# Class 12 Physics: Test Paper

#### Instructions:

- 1. This exam is of 1 hour 30 minutes duration.
- 2. Do not use the internet or any external resources while giving the exam.

### Chapter 1: Electric Charges and Fields

- 1. Define Electric field. Three charges 1  $\mu$ C, 1 C $\mu$ , and 2  $\mu$ C are kept at the vertices A, B, and C of an equilateral triangle ABC of 10 cm side, respectively. The resultant force on the charge at C is (4 marks)
- 2. A point charge is placed at the center of a hollow conducting sphere of internal radius 'r' and outer radius 2r'. What will be the ratio of the surface charge density of the inner surface to that of the outer surface? (3 marks)
- 3. Explain the principle of superposition of electric forces. (3 marks)
- 4. Define electric potential. Derive an expression for the electric potential at a point due to an electric dipole. Discuss the special cases. (4 marks)

## **Chapter 2: Electrostatic Potential and Capacitance**

- 1. Calculate potential on the axis of a ring at the distance z from the center due to charge Q uniformly distributed along the ring of radius. (3 marks)
- 2. Define capacitance. Derive the formula for the capacitance of a parallel plate capacitor. (4 marks)
- 3. How does the capacitance of a capacitor change when a dielectric material is introduced between its plates? (2 marks)

### Chapter 3: Current Electricity

- 1. Differentiate between resistivity and resistance. Discuss factors affecting resistance. A given metallic wire of resistance R is doubled on itself. What will be its new resistance? (3 marks)
- 2. The resistance of a silver wire at  $0^{\circ}$ C is  $1.25 \Omega$ . Up to what temperature must it be heated so that its resistance is doubled? Given the temperature coefficient of resistance ( $\alpha$ ) for silver is  $0.0041 \text{ C}^{-1}$ . (4 marks)
- 3. Calculate the drift speed of the electrons when 1A of current exists in a copper wire of cross-section  $2 \text{ mm}^2$ . The number of free electrons per unit volume is  $8.5 \times 10^{22}$ . (3 marks)