

**St. Mary's School, Dwarka**  
**Holiday Home Work**  
**Class XII**  
**Subject: Physics**

**Objective:**

- 1) To enable the students to revise the concepts already taught in the class.
- 2) To enable the students to enhance their numerical ability
- 3) To give an exposure to the students about the type of HOTS questions related to the topic.

**Homework:**

**Write the first five experiments based on Meter Bridge, OHM'S LAW and Galvanometer in your practical file and submit the file on reopening of school.**

**As discussed in the class please complete the project allotted to you.**

**Please file these assignments in a h.w file. Donot do this h.w in your c.w notebook**

**IMPORTANT QUESTIONS FOR CBSE EXAMINATION**

**Unit-III: MAGNETIC EFFECTS OF CURRENT**

**2 mark Questions**

1. An electron and a proton are moving along the same direction with the same kinetic energy. When they pass through a uniform magnetic field perpendicular to the direction of their motion, they describe paths of the same radius. Is this statement true or false?
2. Uniform electric and magnetic fields are produced pointing in the same direction. An electron is projected in the direction of the fields. What will be the effect on the kinetic energy of the electron due to the two fields?
3. A particle of mass  $m$  and charge  $q$  moves at right angles to a uniform magnetic field. Plot a graph showing the variation of the radius of the circular path described by it with the increase in its (a) charge, (b) kinetic energy, where, in each case other factors remain constant. Justify your answer.
4. A charged particle having a charge  $q$ , is moving with a speed  $v$  along the  $x$ -axis. It enters a region of space where an electric field  $E$  along  $y$ -axis and a magnetic field  $B$  are both present. The particle, on emerging from this region, is observed to be moving along the  $x$ -axis only. Obtain an expression for the magnitude of  $B$  in terms of  $v$  and  $E$ . Also give the direction of  $B$ .
5. A long wire is first bent into a circular coil of one turn and then into a circular coil of smaller radius having  $n$  turns. If the same current passes in both the cases find the ratio of the magnetic field produced at the centers in the two cases.
6. Why is diamagnetism independent of temperature?
7. Identify the following curve and name it. Explain the following terms on the basis of the curve. (a) Soft magnetic material (b) Hard magnetic Material (c) Give one example each for the material (d) one application each for the material
8. Two wires of equal lengths are bent in the form of two loops. One of the loops is square shaped whereas the other loop is circular. These are suspended in uniform magnetic field and the same current is passing through them. Which loop will experience greater torque?

9. Does the torque on a planar current loop in a magnetic field change, when its shape is changed without changing its area?
10. Why are pole pieces of galvanometer made concave?
11. What type of materials is used for making permanent magnets transformer cores?  
Give two line reasons for each
12. Show that the far field of a solenoid resembles that of a bar magnet. Hence define the magnetic moment of a solenoid.

### 3 mark questions

13. A long cylinder of radius  $R_0$  is carrying a current  $I_0$ , which is uniformly distributed over its cross section. Derive an expression for the magnitude of magnetic field inside as well as outside the wire. Plot a curve to show the variation of magnetic field with radial distance.
14. Draw a labeled diagram and explain the construction and working of a moving coil galvanometer. Define its current and voltage sensitivity and explain how they can be increased.  
(b) A galvanometer with a coil resistance of 5 ohm can tolerate a maximum current of 10mA. Explain how this can be converted into an ammeter of range 1A.

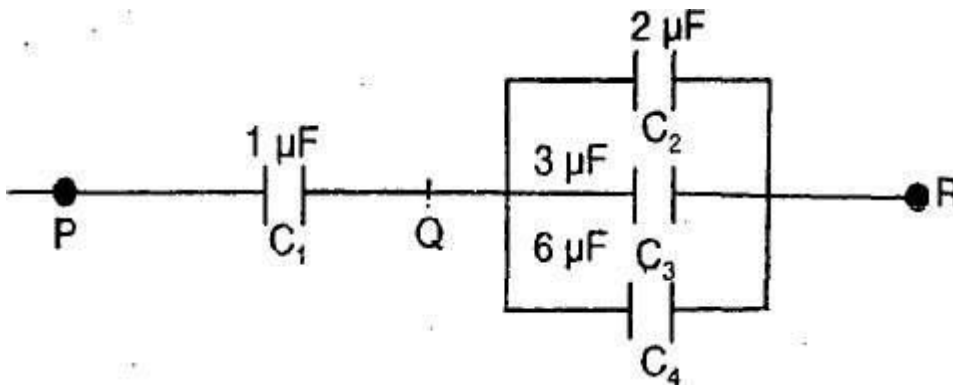
## CLASS – XII PHYSICS (Electrostatics)

