Maxprap. Chapter wise Series Class 10th – Physics

Class : 10th **Topic : Magnetic Effect of Electric Current**

Max. Marks : 50 **Duration : 2 Hrs**

Sections: A (MCQs), B (Short Answer-I), C (Short Answer-II), D (Long Answer), E (Case-Based).

General Instructions:

(i). All questions are compulsory.

(ii). This question paper contains 23 questions divided into five Sections A, B, C, D and E. (iii). Section A comprises of 10 MCQs of 1 mark each. Section B comprises of 5 questions of 2 marks each. Section C comprises of 4 questions of 3 marks each. Section D comprises of 2 question of 5 marks each and Section E comprises of 2 Case Study Based Questions of 4 marks each.

(iv). There is no overall choice.

Section A

Questions 1 to 10 carry 1 mark each

1. The direction of force acting on a current carrying conductor placed in a magnetic fieldcan be obtained by:

a) Fleming's right hand rule. b) Clock face rule.

c) Fleming's left hand rule. d) Ampere's swimming rule.

2. The magnetic field inside a long straight current carrying solenoid:

a) increases as we move towards its end. b) is zero.

c) is same at all points. d) decreases as we move towards its end.

3. The fuse wire should have

a) Low resistance, High melting point b) High resistance, Low melting point

c) High resistance, High melting point d) Low resistance, Low melting point

4. The magnetic field lines due to straight wire carrying a current are

a) Straight b) Circular c) Elliptical d) Parabolic

5. When a coil carries current in an anti clockwise direction what pole does it create?

a) South pole b) Zero pole c) North pole d) both South pole and North pole

6. A positively - charged particle (alpha - particle) projected towards west is deflected towards north by a magnetic field. The direction of magnetic field is:

a) upward b) downward c) towards south d) towards east

7. Strength of magnetic field produced by a current carrying solenoid **DOES NOT** depend upon:

a) material of core of the solenoid b) radius of solenoid

c) number of turns in the solenoid d) direction of the current flowing through it

8. The strength of the magnetic field produced inside a current carrying long straight solenoid does **not** depend upon:
a) Area of cross - section of the tube of the solenoid
b) Material of the core of the solenoid
c) Direction of current flowing through the coil of the solenoid
d) Number of turns per unit length in the solenoid

Assertion(A)/Reason(R) Based (9-10): In the following questions, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.
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.

9. **Assertion (A):** The magnetic field lines around a current carrying straight wire do not intersect each other.
Reason (R): The magnitude of the magnetic field produced at a given point increases as the current through the wire increases.

10. **Assertion (A):** Electric appliances with metallic body have three connections, whereas an electric bulb has two pin connections.
Reason (R): Three - pin connections reduce heating of connecting wires.

SECTION – B

Questions 11 to 15 carry 2 marks each

11. State the rule to determine the direction of a (a) magnetic field produced around a straight conductor carrying current and (b) force experienced by a current carrying straight conductor placed in a magnetic field which is perpendicular to it.

12. Name the poles P, Q, R and S of the magnets in the following figures **a** and **b**

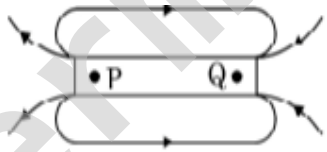


Figure 'a'

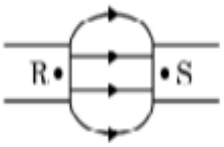


Figure 'b'

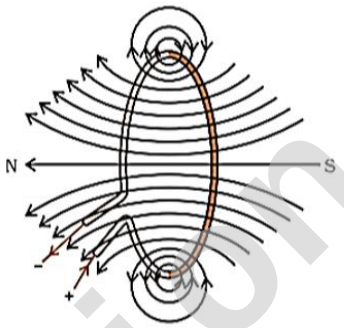
13.
a) Name two safety measures commonly used in electric circuits and appliances.
b) The power rating of an electric oven is 220 V; 2 kW. If it is used in a domestic electric circuit of current rating of 5 A, what result do you expect? Justify your answer with necessary calculations.

14. What is a solenoid? Draw a diagram to show the pattern of magnetic field around a current carrying solenoid. Name the region of uniform magnetic field.

15. Why does a current carrying conductor kept in a magnetic field experience force? What is the direction of force acting on the conductor?

