## Section (A) : Properties of charge and Coulomb's Law

**A-1.** Three charges + 4q, -q and +4q are kept on a straight line at position (0, 0, 0), (a, 0, 0) and (2a, 0, 0) respectively. Considering that they are free to move along the x-axis only
(1) All the charges are in stable equilibrium
(2) All the charges are in unstable equilibrium
(3) Only the middle charge is in stable equilibrium
(4) Only middle charge is in unstable equilibrium

**A-2.** Two identical metallic sphere are charged with 10 and -20 units of charge. If both the spheres are first brought into contact with each other and then are placed to their previous positions, then the ratio of the force in the two situations will be :-
(1) 8 : 1 (2) 1 : 8 (3) 2 : 1 (4) 1 : 2

**A-3.** Two equal and like charges when placed 5 cm apart experience a repulsive force of 0.144 newton. The magnitude of the charge in microcoloumb will be :
(1) 0.2 (2) 2 (3) 20 (4) 12

**A-4.** Two charges of +1 μC & + 5 μC are placed 4 cm apart, the ratio of the force exerted by both charges on each other will be -
(1) 1 : 1 (2) 1 : 5 (3) 5 : 1 (4) 25 : 1

**A-5.** A negative charge is placed at some point on the line joining the two +Q charges at rest. The direction of motion of negative charge will depend upon the :
(1) position of negative charge alone
(2) magnitude of negative charge alone
(3) both on the magnitude and position of negative charge
(4) magnitude of positive charge.

**A-6.** A body has 80 microcoulomb of charge. Number of additional electrons on it will be :
(1) $8 \times 10^{-5}$ (2) $80 \times 10^{15}$ (3) $5 \times 10^{14}$ (4) $1.28 \times 10^{-17}$

**A-7.** Coulomb's law for the force between electric charges most closely resembles with :
(1) Law of conservation of energy (2) Newton's law of gravitation
(3) Newton's 2nd law of motion (4) The law of conservation of charge

**A-8.** A charge $Q_1$ exerts force on a second charge $Q_2$. If a 3rd charge $Q_3$ is brought near, the force of $Q_1$ exerted on $Q_2$.
(1) Will increase (2) Will decrease (3) Will remain unchanged
(4) Will increase if $Q_3$ is of the same sign as $Q_1$ and will decrease if $Q_3$ is of opposite sign

**A-9.** A charge particle $q_1$ is at position (2, - 1, 3). The electrostatic force on another charged particle $q_2$ at (0, 0, 0) is :
(1) $\frac{q_1 q_2}{56\pi \epsilon_0}(2\hat{i} - \hat{j} + 3\hat{k})$ (2) $\frac{q_1 q_2}{56\sqrt{14}\,\pi \epsilon_0}(2\hat{i} - \hat{j} + 3\hat{k})$
(3) $\frac{q_1 q_2}{56\pi \epsilon_0}(\hat{j} - 2\hat{i} - 3\hat{k})$ (4) $\frac{q_1 q_2}{56\sqrt{14}\,\pi \epsilon_0}(\hat{j} - 2\hat{i} - 3\hat{k})$

**A-10.** Three charge +4q, Q and q are placed in a straight line of length $\ell$ at points distance 0, $\ell/2$ and $\ell$ respectively. What should be the value of Q in order to make the net force on q to be zero?
(1) –q (2) –2q (3) –q/2 (4) 4q

**A-11.** Two point charges placed at a distance r in air exert a force F on each other. The value of distance R at which they experience force 4F when placed in a medium of dielectric constant K = 16 is :
(1) r (2) r/4 (3) r/8 (4) 2r

## Section (B) : Electric Field

**B-1.** If an electron is placed in a uniform electric field, then the electron will :
(1) Experience no force.
(2) Moving with constant velocity in the direction of the field.
(3) Move with constant velocity in the direction opposite to the field.
(4) Accelerate in direction opposite to field.

