DPP-8

QUESTIONS BASED ON RELATION BETWEEN $\vec{E}$ AND V:

Q.1 If $\vec{E} = 2y\hat{i} + 2x\hat{j}$, then find $V(x, y, z)$

Q.2 If $V = x^2y + y^2z$ then find $\vec{E}(x, y, z)$

Q.3 If $V = 2r^2$ then find out (i) $\vec{E}(1,0,-2)$ (ii) $\vec{E}(r = 2)$

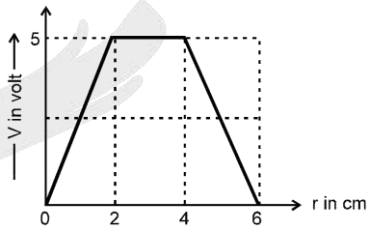
Q.4 An electric field $\vec{E} = (10\hat{i} + 20\hat{j})N/C$ exists in the space. If the potential at the origin is taken to be zero, find the potential at (3 m, 3 m).

Q.5 An electric field $\vec{E} = Bx\hat{i}$ exists in space, where $B = 20\ V/m^2$. Taking the potential at (2 m, 4 m) to be zero, find the potential at the origin.

Q.6 If $E = 2r^2$, then find $V(r)$

Q.7 If $\vec{E} = 2x^2\hat{i} - 3y^2\hat{j}$, then find $V(x, y, z)$

Q.8 The variation of potential with distance r from a fixed point is shown in Figure. The electric field at $r = 5$ cm, is :



(A) $(2.5)V/cm$

(B) $(-2.5)V/cm$

(C) $(-2/5)cm$

(D) $(2/5)V/cm$

Q.9 In the above question, the electric force acting on a point charge of 2C placed at the origin will be :

(A) 2 N (B) 500 N

(C) -5 N (D) -500 N

Q.10 The electric potential V as a function of distance x (in metre) is given by $V = (5x^2 + 10x - 9)$ volt.

The value of electric field at $x = 1$ m would be :

(A) -20volt/m (B) 6volt/m

(C) 11volt/m (D) -23volt/m

Q.11 A uniform electric field having a magnitude E_0 and direction along positive x-axis exists. If the electric potential V is zero at $x = 0$, then its value at $x = +x$ will be :

(A) $V_x = xE_0$ (B) $V_x = -xE_0$

(C) $V_x = x^2E_0$ (D) $V_x = -x^2E_0$

Q.12 Let E be the electric field and V, the electric potential at a point.

(A) If $E \neq 0$, V cannot be zero

(B) If $E = 0$, V must be zero

(C) If $V = 0$, E must be zero

(D) None of these

Q.13 The electric field in a region is directed outward and is proportional to the distance r from the origin. Taking the electric potential at the origin to be zero, the electric potential at a distance r :

(A) increases as one goes away from the origin.

(B) is proportional to r^2

(C) is proportional to r

(D) is uniform in the region

Q.14 A non-conducting ring of radius 0.5 m carries a total charge of 1.11×10^{-10}C distributed non-uniformly on its circumference producing an electric field $\vec{E}$ every where in space. The value of the line integral $\int_{\ell=\infty}^{\ell=0} -\vec{E} \cdot d\vec{\ell}$($\ell = 0$ being centre of the ring) in volts is :

Approximately)

(A) +2

(B) -1

(C) -2

(D) zero

ANSWER KEY

Q.1 $-2xy + C$

Q.2 $-2xy\hat{i} - (x^2 + 2yz)\hat{j} - y^2\hat{k}$

Q.3 (i) $-4(\hat{i} - 2\hat{k})$

(ii) $\vec{E} = -8\hat{r}$

Q.4 $V_{(3,3)} - V_{(0,0)} = -90\ V$

Q.5 40 V

Q.6 $\frac{-2r^3}{3} + C$

Q.7 $-\frac{2x^3}{3} + y^3 + C$

Q.8 (A)

Q.9 (D)

Q.10 (A)

Q.11 (B)

Q.12 (D)

Q.13 (B)

Q.14 (A)