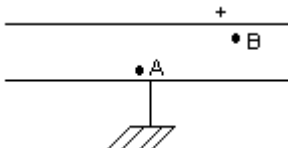


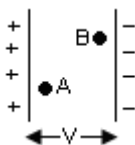
ELECTROSTATIC

CBSE BOARD'S IMPORTANT QUESTIONS OF 1 MARKS

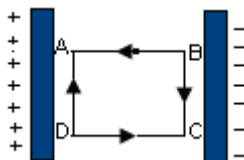
1. Name any two basic properties of electric charge. [1]
2. Define the term electric dipole-moment. [1]
3. Write the physical quantity, which has its unit coulomb/volt. Is it a vector or a scalar quantity ? [1]
4. Is electrostatic potential necessarily zero at point where electric field strength is zero. Illustrate your answer. [1]
5. In a parallel plate capacitor the potential difference of 102 V is maintained between the plates. What will be the electric field at points A and B? [1]



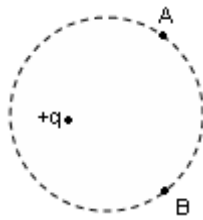
6. Define electric potential. Is it a vector or a scalar quantity? [1]
7. Force between two point electric charges kept at a distance d apart in air is F . If these charges are kept at the same distance in water, how does the force between them changes? [1]
8. Sketch the electric lines of force for two positive Q_1 and Q_2 ($Q_1 > Q_2$) separated by a distance d . [1]
9. Name the physical quantity whose SI unit is (i) coulomb/ volt (ii) newton/coulomb (iii) joule/coulomb. [1]
10. Two protons A and B are placed between two parallel plates having a potential difference V as shown in the figure. [1]
will these protons experience equal or unequal force?



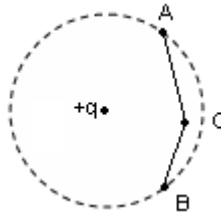
11. What is the amount of work done in moving a 100 nC charge between two points 5 cm apart on an equipotential surface ? [1]
12. In a medium the force of attraction between two point electric charges, distance d apart is F . What distance apart should these be kept in the same medium so that the force between them becomes (i) $3F$ (ii) $F/3$? [1]
13. A uniform electric field E exists between two charged plates as shown in the figure. What would be the work done in moving a charge ' q ' along the closed rectangular path ABCDA? [1]



14. What would be the work done if a point charge $+q$, is taken from a point A to the point B on the circumference of a circle drawn with another point charge $+q$ at the centre ? [1]



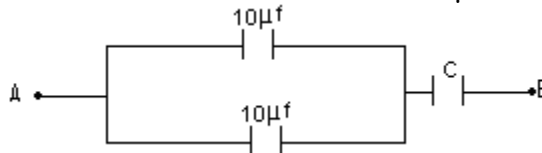
15. If a point charge $+q$, is taken first from A to C and then from C to B of a circle drawn with another point-charge $+q$ as centre, then along which path more work will be done? [1]



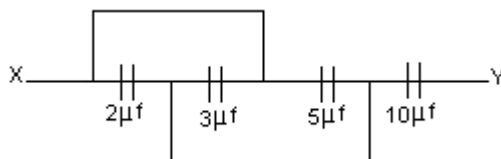
16. Why does the electric field inside a dielectric decrease when it is placed in an external field? [1]
17. In parallel plate capacitor, the capacitance increases from $4\mu\text{F}$ to $80\mu\text{F}$, on introducing dielectric medium between the plates. What is the dielectric constant of the medium? [1]
18. Find the electric field between two metal plates 3 mm apart, connected to a 12 V battery? [1]
19. The work done in moving a charge of 3 mm apart, connected to a 12 V battery. [1]
20. Two charges, $+5\mu\text{C}$ & $80\mu\text{C}$ are placed 1 mm apart. Calculate the dipole moment. [1]
21. Consider three charged bodies A, B and C. If A and B repel each and A attracts C. What is the nature of the force between B and C? [1]
22. What is the important of Coulomb's Law of electric force? [1]
23. Define one coulomb? [1]
24. Two point charges q_1 and q_2 are such that $q_1q_2 < 0$ what is the nature of force between charges? [1]
25. Vehicles carrying inflammable material usually have metallic ropes touching the ground during motion, Why ? [1]
26. A coulomb run through one's dry hair attracts small bits of paper. Why? What happens, if the hair is wet? [1]

