# UNIT-3 <br> ELECTROSTATICS <br> CET QUESTIONS 

1) When a glass rod rubbed with silk, a glass rod is said to be charged
a) positively
b) negatively
c) either positively or negatively
d) none
2) When the ebonite rubbed with flannel, the rod is said to be charged
a) negatively
b) positively
c) electrically neutral
d) none
3) The concept of positive and negative charges was introduced by
a) Max Planck
b) Benjamin Franklin
c) Newton
d) none
4) When a glass rod rubbed with silk, the silk is said to be charged negatively and rod is said to be charged positively then,
a) number of negative charges on silk is less than number of positive charge on glass rod
b) number of negative charges on silk is equal to positive charge on glass rod
c) number of negative charge on silk is greater than the positive charge on glass rod
d) none
5) The fundamental methods of charging are
a) charging by friction
b) charging by conduction
c) charging by induction
d) all the above
6) In charging by friction,
a) law of conservation of charge holds good
b) law of conservation of charge fails
c) law of conservation of energy holds good
d) none
7) In charging by conduction, nature of charge acquired by the conductor by the conductor,
a) is opposite as that of charging body
b) is same as that of charging body
c) may be either (a) or (b)
d) none
8) In charging by induction, nature of charge acquired by the conductor,
a) is opposite as that of charging body
b) is same as that of charging body
c) either (a) or (b)
d) none
9) When charge is given to the insulator,
a) charges flows on its surface
b) charges remains localized
c) it get charged
d) none
10) When a charge is given to a conductor the distribution of charge over its surface depends, on
a) shape of the conductor
b) size of the conductor
c) mass of the conductor
d) none
11) If a cube of side 5 cm has a charge of 6 microcoulombs, then the surface charge density is
a) $4 \times 10^{2} \mu \mathrm{C} / \mathrm{m}^{2}$
b) $4 \times 10^{2} \mathrm{C} / \mathrm{m}^{2}$
c) $4 \times 10^{3} \mu \mathrm{C} / \mathrm{m}^{2}$
d) $4 \times 10^{3} \mathrm{C} / \mathrm{m}^{2}$
12) If the force between the electron in the first Bohr orbit and the nucleus (proton) in hydrogen atom is F , then the force between them when the electron is in the second orbit is
a) $4 F$
b) $\mathrm{F} / 4$
c) $F / 9$
d) $F / 16$
13) A charge $Q$ is divided into two parts $q$ and $Q-q$ and separated by a distance $R$. The force of repulsion between them will be maximum when
a) $q=Q / 4$
b) $q=Q / 2$
c) $q=Q$
d) none of these
14) The dielectric constant $K$ of an insulator can be:
a) -1
b) zero
c) 0.5
d) 5
15) The dielectric constant $K$ of an insulator can not be:
a) 3
b) 6
c) 8
d) $\alpha$
16) The total electric flux leaving spherical surface of radius 1 cm and surrounding an electric dipole is:
a) $q / \varepsilon_{0}$
b) zero
c) $2 q / \varepsilon_{0}$
d) $8 \prod \mathrm{r}^{2}$
17) Two particles of masses $m$ and $2 m$ with charges $2 q$ and $2 q$ are placed in a uniform electric field E and allowed to move foe the same time .The ratio of their kinetic energies will be:
a) $2: 1$
b) $8: 1$
c) $4: 1$
d) $1: 4$
18) A particle of mass $m$ and charges $q$ is placed at rest in a uniform electric field $E$ and then released. The KE attained by the particle after moving a distance y is :
a) $q E y^{2}$
b) $q E^{2} y$
c) $q E y$
d) $q^{2} E y$
19) A particles a has a charge $+q$ and particle $B$ has charge $+4 q$ with each of them having the same mass m . When allowed to fall from rest through the same electrical potential difference ,the ratio of their speeds $\mathrm{v}_{\mathrm{A}} / \mathrm{v}_{\mathrm{B}}$ will become:
a) $2: 1$
b) $1: 2$
c) $1: 4$
d) $4: 1$
20) Two point charges exert on each other a force $F$ when they are placed ' $r$ ' distance apart in air . When they are placed $R$ distance apart in a medium of dielectric constant $K$, they exert the same force. The distance R equals:
a) $r / \sqrt{K}$
b) $r / K$
c) rK
d) $r \sqrt{K}$
21) The electric potential at appoint ( $x, y$ ) in the $x y$ - plane is given by: $V=-K x y$ The electric field intensity at a distance $r$ from the varies as :
a) $r^{2}$
b) r
c) 2 r
d) $2 r^{2}$
22) Two copper spheres of of same radii, one hollow and the other solid , are charged to the same potential. Which will hold more charge ?
a) Solid sphere
b) Hollow sphere
c) Both will hold more charge
d) Nothing can be predicated
23) When a charge of 20 coulomb is taken from one point to another separated by a distance of 0.2 m , work 2 joule is required to be done. What is the potential difference between the two points ?
a) $2 \mathrm{X} 10^{-2}$ volt
b) $4 \times 10^{-4}$ volt
c) 8 volt
d) $1 \times 10^{-1}$
24) The electric field due to a uniformly charged sphere of radius $R$ as a function of the distance from its center is represented graphically by:
a)




