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Class 12 (Electrostatics)

53. Charges of $+\frac{10}{3}\times10^{-9}$C are placed at each of the four corners of a square of side 8cm. The potential at the intersection of the diagonals is ....

(A) $150\sqrt{2}$ Volt (B) $900\sqrt{2}$ Volt (C) $1500\sqrt{2}$ Volt (D) $900\sqrt{2}\cdot\sqrt{2}$ Volt

54. Three charges 2q, –q, –q are located at the vertices of an equilateral triangle. At the centre of the triangle.

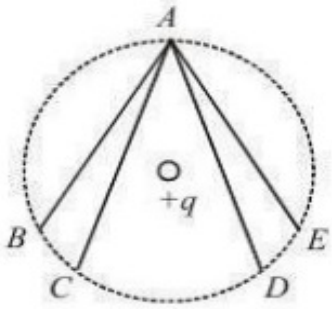
(A) The Field is Zero but Potential is non - zero

(B) The Field is non - Zero but Potential is zero

(C) Both field and Potential are Zero

(D) Both field and Potential are non- Zero

55. In the electric field of a point charge q, a certain charge is carried from point A to B, C, D and E. Then the work done ....



(A) Is least along the Path AB

(B) Is least along the Path AD

(C) Is Zero along all the Path AB, AC, and

(D) Is least along AE

56. Three concentric spherical shells have radii a, b and c (a < b < c) and have surface charge densities σ, $-\sigma$ and σ respectively. If V_A, V_B and V_C denote the Potentials of the three shells, then for c = a + b, we have

(A) $V_C = V_B = V_A$ (B) $V_c = V_B \neq V_A$ (C) $V_c \neq V_B \neq V_A$ (D) $V_c = V_A \neq V_B$

57. The electric Potential at a point P (x, y, z) is given by $V = -x^2y - xz^3 + 4$ The electric field $\vec{E}$ at that point is .....

(A) $\hat{i}\,(2xy + z^3) + \hat{j}\,x^2 + \hat{k}3xz^2$ (B) $\hat{i}\,2xy + \hat{j}\,(x^2 + y^2) + \hat{k}\,(3xy - y^2)$

(C) $\hat{i}\,z^3 + \hat{j}\,xyz + \hat{k}z^2$ (D) $\hat{i}\,(2xy - z^3) + \hat{j}\,xy^2 + \hat{k}3z^2x$

58. Three particles, each having a charge of 10 c are placed at the corners of an equilateral triangle of side 10 cm. The electrostatic potential energy of the system is

$\left(\text{Given } \frac{1}{4\pi\epsilon_o} = 9\times10^9 \text{ N.m}^2/\text{c}^2\right)$.

(A) 100 J (B) 27 J (C) Zero (D) Infinite

59. Four equal charges Q are placed at the four corners of a square of each side is 'a'. Work done in removing a charge - Q from its centre to infinity is ...

(A) 0 (B) $\frac{\sqrt{2}Q^2}{\pi \epsilon_0 a}$ (C) $\frac{\sqrt{2}Q^2}{4\pi \epsilon_0 a}$ (D) $\frac{Q^2}{2\pi \epsilon_0 a}$

60. Two charged spheres of radii R_1 and R_2 having equal surface charge density. The ratio of their potential is ...

(A) $\frac{R_2}{R_1}$ (B) $\left(\frac{R_2}{R_1}\right)^2$ (C) $\left(\frac{R_1}{R_2}\right)^2$ (D) $\frac{R_1}{R_2}$

61. Two equal charges q are placed at a distance of 2a and a third charge -2q is placed at the midpoint. The potential energy of the system is ....

(A) $\frac{9q^2}{8\pi \epsilon_0 a}$ (B) $\frac{q^2}{8\pi \epsilon_0 a}$ (C) $-\frac{7q^2}{8\pi \epsilon_0 a}$ (D) $\frac{6q^2}{8\pi \epsilon_0 a}$

62. Two point charges 100 c and 5 c are placed at points A and B respectively with AB = 40 cm. The work done by external force in displacing the charge 5 c from B to C where BC = 30 cm, angle ABC = $\frac{\pi}{2}$ and $\frac{1}{4\pi \epsilon_0} = 9 \times 10^9 \text{ Nm}^2/\text{c}^2$.

(A) 9 J (B) $\frac{9}{25}$ J (C) $\frac{81}{20}$ J (D) $-\frac{9}{4}$ J

63. The electric potential V is given as a function of distance x (metre) by $V = (5x^2 + 10x - 9)$ volt. Value of electric field at $x = 1$ is .....

(A) $-20\frac{V}{m}$ (B) $6\frac{V}{m}$ (C) $11\frac{V}{m}$ (D) $-23\frac{V}{m}$

64. A sphere of radius 1cm has potential of 8000 v, then energy density near its surface will be ...

(A) $64 \times 10^5 \frac{J}{m^3}$ (B) $2.83\frac{J}{m^3}$ (C) $8 \times 10^3 \frac{J}{m^3}$ (D) $32\frac{J}{m^3}$

65. If a charged spherical conductor of radius 10cm has potential v at a point distant 5 cm from its centre, then the potential at a point distant 15cm from the centre will be .....

(A) $\frac{1}{3}$V (B) $\frac{3}{2}$V (C) 3V (D) $\frac{2}{3}$V