

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  $45^\circ$   
(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

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### 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.

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### 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)