25) When $10^{19}$ electrons are removed from a neutral metal plate, the electric charge on it is (in coloumb)
a) +1.6
b) -1.6
c) $10^{-19}$
d) $10^{+19}$
26) Electric charges +10 microC, +5 microC, -3 microC and +8 microC are placed at the corners of a square of side $\sqrt{2} \mathrm{~m}$. The potential at the centre of the square.
a) $1.8 \times 10^{6}$
b) 1.8
c) $1.8 \times 10^{5}$
d) $18 \times 10^{5}$
27) n identical mercury droplets charged to the same potential V coalesce to form a single bigger drop. The potential of the new drop will be
a) $n^{2 / 3} V$
b) $n V^{2}$
c) nV
d) $V / n$
28) A charged particle of mass $m$ and charge $q$ is released from rest in a uniform electric field $E$. Neglecting the effect of gravity, the kinetic energy of the charged particle after $t$ second is
a) $\frac{2 \mathrm{Et}^{2}{ }^{2}}{\mathrm{mq}}$
b) $\frac{\mathrm{Eq}^{2} \mathrm{~m}}{2 \mathrm{t}^{2}}$
c) $\frac{\mathrm{Eqm}}{\mathrm{t}}$
d) $\frac{E^{2} q^{2} t^{2}}{2 m}$
29) When a body is earth connected, electrons from the earth flow into the body. This means the body is
a) charged negatively
b) an insulator
c) uncharged
d) charged positively
30) An electron is accelerated through a potential difference of 45.5 volt. The velocity acquired by it is (in $\mathrm{m} \mathrm{s}^{-1}$ )
a) $10^{6}$
b) zero
c) $4 \times 10^{6}$
d) $4 \times 10^{4}$
31) The potential to which a conductor is raised depends on
a) the amount of charge
b) geometry and size of the conductor
c) both
(a) \& (b) d) only on (a)
32) The work done in carrying a charge $q$ once round a circle of radius $r$ with a charge $Q$ at the centre is
a) $\frac{q Q}{4 \pi \varepsilon_{0} r}$
b) $\frac{\mathrm{qQ}}{4 \pi \varepsilon^{2}{ }_{0} \mathrm{r}^{2}}$
c) $\frac{\mathrm{qQ}}{4 \pi \varepsilon_{0} \mathrm{r}^{2}}$
d) none of these
33) Identity the wrong statement in the following : Coulomb's law correctly describes the electric force that
a) binds the electrons of an atom to its nucleus
b) binds the protons and neutrons in the nucleus of an atom
c) binds atom together to form nucleus
d) binds atoms and molecules to form solids
34) In order to increase the capacity of a parallel plate condenser one should introduce between the plates a sheet of
a) mica
b) tin
c) copper
d) stainless steel
35) A capacitor is charged by using a battery which is then disconnected. A dielectric slab is then slipped between the plates, which results in
a) reduction of charge on the plates and increase of potential across the plates
b) increase in the potential difference across the plates, reduction in stored energy, but no change in the charge on the plates
c) decrease in the potential in stored energy, but no change in the charge on the plates
d) none of the above
36) A parallel plate capacitor has plates with area A and separation d. A battery charges the plates to a potential difference $V_{0}$. The battery is then disconnected and a dielectric slab of thickness $d$ is introduced. The ratio of energy stored in the capacitor before and after the slab is introduced, is
a) K
b) $1 / \mathrm{K}$
c) $A / d^{2} K$
d) $d^{2} K / A$
37) Five identical capacitors, each with capacitance C are connected as shown in the figure. Then the equivalent capacitance between $A$ and $B$ is
a) C
b) 5 C
c) $\mathrm{C} / 5$

