

(1 MARK)

1. The figure here shows electric field lines. The electric field strength at P_1 is E_1 and that at P_2 is E_2 . If distance between P_1 , P_2 is r , then which of the following statement is true?



- (a) $E_1 > E_2$ (b) $E_1 < E_2$ (c) $E_2 = rE_1$ (d) $E_2 = E_1/r^2$
2. Two charges 10 pC and 5 pC are placed 20 cm apart. The ratio of Coulomb's force experienced by them is:
- (a) 2 : 5 (b) 1 : 1 (c) 3 : 7 (d) None of these
3. Which of the following method is an indirect method of charging:
- (a) charging by induction (b) charging by physical contact
(c) charging by friction (d) none of these
4. Write unit electric flux.
5. **Assertion:** *Electric lines of field cross each other.*
Reason: *Electric field at a point superimpose to give one resultant electric field.*
- (a) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
(b) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.
(c) If the Assertion is correct but Reason is incorrect.
(d) If both the Assertion and Reason are incorrect
6. Which of the following statement is correct? The electric field at a point is
- (a) always continuous. (b) continuous if there is a charge at that point.
(c) discontinuous only if there is a negative charge at that point.
(d) discontinuous if there is a charge at that point.
7. The force per unit charge is known as
- (a) electric flux (b) electric field (c) electric potential (d) electric current
8. The SI unit of electric field is
- (a) N/m (b) N-m (c) N/C (d) N/C²

9. The magnitude of electric field intensity E is such that, an electron placed in it would experience an electrical force equal to its weight is given by

- (a) mge (b) mg/e (c) e/mg (d) e^2g/m^2

10. **Assertion:** *Coulomb force and gravitational force follow the same inverse-square law.*

Reason: *Both laws are same in all aspects.*

- (a) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
(b) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.
(c) If the Assertion is correct but Reason is incorrect.
(d) If both the Assertion and Reason are incorrect

11. State and explain coulombs law. Write unit of ϵ_0 . **(2 MARKS)**

12. Two charged spheres of 3C and 9C are in contact to each other. Find their charges in equilibrium and also find no of electrons transferred in equilibrium. **(2MARKS)**

13. Two large, thin metal plates are parallel and close to each other. On their inner faces, the plates have surface charge densities of opposite signs and of magnitude $17.7 \times 10^{-22} \text{ C/m}^2$. What is electric field intensity

- (a) in the outer region of the first plate, and
(b) between the plates? **2 MARKS**

14. State and explain gauss law? What is the flux through a cube enclosing a charge q at its centre? **2 MARKS**

15. If a dipole is kept in a uniform electric field E , derive the expression for torque experienced by it.

Diagrammatically represent the position of the dipole in stable and unstable equilibrium. **(3 MARKS)**

16. Three charges $+3\mu\text{C}$, $-2\mu\text{C}$ and $+2\mu\text{C}$ are placed at the corners of an equilateral triangle of side 1m. find net force on $+3\mu\text{C}$. **(3 MARKS)**

17. Calculate the electric field intensity which would be sufficient to balance the weight of an electron. **3 MARKS**

18. Three-point charges +1C, -1C and +2C are at the vertices of an equilateral triangle of side 20cm. Find net force on +1C. **3 MARKS**

19. (5 MARKS)

- a) An electric dipole of dipole moment \vec{P} consists of point charges +q and -q separated by a distance 2l. deduce the expression for \vec{E} due to dipole at a distance x from the centre of dipole in axial line and hence show that for $x \gg l$ $\vec{E} = \frac{2K\vec{P}}{x^3}$. Write relation between \vec{E}_{axial} and $\vec{E}_{\text{equatorial}}$.

20. 5 MARKS

- a) A thin metallic spherical shell of radius R carries a charge Q on its surface. A point charge of Q/2 is placed at its centre C and the other charge +2Q is placed outside the shell at a distance x from the centre as shown in figure. (i) Find the force on the charge at the centre of shell and at the point A (ii) find the electric flux through the shell.