**B-2.** If Q = 2 coloumb and force on it is F = 100 newton, then the value of field intensity will be :
(1) 100 N/C (2) 50 N/C (3) 200 N/C (4) 10 N/C

**B-3.** Two infinite linear charges are placed parallel at 0.1 m apart. If each has charge density of 5μ C/m, then the force per unit length of one of linear charges in N/m is :
(1) 2.5 (2) 3.25 (3) 4.5 (4) 7.5

**B-4.** The intensity of an electric field at some point distant r from the axis of infinite long pipe having charges per unit length as q wil be :
(1) proportional to $r^2$ (2) proportional to $r^3$
(3) inversely proportional to r. (4) inversely proportional to $r^2$.

**B-5.** The electric field intensity due to a uniformly charged sphere is zero :
(1) at the centre (2) at infinity
(3) at the centre and at infinite distance (4) on the surface

**B-6.** Two spheres of radii 2 cm and 4 cm are charged equally, then the ratio of charge density on the surfaces of the spheres will be -
(1) 1 : 2 (2) 4 : 1 (3) 8 : 1 (4) 1 : 4

**B-7.** Total charge on a sphere of radii 10 cm is 1 μC. The maximum electric field due to the sphere in N/C will be
(1) $9 \times 10^{-5}$ (2) $9 \times 10^{3}$ (3) $9 \times 10^{5}$ (4) $9 \times 10^{15}$

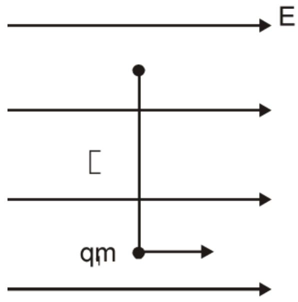
**B-8.** A charged water drop of radius 0.1 μm is under equilibrium in some electric field. The charge on the drop is equivalent to electronic charge. The intensity of electric field is (g = 10 m/$s^2$)
(1) 1.61 $NC^{-1}$ (2) 26.2 $NC^{-1}$ (3) 262 $NC^{-1}$ (4) 1610 $NC^{-1}$

**B-9.** Two large sized charged plates have a charge density of +σ and -σ. The resultant force on the proton located midway between them will be -
(1) $\sigma e/\varepsilon_0$ (2) $\sigma e/2\varepsilon_0$ (3) $2\sigma e/\varepsilon_0$ (4) zero

**B-10.** Two parallel charged plates have a charge density +σ and -σ. The resultant force on the proton located outside the plates at some distance will be
(1) $2\sigma e/\varepsilon_0$ (2) $\sigma e/\varepsilon_0$ (3) $\sigma e/2e_0$ (4) zero

**B-11.** There is a uniform electric field in x-direction. If the work done by external agent in moving a charge of 0.2 C through a distance of 2 metre slowly along the line making an angle of 60º with x-direction is 4 joule, then the magnitude of E is:
(1) $\sqrt{3}$ N/C (2) 4 N/C (3) 5 N/C (4) 20 N/C

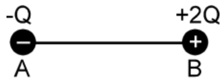
**B-12.** A simple pendulum has a length $\ell$, mass of bob m. The bob is given a charge q coulomb. The pendulum is suspended in a uniform horizontal electric field of strength E as shown in figure, then calculate the time period of oscillation when the bob is slightly displace from its mean position is :




(1) $2\pi\sqrt{\frac{\ell}{g}}$ (2) $2\pi\sqrt{\left\{\frac{\ell}{g+\frac{qE}{m}}\right\}}$

(3) $2\pi\sqrt{\left\{\frac{\ell}{g-\frac{qE}{m}}\right\}}$ (4) $2\pi\sqrt{\frac{\ell}{\sqrt{g^2+\left(\frac{qE}{m}\right)^2}}}$

**B-13.** Charge 2Q and –Q are placed as shown in figure. The point at which electric field intensity is zero will be :




(1) Somewhere between –Q and 2Q
(2) Somewhere on the left of –Q
(3) Somewhere on the right of 2Q
(4) Somewhere on the right bisector of line joining –Q and 2Q

**B-14.** The maximum electric field intensity on the axis of a uniformly charged ring of charge q and radius R will be :

