LAKSHYA (JEE)

Electrostatic Potential & Capacitance

DPP-02

1. A uniform electric field pointing in positive x-direction exists in a region. Let A be the origin, B be the point on the x-axis at = x = +1 cm and C be the point on the y-axis at y = +1cm. Then the potentials at the points A, B and C satisfy

(A) $V_A < V_B$ (B) $V_A > V_B$

(C) $V_A < V_C$ (D) $V_A > V_C$

2. The electric field in a region is given by $\vec{E} = (Ax + B)\hat{i}$, where E is in NC^{-1} and x is in meters. The values of constants are A = 20 SI unit and B = 10 SI unit. If the potential at x = 1 is V_1 and that at x = –5 is V_2, then $V_1 - V_2$,

(A) – 48 V (B) 520 V

(C) 180 V (D) 320 V

3. Assume that an electric field $\vec{E} = 30x^2\hat{i}$ exists in space. Then, the potential difference $V_A - V_0$, where V_0 is the potential at the origin and V_A the potential at x = 2 m is

(A) 120 V (B) –120 V

(C) –80 V (D) 80 V

4. Uniform electric field of magnitude 100 Vm^{-1} in space is directed along the line $y = 3 + x$. Find the potential difference between points A (3, 1) and B (1, 3).

5. A uniform electric field is present in the positive x-direction. If the intensity of the field is 5 N/C then find the potential difference ($V_B - V_A$) between two points A (0 m, 2 m) and B (5 m, 3 m).

6. An electric field is expressed as $\vec{E} = (2\hat{i} + 3\hat{j})$ V/m. Find the potential difference $(V_A - V_B)$ between two points A and B whose position vectors are given by $\vec{r}_A = (\hat{i} + 2\hat{j})$ and $\vec{r}_B = (2\hat{i} + \hat{j} + 3\hat{k})$ m.

7. Uniform electric field exists in a region and is given by $\vec{E} = E_0\hat{i} + E_0\hat{j}$. There are four points A ($-a$, 0), B (0, $-a$), C (a, 0), and D (0, a) in the xy plane. Which of the following is the correct relation for the electric potential?

(A) $V_A = V_C > V_B = V_D$

(B) $V_A = V_B > V_C = V_D$

(C) $V_A > V_C > V_B = V_D$

(D) $V_A < V_C < V_B < V_D$

8. The potential of a point B(–20 m, 30 m) taking the potential of a point A(30 m, –20 m) to be zero in an electric field $\vec{E} = 10x\hat{i} - 20\hat{j}$ NC^{-1} is

(A) 350 V (B) –100 V

(C) 300 V (D) 3500 V

9. At a distance r from a point located at origin in space, the electric potential varies as V = 10r. Find the electric field at $\vec{r} = 3\hat{i} + 4\hat{j} - 5\hat{k}$

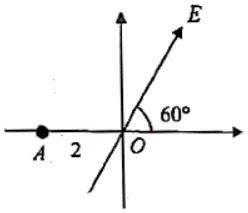
(A) $\sqrt{2}(3\hat{i} + 4\hat{j} - 5\hat{k})$

(B) $-\sqrt{2}(3\hat{i} + 4\hat{j} - 5\hat{k})$

(C) $-\sqrt{3}(3\hat{i} + 4\hat{j} - 5\hat{k})$

(D) None of these

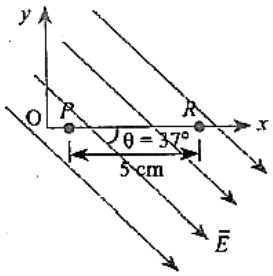
10. A uniform electric field of 100 Vm^{-1} is directed at 60° with the positive x-axis as shown in figure. If QA = 2 m, the potential difference $V_0 - V_A$ is



(A) –50 V (B) 50 V

(C) 100 V (D) –100 V

11. A uniform field of magnitude $\vec{E}$ = 2000 N/C is directed θ = 37° below the horizontal.



Find:

(A) The Potential difference between P and R ($V_P - V_R$).

(B) If we define the reference level of potential so that potential at R is V_R = 500 V, what is the potential at P?

ANSWER KEY

1. (B)
2. (C)
3. (C)
4. 0
5. –25 V
6. –1V
7. (B)
8. (D)
9. (B)
10. (D)
11. (A) –80 V; (B) –580 V

Note - If you have any query/issue

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