

12 - Std

MONTHLY TEST - JUNE - 2025

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Time : 1.30 Hrs

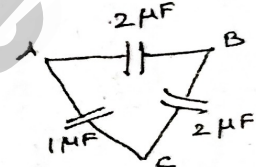
SJM

PHYSICS

Marks : 40

I Answer all the questions.

1. Which charge configuration produces a uniform electric field?
 a) Uniformly charged infinite plane b) Point charge
 c) Uniformly charged Infinite line d) Uniformly charged spherical shell
2. Air medium changed into a dielectric medium the following one quantity increases?
 a) Electric potential b) electric flux c) Capacitance d) Electric field
3. An electric dipole is placed at an alignment angle of 30° with an electric field of $2 \times 10^5 \text{ NC}^{-1}$. It experiences a torque equal to 8 Nm . The charge on the dipole if the dipole length is 1 cm is
 a) 5 mc b) 7 mc c) 4 mc d) 8 mc
4. The amount of work done for an electron moved in a equal potential surface of 5 V is
 a) $8 \times 10^{-19} \text{ J}$ b) $-8 \times 10^{-19} \text{ J}$ c) $1.6 \times 10^{-19} \text{ J}$ d) Zero
5. The unit for electric susceptibility is
 a) Cm b) $\text{Cm}^2 \text{V}^{-1}$ c) Cm^{-2} d) Cm^{-1}
6. An electric field $\vec{E} = 10x\hat{i}$ exists in a certain region of space. Then the potential difference $V = V_0 - V_A$, where V_0 is the potential at the origin and V_A is the potential at $x = 2 \text{ m}$. is
 a) -20 V b) $+20 \text{ V}$ c) 10 V d) -10 V
7. Three capacitors are connected in triangle as shown in the figure. The equivalent capacitance between the point A and C is
 a) $1 \mu\text{F}$ b) μF
 c) $3 \mu\text{F}$ d) $1/4 \mu\text{F}$
8. The value of electric field due to an infinite parallel like charged sheets at its centre is,
 a) zero b) σ/ϵ_0 c) $\sigma/2\epsilon_0$ d) None
9. Two points A and B are maintained at a potential of 7 V and -4 V respectively. The work done in moving 50 electron from A to B is
 a) $8.80 \times 10^{-17} \text{ J}$ b) $-8.80 \times 10^{-17} \text{ J}$ c) $4.40 \times 10^{-17} \text{ J}$ d) $5.80 \times 10^{-17} \text{ J}$
10. Two metallic spheres of radii 1 cm and 3 cm are given charges of $-1 \times 10^{-2} \text{ C}$ and $5 \times 10^{-2} \text{ C}$ respectively. If these are connected by a conducting wire, the final charge on the bigger sphere is
 a) $3 \times 10^{-2} \text{ C}$ b) $4 \times 10^{-2} \text{ C}$ c) $1 \times 10^{-2} \text{ C}$ d) $2 \times 10^{-2} \text{ C}$

**II Answer any three questions. Q.No. 15 is compulsory.**

3 x 2 = 6

11. What are the differences between coulomb force and gravitational force?
12. Define : Electric flux. Given its unit.
13. What is polarisation?
14. What is corona discharge? Give its advantage?
15. Consider a point charge $+q$ placed at the origin and another point charge $-2q$ placed at a distance of 9 m from the charge $+q$. Determine the point between the two charges at which electric potential is zero.

III Answer any three questions only. Q.No. 20 is compulsory.

3 x 3 = 9

16. Define 'Electric field' and discuss its various aspects (any 3).
17. Distinguish Polar and Non polar molecules.
18. Obtain an expression for capacitance for a parallel Plate capacitor?
19. Define 'Electric dipole' Give the expression for the magnitude of its electric dipole moment and the direction.
20. A parallel plate capacitor has square plates of side 5 cm and separated by a distance of 1 mm .
 (a) Calculate the capacitance of this capacitor. (b) If a 10 V battery is connected to the capacitor, what is the charge stored in any one of the plates?

IV Answer any three questions only.

3 x 3 = 15

21. Calculate the electric field due to a dipole on its equatorial plane.
22. Derive an expression for electrostatic potential due to an electric dipole.
23. Obtain an expression for energy stored in the parallel plate capacitor.
24. Derive the expression for resultant capacitance, when capacitors are connected in series and parallel.

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