1 \mu C$ is placed at a point with coordinates $x = 3, y = 2, z = 0$. Obtain the electrostatic field \vec{E} at a point with coordinates $x = 3, y = 5, z = 0$. All distances are in meters.
4. Consider a uniform spherical charge distribution with total charge $+Q$ and a point charge having a charge $-\frac{Q}{4}$ placed at a distance d from the center of the sphere as shown in the figure.



Obtain the position/positions where the net electric field will be zero.

5. A negative charge of $1 \mu C$ is placed at the center of a cavity formed inside a spherical conducting shell having an inner radius $0.2 m$ and an outer radius $1 m$. What is the charge density on the outer surface of the sphere?