पुष्पना International School

Shree Swaminarayan Gurukul, Zundal

P. A – I Examination 2021 – 22					
Student Name				**Grade**	**XII**
Date				**Subject**	**PHYSICS**
Roll No.		**Time**	**2hr**	**Total Marks**	**50**

Q -1 Multiple Choice Type Questions (MCQs) [10]

1. The surface considered for Gauss's law is called
   (a) Closed surface
   (b) Spherical surface
   (c) Gaussian surface
   (d) Plane surface
2. The force per unit charge is known as
   (a) electric flux
   (b) electric field
   (c) electric potential
   (d) electric current
3. Electric field lines provide information about
   (a) field strength
   (b) direction
   (c) nature of charge
   (d) all of these
4. Which of the following statement is true?
   (a) Electrostatic force is a conservative force.
   (b) Potential at a point is the work done per unit charge in bringing a charge from any point to infinity.
   (c) Electrostatic force is non-conservative
   (d) Potential is the productof charge and work.
5. Consider a uniform electric field in the z-direction. The potential is a constant
   (a) for any x for a given z
   (b) for any y for a given z
   (c) on the x-y plane for a given z
   (d) all of these
6. A test charge is moved from lower potential point to a higher potential point. The potential energy of test charge will
   (a) remain the same
   (b) increase

(c) decrease
(d) become zero

7. Which of the following statements is false for a perfect conductor?
   (a) The surface of the conductor is an equipoten-tial surface.
   (b) The electric field just outside the surface of a conductor is perpendicular to the surface.
   (c) The charge carried by a conductor is always uniformly distributed over the surface of the conductor.
   (d) None of these.
8. An electric heater is connected to the voltage supply. After few seconds, current gets its steady value then its initial current will be
   (a) equal to its steady current
   (b) slightly higher than its steady current
   (c) slightly less than its steady current
   (d) zero
9. In the series combination of two or more than two resistances
   (a) the current through each resistance is same.
   (b) the voltage through each resistance is same.
   (c) neither current nor voltage through each resistances is same.
   (d) both current and voltage through each resistances are same.
10. In a Wheatstone bridge if the battery and galvanometer are interchanged then the deflection in galvanometer will
   (a) change in previous direction
   (b) not change
   (c) change in opposite direction
   (d) none of these.

Q -2 Answer the following (2 Marks each) (Any ten) [20]

1. Which orientation of an electric dipole in a uniform electric field would correspond to stable equilibrium ?
2. Name the physical quantity whose S.I. unit is JC^{-1}. Is it a scalar or a vector quantity?
3. Why should electrostatic field be zero inside a conductor?
4. A charge ‘q’ is placed at the centre of a cube of side l. What is the electric flux passing through two opposite faces of the cube?
5. A 500 µC charge is at the centre of a square of side 10 cm. Find the work done in moving a charge of 10 µC between two diagonally opposite points on the square.
6. What is the electrostatic potential due to an electric dipole at an equatorial point?

7. What is the work done in moving a test charge q through a distance of 1 cm along the equatorial axis of an electric dipole?
8. Define the term 'potential energy' of charge 'q' at a distance V in an external electric field
9. A 10 v battery of negligible internal resistance is connected across a 200 V battery and a resistance of 38Ω as shown in the figure. Find the value of the current in circuit.
10. The emf of a cell is always greater than its terminal voltage. Why? Give reason.
11. A cell of emf 'E' and internal resistance 'r' draws a current 'I'. Write the relation between terminal voltage 'V' in terms of E, I and r

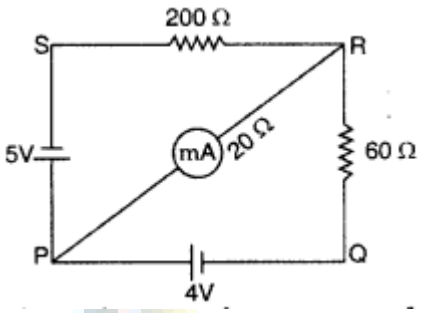
Q -3 Answer the following questions (3 Marks each)(Any Four) [12]

1. A charge 'q' is placed at the centre of a cube of side l. What is the electric flux passing through two opposite faces of the cube?
2. A thin straight infinitely long conducting wire having charge density X is enclosed by a cylindrical surface of radius r and length l, its axis coinciding with the length of the wire. Find the expression for the electric flux through the surface of the cylinder
3. "For any charge configuration, equipotential surface through a point is normal to the electric field." Justify.
4. Two equal balls having equal positive charge 'q' coulumbs are suspended by two insulating strings of equal length. What would be the effect on the force when a plastic sheet is inserted between the two ?
5. Why is a potentiometer preferred over a voltmeter for determining the emf of a cell?

Q -4 Answer the following questions (4 Marks each) (Any two) [08]

1. A spherical conducting shell of inner radius rx and outer radius r2 has a charge 'Q'. A charge 'q' is placed at the centre of the shell.
   (a) What is the surface charge density on the
   (i) inner surface,
   (ii) outer surface of the shell?
   (b) Write the expression for the electric field at a point $x > r_2$ from the centre of the shell.
2. Two point charges, $q_1 = 10 \times 10^{-8}$C, $q_2 = -2 \times 10^{-8}$ C are separated by a distance of 60 cm in air.
   (i) Find at what distance from the 1st charge, q_1 would the electric potential be zero.
   (ii) Also calculate the electrostatic potential energy of the system.
3. The network PQRS, shown in the circuit diagram, has the batteries of 4 V and 5 V and negligible internal resistance. A milliammeter of 20 Ω resistance is connected

between P and R. Calculate the reading in the milliammeter.



********** Best of Lucky **********