(1) $\frac{1}{4\pi\varepsilon_0}\frac{q}{3\sqrt{3}R^2}$ (2) $\frac{1}{4\pi\varepsilon_0}\frac{2q}{3R^2}$ (3) $\frac{1}{4\pi\varepsilon_0}\frac{2q}{3\sqrt{3}R^2}$ (4) $\frac{1}{4\pi\varepsilon_0}\frac{3q}{2\sqrt{3}R^2}$

**B-15.** A charged particle of charge q and mass m is released from rest in an uniform electric field E. Neglecting the effect of gravity, the kinetic energy of the charged particle after time 't' seconds is

(1) $\frac{Eqm}{t}$ (2) $\frac{E^2q^2t^2}{2m}$ (3) $\frac{2E^2t^2}{mq}$ (4) $\frac{Eq^2m}{2t^2}$

## Section (C) : Electric Potential and Potential Difference

**C-1.** A force of 3000 N is acting on a charge of 3 coloumb moving in a uniform electric field. The potential difference between two point at a distance of 1 cm in this field is :

(1) 10V (2) 90V (3) 1000V (4) 9000V

**C-2.** If we move in a direction opposite to the electric lines of force :

(1) electrical potential decreases. (2) electrical potential increases.
(3) electrical potential remains uncharged (4) nothing can be said.

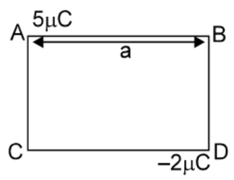
**C-3.** The distance between two plates is 2 cm, when an electric potential difference of 10 volt is applied between the plates, then the value of electric field will be -

(1) 20 N/C (2) 500 N/C (3) 5 N/C (4) 250 N/C

**C-4.** Potential difference between centre and the surface of sphere of radius R and having uniform volume charge density $\rho$ within it will be :

(1) $\frac{\rho R^2}{6\in_0}$ (2) $\frac{\rho R^2}{4\in_0}$ (3) 0 (4) $\frac{\rho R^2}{2\in_0}$

**C-5.** In the figure shown two point charges $5\mu C$ and $-2\mu C$ are placed at two corners of a square. The potential difference between the other two corners due to these charges will be (in V)




(1) 5400/a (2) 6000/a

(3) 0 (4) cannot be determined

**C-6.** The potential due to a point charge at distance r is
(1) Proportional to r (2) Inversely proportional to r
(3) Proportional to $r^2$ (4) Inversely proportional to $r^2$

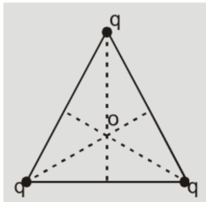
**C-7.** The dimensions of potential difference are -
(1) $ML^2T^{-2}Q^{-1}$ (2) $MLT^{-2}Q^{-1}$ (3) $MT^{-2}Q^{-2}$ (4) $ML^2T^{-1}Q^{-1}$

**C-8.** An object is charged with positive charge. The potential at that object will be -
(1) Positive only (2) Negative only
(3) Zero always (4) May be positive, negative or zero.

**C-9.** Two points (0, a) and (0, -a) have charges q and -q respectively then the electrical potential at origin will be-
(1) zero (2) kq/a (3) kq/2a (4) $kq/4a^2$

**C-10.** The charges of same magnitude q are placed at four corners of a square of side a. The value of potential at the centre of square will be -
(1) 4kq/a (2) $4\sqrt{2}kq/a$ (3) $4kq\sqrt{2a}$ (4) $kq/a\sqrt{2}$

**C-11.** Three equal charges are placed at the three corners of an equilateral triangle as shown in the figure. The statement which is true for electric potential V and the field intensity E at the centre of the triangle




(1) V = 0, E = 0 (2) $V = 0, E \neq 0$
(3) $V \neq 0, E = 0$ (4) $V \neq 0, E \neq 0$

**C-12.** The potential at 0.5 Å from a proton is
(1) 0.5 volt (2) 8μ volt (3) 28.8 volt (4) 2 volt

**C-13.** An infinite number of charges of equal magnitude q, but alternate charge of opposite sign are placed along the x-axis at x = 1, x = 2, x = 4, x =8,... and so on. The electric potential at the point x = 0 due to all these charges will be -
(1) kq/2 (2) kq/3 (3) 2kq/3 (4) 3kq/2

**C-14.** The electric potential inside a uniformly positively charged non conducting solid sphere has the value which
(1) Increase with increases in distance from the centre.
(2) Decreases with increases in distance from the centre.
(3) Is equal at all the points.
(4) Is zero at all the points.

