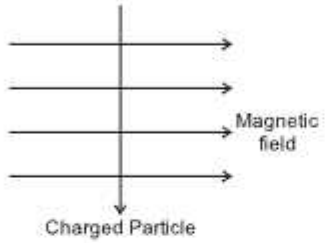
4 : Magnetic Effects of Electric Current

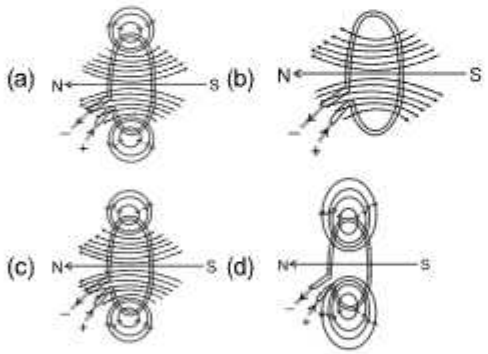
1. Why is a series arrangement not used for connecting domestic electrical appliances in a circuit? **[2008] ...[1M]**

2. A charged particle enters at right angles into a uniform magnetic field is shown. What should be the nature of charge on the particle if it begins to move in a direction pointing vertically out of the page due to its interaction with the magnetic field? **[2010] ...[1M]**

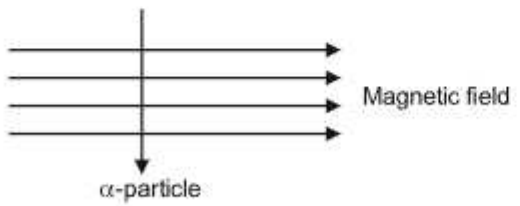


3. What is the function of a galvanometer in a circuit? **[2019] ...[1M]**

4. The correct pattern of magnetic field lines of the field produced by a current carrying circular loop is: **[2023] ...[1M]**



5. An alpha particle enters a uniform magnetic field as shown. The direction of force experienced by the alpha particle is: **[2023] ...[1M]**



(a) Towards right

(b) Towards left

(c) Into the page

(d) Out of the page

6. **A :** A current carrying straight conductor experiences a force when placed perpendicular to the direction of magnetic field. **[2023] ...[1M]**

R : The net charge on a current carrying conductor is always zero.

(a) Both (A) and (R) are true and (R) is the correct explanation of (A)

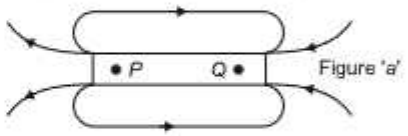
(b) Both (A) and (R) are true but (R) is not the correct explanation of (A)

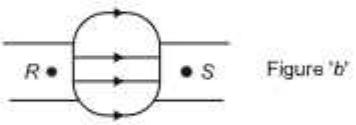
(c) (A) is true but (R) is false

(d) (A) is false but (R) is true

7. What is meant by the term, 'magnetic field'? Why does a compass needle show deflection when brought near a bar magnet? **[2008] ...[2M]**

8. (a) Name the poles *P*, *Q*, *R* and *S* of the magnets in the following figures 'a' and 'b':





(b) State the inference drawn about the direction of the magnetic field lines on the basis of these diagrams. **[2022] ...[2M]**

OR

When is the force experienced by a current - carrying straight conductor placed in a uniform magnetic field **[2022] ...[2M]**

(i) Maximum ;

(ii) Minimum ?

9. (a) Distinguish between the terms 'overloading' and 'short-circuiting' as used in domestic circuits.

(b) Why are the coils of electric toasters made of any alloy rather than a pure metal?

[2008] ...[3M]

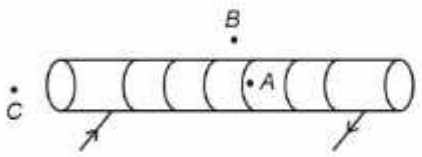
10. (A) (i) Why is an alternating current (A.C.) considered to be advantageous over direct current (D.C.) for the long distance transmission of electric power?

(ii) How is the type of current used in household supply different from the one given by a battery of dry cells?

(iii) How does an electric fuse prevent the electric circuit and the appliances from a possible damage due to short circuiting or overloading. **[2023] ...[3M]**

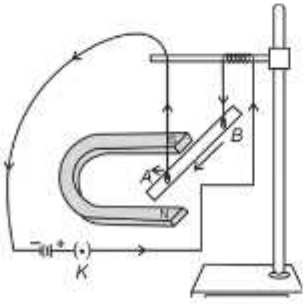
OR

(B) For the current carrying solenoid as shown, draw magnetic field lines and give reason to explain that out of the three points *A*, *B* and *C*, at which point the field strength is maximum and at which point it is minimum?



11. ***Case Study Based Questions :***

A student was asked to perform an experiment to study the force on a current carrying conductor in a magnetic field. He took a small aluminium rod *AB*, a strong horse shoe magnet, some connecting wires, a battery and a switch and connected them as shown. He observed that on passing current, the rod gets displaced. On reversing the direction of current, the direction of displacement also gets reversed. On the basis of your understanding of this phenomenon, answer the following questions: **[2022] ...[4M]**



(a) Why does the rod get displaced on passing current through it?

(b) State the rule that determines the direction of the force on the conductor *AB*.

(c) (i) If the U shaped magnet is held vertically and the aluminium rod is suspended horizontally with its end *B* towards due north, then on passing current through the rod from *B* to *A* as shown, in which direction will the rod be displaced?

(ii) Name any two devices that use current carrying conductors and magnetic field.

OR

Draw the pattern of magnetic field lines produced around a current carrying straight conductor held vertically on a horizontal cardboard. Indicate the direction of the field lines as well as the direction of current flowing through the conductor.

12. (a) What is a magnetic field? How can the direction of magnetic field lines at a place be determined?

(b) State the rule for the direction of the magnetic field produced around a current carrying conductor. Draw sketch of the pattern of field lines due to a current flowing through a straight conductor. **[2009] ...[5M]**

13. (a) What is a solenoid? Draw a sketch of the pattern of field lines of the magnetic field through and around a current carrying solenoid.

(b) Consider a circular loop of wire lying in the plane of the table. Let the current pass through the loop clockwise. Apply the right hand rule to find out the direction of the magnetic field inside and outside the loop. **[2009, 2010] ...[5M]**

14. State Fleming's left hand rule. **[2018] ...[1M]**

15. What is a solenoid? Draw the pattern of magnetic field lines of **[2019] ...[5M]**

(i) A current carrying solenoid and

(ii) A bar magnet.

List two distinguishing features between the two fields.

16. (a) What is an electromagnet? List any two uses.

(b) Draw a labelled diagram to show how an electromagnet is made.

(c) State the purpose of soft iron core used in making an electromagnet.

(d) List two ways of increasing the strength of an electromagnet if the material of the electromagnet is fixed. **[2020] ...[5M]**