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27. Calculate the capacitance of the capacitor C in the figure; if the equivalent capacitance of the combination between A and B is $15\mu\text{F}$. [2]

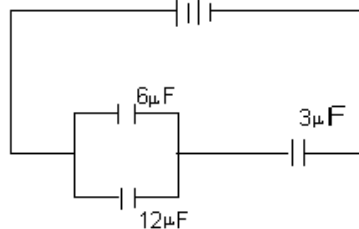


28. How much energy will be stored in a capacitor of $470\mu\text{F}$ capacity, when charged by a battery 20V ? [2]
29. Three capacitors of equal capacitance, when connected in series, have a net capacitance of C_1 and when connected in parallel have a capacitance of C_2 . What will be the value of C_1/C_2 ? [2]
30. An electric dipole, when held at 30° with respect to a uniform electric field of 10^4N/C , experiences a torque of $9 \times 10^{-26}\text{Nm}$. Calculate the dipole moment of the dipole. [2]
31. The electric field at a point due to a point charge is 20N/C and electric potential at that point is 10J/C . Calculate the distance of the point from the charge and the magnitude of the charge. [2]
32. Two point charges $+4\mu\text{F}$ and $-6\mu\text{F}$ are separated by a distance of 20cm in air. At what point on the line joining the two charge is the electric potential zero? [2]
33. Two point electric charges of values q and $2q$ are kept at a distance d apart from each other in air. A third charge Q is to be kept along the same line in such a way that the net force acting on q and $2q$ is zero. Calculate the position of charge Q in terms of q and d . [2]
34. A proton placed in a uniform electric field of magnitude 2000N/C moves between two points in the direction of electric field. If the distance between the points is 0.2m , find the value of (i) p.d. between the points, (ii) work done. [2]
35. Four capacitors are connected as shown in the figure given below: Calculate the equivalent capacitance between the points X and Y. [2]

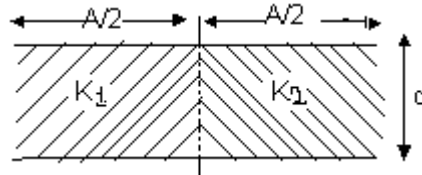


36. An electric dipole of length 2cm is placed with its axis making an angle of 60° to a uniform electric field of 10^5N/C . If it experiences a torque of $8\sqrt{3}\text{Nm}$, calculate the: (i) magnitude of the charge on the dipole, and (ii) Potential energy of the dipole. [2]
37. When two capacitors of capacitance C_1 and C_2 are connected in series the net capacitance is $3\mu\text{F}$; when connected in parallel its value is $16\mu\text{F}$. Calculate value of C_1 and C_2 . [2]
38. Two point charges A and B of value $+5\mu\text{F}$ and $+6\mu\text{F}$ are kept 12cm apart in air. Calculate the work done when charge B is moved by 2cm towards charge A. [2]

