

Electrostatic Potential and Capacitance

1. Which of the following statement is true?

- (a) Electrostatic force is a conservative force.
- (b) Potential at a point is the work done per unit charge in bringing a charge from any point to infinity.
- (c) Electrostatic force is non-conservative
- (d) Potential is the product of charge and work.

▼ Answer

Answer: a

2. 1 volt is equivalent to

- (a) $\frac{\text{newton}}{\text{second}}$
- (b) $\frac{\text{newton}}{\text{coulomb}}$
- (c) $\frac{\text{joule}}{\text{coulomb}}$
- (d) $\frac{\text{joule}}{\text{second}}$

▼ Answer

Answer: c

3. The work done in bringing a unit positive charge from infinite distance to a point at distance x from a positive charge Q is W. Then the potential at that point is

- (a) $\frac{WQ}{x}$
- (b) W
- (c) $\frac{W}{x}$
- (d) WQ

▼ Answer

Answer: b

4. Consider a uniform electric field in the z-direction. The potential is a constant

- (a) for any x for a given z
- (b) for any y for a given z
- (c) on the x-y plane for a given z
- (d) all of these

▼ Answer

Answer: d

5. Equipotential surfaces

- (a) are closer in regions of large electric fields compared to regions of lower electric fields.
- (b) will be more crowded near sharp edges of a conductor.
- (c) will always be equally spaced.
- (d) both (a) and (b) are correct.

▼ Answer

Answer: d

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6. In a region of constant potential
- (a) the electric field is uniform.
 - (b) the electric field is zero.
 - (c) there can be no charge inside the region.
 - (d) both (b) and (c) are correct.

▼ Answer

Answer: d

7. A test charge is moved from lower potential point to a higher potential point. The potential energy of test charge will
- (a) remain the same
 - (b) increase
 - (c) decrease
 - (d) become zero

▼ Answer

Answer: c

8. An electric dipole of moment $\vec{p}$ is placed in a uniform electric field $\vec{E}$. Then

- (i) the torque on the dipole is $\vec{p} \times \vec{E}$
 - (ii) the potential energy of the system is $\vec{p} \cdot \vec{E}$
 - (iii) the resultant force on the dipole is zero. Choose the correct option.
- (a) (i), (ii) and (iii) are correct
 - (b) (i) and (iii) are correct and (ii) is wrong
 - (c) only (i) is correct
 - (d) (i) and (ii) are correct and (iii) is wrong

▼ Answer

Answer: b

9. If a conductor has a potential $V \neq 0$ and there are no charges anywhere else outside, then

- (a) there must be charges on the surface or in-side itself.
- (b) there cannot be any charge in the body of the conductor.
- (c) there must be charges only on the surface.
- (d) both (a) and (b) are correct.

▼ Answer

Answer: c

10. Which of the following statements is false for a perfect conductor?

- (a) The surface of the conductor is an equipoten-tial surface.
- (b) The electric field just outside the surface of a conductor is perpendicular to the surface.
- (c) The charge carried by a conductor is always uniformly distributed over the surface of the conductor.
- (d) None of these.

▼ Answer

Answer: d

11. Dielectric constant for a metal is

- (a) zero
- (b) infinite
- (c) 1
- (d) 10

▼ Answer

Answer: b

12. When air is replaced by a dielectric medium of constant K , the maximum force of attraction between two charges separated by a distance

- (a) increases K times
- (b) remains unchanged
- (c) decreases K times
- (d) increases K^{-1} times

▼ Answer

Answer: c

13. In a parallel plate capacitor, the capacity increases if

- (a) area of the plate is decreased.
- (b) distance between the plates increases.
- (c) area of the plate is increased.
- (d) dielectric constantly decreases.

▼ Answer

Answer: c

14. A parallel plate air capacitor is charged to a potential difference of V volts. After disconnecting the charging battery the distance between the plates of the capacitor is increased using an insulating handle. As a result the potential difference between the plates

- (a) increases
- (b) decreases
- (c) does not change
- (d) becomes zero

▼ Answer

Answer: a

15. Two identical capacitors are joined in parallel, charged to a potential V , separated and then connected in series, the positive plate of one is connected to the negative of the other. Which of the following is true?

- (a) The charges on the free plates connected together are destroyed.
- (b) The energy stored in this system increases.
- (c) The potential difference between the free plates is $2V$.
- (d) The potential difference remains constant.

▼ Answer

Answer: c

16. A capacitor has some dielectric between its plates, and the capacitor is connected to a dc source. The battery is now disconnected and then the dielectric is removed, then

- (a) capacitance will increase.
- (b) energy stored will decrease.
- (c) electric field will increase.
- (d) voltage will decrease.

▼ Answer

Answer: c

17. Two spherical conductors each of capacity C are charged to potential V and $-V$. These are then connected by means of a fine wire. The loss of energy is

- (a) zero
- (b) $\frac{1}{2}CV^2$
- (c) CV^2
- (d) $2CV^2$

▼ Answer

Answer: c

