INDUS RANGERS INSTITUTE PVT. LTD.

Electrostatic

1.At a large distance (r) , the electric field due to a diploe varies as

(a)1/r (b)$1/r^2$

(c)$1/r^3$ (d)$1/r^1$

2.AS the electric charge on the surface of a hollow metal sphere increase , the electric field intensity inside the sphere

(a)decrease (b)increase

(c)remains the same

(d)may increase or decrease depending on the radius of the sphere

3.The capacitance unit of convenient size is

(a)farad (b)microfarad

(c)kilofarad (d)megafarad

4.A and B are two spherical conductors of the same extent and size. A is solid and B is hollow. Both are charged to the same potential .If the charges on A and B are Q_A and Q_B respectively, then

(a)$Q_A\ is\ less\ than\ Q_B$

(b) $Q_A\ is\ greater\ than\ Q_B$ but not double

(c)$Q_A = Q_B$ (d) $Q_A = 2Q_B$

5.Two capacitor of capacitance C_1 and C_2 are connected in parallel. If a change Q is given to the assembly, it gets shared .The ratio of the charge on capacitor C_1 to the charge on capacitor C_2 is given by

(a)C_1/C_2 (b)C_2/C_1

(c)C_1^2/C_2^2 (d)C_2^2/C_2^2

6. Capacitor connected in series have

(a)the same difference of potential across each capacitor

(b)the effective capacitance equal to the sum of the individual capacitances

(c)numerically same charge on each plate of all the capacitors

(d)none of the above

7.A large isolated metal sphere of radius r carries a fixed charge. A small charge is placed at a distance s from its surface .It experiences a force which is

(a)proportional to r

(b)inversely proportional to s

(c)inversely proportional to s^2

(d)inversely proportional to $(r + s)^2$

8.Two point charges +2 coulomb and +6 coulomb repel each other with a force of 12 N. If a charge of -4 coulomb is given to each of these charges , the force will be

(a)4 N (repulsive) (b)4N(attractive)

(c)8 N(repulsive) (d)8 N(attractive)

9.A capacitor connected to a 10 V battery collects a charge of 40 micro coulomb with air as dielectric and 100 micro coulomb with oil as dielectric .The dielectric and 100 micro coulomb with oil as dielectric .The dielectric constant of the oil is

(a)4 (b)2.5 (c)0.4 (d)1.0

10. The ratio of the electric force between two electrons to the gravitational force between them is of the order of

(a)10^{42} (b)10^{40} (c)10^{36} (d)10^{34}

11.Three points charges , each +q, are placed at the corners of an equilateral triangle of side r .The electric field at the circumcentre will be (k=1/4$\pi\epsilon_0$)

(a)3Kq/r² (b)kq/r² (c)$\frac{3Kq}{2r^2}$ (d)zero

12.A given charge situated at a certain distance from a short electric dipole in the end –on position experiences a force F. If the distance of the charge is doubled, the force acting on the charge will be

(a)2F (b)F/2 (c)F/4 (d)F/8

13.Two pints charges $q_{1=}$ 4 μC and q_2=9 μC are placed 20 cm apart. The electric field due to them will be zero on the line joining them at a distance of

(a)8 cm from q_1 (b)8 cm from q_2

(c)$\frac{80}{13}$ cm from q_1 (d) $\frac{80}{13}$ cm from q_2

14. The magnitude of the electric field required to just balance in air a 2 x 10^{-4} Kg liquid drop carrying a charge of 9.8 x 10^{-2} μC is

(a)10^4 N/C (b)2 x 10^4 N/C

(c)4 x 10^4 N/C (d)5 x 10^4 N/C

15.Three charge q, Q and 4q are placed in a straight line of length l at points distant 0, l/2 and l respectively from one end .In order to make the net force q zero, the charge Q must be equal to

(a)-q (b)-2q (c)$\frac{-q}{2}$ (d)q

16.Two pint charges q_1=+2C and q_2=-1 C are separated by a distance d. The position on the line joining the two charges where a third charge q=+1 C will be in equilibrium is at a distance

(a)dI$\sqrt{2}$ from q_1 between q_1 and q_2.