SECTION – C

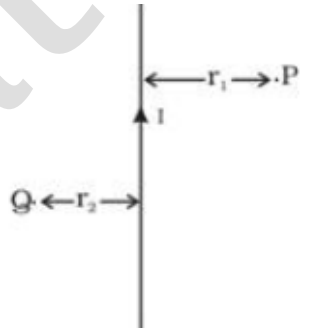
Questions 16 to 19 carry 3 marks each



16. Magnetic field lines of the field produced by a current - carrying circular loop are shown in the figure. By analyzing the concept of magnetic field and magnetic field lines answer the following questions:

a) How is the direction of the magnetic field at a point determined?

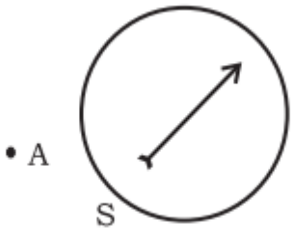
b) What is the direction of the magnetic field at the centre of a current - carrying circular loop?



17. AB is a current carrying conductor in the plane of the paper as shown in Figure.

a) What are the directions of magnetic fields produced by it at points P and Q?

b) Given $r_1 > r_2$, where will the strength of the magnetic field be larger?



18. A magnetic compass needle is placed in the plane of paper near point A as shown in the figure.

a) In which plane should a straight current - carrying conductor be placed so that it passes through A and there is no change in the deflection of the compass?

b) Under what condition is the deflection maximum and why?

19.

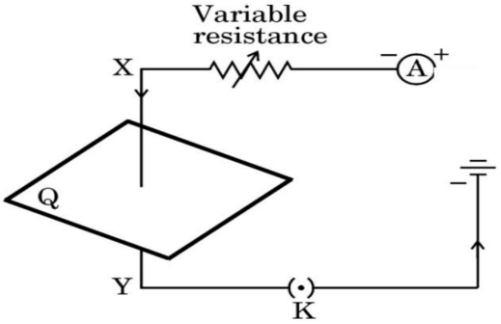
a) Draw the pattern of magnetic field lines around a bar magnet. Mark the position of North Pole, South Pole and the places where the magnetic field is strongest.

b) Why do the magnetic field lines not intersect each other?

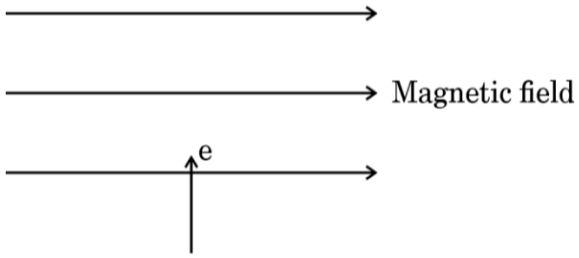
SECTION – D

Questions 20 to 21 carry 5 marks each

20. The given figure shows the current passing through the straight conductor XY.



a) Copy the diagram and draw the magnetic field lines when current flows from conductor X to Y.
b) Name and state the rule used in determining the direction of the magnetic field lines in the situation given above.
c) State Fleming's left hand rule. Using this rule, determine the direction of force applied on an electron entering a uniform magnetic field as shown in the figure.

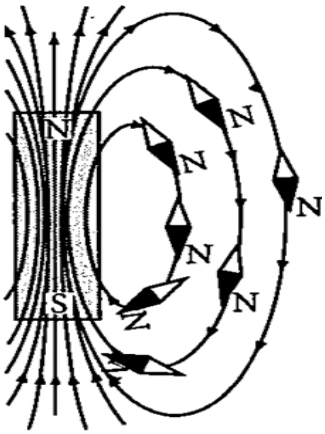


21.
a) State Fleming's Left - hand rule.
b) List three characteristic features of the electric current used in our homes.
c) What is a fuse? Why is it called a safety device?
d) Why is it necessary to earth metallic electric appliances?

SECTION – E (Case Study Based Questions)

Questions 22 & 23 carry 4 marks each

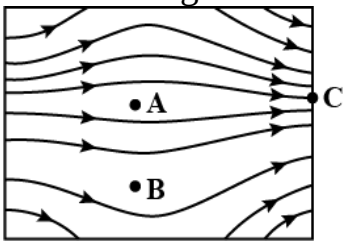
22. **Read the following text carefully and answer the questions that follow:**



A magnetic field is described by drawing the magnetic field lines. When a small north magnetic pole is placed in the magnetic field created by a magnet, it will experience a force. And if the north pole is free, it will move under the influence of the magnetic field. The path traced by a north magnetic pole free to move under the influence of a magnetic field is called a magnetic field line.