### 2 mark questions

1. A small test charge is released from rest at a point in electric field. Will it travel along the field line passing through that point?
2. A Van de Graff type generator is capable of building up potential difference of  $15 \times 10^6$  V. The dielectric strength of the gas surrounding the electrode is  $5 \times 10^7$  Vm<sup>-1</sup>. What is the minimum radius of the spherical shell required?
3. Under what conditions will the torque exerted by the magnetic field on a charged particle be (i) maximum and (ii) minimum?
4. Write any two factors on which internal resistance of a cell depends.
5. An Ammeter is connected in series with  $R = 3\text{ohm}$  to a battery of 3V. What is the value of current if the ammeter (i) is a galvanometer of resistance 60 ohm (ii) is galvanometer but shunted by resistance of 0.02ohm.
6. Define corona discharge.
7. Under what conditions will the torque exerted by the electric field on an electric dipole be (i) maximum and (ii) minimum?
8. Write any two factors on which capacitance of parallel plate capacitor depends.

### 3 mark questions

9. Find the value of resultant capacitance of the given combination between P and R. If the applied potential is 50 V, find the charge across through  $C_1$ ,  $C_2$  and  $C_3$ .



10. Consider a uniform electric field  $E = 3 \times 10^3 \hat{i}$  N/C. (a) what is the flux of this field through a square of 10 cm on a side whose plane is parallel to yz – plane? (b) What is the flux through the same square if the normal to this plane makes a 60degree angle with the axis?

11. An electrician technician requires a capacitance of  $2 \mu\text{F}$  in a circuit across a potential difference of  $1\text{kV}$ . A large no. of  $1\mu\text{F}$  capacitors are available to him each of which can withstand a potential difference of not more than  $400\text{V}$ . Suggest a possible arrangement that requires the minimum number of capacitors.

12. The resistance of Nichrome wire at  $27^\circ\text{C}$  is found to be  $73.5\text{ohm}$ . Find the temperature at which its resistance becomes  $85.8\text{ohm}$ , the value of  $B$  is  $1.70 \times 10^{-4}/^\circ\text{C}$ .

13 Show that the force on each plate of a parallel plate capacitor has a magnitude equal to  $\frac{1}{2} QE$ , where  $Q$  is the charge on the capacitor and  $E$  is the magnitude of the electric field between the plates. Explain the origin of the factor  $\frac{1}{2}$ ...

14. (a) A charge  $+Q$  is placed on a large spherical conducting shell of radius  $R$ . Another small conducting sphere of radius  $r$  carrying charge  $q$  is introduced inside the large shell and is placed at its centre. Find the potential difference between two points, one lying on the sphere and other on the shell.

(b) How would the charge between the two flows if they are connected by a conducting wire? Name the device which works on this fact.

