Electrostatics

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1)Two charges 4q and –q are placed a distance ‘r’ apart. A charge Q is placed exactly mid-way between them. What will be the value of Q so that charge 4q experiences no net force?

- q/4
- -q/4
- 4q
- -4q

2)Two point charges of +4μC and +2μc repel each other with a force of 8N. If a charge of –4μ C is added to each of these charges, the force would be

- Zero
- 8N
- 4N
- 12N

3)Force between two charges separated by a certain distance in air is ‘F’. If each charge were doubled and distance between them also doubled, Force would be

- 2F
- F
- 4F
- F/4

4)Two point charges certain distance apart in air repel each other with a force F. A glass plate is introduced between the charges. The force becomes F^1 where

1) $F^1 < F$
2) $F^1 = F$
3) $F^1 > F$
4)Data is insufficient.

5)Two equally charged identical metal spheres A and B repel each other with a force $3X10^{-5}$ N. Another identical uncharged sphere c is touched with A and then placed at the mid point between A and B. Net force on 'c' is

1) $1x10^{-5}$ N

2) $2x10^{-5}$ N

3) $1.5x10^{-5}$ N

4) $3x10^{-5}$ N

6) If charge q is placed at the centre of the line joining two equal charges Q. The system of three charges will be in equilibrium if q is

- -Q/2
- -Q/4
- -4Q
- +Q/2

7) In one gram of a solid, there are 5×10^{21} atoms. If one electron is removed from every one of 0.01% of the solid, the change gained by the solid is

- +0.08c
- +0.8c
- -0.08c
- -0.8c

8) When air is replaced by dielectric medium of constant k the maximum force of attraction between two charges separated by a distance

- Increases k^{-1} times
- Increases k times
- Remains unchanged
- decreases k times

9) In paper and cotton industries, the atmosphere is kept moist. This is to

- Remove dust and dirt
- Conduct the charges produced due to friction as material is dried
- Reduce the temperature of surrounding
- Prolong process of drying

10) The statement which is incorrect is

- Gravitational force may be attractive while electrostatic force ma be attractive or repulsive
- Both gravitational and electrostatic forces very inversely as the square of the distance
- Gravitational force is a short range force while electrostatic force is a long range force
- Gravitational force is very weak compared to electrostatic force

11) There is an electric field E in X-direction. If work done in moving a charge 0.2c through a distance of 2m along a line making an angle of 60^0 with X-axis is 4J, what is the value of E?

1) $\sqrt{3}NC^{-1}$

2) $4Nc^{-1}$

3) $5NC^{-1}$

4) noneof these

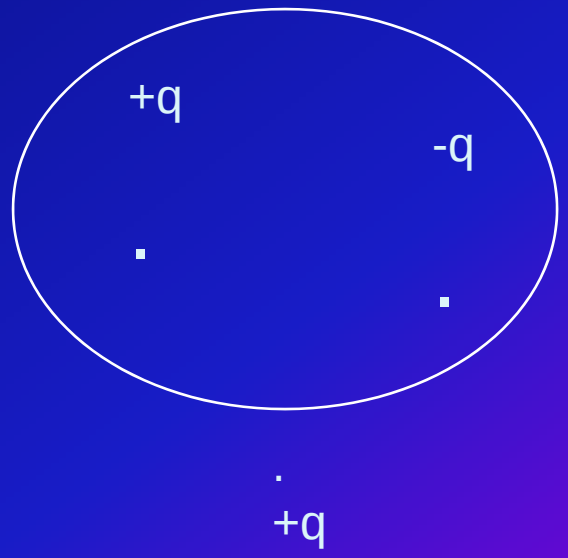
12) Shown below is a distribution of charges. The flux of electric field due to these charges through the surface is

1) $\frac{3q}{\varepsilon_0}$

2) zero

3) $\frac{2q}{\varepsilon_0}$

4) $\frac{q}{\varepsilon_0}$



13) If the electric flux entering and leaving an enclosed surface respectively is ø1 and ø2 the electric charge inside the surface will be

1) $\frac{\phi_2 - \phi_1}{\varepsilon_0}$

2) $\frac{\phi_1 + \phi_2}{\varepsilon_0}$

3) $\frac{\phi_1 - \phi_2}{\varepsilon_0}$

14) Two metal pieces having a potential difference of 800v are 0.02m apart horizontally. A particle of mass 1.96×10^{-15} Kg is suspended in equilibrium between
the plates. If 'e' is the elementary charge, then charge on particle is

