Ch—02 Electrostatic Potential and Capacitance
Daily Practice Problem 02

Q1) 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= +1cm 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. $V_A > V_C$

Ans) b

Q2) The electric field in a region is given by $\vec{E} = (Ax + B)\hat{\imath}$, 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

Ans) c

Q3) Assume that an electric field $\vec{E} = 30x^2\,\hat{\imath}$ 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

Ans) c

Q4) 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).

Ans) 0

Q5) 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).

Ans) -25 V

Q6) An electric field is expressed as $\vec{E} = (2\hat{\imath} + 3\,\hat{\jmath})$ V/ m. Find the potential difference (V_A - V_B) between two points A and B whose position vectors are given by $\vec{r}_B = (2\hat{\imath} + \hat{\jmath} + 3\hat{k})$m.

Ans) -1 V

Q7) Uniform electric field exists in a region and is given by $\vec{E} = E_0\hat{\imath} + E_0\hat{\jmath}$. 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. $V_A < V_C < V_B < V_D$

Ans) b

Q8) 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

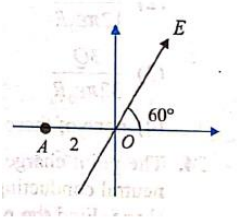
Ans) d

Q9) At a distance r from a point located at origin in space, the electric potential varies as V = 10r. Find the electric field at $\vec{r} = 3\hat{\imath} + 4\hat{\jmath} - 5\hat{k}$.

a. $\sqrt{2}(3\hat{\imath} + 4\hat{\jmath} - 5\hat{k})$
b. $-\sqrt{2}(3\hat{\imath} + 4\hat{\jmath} - 5\hat{k})$
c. $-\sqrt{3}(3\hat{\imath} + 4\hat{\jmath} - 5\hat{k})$
d. None of these

Ans) b

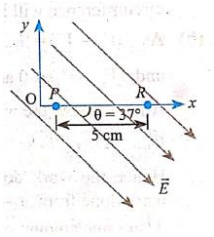
Q10) A uniform electric field of 100 Vm^{-1} is directed at 60° with the positive x-axis as shown in figure. If QA = 2 m, the potential difference V_0-V_A is



a. -50 V
b. 50 V
c. 100 V
d. -100 V

Ans) d

Q11) 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?

Ans) a) 80 V, b) 580 V