

A. MCQ (20 Questions)

1. Electric potential energy of a two-charge system is:
(A) kq_1q_2/r
(B) kq/r^2
(C) qE
(D) None
2. Work done to bring a unit positive charge from infinity to a point is called:
(A) Electric field
(B) Electric flux
(C) Electric potential
(D) Potential energy
3. If electric field increases, the potential gradient:
(A) increases
(B) decreases
(C) becomes zero
(D) remains constant
4. Relation between E and V is: (PYQ Term-1 2022)
(A) $E=-dV/dr$
(B) $E=dV/dr$
(C) $E=V \cdot r$
(D) $E=V/r$
5. Equipotential surfaces are always:
(A) parallel to electric field
(B) perpendicular to electric field
(C) at 45°
(D) none
6. Work done in moving a charge **between two equipotential surfaces** is:
(A) zero
(B) maximum
(C) depends on charge
(D) infinite
7. Potential energy between two like charges is:
(A) positive
(B) negative
(C) zero
(D) infinite
8. Electric potential is:
(A) vector
(B) scalar
(C) tensor
(D) none

9. Potential due to multiple charges is obtained using:

- (A) Gauss law
- (B) Superposition principle
- (C) Ampere's rule
- (D) None

10. Equipotential surfaces: (PYQ 2018A)

- (A) Never intersect
- (B) Always intersect
- (C) Sometimes intersect
- (D) Intersect at right angles

11. A point is said to be at zero potential when:

- (A) no work is done
- (B) charge is zero
- (C) force is zero
- (D) energy is maximum

12. SI unit of potential energy:

- (A) Joule
- (B) Volt
- (C) Newton
- (D) Farad

13. Potential difference between two points is equal to:

- (A) work per unit charge
- (B) force per unit charge
- (C) energy \times charge
- (D) none

14. If potential doubles, electric field:

- (A) doubles
- (B) halves
- (C) remains same
- (D) becomes zero

15. The potential energy of two charges decreases when:

- (A) distance increases
- (B) distance decreases
- (C) charges decrease
- (D) none

16. Electric potential at infinity is taken as:

- (A) 1
- (B) 0
- (C) infinity
- (D) -1

17. If $V = \text{constant}$, E must be:

- (A) zero
- (B) infinity
- (C) non-zero
- (D) negative

18. Potential due to electric dipole varies as: (PYQ 2023A)

- (A) $1/r^2$

- (B) $1/r$
- (C) $1/r^3$
- (D) r

19. Electric potential energy of like charges is:

- (A) maximum
- (B) minimum
- (C) zero
- (D) none

20. V is equal to U/q when:

- (A) $q \rightarrow 0$
- (B) $U \rightarrow 0$
- (C) Force = 0
- (D) Standard definition of potential

B. Short Answer Questions (5 Questions)

1. Define electric potential energy between two-point charges.
2. State any two properties of equipotential surfaces. (PYQ 2018A)
3. Show the relation between electric field and electric potential. (PYQ Term-1 2022)
4. What is potential gradient?
5. Explain why no work is done in moving a charge on an equipotential surface.

C. Long Answer Questions (2 Questions)

1. Derive an expression for the electric potential energy of a system of two-point charges separated by distance r .
2. Explain what equipotential surfaces are. Derive the relationship between electric field and potential gradient. (PYQ Term-1 2022)