Constants:

Coulomb constant k = 9.0 x 10^9 $N.M^2/C^2$. ε0 = 8.85 x 10^{-12} $C^2/N.m^2$.

Mass of electron = 9.1 x 10^{-31} kg   e = 1.6 x 10^{-19}C

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1. In the figure shown the point charges.

Q = 30 µ C, q = 5.0µC, and d = 30 cm.

The magnitude of the electrostatic force on q in (N) is:

a. 15   b. 23   c. zero   d. 7.4   e. 38

2. In the rectangular figure shown a = 60cm, b = 80cm, and the point charges Q= -4.0nCm and q = +1.5 nC. The magnitude of the electric field at point P in the (N.C) is:

a. 68   b. 72   c. 77   d. 82   e. 120.

3. A charge of 80nC is uniformly along the x- axis from x= 0 to x = 2.0. The magnitude of the electric field in (N/C) at the point x = 8.0m is:

4. Two point charge q_1 = + 1.6nC and q_2= -1.6nC are placed at x= 0, and x= 60 respectively the magnitude of the electric field in (N/C) on the y – axis at y= 80cm is:

a. 14 b. 35 c. 27 d. 12 e. 37.

5. A charge of uniform density of 3.5nC/m is distributed along a circular are as shown. The magnitude of the electric field in (N/C) at point P is:

a. 76.5 b. zero. C. 126.0 d. 31.5 e. 63.0

6. A solid spherical conductor a radius of 15cm. The electric field 30cm from the center of this sphere has a magnitude of 800N/C. the surface charge density in (C/m^2) on the sphere is:

a. $7.1x10^{-9}$ b. $1.0x10^{-8}$ c. $1.4x\ 10^{-8}$ d. $2.8\ x\ 18^{-8}$ e. $1.1\ x\ 10^{-7}$.

7. An electron enters a region of uniform electric field of magnitude 50/C with an initial velocity of 40km/s in a direction parallel to that of the electric field. The speed in (km/s) of the electron 1.5ns after entering this region is:

a. 18 b. 53 c. 27 d. 62 e. 42

8. A uniform electric field E = I 5.0 (kN/c). the flux in ($kN.m^2/c$) of this field through a square of side 20cm, when the normal to the plane of the square makes an angle of 45^o with the x-axis, is:

a. 71 b. 0.19 c. 0.28 d. 0.35 e. 0.14

9. An infinitely long cylinder of radius 4.0cm carries a uniform volume charge density ρ = 2000 nC/m^3. The electric field at r = 2.0cm in (kN/C) is:

a. 2.26 b. 0.11 c. 0.057 d. 0.44 e. 0.23

10. Point A at (2m, 3m) and B at (5m, 7m) are in a region of uniform electric field E = (4j + 3j) N/C. The potential difference VA-VB in (volts) is:

a. 33 b. 27 c. 24 d. 30 e. 11.

Put a circle around the correct answer?

Problem 1-3 are related to the following figures.

A. The electric potential (V) inside and outside a charged conducting sphere of radius R is given by the figure.

a. A b. B c. C d. D

B. The electric field (E) inside and outside a charged conducting sphere of radius R is given by the figure.

a. A b. B C. c d. D

C. The electric field (E) inside and outside a uniform spherical distribution of charge of radius R is given by the figure.

a. A b. B c. C d. D

D. In the figure, the charge/unit area on the outside surface of the conducting spherical shell is:

a. q /(4πR^2_1)   b. q/ (4 πR^2_2)

c. -q/ (4 πR^2_1)   d. -q / (4 πR^2_2)

Problems 5-8 are related to the following figure:

The kinetic field (E) at O is:

a. k $\frac{Q}{a^2}$ (i + j)   b. k $\frac{Q}{a^2}$ (I –j).

c. k $\frac{Q}{a^2}$ (-i + j)   d. zero.

6. The electric potential (V) at O is:

a. k $2Q/a^2$ b. k Q/a^2 c. k2Q/a   d. zero

* The work done in moving a charge (2Q) from infinity to O is:

a. k $4Q^2/a^2$ b. k 2 Q^2/a^2 c. k4 Q^2/a d. zero

8. The electric potential energy of the system when the charge (2Q) is at the poin O is:

a. $k\,Q^2/(a\,\sqrt{2})$ b. $-\,k\,Q^2/\,(a\,\sqrt{2})$

c. $k\,Q^2/a$ d. $-\,k\,Q^2/a$

Two conducting spherical shells with radii r1 and r2 and a uniform charge densities $\sqrt{1}$ and $\sqrt{2}$ respectively. They are connected by a long wire, the ratio of their final charges (Q_1/Q_2) is:

a. $\sqrt{1}/\sqrt{2}$ b. $\sqrt{1}/\sqrt{2}$ c. r_1/r_2 d. 1.0

10. A ring with uniform linear charge density (λ) and radius R, the electric potential at the center of the ring is:

a. zero b. $k\,\frac{\lambda}{R}$ c. r_1/r_2 d. $2\pi R\pi k$

11. In the figure show, the electric flux through the hemisphere due to the uniform E is:

a. $E\pi R^2$ b. $-\,E\pi R^2$

c. $E\,(2\pi R)$ d. $E\,(2\pi R^2)$

12. If the electric potential function is : V= $3x^2y + 2xy$ (v) then the electric field (E) at (-2, 0)m, in v/m is:

a. -81 b. 81 c. -8j d. 8j

Problems 13 and 14 are related to the following information.

A parallel plate capacitor, of plate area $40cm^2$, and plate separation 1.0mm. If the electric field between the plates is 2.5×10^5 V/m.

The potential difference between the two plates (in V) is:

a. 2500 b. 250 c. 25 d. 500

14. The magnitude of the charge on each plate (in Pc) is:

a. 8.85 b. 8.85x 10 c. 8.85×10^2 d. 8.85×10^3

Problem 15 and 16 are related to the following circuit.

16. The equivalent capacitance (in πF) is:

a. 2　　b. 4.33　　c. 0.5　　d. 6

17. The charge (in π C) on the 3 πF capacitor is:

a. 20　　b. 60　　c. 40　　d. 80