38) A parallel plate condenser with plate area A and separation d is filled with two dielectric materials as shown in the adjoining figure. The dielectric constants are $\mathrm{K}_{1}$ and $\mathrm{K}_{2}$ respectively. The capacitance will be
a) $\frac{\varepsilon_{0} \mathrm{~A}}{\mathrm{~d}}\left(\mathrm{~K}_{1}+\mathrm{K}_{2}\right)$
b) $\frac{\varepsilon_{0} \mathrm{~A}}{\mathrm{~d}}\left(\frac{\mathrm{~K}_{1}+\mathrm{K}_{2}}{\mathrm{~K}_{1} \mathrm{~K}_{2}}\right)$
c) $\frac{2 \varepsilon_{0} \mathrm{~A}}{\mathrm{~d}}\left(\frac{\mathrm{~K}_{1} \mathrm{~K}_{2}}{\mathrm{~K}_{1}+\mathrm{K}_{2}}\right)$
d) $\frac{2 \varepsilon_{0} \mathrm{~A}}{\mathrm{~d}}\left(\frac{\mathrm{~K}_{1}+\mathrm{K}_{2}}{\mathrm{~K}_{1} \mathrm{~K}_{2}}\right)$

39) Two capacitors 2 micro F and 4 micro F are connected in parallel. A third capacitor of 6 micro F capacity is connected in series. The combination is then connected across a 12 V battery. The voltage across 2 micro F capacity is
a) 2 volt
b) 6 volt
c) 8 volt
d) 1 volt
40) A parallel plate condenser is filled with two dielectrics as shown in figure. Area of each plate is $A$ meter ${ }^{2}$ and the separation is $d$ metre. The dielectric constants are $K_{1}$ and $K_{2}$ respectively. Its capacitance in farad will be
a) $\frac{\varepsilon_{0} A}{d}\left(K_{1}+K_{2}\right)$
b) $\frac{\varepsilon_{0} \mathrm{~A}}{\mathrm{~d}}\left(\frac{\mathrm{~K}_{1}+\mathrm{K}_{2}}{2}\right)$

c) $\frac{\varepsilon_{0} \mathrm{~A}}{\mathrm{~d}} 2\left(\mathrm{~K}_{1}+\mathrm{K}_{2}\right)$
d) $\frac{\varepsilon_{0} A}{d}\left(\frac{K_{1}-K_{2}}{2}\right)$
41) What is the area of the plate of a 3 micro $F$ parallel plate capacitor, if the separation between the plates is 5 mm ?
a) $1.694 \times 10^{9} \mathrm{~m}^{2}$
b) $4.529 \times 10^{9} \mathrm{~m}^{2}$
c) $9.281 \times 10^{9} \mathrm{~m}^{2}$
d) $12.981 \times 10^{9} \mathrm{~m}^{2}$
42) A capacitor of 10 micro F charged up to 250 volts is connected in parallel with another capacitor of 5 micro F charged up to 100 volts. The common potential is
a) 500 V
b) 400 V
c) 300 V
d) 200 V
43) A spherical drop of capacitance $1 \mu \mathrm{~F}$ is broken into eight drops of equal radius .The capacitance of each small drop is :
a) $\frac{1}{2} \mu \mathrm{~F}$
b) $\frac{1}{4} \mu \mathrm{~F}$
c) $\frac{1}{8} \mu \mathrm{~F}$
d) $\frac{1}{16} \mu \mathrm{~F}$
44) The effective capacitance between $A$ and $B$ in the figure shown is (all capacitance are in $\mu \mathrm{F}$ ):
a) $21 \mu \mathrm{~F}$
b) $23 \mu \mathrm{~F}$
c) $\frac{3}{14} \mu \mathrm{~F}$
d) $\frac{14}{3} \mu \mathrm{~F}$