(b) dI$\sqrt{2}$ from q_1 away from q_2.

(c) dI$\sqrt{2}-1$) from q_2 between q_1 and q_2.

(d) dI$\sqrt{2-1)}$ from q_2 away from q_1.

17.A charge Q is placed at each of the two opposite corners of a square. A charge q is placed at each of the other two corners. If the resultant force on Q is zero, then

(a)Q=$\sqrt{2q}$ (b)Q=-$\sqrt{2q}$

(c)Q=2$\sqrt{2q}$ (d)Q=-2$\sqrt{2q}$

18. The electric field in a region of space is given by $\vec{E} = 5\hat{\imath} + 2\hat{\jmath}$ N/C.The electric flux due to this field through an area 2m² lying in the YZ plane, in S.I units, is =

(a)10 (b)20 (c)10$\sqrt{2}$ (d)2$\sqrt{29}$

19.Two positive point charge are 3m apart and their combined charge is 20 μC.If the force between them is 0.075 N, the charges are

(a)10 μC, 10 μC (b)15μC, 5μC

(c)12 μC, 8 μC (d)14μC, 6μC

20.Three identical charges are placed at the corners of an equilateral triangle .If the force between any two charges is F, then the net force on each will be

(a)$\sqrt{2F}$ (b)2F (c)$\sqrt{3F}$ (d)3F

21.A charge Q is divided into two parts and the two parts are separated by a certain distance. The force between them will be maximum if one of the charges is

(a)Q/2 (b)Q/3 (c)Q/4 (d)None

22. An electric dipole placed a uniform electric field will have minimum potential energy when the dipole moment is inclined to the field at an angle

(a)π (b)$\pi/2$ (c)zero (d)3 $\pi/2$

23.Two charged conducting spheres of radii R_1 and R_2 separated by a large distance , are connected by a long wire. The ratio of the charges on them is

(a)$\frac{R_1}{R_2}$ (b)$\frac{R_2}{R_1}$ (c)$\frac{R_1^2}{R_2^2}$ (d)$\frac{R_2^2}{R_1^2}$

24.Two isolated ,charged conducting sphere of radii R_1 and R_2 produce the same electric field near their surface .The ratio of electric potentials on their surfaces is

(a)R_1/R_2 (b)R_2/R_1

(c)R_1^2/R_2^2 (d)R_2^2/R_1^2

25. Three point charges +q,+2q and -4 q ,where q =0.1 μC, are placed at the vertices of an equilateral triangle of side 10 cm as shown. The potential energy of the system is

(a)3 x 10^{-3} J (b)- 3 x 10^{-3} J

(c)9 x 10^{-3}J (d) -9 x 10^{-3}J

26.A 100 microfarad capacitor is to have an energy content of 50 J in order to operate a flash lamp. The voltage required to charge the capacitor is

(a)500 V (b)1000V

(c)1500 V (d)2000V

27.A capacitor having a capacity of 2.0 microfarad is charged upto to 200V and its plates are joined to a wire. The heat produced in joule will be

(a)4-10^4 (b)4 x 10^{10}

(c)4 x 10^2 (d)2 x 10^{-2}

28.The capacitance of a parallel plate condenser does not depend on

(a)area of the plates

(b)metal of the plates

(c)medium between the plates

(d)distance between the plates

29. Electric field intensity at a point inside a hollow charged spherical conductor

(a)is zero (b)is constant

(c)increase with the distance from the centre of the sphere

(d)none of the above

30. The space between the plates of a capacitor is filled by a liquid of dielectric

constant K. The capacitance of the capacitor

(a)increase by a factor

(b)increase by a factor k^2

(c)decrease by a factor k

(d)decrease by a factor k^2Its energy in joules is