Chapter 23

Term083

Q6. Consider two large oppositely charged parallel metal plates, placed close to each other. The plates are square with sides L and carry charges Q and −Q. The magnitude of the electric field in the region between the plates is:

A) $E = Q/\varepsilon_o L^2$

Q7. A non-conducting sphere of radius R = 10 cm carries a charge density $\rho = 10^{-9}$ C/m^3 distributed uniformly throughout its volume. At what distance within the sphere, measured from the center of the sphere, the magnitude of the electric field is E = 1.32 N/m?

A) 3.50 cm

Q8.

An infinitely long non-conducting cylinder of radius R = 2.00 cm carries a uniform charge density $\rho = 18.0\ \mu$C/ m^3. Calculate the electric field at distance r = 1.00 cm from the axis of the cylinder?

A) 1.02×10^4 N/C.

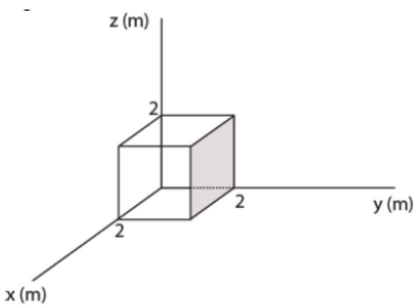
Term082

Q5. Consider a conducting neutral spherical shell having an inner radius of 3.70 cm and an outer radius of 4.50 cm. A positive point charge q is placed at the center of the shell. The magnitude of the electric field a distance 5.00 cm from the center of the shell is 2500 N/C. Calculate the magnitude of the charge density on the outer surface of the shell.

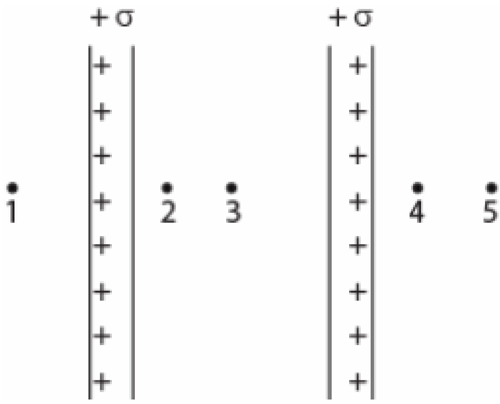
A) 2.73×10^{-8} C/m^2

Q6. Figure 7 shows a Gaussian cube of side 2.0 m. The cube is placed in a non-uniform electric field $E = 24\,\hat{i} + 30y\,\hat{j} + 16\,\hat{k}$. The electric flux (in N.m^2/C) through the shaded face is:

A) 240

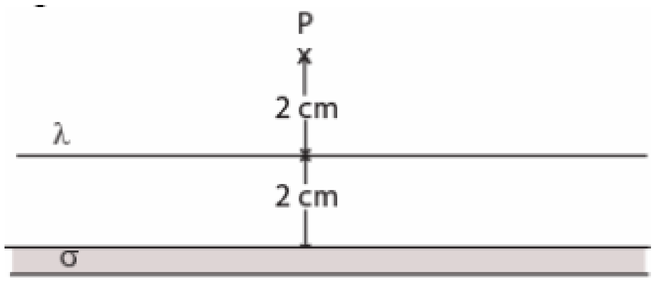


Q7. Two large thin non-conducting parallel sheets carry positive charges of equal magnitude that are distributed uniformly over their outer surfaces as shown in figure 8. Rank the points 1 through 5 according to the magnitude of the electric field at the points, greatest to least.



A) 1, 4, and 5 tie, then 2 and 3 tie.

Q8. Consider an infinitely large non-conducting flat sheet carrying a uniform charge density σ = +20 nC/m2 and a long thin wire carrying a uniform charge density λ = −2.0 nC/m arranged as shown in figure 4. The magnitude of the net electric field due to these two charge distributions at point P is



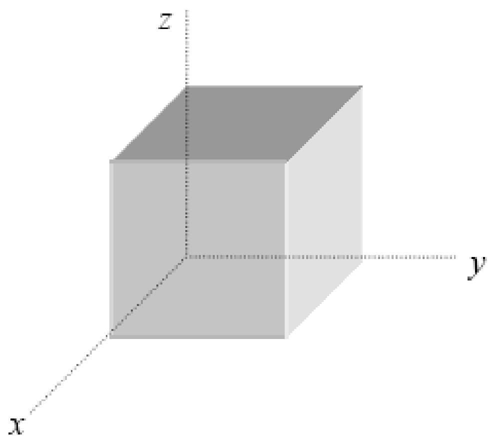
A) 670 N/C

Term081

Q5. A spherical conducting shell has charge Q. A particle with charge q is placed at the center of the spherical shell. The charge on the inner surface of the shell and the charge on the outer surface of the shell, respectively, are:

A) −q, (Q + q)

