Cuddalore - Dt

# COMMON FIRST MID-TERM TEST - 2023

**A**

## Standard XII

Reg.No. | | | | | | |

## PHYSICS

*Time : 1.30 hrs*

**Part - I**

*Marks : 50*

**I. Choose the correct answer:** **10 x 1 = 10**

1. An electric dipole is placed at an alignment angle of 30° with an electric field of $2 \times 10^5$ $NC^{-1}$. It experiences a torque equal to 8 Nm. The charge on the dipole if the dipole of length is 1 cm is
   a) 4 mC b) 8 mC c) 5 mC d) 7 mC
2. If the voltage applied on a capacitor increased from V to 2V, choose the correct conclusion.
   a) Q remains the same, C is doubled b) Q is doubled, C doubled
   c) C remains same, Q doubled d) Both Q and C remain same
3. A parallel plate capacitor stores a charge Q at a voltage V. Suppose the area of the parallel plate capacitor and the distance between the plates are each doubled then which is the quantity that will change?
   a) capacitance b) charge c) voltage d) energy density
4. Two metallic spheres of radii 1cm and 3cm are given charges of $-1 \times 10^{-2}$ C and $5 \times 10^{-2}$ C respectively. If these are connected by a conducting wire, the final charge on the bigger sphere is
   a) $3 \times 10^{-2}$ C b) $4 \times 10^{-2}$ C c) $1 \times 10^{-2}$ C d) $2 \times 10^{-2}$ C
5. A toaster operating at 240 V has a resistance of 120 Ω. Its power is
   a) 400 W b) 2 W c) 480 W d) 240 W
6. In India electricity is supplied for domestic use at 220 V. It is supplied at 110 V in USA. If the resistance of a 60W bulb for use in India is R, the resistance of 60W bulb for use in USA will be
   a) R b) 2R c) $R/4$ d) $R/2$
7. The internal resistance of a 2.1V cell which gives a current of 0.2A through a resistance of 10Ω is
   a) 0.2 Ω b) 0.5 Ω c) 0.8 Ω d) 1.0 Ω
8. In Joule's heating law, when R and t are constant, if the H is taken along the y-axis and $I^2$ along x-axis, the graph is
   a) straight line b) parabola c) circle d) ellipse
9. A circular coil of radius 5cm and 50 turns carries a current of 3 ampere. The magnetic dipole moment of the coil is nearly
   a) 1.0 $Am^2$ b) 1.2 $Am^2$ c) 0.5 $Am^2$ d) 0.8 $Am^2$
10. A non conducting charged ring carrying a charge of q, mass m and radius r is rotated about its axis with constant angular speed ω. Find the ratio of its magnetic moment with angular momentum is
    a) $\frac{q}{m}$ b) $\frac{2q}{m}$ c) $\frac{q}{2m}$ d) $\frac{q}{4m}$

## Part - II

**II. Answer any 5 questions. (Q.No.14 is compulsory)** 5 x 2 = 10

11. State Coulomb's law in electrostatics.
12. Define electric flux. Give its unit.
13. Write a short note on "electrostatic shielding".
14. A sample of HCl gas is placed in a uniform electric field of magnitude $3 \times 10^4$ $NC^{-1}$. The dipole moment of each HCl molecule is $3.4 \times 10^{-30}$ Cm. Calculate the maximum torque experienced by each HCl molecule.
15. State macroscopic form of Ohm's Law.
16. State Kirchhoff's voltage rule.
17. What is Peltier effect?
18. State Fleming's left hand rule.

## Part - III

**III. Answer any 5 questions. (Q.No.25 is compulsory)** 5 x 3 = 15

19. Derive an expression for electrostatic potential due to a point charge.
20. Obtain the expression for energy stored in a parallel plate capacitor.
21. Give the properties of Electric field lines.
22. Obtain the expression for electric field due to an charged infinite plane sheet.
23. Derive the relation between current and drift velocity.
24. Explain the equivalent resistance of a series resistor network.
25. If the resistance of coil is 3Ω at 20°C and $\alpha = 0.004/^{o}C$, then determine its resistance at 100°C.
26. State and explain Biot - Savart's law.

## Part - IV

**IV. Answer all the questions.** 3 x 5 = 15

27. a) Calculate the electric field due to a dipole on its axial line.

*(OR)*

b) Explain in detail the construction and working of a Van De graaff generator.

28. a) Obtain the condition for bridge balance in Wheatstone's bridge.

*(OR)*

b) Deduce the relation for the magnetic field at a point due to an infinitely long straight conductor carrying current.

29. a) Derive an expression for electrostatic potential due to an electric dipole and discuss the special cases.

*(OR)*

b) How the emf of two cells are compared using potentiometer.

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