PHYSICS

BOOKS - BETTER CHOICE PUBLICATION

ELECTROSTATIC POTENTIAL

Very Short Answertype Questions 1 Mark Questions

1. Name the physical quantity whose S.I. unit is Joule Per Coulomb $\left(JC^{-1}\right)$.

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2. Define the unit of electric potential in S.I. system of units.

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3. What do you mean by equipotential surface ?

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4. Write a relation between electric potential and electric field intensity at a point due to a point charge ?

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5. Name the physical quantity whose S.I. unit is Joule Per Coulomb $\left(JC^{-1}\right)$.

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6. How many electron volts make one joule?

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7. 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 as shown in the figure, then along which path more than

will be done.

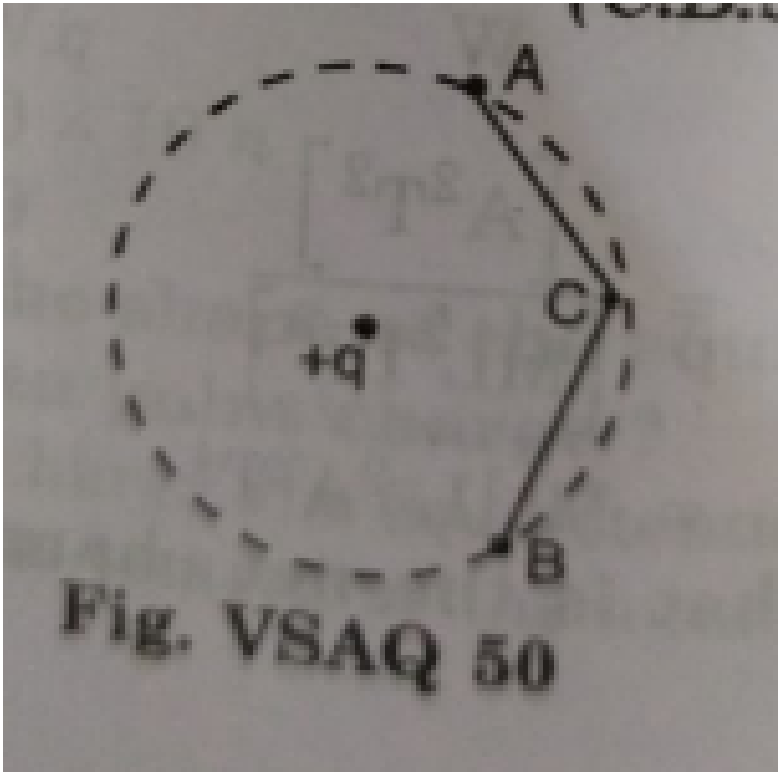

Fig. VSAQ 50

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8. The electric potential is constant in a region.

What can you say about electric field there?

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Short Answertype Questions 2 Marks Questions

1. How can the whole charge of a conductor be transferred to another isolated conductor?

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2. Why electric field is always at right angle to the equipotential surface ?

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3. Why electric field is always at right angle to the equipotential surface ?

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4. Show that electric field everywhere is normal to the equipotential surface.

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5. How is electric field at a point related to potential gradient?

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6. Can two different equipotential surfaces intersect each other?

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7. No two equipotential surfaces intersect each other. Why?

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8. Why electric field is always at right angle to the equipotential surface ?

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9. Draw an equipotential surface in a uniform electric field?

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Long Answertype Questions 5 6 Marks Questions

1. Define electric potential. What is the SI unit of potential? Obtain an expression for electric potential at a distance r from isolated unit positive charge.

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2. Show that work done in moving an electric charge between any two points in the electric

field of a point charge is independent of the path along which the charge moves.

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3. Define potential difference between two points in an electrostatic field. Find an expresion for it. Define its SI unit.

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4. Give the physical meaning of electrostatic potential?

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5. Obtain an expression for potential energy of the configuration of

three charges

Hence generalise the result for a system of n point charges?

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6. What is electric potential enerrgy due to a system of charges? Derive an expression for it.

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7. What is the direction of electric field at a point on the equitorial line of electric dipole ?

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8. Show mathematically that the potential at a point on the equitorial line of an electic dipole is zero.

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Numerical Problems

1. Two charges $3 \times 10^{-8} C$ and $-2 \times 10^{-8} C$ are located 15 cm apart. At what point on the line joining the two charges is the electrical

potential zero? Take the potential at infinity to be zero.

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2. Two charges $4 \times 10^{-6} C$ and $-2 \times 10^{-6} C$ are placed 45 cm, apart. Find out the location of a point, lying on the line joining two charges, where the electric potential is zero.

