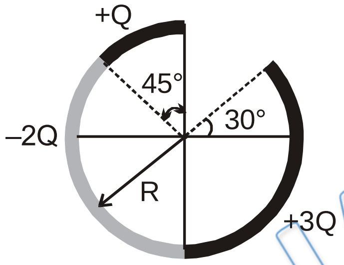
DPP – 4 (Electrostatics)

Video Solution on Website:- https://physicsaholics.com/home/courseDetails/93

Video Solution on YouTube:- https://youtu.be/OlriAKSU7iM

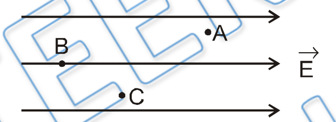
Written Solution on Website:- https://physicsaholics.com/note/notesDetalis/39

Q 1. Figure shows three circular arcs, each of radius R and total charge as indicated. The net electric potential at the centre of curvature is:



(a) $\frac{Q}{2\pi\varepsilon_0 R}$ (b) $\frac{Q}{4\pi\varepsilon_0 R}$ (c) $\frac{2Q}{\pi\varepsilon_0 R}$ (d) $\frac{Q}{\pi\varepsilon_0 R}$

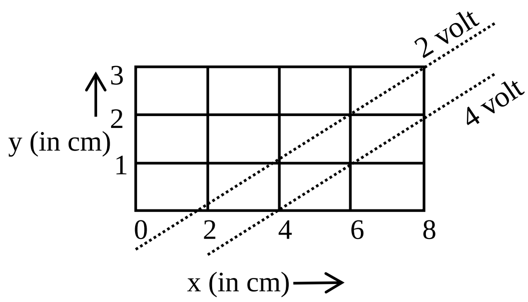
Q 2. A, B and C are three points in a uniform electric field. The electric potential is:



(a) maximum at B (b) maximum at C
(c) same at all the three points A, B and C (d) maximum at A

Q 3. In a region the potential is represented by V(x, y, z) = 6x – 8xy –8y + 6yz, where V is in volts and x, y, z, are in meters. The electric force experienced by a charge of 2 coulomb situated at point (1, 1,1) is:
(a) $6\sqrt{5}$N (b) 30N (c) 24N (d) $4\sqrt{35}$N

Q 4. Figure below shows two equipotential lines in xy-plane for an electric field. The scales are marked. Electric field in the space between these equipotential lines are respectively

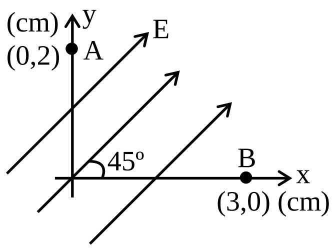


(a) + 100 i – 200 j V/m
(b) – 100 i + 200 j V/m
(c) + 200 i+ 100 j V/m
(d) – 200 i – 100 j V/m

Q 5. The equation of an equipotential line in an electric field is y = 2x, then the electric field strength vector at (1, 2) may be -

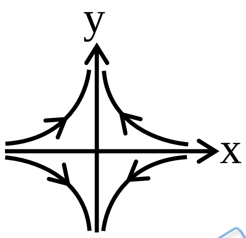
(a) 4 i + 3 j (b) 4 i + 8j (c) 8 i + 4 j (d) – 8i + 4 j

Q 6. A uniform electric field of 400 V/m is directed at 45º above the x-axis as shown in figure. The potential difference $V_A - V_B$ is given by–

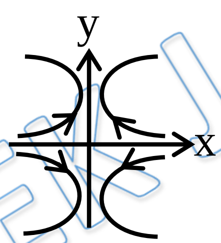


(a) 0 V (b) 4V (c) 6.4V (d) 2.8V

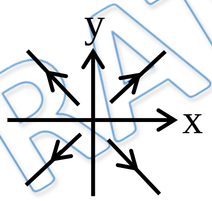
Q 7. The potential field depends on x and y coordinates as V = $(x^2 - y^2)$. Corresponding electric field lines in x-y plane as shown in Fig -



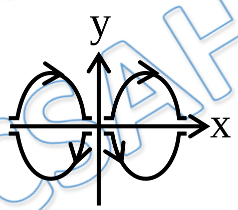
(a)



(b)



(c)



(d)

Q 8. The potential field of an electric field $\vec{E} = (y\hat{i} + x\hat{j})$ is

(a) V = –xy + constant (b) V = –(x + y) + constant

(c) V = - $(x^2 + y^2)$ + constant (d) V = constant

Q 9. A nonconducting ring of radius 0.5 m carries a total charge of 1.11 × 10^{-10} C distributed nonuniformly on its circumference, producing an electric field $\vec{E}$ everywhere in space. The value of the line integral $\int_{l=\infty}^{l=0} -\vec{E}.\vec{dl}$ (*l* = 0 being the centre of the ring) in volts is

(a) +2 (b) –1 (c) –2 (d) 0

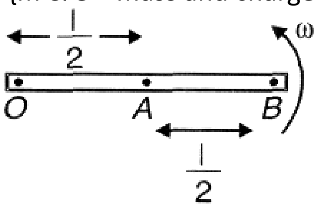
Q 10. Two points are at distances a and b (a < b) from a long string of charge per unit length λ. The potential difference between the points is proportional to

(a) $\frac{b}{a}$ (b) $\frac{b^2}{a^2}$ (c) $\sqrt{\frac{b}{a}}$ (d) ln (b/a)

Q 11. On the axis of uniformly charged ring of radius R magnitude of rate of change of potential is maximum at

(a) Centre of ring
(b) Distance .5R from centre of ring
(c) Distance .7R from centre of ring
(d) Distance R from ring

Q 12. A conducting rod of length L rotates about its one end with angular velocity ω Potential difference between A and B is {m & e = mass and charge on electron)



(a) $\frac{m\omega^2 l^2}{e}$ (b) $\frac{3m\omega^2 l^2}{4e}$ (c) $\frac{3m\omega^2 l^2}{8e}$ (d) zero

Q 13. In a uniform electric field, the potential of origin is V and V/2 at each of the points (a, 0, 0), (0, b, 0), (0, 0, c). The potential at (a, b, c) will be
(a) V/2 (b) -3V/2 (c) –V/2 (d) -V

Answer Key

Q.1 a	Q.2 a	Q.3 d	Q.4 b	Q.5 d
Q.6 d	Q.7 a	Q.8 a	Q.9 a	Q.10 d
Q.11 c	Q.12 c	Q.13 c		