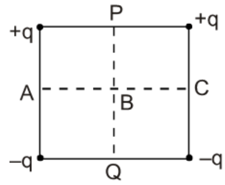
**C-15.** The potential difference between two isolated spheres of radii $r_1$ and $r_2$ is zero. The ratio of their charges $Q_1/Q_2$ will be-
(1) $r_1/r_2$ (2) $r_2/r_1$ (3) $r_1^2/r_2^2$ (4) $r_1^3/r_2^3$

**C-16.** 64 charged drops coalesce to form a bigger charged drop. The potential of bigger drop will be times that of smaller drop -
(1) 4 (2) 16 (3) 64 (4) 8

**C-17.** The electric potential outside a uniformly charged sphere at a distance 'r' is ('a' being the radius of the sphere)-
(1) Directly proportional to $a^3$ (2) Directily proportional to r.
(3) Inversely proportional to r. (4) Inversely proportional to $a^3$.

**C-18.** At a certain distance from a point charge the electric field is 500 V/m and the potential is 3000 V. What is the distance ?
(1) 6 m (2) 12 m (3) 36 m (4) 144 m

**C-19.** Figure represents a square carrying charges +q, +q, –q, –q at its four corners as shown. Then the potential will be zero at points




(1) A, B, C, P and Q (2) A, B and C
(3) A, P, C and Q (4) P, B and Q

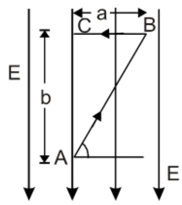
**C-20.** Two equal positive charges are kept at points A and B. The electric potential at the points between A and B (excluding these points) is studied while moving from A to B. The potential
(1) continuously increases (2) continuosly decreases
(3) increases then decreases (4) decreases than increases

**C-21.** A semicircular ring of radius 0.5 m is uniformly charged with a total charge of $1.5 \times 10^{-9}$ coul. The electric potential at the centre of this ring is :
(1) 27 V (2) 13.5 V (3) 54 V (4) 45.5 V

**C-22.** When a charge of 3 coul is placed in a uniform electric field it experiences a force of 3000 newton. The potential difference between two points separated by a distance of 1 cm along field with in this field is:
(1) 10 volt (2) 90 volt (3) 1000 volt (4) 3000 volt

**C-23.** The kinetic energy which an electron acquires when accelerated (from rest) through a potential difference of 1 volt is called :
(1) 1 joule (2) 1 electron volt (3) 1 erg (4) 1 watt

**C-24.** The potential difference between points A and B in the given uniform electric field is :




(1) Ea (2) $E\sqrt{(a^2+b^2)}$
(3) Eb (4) $(Eb/\sqrt{2})$

**C-25.** An equipotential surface and a line of force :
(1) never intersect each other (2) intersect at 45°
(3) intersect at 60° (4) intersect at 90°

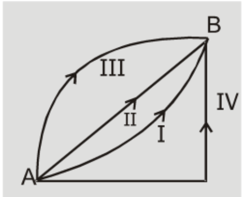
**C-26.** A particle of charge Q and mass m travels through a potential difference V from rest. The final momentum of the particle is :
(1) $\frac{mV}{Q}$ (2) $2Q\sqrt{mV}$ (3) $\sqrt{2m\ QV}$ (4) $\sqrt{\frac{2QV}{m}}$

**C-27.** If a uniformly charged spherical shell of radius 10 cm has a potential V at a point distant 5 cm from its centre, then the potential at a point distant 15 cm from the centre will be :
(1) $\frac{V}{3}$ (2) $\frac{2V}{3}$ (3) $\frac{3}{2}V$ (4) 3V