- 8e
- 6e
- 3e
- e

15) An electron is projected into a region of uniform electric field with a velocity v such that it moves in the direction of the field. As the electron moves , its velocity

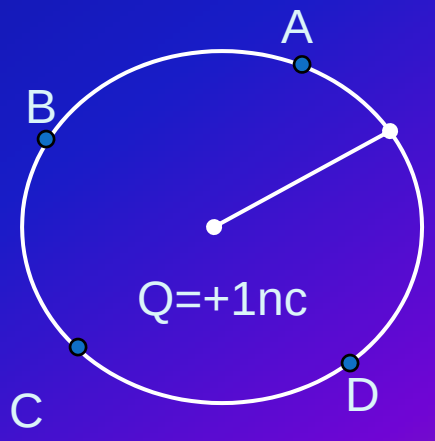
- Remains the same
- Increases
- Decreases
- Continuously charges in direction

16) If a particle of mass ‘m’ and charge +q moves from rest in an electric field from a point at a higher potential to a point at a lower potential and V be the potential difference between the two points, then the velocity acquired by the particle is

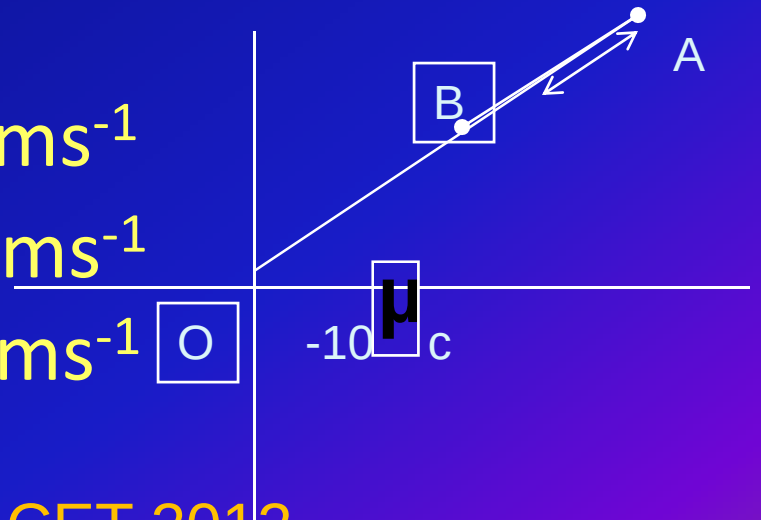
1) $\sqrt{\frac{2qv}{m}}$ 2) $\sqrt{\frac{2m}{qv}}$ 3) $\sqrt{2mc}$ 4) $\sqrt{\frac{m}{2qv}}$

17) A point charge of +1nc is at centre of circle of radius 5cm as shown in the diagram. A, B, C and D are points on the circumference of the circle. The amount of work done in taking +1c of charge is

- Greatest for the path AD
- Greatest for the path AB
- Same for the paths AC & BD
- Zero for all the paths



18) A particle of mass 6mg carrying a charge of -1μc is projected with a velocity v towards a charge of -10μc from a point A as shown in the diagram. It comes to rest at a point B distant 1m from 'O' and then turns back. Then v is nearly



1) $100ms^{-1}$

2) $173ms^{-1}$

3) $500ms^{-1}$

4) $325ms^{-1}$

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19) The number of electron to be removed from a neutral copper sphere of radius 1m in order that there exists an electric intensity of $9vm^{-1}$ on the surface of the sphere is

1) $625x10^{7}$

2) $6.25x10^{7}$

3) $625x10^{8}$

4) $6.25x10^{8}$

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20) Can a sphere of radius 1m hold a charge of 1c?

- Yes
- No
- Depends upon the metal of the sphere
- Depends upon whether the charge is +ve or-ve

21) The energy stored in a capacitor is actually stored

- Between the plates
- On the positive plate
- On the negative plate
- On the outer surface of the plates

22) If an uncharged capacitor is charged by connecting it to a battery, then the amount of energy lost as heat is

1) $\frac{1}{2}QV$

2) QV

3) $\frac{1}{2}QV^2$

4) QV^2

23) A variable capacitor is permanently connected to a 100volt battery. If the capacity is changed from 2μF to 10μF, then the change in energy is equal to

- $2x10^{-1}J$
- $2.2x10^{-2}J$
- $3.5x10^{-2}J$
- $4x10^{-2}J$

24) The capacity of a parallel plate capacitor depends on

- The type of metal used
- The thickness of plates
- The potential applied across the plates
- The separation between the plates

25) A capacitor of capacitance 6μF was originally charged to 10volt. Now the potential difference is made 20volt. What is the increase in its potential energy?