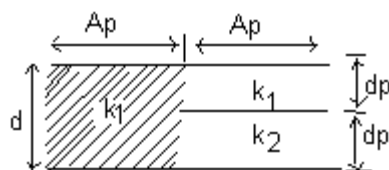
39. A hollow charges $4 \mu\text{C}$, $-2 \mu\text{C}$ are separated by a distance of 1 m in air. At what point on the line joining the charges is the electric potential zero? [2]
40. Two point charges of $+3 \times 10^{-19}\text{C}$ and $+12 \times 10^{-19}\text{C}$ are separated by a distance of 2.5 m. Find the point on the line joining them at which the electric field intensity is zero. [2]
41. Two point charges of $+3 \times 10^{-8}\text{C}$ and $-2 \times 10^{-8}\text{C}$ are located 15cm apart in air. Find at what point on the line joining these electric potential is zero. Take potential at infinity to be zero. [2]
42. S_1 and S_2 are two hollow concentric spheres enclosing charges Q and $2Q$ respectively as shown in the figure
- What is the ratio of the electric flux through S_1 and S_2 ?
 - How will the electric flux through the sphere S_1 change, if a medium of dielectric constant 5 is introduced in the space inside S_1 in place of air? [2]
43. Fore electric field intensity and potential at a point due to a point charge are 36 N/C and 18 J/C square of side $2\sqrt{2}$. Calculate the electric potential at the centre of the square. [2]
44. A portion is moved in a uniform electric field of $1.7 \times 10^{-4} \text{ N/C}$ between two points A and B separated by a distance of 0.1m.
- What is the potential difference between the points?
 - How much work is done in the above process? [2]
45. Two identical metallic spheres, having unequal, opposite charges are placed at a distance 0.90 m apart in air. After bringing them in contact with each other, they are again placed at the same distance apart Now the force of repulsion between them is 0.025N. Calculate the final charge on each of them. [2]
46. In the arrangement of capacitors shown here, the energy stored in the $6\mu\text{F}$ Capacitor is E . Find the following:
- Energy stored in the $12\mu\text{F}$ capacitor
 - Energy stored in the $3\mu\text{F}$ capacitor
 - Total energy drawn from the battery.



47. Calculate capacitance of capacitor as shown. [3]

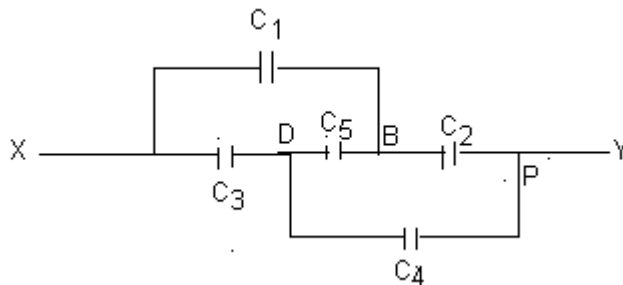


48. Calculate the capacitance of the capacitor shown in the figure: where k_1, k_2 and k_3 are the values of dielectric constants. [3]



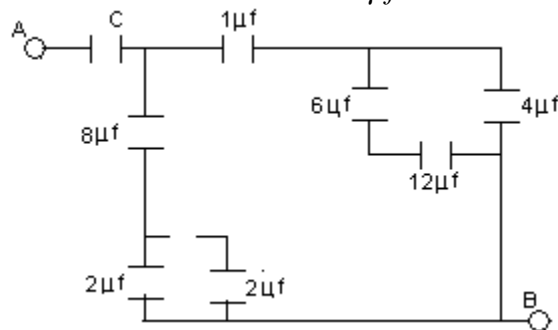
49. Calculate effective capacitance between the terminals A and B. Value of the capacitors are given as [3]

$$C_1=10\mu\text{F}, C_2=20\mu\text{F}, C_3=3\mu\text{F}, C_4=6\mu\text{F}.$$



the potential difference and charge across each capacitor.

50. A $20\mu\text{F}$ capacitor charge to 500 volts is connected in parallel with another capacitors of $10\mu\text{F}$ charged to 200 volts. Find the common potential? [3]
51. For the network of capacitance shown, find the value of capacitance 'C' if the equivalent capacitance between 'A' and 'B' is $1\mu\text{f}$. [3]



52. Define the term electric dipole moment. Derive an expression for total work done in rotating the dipole through an angle ' θ ' in uniform electric field 'E'. [3]