## Section (D) : Electric Potential Energy OF A PARTICLE

**D-1.** A nucleus has a charge of + 50e. A proton is located at a distance of $10^{-12}$ m. The potential at this point in volt will be -
(1) $14.4 \times 10^4$ (2) $7.2 \times 10^4$ (3) $7.2 \times 10^{-12}$ (4) $14.4 \times 10^8$

**D-2.** Under the influence of charge, a point charge q is carried along different paths from a point A to point B, then work done will be

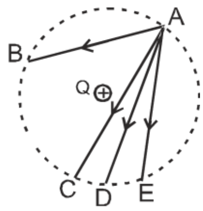



(1) Maximum for path four. (2) Maximum for path one.
(3) Equal for all paths (4) Minimum for path three.

**D-3.** An electron moving in a electric potential field $V_1$ enters a higher electric potential field $V_2$, then the change in kinetic energy of the electron is proportional to

(1) $(V_2 - V_1)^{1/2}$ (2) $V_2 - V_1$ (3) $(V_2 - V_1)^2$ (4) $\frac{(V_2 - V_1)}{V_2}$

**D-4.** In the electric field of charge Q, another charge is carried from A to B. A to C, A to D and A to E, then work done will be




(1) minimum along path AB. (2) minimum along path AD.
(3) minimum along path AE. (4) zero along all the paths.

**D-5.** The work done to take an electron from rest where potential is – 60 volt to another point where potential is – 20 volt is given by -
(1) 40 eV (2) –40 eV (3) 60 eV (4) –60 eV

**D-6.** If a charge is shifted from a low potential region to high potential region. the electrical potential energy:
(1) Increases (2) Decreases
(3) Remains constant (4) May increase or decrease.

## Section (E) : Potential Energy Of a System Of Point Charge

**E-1.** In H atom, an electron is rotating around the proton in an orbit of radius r. Work done by an electron in moving once around the proton along the orbit will be -
(1) ke/r (2) $ke^2/r^2$ (3) $2\pi re$ (4) zero

**E-2.** When the seperation between two charges is incresased, the electric potential energy of the charges
(1) increases (2) decresaes (3) remains the same (4) may increase or decrease

**E-3.** You are given an arrangement of three point charges q, 2q and xq separated by equal finite distances so that electric potential energy of the system is zero. Then the value of x is :
(1) $-\frac{2}{3}$ (2) $-\frac{1}{3}$ (3) $\frac{2}{3}$ (4) $\frac{3}{2}$

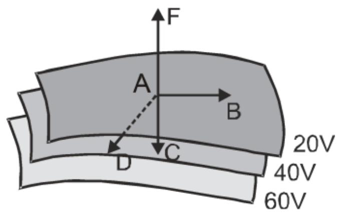
## Section (F) : Self Energy And Energy Density

**F-1.** A sphere of radius 1 cm has potential of 8000 V. The energy density near the surface of sphere will be:
(1) $64 \times 10^5$ J/m$^3$ (2) $8 \times 10^3$ J/m$^3$ (3) 32 J/m$^3$ (4) 2.83 J/m$^3$

**F-2.** If ' n ' identical water drops assumed spherical each charged to a potential energy U coalesce to a single drop, the potential energy of the single drop is(Assume that drops are uniformly charged):
(1) $n^{1/3}$ U (2) $n^{2/3}$ U (3) $n^{4/3}$ U (4) $n^{5/3}$ U

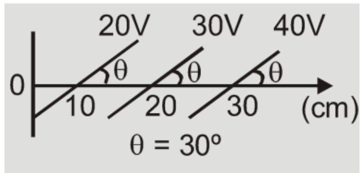
## Section (G) : Questions Based On Relation Between $\vec{E}$ And V :

**G-1.** A family of equipotential surfaces are shown. The direction of the electric field at point A is along -



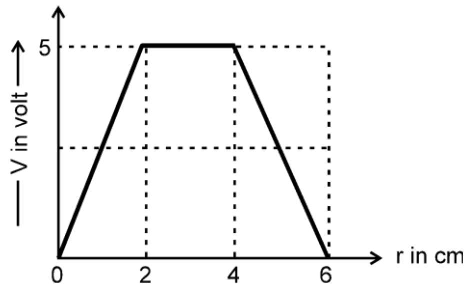

(1) AB (2) AC (3) AD (4) AF

**G-2.** Some equipotential surfaces are shown in the figure. The magnitude and direction of the electric field is




(1) 100 V/m making angle $120^0$ with the x-axis
(2) 100 V/m making angle $60^0$ with the x-axis
(3) 200 V/m making angle $120^0$ with the x-axis
(4) none of the above

