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Class 12 (Physics)

Sheet 2 (Electrostatics)

37. A charged particle of mass 1 kg and charge  $2\text{ C}$  is thrown from a horizontal ground at an angle  $\theta = 45^\circ$  with speed  $20\text{ m/s}$ . In space a horizontal electric field  $E = 2 \times 10^7\text{ V/m}$  exist. The range on horizontal ground of the projectile thrown is .....
- (A) 100 m            (B) 50 m            (C) 200 m            (D) 0 m
38. If electron in ground state of H-atom is assumed in rest then dipole moment of electron proton system of H-atom is .....
- Orbit radius of H atom in ground state is  $0.56\text{ \AA}$ .
- (A)  $0.253 \times 10^{-29}\text{ cm}$     (B)  $0.848 \times 10^{-29}\text{ cm}$     (C)  $0.305 \times 10^{-29}\text{ cm}$     (D)  $1.205 \times 10^{-28}\text{ cm}$
39. At what angle  $\theta$  a point P must be located from dipole axis so that the electric field intensity at the point is perpendicular to the dipole axis ?
- (A)  $53^\circ$  to  $54^\circ$             (B)  $50^\circ$  to  $51^\circ$             (C)  $45^\circ$  to  $46^\circ$             (D)  $52^\circ$  to  $53^\circ$
40. An electric dipole is placed at an angle of  $60^\circ$  with an electric field of intensity  $10^5\text{ NC}^{-1}$ . It experiences a torque equal to  $8\sqrt{3}\text{ Nm}$ . If the dipole length is  $2\text{ cm}$  then the charge on the dipole is ..... c.
- (A)  $-8 \times 10^3$             (B)  $8.54 \times 10^{-4}$             (C)  $8 \times 10^{-3}$             (D)  $0.85 \times 10^{-6}$
41. An electric dipole coincides on z axis and its mid point is on origin of the cartesian co-ordinate system. The electric field at an axial point at a distance z from origin is  $\vec{E}_{(z)}$  and electric field at an equatorial point at a distance y from origin is  $\vec{E}_{(y)}$
- $\left| \frac{\vec{E}_{(z)}}{\vec{E}_{(y)}} \right| (y = z \gg a) = \dots\dots\dots$
- (A) 1            (B) 2            (C) 4            (D) 3
42. An oil drop of 12 excess electrons is held stationary under a constant electric field of  $2.55 \times 10^4\text{ Vm}^{-1}$ . If the density of the oil is  $1.26\text{ gm/cm}^3$  then the radius of the drop is ..... m.
- (A)  $9.81 \times 10^{-7}$             (B)  $9.29 \times 10^{-7}$             (C)  $9.38 \times 10^{-8}$             (D)  $9.34 \times 10^{-8}$
43. A Charge q is placed at the centre of the open end of cylindrical vessel. The flux of the electric field through the surface of the vessel is .....
- (A)  $\frac{q}{\epsilon_0}$             (B)  $\frac{q}{2\epsilon_0}$             (C)  $\frac{2q}{\epsilon_0}$             (D) Zero

44. The inward and outward electric flux for a closed surface in units of  $\text{Nm}^2/\text{C}$  are respectively  $8 \times 10^3$  and  $4 \times 10^3$ . Then the total charge inside the surface is .....

(A)  $\frac{-4 \times 10^3}{\epsilon_0}$       (B)  $-4 \times 10^3$       (C)  $4 \times 10^3$       (D)  $-4 \times 10^3 \epsilon_0$

45. A sphere of radius  $R$  has a uniform distribution of electric charge in its volume. At a distance  $x$  from its centre, (for  $x < R$ ), the electric field is directly proportional to .....

(A)  $x$       (B)  $x^{-1}$       (C)  $x^{-2}$       (D)  $x^2$

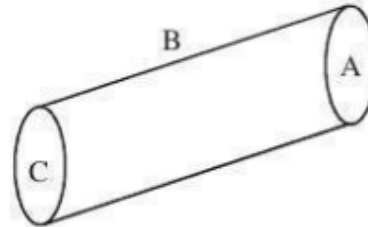
46. The electric flux for gaussian surface A that enclose the charged particles in free space is .....

(given  $q_1 = -14\text{nc}$ ,  $q_2 = 78.85 \text{ nc}$ ,  $q_3 = -56\text{nc}$ )

(A)  $10^4 \text{ Nm}^2/\text{C}$       (B)  $10^3 \text{ Nm}^2/\text{C}$       (C)  $6.2 \times 10^3 \text{ Nm}^2/\text{C}$       (D)  $6.3 \times 10^4 \text{ Nm}^2/\text{C}$

47. A hollow cylinder has a charge  $q$  coulomb within it. If  $\phi$  is the electric flux in units of volt-meter associated with the curved surface B, the flux linked with the plane surface A in units of volt-meter will be .....

(A)  $\frac{1}{2} \left( \frac{q}{\epsilon_0} - \phi \right)$       (B)  $\frac{q}{2\epsilon_0}$   
 (C)  $\frac{\phi}{3}$       (D)  $\frac{q}{\epsilon_0} - \phi$



48. An infinitely long thin straight wire has uniform linear charge density of  $\frac{1}{3} \text{ c/m}$ . Then, the magnitude of the electric intensity at a point 18 cm away is .....  $\text{NC}^{-1}$ .

(A)  $0.66 \times 10^{11}$       (B)  $1.32 \times 10^{11}$       (C)  $0.33 \times 10^{11}$       (D)  $3 \times 10^{11}$

49. Two points are at distances  $a$  and  $b$  ( $a < b$ ) from a long string of charge per unit length  $\lambda$ . The potential difference between the points is proportional to .....

(A)  $\ln\left(\frac{b}{a}\right)$       (B)  $\frac{\lambda}{\pi \epsilon_0} \ln\left(\frac{b^2}{a^2}\right)$       (C)  $\frac{\lambda}{2\pi \epsilon_0} \ln\sqrt{\frac{b}{a}}$       (D)  $\frac{\lambda}{2\pi \epsilon_0} \ln\left(\frac{b}{a}\right)$

50. A long string with a charge of  $\lambda$  per unit length passes through an imaginary cube of edge  $l$ . The maximum possible flux of the electric field through the cube will be .....

(A)  $\sqrt{3} \frac{\lambda l}{\epsilon_0}$       (B)  $\frac{\lambda l}{\epsilon_0}$       (C)  $\sqrt{2} \frac{\lambda l}{\epsilon_0}$       (D)  $\frac{6 \lambda l^2}{\epsilon_0}$

51. Two Points P and Q are maintained at the Potentials of 10 v and  $-4$  v, respectively. The work done in moving 100 electrons from P to Q is .....

(A)  $2.24 \times 10^{-16} \text{ J}$       (B)  $-9.60 \times 10^{-17} \text{ J}$       (C)  $-2.24 \times 10^{-16} \text{ J}$       (D)  $9.60 \times 10^{-17} \text{ J}$

52. The electric Potential  $V$  at any Point o ( $x, y, z$  all in metres) in space is given by  $V = 4x^2$  volt. The electric field at the point (1m, 0.2m) in volt/metre is .....

(A) 8, along negative  $x$  - axis      (B) 8, along positives  $x$  - axis  
 (C) 16, along negative  $x$  - axis      (D) 16, along positives  $x$  - axis