- $3x10^{-4}J$
- $6x10^{-4}J$
- $9x10^{-4}J$
- $12x10^{-4}J$

26) Two copper spheres of same radius, one hollow and the other solid are charged to the same potential, then

- The hollow sphere will hold more charge
- The solid sphere will hold more charge
- Both of them will hold same charge
- Hollow sphere cannot hold any charge

27) The capacitance of a capacitor does not depend upon

- Distance between the plates
- Area of the plates
- Curvature of the plates
- Material of the plates

28) Two capacitors with capacitances c_1 and c_2 are charged to potentials v_1 and v_2 respectively. When they are connected in parallel, the ratio of their respective charges is

1) $\frac{c_1^2}{c_2^2}$ 2) $\frac{v_1^2}{v_2^2}$ 3) $\frac{v_1}{v_2}$ 4) $\frac{c_1}{c_2}$

29) Three capacitors each of capacity 4μF are to be connected in such a way that the effective capacitance is 6μF, this can be done by

- Connecting all of them in series
- Connecting all of them in parallel
- Connecting two in series and one in parallel
- Connecting two in parallel and one in series

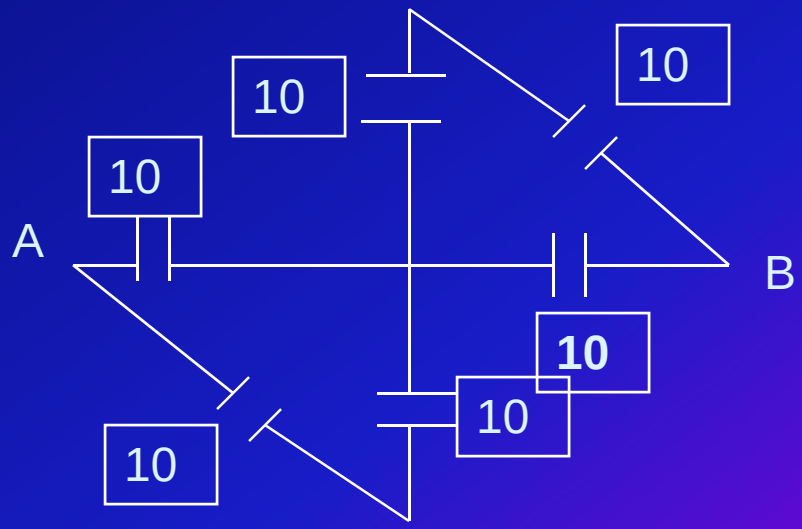
30) Three capacitors of capacity C each are joined first in series and then in parallel. The capacity becomes n

times, where n is

- 3
- 6
- 9
- 12

31) The effective capacitance between A and B is

1) 1 μF
2) $2\frac{2}{3}$ μF
3) $3\frac{1}{2}$ μF
4) 4 μF



32) In a parallel plate capacitor of capacitance c, a sheet of copper is inserted between the plates, parallel to them. The thickness of the sheet is half the separation between the plates. The capacitance now becomes

- 2c
- 4c
- c/4
- c/2

33) Two conducting spheres of radii R_1 and R_2 are given the same charge. The ratio of their potentials will be

1) $\sqrt{\frac{R_2}{R_1}}$

2) $\frac{R_2}{R_1}$

3) $\frac{R_2^2}{R_1^2}$

4) $\frac{R_2^3}{R_1^3}$

34) Two conducting spheres of radii r_1 and r_2 are charged such that they have the same electric field on their surfaces. The ratio of the charge on them is

1) $\sqrt{\frac{r_1}{r_2}}$

2) $\frac{r_1}{r_2}$

3) $\frac{r_1^2}{r_2^2}$

4) $\sqrt{\frac{r_2}{r_1}}$

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35) A parallel plate capacitor is charged and is disconnected from the battery. If the plates of the capacitor are moved apart by means of insulating handles,

- The charge on the capacitor becomes zero
- The capacitance becomes infinity
- The charge on capacitor increases
- Voltage across the plates increases

