Physicsaholics

DPP – 6 (Electrostatics)

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Q 1. If three electric di-poles are placed in some closed surface, then the electric flux emitting from the surface will be-
(a) Zero (b) positive
(c) Negative (d) None of these

Q 2. A rectangular surface of 2 metre width and 4 metre length, is placed in an electric field of intensity 20 newton/C, there is an angle of 60° between the perpendicular to surface and electrical field intensity. Then total flux emitted from the surface will be- (In Volt-metre):
(a) 80 (b) 40 (c) 20 (d) 120

Q 3. A sphere of radius 50 cm has a surface charge density of 8.85×10^{-6} C/m^2 . The electric field near the surface in N/C is-
(a) 8.85×10^{-6} (b) 8.85×10^{6}
(c) 1×10^{6} (d) Zero

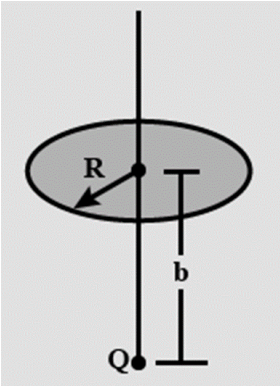
Q 4. The Earth has an electric field with a magnitude roughly 100 N/C at its surface. Assuming there is a point charge at the Earth's center creating this field, how much charge does the earth possess? (Radius of earth = 6371 km)
(a) 450.9×10^{3} C (b) 451.4×10^{6} C
(c) 1×10^{3} C (d) 10^{6} C

Q 5. In X-Y plane, there is a surface charge density of $5 \times 10^{-6}\ C/m^2$. on a long uniformly charged sheet. A circular loop of radius 0.1m is placed as that plane of loop makes an angle of 30° with Z axis. Determine the electric flux through the loop
(a) 4 kVm (b) 4.44 kVm
(c) 500 kVm (d) 5.55 kVm

Q 6. A point charge q is placed at a distance $\frac{a}{2}$ perpendicular to the above the center of a square of side a. The electric flux through the square is:
(a) $\frac{q}{\varepsilon_o}$ (b) $\frac{q}{\pi\varepsilon_o}$ (c) $\frac{q}{4\varepsilon_o}$ (d) $\frac{q}{6\varepsilon_o}$

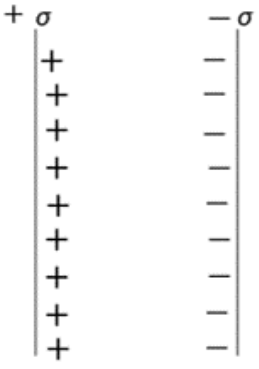
Q 7. The electric field in a region is given by $\vec{E} = a\hat{\imath} + b\hat{\jmath}$. Here a and b are constants. Find the net flux passing through a square area of side L_o parallel to y-z plane:
(a) $\sqrt{a^2 + b^2}L_o^2$ (b) $2aL_o^2$ (c) aL_o^2 (d) $(a + b)L_o^2$

Q 8. A point charge Q is located on the axis of a disc of radius R at a distance b from the plane of the disc (figure). Show that if one-fourth of the electric flux from the charge passes through the disc, then:



(a) $R = b$ (b) $R = \sqrt{2}b$
(c) $R = \sqrt{3}b$ (d) $R = 2b$

Q 9. Two infinite plane parallel sheets, separated by a distance d have equal and opposite uniform charge densities $+\sigma$ & $-\sigma$. Electric field at a point between the sheets is:



(a) $\frac{\sigma}{2\varepsilon_o}$
(b) $\frac{\sigma}{\varepsilon_o}$
(c) zero
(d) depends on the location of the point

Q 10. The electric intensity due to an infinite cylinder of radius R and having charge q per unit length at a distance r (r>R) from its axis is:
(a) Directly proportional to r^2
(b) Directly proportional to r^3
(c) Inversely proportional to r
(d) Inversely proportional to r^2

Q 11. The electric intensity outside a charged sphere of radius R and surface charge density σ at a distance r(r > R) is:(Charge is distributed uniformly over its surface)
(a) $\frac{\sigma R^2}{\varepsilon_o r^2}$ (b) $\frac{\sigma r^2}{\varepsilon_o R^2}$
(c) $\frac{\sigma r}{\varepsilon_o R}$ (d) $\frac{\sigma R}{\varepsilon_o r}$

Q 12. Let $\rho = \frac{Qr^2}{\pi R^5}$ be the volume charge density at distance r from the centre for a a soild sphere of radius R and charge Q. The electric field at $r = \frac{R}{2}$ from the centre will be:

(a) $\frac{Q}{4\pi\varepsilon_o R^2}$ (b) $\frac{Q}{40\pi\varepsilon_o R^2}$

(c) $\frac{Q}{8\pi\varepsilon_o R^2}$ (d) None of these

Q 13. A spherical volume has a uniformly distributed charge density $2 \times 10^{-4}\ C/m^3$. The electric field at a point inside the volume at a distance 4.0 cm from the centre is:

(a) $3.01 \times 10^5\ N/C$ (b) $2.1 \times 10^5\ N/C$

(c) $6.2 \times 10^5\ N/C$ (d) None of these

Q 14. The surface charge density of a thin charge disc of radius R is σ. The value of the electric field at the centre of the disc is $\frac{\sigma}{2\varepsilon_o}$. With respect to the field at the centre, the electric field along the axis at a distance R From the centre of the disc:

(a) reduces by 70.7% (b) reduces by 29.3%

(c)reduces by 9.7% (d) reduces by 14.6%

Q 15. Potential difference between centre and the surface of sphere of radius R and uniform volume charge density ρ within it will be:

(a) $\frac{\rho R^2}{2\varepsilon_o}$ (b) $\frac{\rho R^2}{4\varepsilon_o}$

(c) zero (d) $\frac{\rho R^2}{6\varepsilon_o}$

Q 16. Sphere of radius a = 1m with an empty spherical cavity of radius b = 0.25m, has a positive volume charge density $\rho = 10^{-6}\ C/m^3$. The center of the cavity is at the distance d = 0.5m from the center of the charged sphere. Find the electric field intensity at a point inside the cavity:

(a) 18.8 N/C (b) 10 kN/C

(c) 18.8 kN/C (d) depends on the position of the point

Answer Key

Q.1 a	**Q.2 a**	**Q.3 c**	**Q.4 a**	**Q.5 b**
Q.6 d	**Q.7 c**	**Q.8 c**	**Q.9 b**	**Q.10 c**
Q.11 a	**Q.12 b**	**Q.13 a**	**Q.14 a**	**Q.15 d**
Q.16 c				