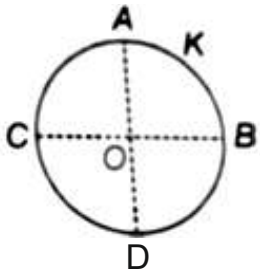
PHYSICS

ELECTROSTATICS

31. A thin conducting ring of radius R is given a charge Q of the ring due to the charge on the part AKB of the ring is E. The electric field at the centre due to the charge on the part ACDB of the ring is



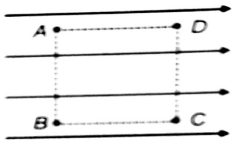
(1) 3E along OK

(2) 3E along KO

(3) E along OK

(4) E along KO

32. Figure shows four points A, B, C and D in uniform electric field $\vec{E}$. The lines AB and CD are perpendicular and BC and AD are parallel to the field lines. If V_A, V_B, V_C and V_D are electric potential at A, B, C and D choose the correct option.



(1) $V_A = V_B = V_C = V_D$

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

(3) $(V_A = V_B) < (V_C = V_D)$

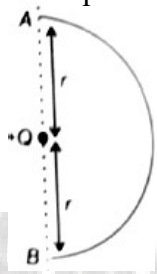
(4) $V_A > V_B = C_C > V_D$

33. An electric dipole is placed in a uniform electric field. To have maximum potential energy angle between dipole moment and electric field is

(1) zero (2) $\frac{\pi}{2}$

(3) π (4) $\frac{3\pi}{2}$

34. The work done in slowly moving an electron of charge e and mass m from A to B along a semicircular path (as shown in the figure) in vertical plane in the field of charge Q is



(1) –2mgr

(2) $-\frac{Qe}{r}$

(3) $2mgr + \frac{2Qe}{r}$

(4) zero

35. An α-particle is accelerated from rest through a potential of V volts. Its final kinetic energy is

(1) 2 eV (2) 1 eV

(3) 4 eV (4) $\frac{1}{2}$ eV

36. The value of electric potential at any point due to any short electric dipole is (where $\vec{p}$ is dipole moment, $\vec{r}$ is position and $k = \frac{1}{4\pi\varepsilon_0}$)

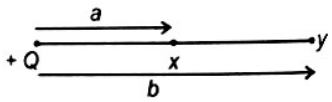
(1) $\frac{k\vec{p}\cdot\vec{r}}{r^2}$ (2) $\frac{k\vec{p}\cdot\vec{r}}{r^3}$

(3) $\frac{k\vec{p}\times\vec{r}}{r^2}$ (4) $\frac{k\vec{p}\times\vec{r}}{r^3}$

37. A positive charge q is carried slowly from a point x to point y in an electric field of point charge +Q. The work done by external force is

(1) $\frac{Qq}{4\pi\varepsilon_0}\left(\frac{1}{b}-\frac{1}{a}\right)$

(2) $\frac{Qq}{2\pi\varepsilon_0}\left(\frac{1}{a}-\frac{1}{b}\right)$



(3) $\frac{Qq}{2\pi\varepsilon_0}\left(\frac{1}{a}+\frac{1}{b}\right)$

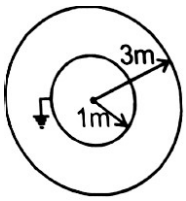
(4) $\frac{Qq}{2\pi\varepsilon_0}\left(\frac{1}{b}-\frac{1}{a}\right)$

38. An electric dipole of dipole moment p is placed parallel to the uniform electric field E. The work done by external force to rotate it perpendicular to the field is

(1) –pE (2) pE

(3) 2pE (4) –2pE

39. Figure shows a solid conducting sphere of radius 1 m, enclosed by a metallic shell of radius 3 m such that their centres coincide. If outer shell is given a charge of 6 μC and inner sphere is earthed, find magnitude charge on the surface of inner shell.



(1) 1 μC

(2) 2 μC

(3) 4 μC

(4) 6 μC

40. If the electric potential on the axis of an electric dipole at a distance r from it is V, then the potential at a point on its equatorial line at the same distance away from it will be

(1) 2V (2) $\frac{V}{2}$

(3) 0 (4) –V