**G-3.** The variation of potential with distance r from a fixed point is shown in Figure. The electric field at r = 5 cm, is :




(1) (2.5) V/cm (2) (–2.5) V/cm (3) (–2/5) cm (4) (2/5) V/cm

**G-4.** The electric field and the electric potential at a point are E and V respectively
(1) If E = 0, V must be zero
(2) If V = 0, E must be zero
(3) If $E \neq 0$, V cannot be zero
(4) None of these

**G-5.** 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 :
(1) Is uniform in the region
(2) Is proportional to r
(3) Is proportional to $r^2$
(4) Increases as one goes away from the origin.

## Section (H) : Dipole

**H-1.** The force on a charge situated on the axis of a dipole is F. If the charge is shifted to double the distance, the acting force will be -
(1) 4F (2) F/2 (3) F/4 (4) F/8

**H-2.** A dipole of dipole moment p, is placed in an electric field $\vec{E}$ and is in stable equilibrium. The torque required to rotate the dipole from this position by angle θ will be -
(1) pE cos θ (2) pE sin θ (3) pE tan θ (4) –pE cosθ

**H-3.** The electric potential at a point due to an electric dipole will be -
(1) $\frac{k(\vec{p}.\vec{r})}{r^3}$ (2) $\frac{k(\vec{p}.\vec{r})}{r^2}$ (3) $\frac{k(\vec{p}\times\vec{r})}{r}$ (4) $\frac{k(\vec{p}\times\vec{r})}{r^2}$

**H-4.** The ratio of electric fields due to an electric dipole on the axis and on the equatorial line at equal distance will be
(1) 4 : 1 (2) 1 : 2 (3) 2 : 1 (4) 1 : 1

**H-5.** An electric dipole is made up of two equal and opposite charges of $2 \times 10^{-6}$ coulomb at a distance of 3 cm. This is kept in an electric field of $2 \times 10^{5}$ N/C, then the maximum torque acting on the dipole -
(1) $12 \times 10^{-1}$ Nm (2) $12 \times 10^{-3}$ Nm (3) $24 \times 10^{-3}$ Nm (4) $24 \times 10^{-1}$ Nm

**H-6.** The distance between two singly ionised atoms is 1Å. If the charge on both ions is equal and opposite then the dipole moment in coulomb-metre is
(1) $1.6 \times 10^{-29}$ (2) $0.16 \times 10^{-29}$ (3) $16 \times 10^{-29}$ (4) $1.6 \times 10^{-29}/4\pi\varepsilon_0$

**H-7.** The electric potential in volt at a distance of 0.01 m on the equatorial line of an electric dipole of dipole moment p is -
(1) $p/4\pi\in_0 \times 10^{-4}$ (2) zero (3) $4\pi\in_0 p \times 10^{-4}$ (4) $4\pi\in_0 /p \times 10^{-4}$

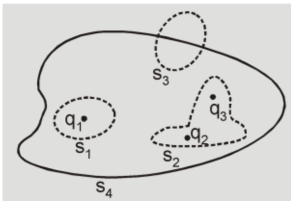
**H-8.** The electric potential in volt due to an electric dipole of dipole moment $2 \times 10^{-8}$ C-m at a distance of 3m on a line making an angle of $60^0$ with the axis of the dipole is -
(1) 0 (2) 10 (3) 20 (4) 40

**H-9.** A dipole of electric dipole moment P is placed in a uniform electric field of strength E. If $\theta$ is the angle between positive directions of P and E, then the potential energy of the electric dipole is largest when $\theta$ is :
(1) zero (2) $\pi/2$ (3) $\pi$ (4) $\pi/4$