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53. A parallel plate capacitor of capacitance 'c' is charged to a potential difference 'v' [5]
now the battery is disconnected and a dielectric slab of constant 'K' that completely fills the space between two plates is introduced. What will be the new (i) Capacitance (ii) Charge stored (iii) Potential difference between plates (iv) Electric field between [5]
54. What is a dielectric ? A dielectric slab of thickness t , is kept between the plates of a parallel plate capacitor separated by distance d . Derive the expression for the capacity of the capacitor for $t \ll d$. [5]
55. A parallel plate capacitor has two identical plates each of area A , separated by a distance d . The space between the plates is filled with a dielectric medium. Derive an expression for the capacitance of the capacitor. [5]
56. A capacitor is charged to potential V_1 . The power supply is then disconnected and the capacitor is then connected in parallel to another capacitor (uncharged)
(a) derive the expression for the common potential of the combination of capacitor.
(b) Show that the total energy of combination is less than the sum of the energy stored in them before they are connected. [5]
57. Explain the principle of a capacitor. Derive an expression for the capacitance of a parallel plate capacitor. [5]
58. What is an electric dipole ? Deduce an expression for the torque on an electric dipole placed in a uniform electric field. Hence define dipole moment. [5]
59. Define capacitance of a capacitor. Give its S.I unit. Prove that the total electrostatic energy stored in a parallel plate capacitor is $\frac{1}{2} CV^2$. Hence derive the expression for the energy density of a capacitor. [5]
60. Explain the effect of introducing a dielectric slab between the plates of a parallel plate capacitor on its capacitance. Derive an expression for its capacitance with dielectric as the medium between the plates. [5]
61. Give the principle and explain the working of a Van de Graff generator with the help of a labeled diagram. [5]
62. An electric dipole is held in a uniform electric field.
(i) Show that no translational force acts on it.
(ii) Derive an expression for the torque acting on it.
(iii) The dipole is aligned parallel to the field. Calculate the work done in rotating it through 180° . [5]
63. Derive an expression for the energy stored in a parallel plate capacitor with air as the medium between its plates.
Air is replaced by a dielectric medium of dielectric constant k . How does it change the total energy of the capacitor ? [5]
64. Derive the expression for the capacitance of a dielectric constant k . Explain why the capacitance decreases when the dielectric medium is removed from between the plates. [5]
65. State Gauss theorem in electrostatics and express it mathematically. Using it, derive an expression for electric field at a point near a thin infinite plane sheet of electric charge. How does this electric field change for a uniformly thick sheet of charge ? [5]
66. Define capacitance of a capacitor. Give its unit. Derive an expression for the

capacitance of a parallel plate capacitor in which a dielectric of medium of dielectric constant k fills the space between the plates . [5]

- 67.** State Gauss ' theorem . Give its mathematical expression for the electric field intensity at any point due to an infinite plane sheet of charge density $\sigma \text{ C/m}^2$.
- 68.** Derive an expression for the magnitude of electric field intensity at any point along the equatorial line of a short electric dipole. Give the direction of electric field intensities at two equidistant points from the centre of dipole. One along the axial line and another on the equatorial line ? [5]
- 68.** Derive the expression for energy stored in a parallel plate capacitor. How will expression for energy in the capacitor change, when the separation between the plates is doubled and a dielectric medium of dielectric constant 4 is introduced between the plates ? capacitor ? (Assume the capacitor is disconnected from the d.c. source) [5]
- Derive the relation $V = E_0 A/d$ for the capacitance of a parallel plate capacitor , where symbols have their usual meanings. A parallel plate capacitor is charged to a potential difference 'V' and disconnected from the supply . If the distance between the plates is doubled , explain how does (i) electric field and (ii) energy stored in the capacitor change ?

OR

Define the term 'electric dipole moment' . Give its unit. Derive an expression for the torque acting on an electric dipole held in a uniform electric field. An electric dipole is placed in a uniform electric field and it is free to move . Explain what will happen when it is placed (i) parallel to the field and (ii) perpendicular to the field .

- 69.** Derive an expression for the electric potential at a point along the axial line of an electric dipole. At a point due to a point charge , the values of electric fields intensity and potential are 32 N/C and 16 J/C respectively . Calculate (i) magnitude of the charge and (ii) distance of the charge from the point of observation. [5]
- Derive an expression for the energy stored in a parallel plate capacitor .
- A parallel plate capacitor with air as dielectric is charged by a d.c. source to a potential 'V' . Without disconnecting the capacitor from the source , air is replaced by another dielectric medium of dielectric constant 10 . State with reason , how does (i) electric field between the plates and (ii) energy stored in the capacitor change.