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3. Two charges $5 \times 10^{-8} C$ and $-3 \times 10^{-8} C$ are located 16 cm apart. At what point(s) on the line joining the two charges is the electric potential zero? Take the potential at infinity to be zero.

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4. 64 drops of the same size are 1 charged to 300 V each. These drops coalesce to form a bigger drop. Calculate the potential of bigger drop.

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5. 64 drops of the same size are 1 charged to 300 V each. These drops coalesce to form a bigger drop. Calculate the potential of bigger drop.

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6. 125 drops of the same size are charged to 100 V each. These drops coalesce to form a

bigger drop. Calculate the potential of bigger drop.

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7. 343 drops if the same radius are charged to 5 volt each. These drops coalesce to form a bigger drop. Calculate the potential of the bigger drop.

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8. N smalll drops of same size are changed to V volt each. They coalesec to form a bigger drop. Calculate the potential of the bigger drop.

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9. 64 drops of the same size are 1 charged to 300 V each. These drops coalesce to form a bigger drop. Calculate the potential of bigger drop.

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10. The electric potential at 0.1 m from a point charge is 90 V. What is the magnitude of the charge ?

Given $\varepsilon_0 = 8 \cdot 854 \times 10^{-12} C^{2N^{-1}m^{-2}}$

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11. An elecrtron is acelerated through a potential difference of 300 V.What is its energy in electron volt?

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12. The electric potential at 0.3 m from a point charge is 30 V. What is the magnitude of the charge ?

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13. Electric potential at a distance 9 cm from a charge is 100 V. Find the magnitude of a charge.

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14. Electric potential at a distance 0-9 m from a charge is + 50 V. Find the magnitude and nature of charge.

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15. Electric potential at a distance 1 cm from a charge is 90 V. Find the charge.

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16. Two charges $3 \times 10^{-8} C$ and $-2 \times 10^{-8} C$ are located 15 cm apart. At what point on the line joining the two charges is the electrical potential zero? Take the potential at infinity to be zero.

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Most Expected Questions

1. Name the physical quantity whose SI unit is volt metre^{-1}.

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2. Name the physical quantity represented by the expression $\overrightarrow{P} . \overrightarrow{E}$.

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3. What is the direction of electric field w.r.t. and equipotential surface?

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4. What is the shape of equipotential surface for a given point charge?

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5. What is an electron volt (eV)?

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6. What is the work done in moving $5\mu C$ charge between two points equipotential surface ?

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7. In a certain $0.2m^3$ of space, electric potential is found to be 5 V throughout. What is the electric field in this region ?

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Most Expected Questions 2 Marks Questions

1. Draw an equipotential surface for a system consisting of two charges Q, -Q separated by a distance r in air.

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2. In fig. below four equipotential surfaces are shown with their potentials. Out of the three

points A, b and C at which point the electric field is maximum and minimum? Explain with reason.

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3. Why do we often regard the potential of the earth to be zero?

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4. Following are two statements about the relationship between the electric field an electric potential. If the electric field at a certain point is zero, the nthe electric potential at the same point is also zero.

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Most Expected Questions 3 4 Marks Questions

1. Deduce an expression for electric potential due to an electric dipole at any point on its axis. Mention one contrasting feature of electric potential of dipole at a point as compared to that due to a single charge.

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2. Show that the electric field intensity at a point in an electric field is equal to the negative of the potential gradient of the field

at that point.

$$E = -\frac{dV}{dr}$$

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Numerical Problems Most Expected Questions

1. Calculate the electric potential at the surface of a gold nucleus. Given radius of nucleus = $6.6 \times 10^{-15} m$ and atomic wight of gold is 79.

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2. Two positive charges of $10\mu C$ and $5\mu C$ are 12 cm apart. Find the work done in bringing them 6 cm closer.

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3. At a point due to a point charge, the values of electric field intensity and potential are $32NC^{-1}$ and $16JC^{-1}$ respectively. Calculate magnitude of charge and distance of the charge from the point of observation.

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4. If 200 J of work must be done to move electric charge equal to 8C from a place where potential is - 10 V to another place where electric potential is. V volt. Find the value of V.

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5. An electric dipole experiences a torque of 9×10^{-26} Nm when it is placed at an angle

30° with the field $10^4 NC^{-1}$. Find the dipole moment and electrostatic potential energy.

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6. Calculate the voltage needed to balance an oil drop carrying 10 electrons, when located between plates of a capacitor, which are 5 mm apart. Given, mass of the drop $= 3 \times 10^{-16} kg$, charge on electrno $= 1.6 \times 10^{-19} C$ and $g = 9.8 ms^{-2}$

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