## Section (I) : Flux Calculation And Gauss's Law

**I-1.** Total flux coming out of some closed surface is :
(1) $q/\varepsilon_0$ (2) $\varepsilon_0/q$ (3) $q\varepsilon_0$ (4) $\sqrt{q/\varepsilon_0}$

**I-2.** Three charges $q_1 = 1 \times 10^{-6}$ , $q_2 = 2 \times 10^{-6}$ , $q_3 = -3 \times 10^{-6}$ C have been placed, as shown in figure, in four surfaces $S_1$, $S_2$, $S_3$ and $S_4$ electrical flux emitted from the surface $S_2$ in N–m²/C will be




(1) $36\pi \times 10^{3}$ (2) $-36\pi \times 10^{3}$
(3) $36\pi \times 10^{9}$ (4) $-36\pi \times 10^{9}$

**I-3.** Eight charges, 1μC,. -7μC, -4μC, 10μC, 2μC, -5μC, -3μC and 6μC are situated at the eight corners of a cube of side 20 cm. A spherical surface of radius 80 cm encloses this cube. The centre of the sphere coincides with the centre of the cube. Then the total outgoing flux from the spherical surface (in unit of volt meter) is
(1) $36\pi \times 10^{3}$ (2) $684\pi \times 10^{3}$ (3) zero (4) none of the above

**I-4.** A closed cylinder of radius R and length L is placed in a uniform electric field E, parallel to the axis of the cylinder. Then the electric flux through the cylinder must be -
(1) $2\pi R^2E$ (2) $(2\pi R^2 + 2\pi RL)E$ (3) $2\pi RLE$ (4) zero

## Section (J) : Conductor, It's Properties & Electric Pressure

**J-1.** For an electrostatic system which of the statement is always true :
(a) Electric lines are parallel to metallic surface.
(b) Electric field inside a metallic surface is zero.
(c) Electric lines of force are perpendicular to equi-potential surface.
(1) (a) and (b) only (2) (b) and (c) only (3) (a) and (c) only (4) (a), (b) and (c)

**J-2.** A conducting shell of radius 10 cm is charged with $3.2 \times 10^{-19}$ C. The electric potential at a distance 4cm from its centre in volt be
(1) $9 \times 10^{-9}$ (2) 288 (3) $2.88 \times 10^{-8}$ (4) zero

**J-3.** The potential on the conducting spheres of radii $r_1$ and $r_2$ is same, the ratio of their charge densities will be

(1) $r_1/r_2$ (2) $r_2/r_1$ (3) $r_1^2/r_2^2$ (4) $r_2^2/r_1^2$

**J-4.** Two metallic spheres which have equal charges, but their radii are different, are made to touch each other and then separated apart. The potential the spheres will be -

(1) Same as before (2) More for bigger (3) More for smaller (4) Equal

**J-5.** Two spheres of radii R and 2R are given source equally positive charged and then connected by a long conducting wire, then the positive charge will

(1) Flow from smaller sphere to the bigger sphere.

(2) Flow from bigger sphere to the smaller sphere

(3) Not flow.

(4) Oscillate between the spheres.

**J-6.** The electric field near the conducting surface of a uniform charge density σ will be -

(1) $\sigma/\varepsilon_0$ and parallel to surface. (2) $2\sigma/\varepsilon_0$ and parallel to surface.

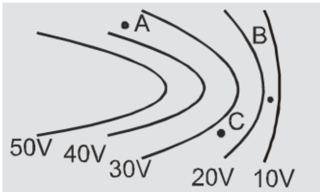
(3) $\sigma/\varepsilon_0$ and perpendicular to surface. (4) $2\sigma/\varepsilon_0$ and perpendicular to surface.

**J-7.** An uncharged conductor A is brought close to another positive charged conductor B, then the charge on B

(1) will increase but potential will be constant. (2) will be constant but potential will increase

(3) will be constant but potential decreases. (4) the potential and charge on both are constant.