Since the direction of the magnetic field line is the direction of the force on a north pole, so the magnetic field lines always begin from the N - pole of a magnet and end on the S - pole of the magnet. Inside the magnet, however, the direction of magnetic field lines is from the S - pole of the magnet to the N - pole of the magnet. Thus, the magnetic field lines are closed curves. When a small compass is moved along a magnetic field line, the compass needle always sets itself along the line tangential to it. So, a line drawn from the south pole of the compass needle to its north pole indicates the direction of the magnetic field at that point.

a) The figure shows the magnetic field lines in a magnetic field. A, B., and C are three points in this field. At what point is the magnetic field strength? (1)



b) Do the magnetic field lines intersect? if not why? (1)

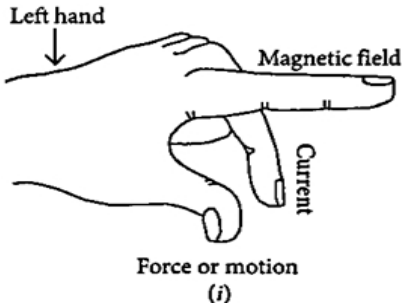
c) A strong bar magnet is placed vertically above a horizontal wooden board. What would be the magnetic lines of force? (2)

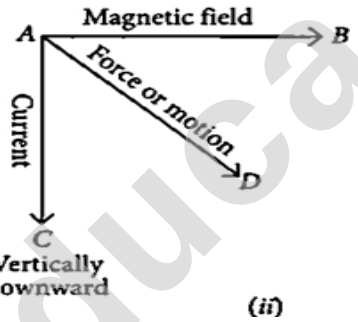
OR

Draw the pattern of magnetic field lines for a bar magnet. (2)

23. **Read the following text carefully and answer the questions that follow:**

Andre Marie Ampere suggested that a magnet must exert an equal and opposite force on a current - carrying conductor, which was experimentally found to be true. But we know that current is due to charges in motion. Thus, it is clear that a charge moving in a magnetic field experience a force, except when it is moving in a direction parallel to it. If the direction of motion is perpendicular to the direction of magnetic field, the magnitude of force experienced depends on the charge, velocity (v), strength of magnetic field (B), and sine of the angle between v and B. Direction of magnetic force is given by Fleming's left - hand rule.

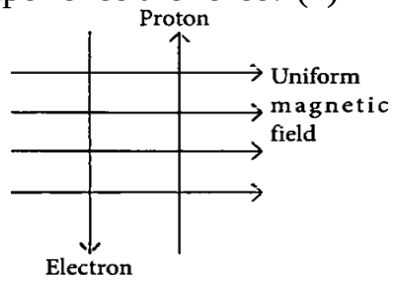




d) If an electron is travelling horizontally towards east. A magnetic field in vertically downward direction exerts a force on the electron along which direction? (1)

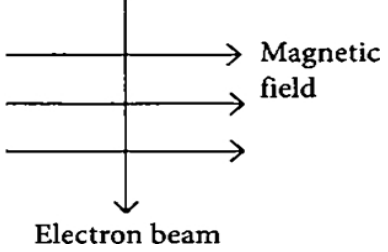
e) A charged particle is moving with velocity v in a magnetic field of induction B. The force on the particle will be maximum when (1)

f) A uniform magnetic field exists in the plane of paper pointing from left to right as shown in figure. In the field, an electron and a proton move as shown. Where do theelectron and the proton experience the force? (2)



OR

An electron beam enters a magnetic field at right angles to it as shown in the figure. What would be the direction of force acting on the electron beam? (2)



Magnetic Effect of Electric Current Paper Details – Analysis		
Objective Questions		
MCQ	1 marks x 8 question = 8	
Assertion Reason	1 marks x 2 question = 2	
Subjective		
Short type I	2 marks x 5 question = 10	
Short type II	3 marks x 4 question = 12	
Long Type	5 marks x 2 question = 10	
Case Studies Based		
Case 1	4 marks	
Case 2	4 marks	

Total = 50 marks Your Score =