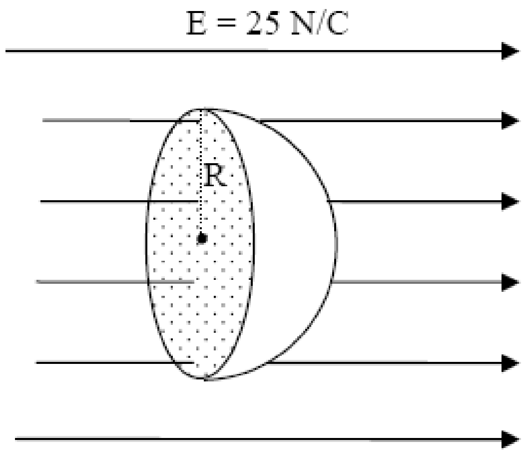
Q6. Fig. 1 shows a Gaussian surface in the shape of a cube with edge 2.0 m**.** This cube lies in a region where the electric field vector is given by E = −4i+8j (N/C) **.** Find the net charge contained in the cube.



A) zero

Q7. If the constant electric field in Fig 2 has a magnitude E = 25 N/C, calculate the electric flux through the curved surface of the hemisphere (half a sphere of radius R = 5.0 cm). (Knowing that the electric field is perpendicular to the flat surface and that the hemisphere encloses no electric charges.)

A) 0.20 $N \cdot m^2/C$



Q8. A charge is distributed uniformly along a long straight wire. If the electric field 4.0 cm from the wire is 40 N/C, then the electric field 8.0 cm from the wire is:

A) 20 N/C

Term073

Q5. A point charged particle is placed at the center of a spherical Gaussian surface. The electric flux through the Gaussian surface can be changed if

A) the point charge is moved to just outside the sphere.
B) the sphere is replaced by a cube of half the volume.
C) the point charge is moved off the center but still inside the original sphere.
D) the sphere is replaced by a cube of the same volume.
E) a second point charge is placed just outside the sphere.

Q6. A spherical conducting shell has a net charge of 10 μC. If a point charge of +3 μC is placed at the center of the shell, the net charge on the outer surface of the shell will be

A) +13 μC.

Q7. A hemisphere (half sphere) of radius 3.5 cm contains a total charge of 6.6×10^{-7} C. The flux through the rounded portion of the surface is 9.8×104 Nm^2 /C. The flux through the flat base is

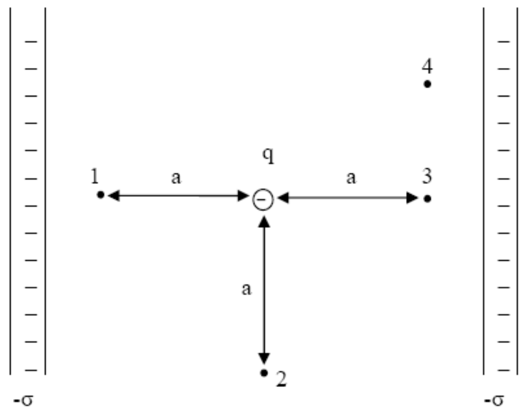
A) -2.3×10^4 N m^2 /C.

8. Charge is uniformly distributed on a long straight wire. At a distance of 5.0 cm from the wire, the electric field is 600 N/C. What is the charge on a length of 80 cm of the wire?
A) 1.3 nC.

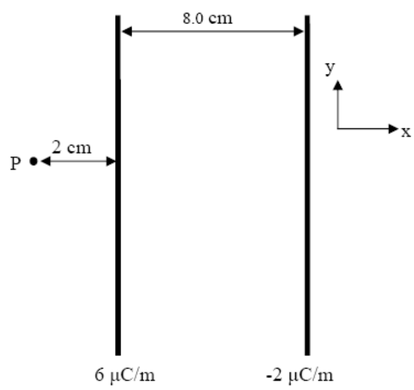
Term072

Q4. A conducting spherical shell, of inner radius a = 2.0 cm and outer radius b = 4.0 cm, is neutral. A small charge Q = 4.0 nC is located at the center of the shell. What is the magnitude of the electric field E at r = 1.0 cm and r = 3.0 cm from the center of the spherical shell, respectively?
A) 36×10^{4} N/C and zero

Q5. The figure below shows two large, parallel, non-conducting sheets with identical negative uniform charge density of magnitude σ. A negative point charge q is placed between the two sheets. Rank the four numbered points according to the magnitude of the net electric field there, greatest first.
A) 1,2,3 tie, then 4



Q6. The figure shows short sections of two very long parallel wires carrying uniform linear charge densities + 6.0 μC/m and – 2.0 μC/m. Find the magnitude and direction of the net electric field at point P.
A) 5.04×10^{6} (-i) N/C



Q7. For the electric field: E = (10 i + 20y j) N/C, what is the electric flux through a 2.0 m^2 portion of the xy-plane?
A) Zero.

Q8. A solid non-conducting sphere, of radius 4.0 m, has a uniform charge density. What is the ratio of the magnitude of the electric field at a distance 2.0 m from the center to the magnitude of the electric field at the surface of the sphere?

A) 0.5