**J-8.** The fig. shows lines of constant potential in a region in which an electric field is present. The value of the potential are written in brackets of the points A, B and C, the magnitude of the electric field is greatest at the point




(1) A (2) B

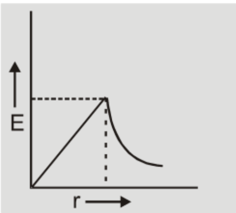
(3) C (4) A & C

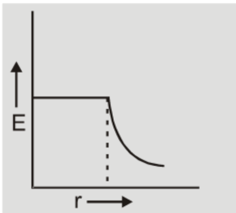
**J-9.** The electric charge in uniform motion produces -

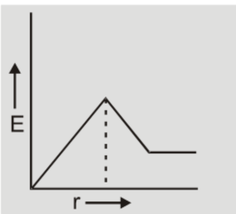
(1) an electric field only (2) a magnetic field only

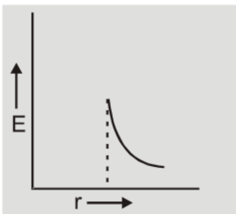
(3) both electric and magnetic fields (4) neither electric nor magnetic fields

**J-10.** Which of the following represents the correct graph for electric field intensity and the distance r from the centre of a hollow charged metal sphere or solid metallic conductor of radius R :

(1) 


(2) 


(3) 

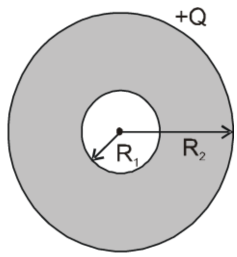

(4) 


**J-11.** A neutral metallic object is placed near a finite metal plate carrying a positive charge. The electric force on the object will be :

(1) towards the plate (2) away from the plate

(3) parallel to the plate (4) zero

**J-12.** Figure shows a thick metallic sphere. If it is given a charge +Q, then electric field will be present in the region



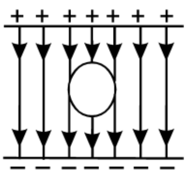

(1) $r < R_1$ only

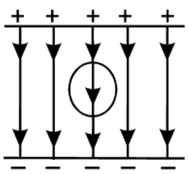
(2) $r > R_1$ and $R_1 < r < R_2$

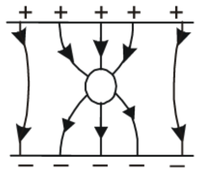
(3) $r$  $R_2$ only

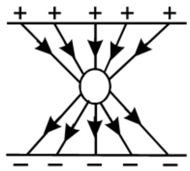
(4) $r$  $R_2$ only

**J-13.#** An uncharged sphere of metal is placed in a uniform electric field produced by two large conducting parallel plates having equal and opposite charges, then lines of force look like

(1) 

(2) 

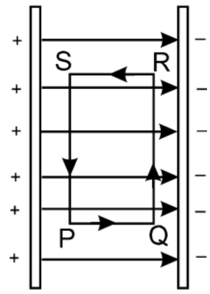
(3) 

(4) 

**J-14.** You are travelling in a car during a thunder storm, in order to protect yourself from lightening would you prefer to :

(1) Remain in the car
(2) Take shelter under a tree
(3) Get out and be flat on the ground
(4) Touch the nearest electrical pole

**J-15.#** The amount of work done in Joules in carrying a charge +q along the closed path PQRSP between the oppositely charged metal plates is (where E is electric field between the plates)



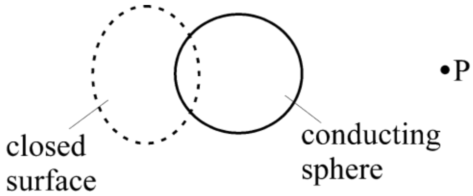

(1) zero

(2) q

(3) qE (PQ + QR + SR + SP)

(4) $q/\varepsilon_0$

**J-16.** Figure shows a closed surface which intersects a conducting sphere. If a positive charge is placed at the point P, the flux of the electric field through the closed surface




(1) will remain zero

(2) will become positive

(3) will become neagative

(4) will become undefined

**J-17.** Two similar very small conducting spheres having charges 40 μC and –20 μC are some distance apart. Now they are touched and kept at same distance. The ratio of magnitude the initial to the final force between them is :

(1) 8 : 1
(2) 4 : 1
(3) 1 : 8
(4) 1 : 1