45) 1000 drops of water of radius 1 cm each carrying a charge of 10 esu combine to form a single drop. The capacitance of the combined drop increases.
a) 1000 times
b) 100 times
c) 10 times
d) 1 time
46) 125 water drops of equal radius and equal capacitance $C$,coalesce to from a single drop capacitance $\mathrm{C}^{\dagger}$. The relation between C and $\mathrm{C}^{\dagger}$ is.
a) $\mathrm{C}^{\mathrm{L}}=5 \mathrm{C}$
b) $\mathrm{C}^{\mathrm{l}}=\mathrm{C} / 125$
c) $\mathrm{C}^{\mathrm{l}}=\mathrm{C} / 125$
d) $\mathrm{C}^{\mathrm{d}}=125 \mathrm{C}$
47) 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 :
a) $\frac{\mathrm{C}_{1}{ }^{2}}{\mathrm{C}_{2}{ }^{2}}$
b) $\frac{V_{1}{ }^{2}}{V_{2}{ }^{2}}$
c) $\frac{V_{1}}{V_{2}}$
d) $\frac{\mathrm{C}_{1}}{\mathrm{C}_{2}}$
48) In a charged capacitor the energy is stored in:
a) the electric field between the plates
b) the edge of the capacitor plates
c) positive charges
d) both in positive and negative charges.
49) What fraction of the energy drawn from the charging battery is stored in the capacitor?
a) $75 \%$
b) $100 \%$
c) $25 \%$
d) $50 \%$
50) Capacitance of a parallel plate capacitor becomes $4 / 3$ times its original value if a dielectric slab of thickness $t=d / 2$ is inserted between the plates ( d is the separation between the plates). The dielectric constant of the slab is
a) 4
b) 8
c) 2
d) 6
51) An air field parallel plate condenser has a capacity of 2 pF . The separation of the plates is doubled and the interspaces between the plates is filled with wax. If the capacity is increased to 6 pF ,the dielectric constant of the wax is :
a) 2
b) 3
c) 4
d) 6
52) A Glass slab is put within the plates of a charged parallel plate which of the following quantities does not change?
53) Energy of the capacitor
54) Capacity
55) Intensity of capacitor
56) Charge
57) Keeping the charge on a capacitor unchanged we, can decrease the energy of the capacitor by
58) Increasing the dielectric constant of the medium between the plates
59) Decreasing the dielectric constant of the medium between the plates
60) Making the dielectric constant zero
61) None of the these
62) While a capacitor remains connected to a battery a dielectric slab is slipped between the plates.
63) The p.d between the plates is changed
64) Charges flow from battery to capacitor
65) The electric field between the plates increases.
66) The energy stored in the capacitor decreases
67) In a charged capacitor, the energy is stored in
68) The electric field between the plates
69) The edges of the capacitor plates
70) Positive changes
71) Negative changes.
72) If $n$ capacitors each of capacitance $c$ are connected in series with a battery of $V$ volt then energy stored in the combination will be
73) $n c v^{2}$
74) $1 / 4 \mathrm{ncv}^{2}$
75) $1 / 2 n c v^{2}$
76) $\frac{1}{2 n} \mathrm{cv}^{2}$
77) A capacitor of $10 \mu \mathrm{~F}$ charged up to 250 volt is connected in parallel with another capacitor of $5 \mu \mathrm{~F}$ changed up to 100 volt the common potential is
78) 500 v
79) 400 v
80) 300 v
81) 200 v
82) The capacity of a parallel plate capacitor is $10 \mu \mathrm{~F}$ when the distance is plated is 80 cm . If the distance between the plate is reduced to 40 cm , then the capacity of this parallel plate capacitor will be
83) $5 \mu \mathrm{~F}$
84) $10 \mu \mathrm{~F}$
85) $20 \mu \mathrm{~F}$
86) $40 \mu \mathrm{~F}$
87) Two capacitors of capacity $\mathrm{C}_{1}=4 \mu \mathrm{~F} \& \mathrm{C}_{2}=1 \mu \mathrm{~F}$ are connected is series. The combination is connected across a source o voltage 200v the ratio of potential across $\mathrm{C}_{2}$ and $\mathrm{C}_{1}$ is :
88) $1: 4$
89) $4: 1$
90) $1: 2$
91) $2: 1$
92) In the diagram given below, the correct conditions will be

93) $Q_{1}=Q_{2}=Q_{3} \& V_{1}=V_{2}=V_{3}=V$
94) $\mathrm{Q}_{1}=\mathrm{Q}_{2}+\mathrm{Q}_{3} \& V=V_{1}+V_{2}+V_{3}$
95) $Q_{1}=Q_{2}+Q_{3} \& V=V_{1}+V_{2}$
96) $Q_{3}=Q_{2} \& V_{2}=V_{3}$