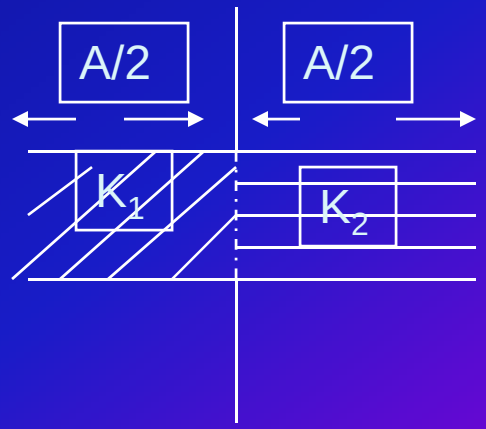
36) A parallel plate capacitor with oil between the plates (dielectric constant of oil K=5) has capacitance c. If the oil is removed, then capacitance of the capacitor becomes

1) $\frac{c}{5}$ 2) $\frac{c}{\sqrt{5}}$ 3) $5c$ 4) $\sqrt{5}c$

37) A parallel plate air capacitor has a capacitance of 1μF. The space between its plates is then filled with two slabs of dielectric constants K_1=2 and K_2=4 as shown. The new capacitance is

1.5μF 2.1μF

3μF 4μF



38) A particle of mass m and charge q is placed at rest in a uniform electric field E and then released. The kinetic energy attained by the particle after moving a distance y is

- qEy^2
- qE^2y
- qEy
- q^2Ey

39) An alpha particle is accelerated through a potential difference of 10^6volt. Its kinetic energy will be

- 1Mev
- 2Mev
- 4Mev
- 8Mev

40) In bringing an electron towards another electron, the electrostatic potential energy of the system

- remains same
- becomes zero
- increases
- decreases

41) Two spheres of radii R_1 and R_2 respectively are charged and joined by a wire. The ratio of electric field of sphere is

1) $\frac{R_2^2}{R_1^2}$ 2) $\frac{R_1^2}{R_2^2}$ 3) $\frac{R_2}{R_1}$ 4) $\frac{R_1}{R_2}$

42) The electric potential v is given as a function of distance x (metre) by $v=5x^2+10x-4$. Value of electric field at x=1metre is

- -23v/m
- 11v/m
- 6v/m
- -20v/m

43) An alpha particle and a proton are accelerated through same potential difference from rest. Find the ratio of their final velocity.

1) $\sqrt{2}:1$ 2) $1:1$ 3) $1:\sqrt{2}$ 4) $1:2$

44) The potential difference applied to a x-ray tube is 5kv and current through it is 3.2mA. Then the number of electrons striking the target per second is

- $2x10^{16}$
- $5x10^{6}$
- $1x10^{7}$
- $4x10^{15}$

45) Equal charges q each are placed at the vertices A and B of an equilateral triangle of side a. the magnitude of electric intensity at the point c is

1) $\frac{1}{4\pi\varepsilon_0}\frac{q}{a^2}$

2) $\frac{\sqrt{2}}{4\pi\varepsilon_0}\frac{q}{a^2}$

3) $\frac{\sqrt{3}}{4\pi\varepsilon_0}\frac{q}{a^2}$

3) $\frac{2}{4\pi\varepsilon_0}\frac{q}{a^2}$

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46) 27 identical drops of mercury are charged simultaneously to the same potential of 10volt each. Assuming drops to be spherical, if all the charged drops, are combined to form a single large drop, then potential, of larger drop would be

- 45v
- 135v
- 270v
- 90v

47) The capacitance of arrangement of 4 plates of area A at a distance d as shown in figure is

1) $\frac{\varepsilon_0 A}{d}$ 2) $\frac{2\varepsilon_0 A}{d}$

3) $\frac{3\varepsilon_0 A}{d}$ 4) $\frac{4\varepsilon_0 A}{d}$

48) A parallel plate capacitor is first charged and then a dielectric slab is introduced between the plates. The quantity that remains unchanged is

- Charge
- Potential
- Capacity
- energy

49) Two capacitors of capacitances c_1 and c_2 are connected in parallel across a battery. If Q_1 and Q_2 respectively be the charges on the capacitors, then Q_1/Q_2 will be equal to

1) $\frac{c_2}{c_1}$ 2) $\frac{c_1}{c_2}$ 3) $\frac{c_1^2}{c_2^2}$ 4) $\frac{c_2^2}{c_1^2}$

50) The surface encloses an electric dipole. The electric flux through the surface is

- Zero
- Positive
- Negative
- infinity

Thank you

Wish you all the best