15 Derive an expression for capacitance of a parallel capacitor when a dielectric slab is inserted between the plates.

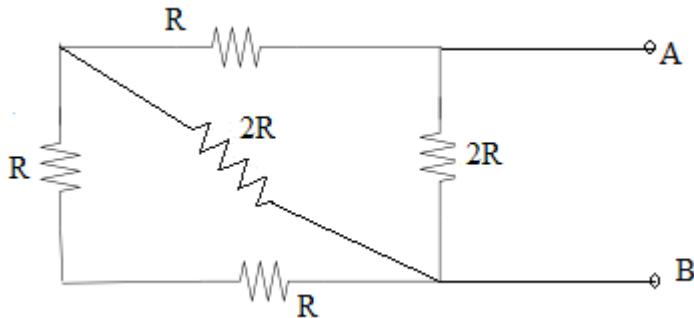
### Questions on Current Electricity

#### 3 mark questions

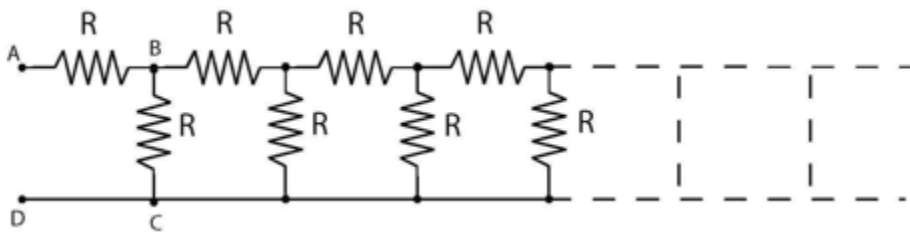
1. If a copper wire is stretched to make it  $.2\%$  longer. Find the percentage change in the resistance

2. An electric current of  $5\text{ A}$  passes through a circuit containing three wires(A,B,C) of the same material .Length of the wires in the circuit are in the ratio  $2:3:4$  And their diameters are in the ratio  $3:4:5$ .Find the amount of current flowing in each branch of the circuit when wires are arranged in parallel combination

3. Find the equivalent resistance between point A and B in following combination of resistors

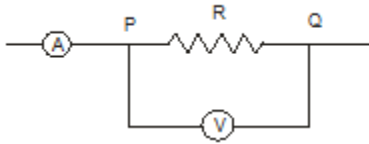


4. Consider the infinite network of resistors as shown below in the figure



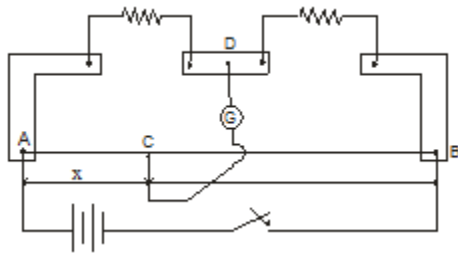
Each resistor in the infinite network has a value of  $2\Omega$ . Find the current drawn from  $12\text{V}$  supply of internal resistance  $0.5\Omega$ .

5. Consider the figure given below

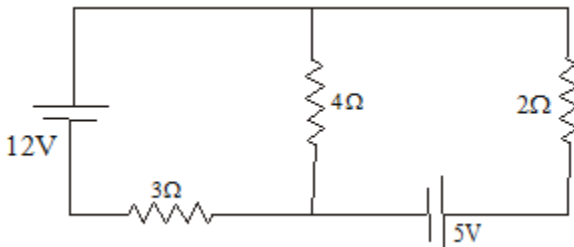


If ammeter shows a reading of 10A and voltmeter having internal resistance  $3000\ \Omega$  measures a voltage of 200V, find resistance R .

6. The arrangement shown below is of the meter bridge experiment. Here  $AC=x$  corresponds to the null deflection in the galvanometer. What will be the value of AC if the radius of the wire AB is doubled?



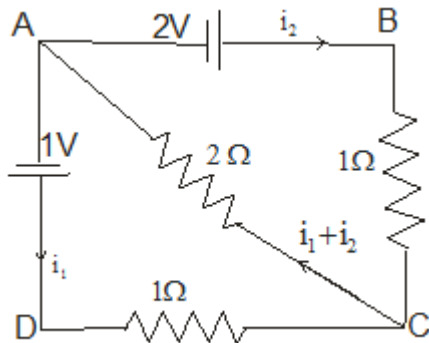
7. A circuit is shown in below figure



a) Find the current in the  $3\Omega, 4\Omega, 2\ \Omega$

b) What is the PD across  $4\ \Omega$  resistors

8. An electrical circuit is shown in the below figure. The internal resistance of the cells is negligible. Find the current in the each resistor



9. The potential difference across a cell is 1.8 V when a current of .5 A is drawn from it. The PD falls to 1.6 V volt when a current of 1.0 A is drawn .Find the EMF and internal resistance of the cell ( ans  $E=2$  volt and  $r=.4$  ohm)

10. What is the resistance of a 1000W 120 V toaster?