

12 - Std

FIRST MID TERM TEST - 2023



Time : 1.30 Hrs

PHYSICS

Marks : 35

**I** (i) Answer all questions. (ii) Choose the correct answer and write it with option.  $10 \times 1 = 10$

- An electric dipole is placed at an alignment angle of  $30^\circ$  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 length is 1 cm is
  - 4 mC
  - 8 mC
  - 5 mC
  - 7 mC
- 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?
  - Capacitance
  - Charge
  - Voltage
  - Energy density
- Two identical conducting balls having positive charges  $q_1$  and  $q_2$  are separated by a center to center distance r. If they are made to touch each other and then separated to the same distance, the force between them will be
  - Less than before
  - Same as before
  - More than before
  - Zero
- Which one of the following is a non polar molecule .....
  - $\text{NH}_3$
  - $\text{CO}_2$
  - $\text{N}_2\text{O}$
  - HCl
- The value of total electric flux coming out from a unit positive charge placed in vacuum
  - $\frac{1}{4\pi\epsilon_0}$
  - $4\pi\epsilon_0$
  - $\epsilon_0$
  - $\frac{1}{\epsilon_0}$
- If the length of a wire is doubled and its area is halved then its resistance will become
  - halved
  - two times
  - four times
  - unchanged
- The internal resistance of 2.1 V cell which gives a current of 0.2 A through a resistance of  $10 \Omega$  is
  - $0.2 \Omega$
  - $0.5 \Omega$
  - $0.8 \Omega$
  - $1.0 \Omega$
- A toaster operating at 240V has a resistance of  $120 \Omega$ . Its power is
  - 400 W
  - 2 W
  - 480 W
  - 240 W
- The vertical component of Earth's magnetic field at a place is equal to the horizontal component. What is the value of angle of dip at this place?
  - $30^\circ$
  - $45^\circ$
  - $60^\circ$
  - $90^\circ$
- The potential energy of magnetic dipole whose dipole is  $\vec{p}_m = (-0.5\hat{i} + 0.4\hat{j}) \text{ Am}^2$  kept in uniform magnetic field  $\vec{B} = 0.2\hat{i} \text{ T}$ 
  - 0.1 J
  - 0.8 J
  - 0.1 J
  - 0.8 J

**II** Answer any three questions and Question No.14 is compulsory.  $3 \times 2 = 6$

- State Ohm's law.
- What is Corona discharge?
- Define electric field. Give its unit.
- Resistance of a material at  $20^\circ\text{C}$  and  $40^\circ\text{C}$  are  $45 \Omega$  and  $85 \Omega$  respectively. Find its temperature co-efficient of resistance.
- Electric current is a scalar quantity. Why?

**III** Answer any three questions and question No.18 is compulsory.  $3 \times 3 = 9$

- Derive an expression for energy stored in capacitor.
- Derive the expression for effective resistance, when resistors are connected in series.
- A parallel plate capacitor filled with mica having  $\epsilon_r = 5$  is connected to a 10 V battery. The area of the parallel plate is  $6\text{m}^2$  and separation distance is 6mm. Find the capacitance and energy stored in the capacitor.
- State Kirchoff's first rule, second rule.
- Write the properties of dia magnetic materials.

**IV** Answer all the question.  $2 \times 5 = 10$

- Obtain an expression for electric field due to an infinitely long charged wire. (OR)
  - Derive an expression for electrostatic potential due to electric dipole and also discuss its various aspects.
- Obtain the condition for bridge balance in Wheatstone's bridge. (OR)
  - Explain the determination of internal resistance a cell using voltmeter.