DEPARTMENT OF EDUCATION (S)
Government of Manipur

CLASS X
PHYSICS
CHAPTER 9 – MAGNETISM

SOLUTIONS

TEXTUAL QUESTIONS AND ANSWERS
EXERCISES

Q1. Draw a sketch to show the magnetic lines of force due to a current carrying straight conductor.

Ans-

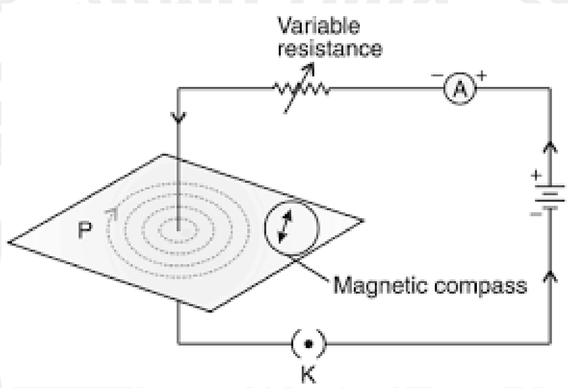


Fig. Diagram showing magnetic lines of force due to a current carrying straight conductor

Q2. Draw the magnetic lines of force due to a circular wire carrying current.

Ans-

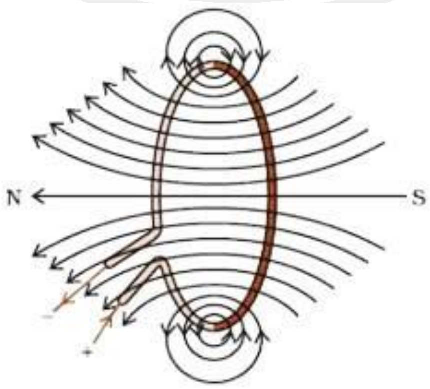


Fig. Diagram showing magnetic lines of force due to a circular wire carrying current

Q3. State the effect of inserting an iron core into a current carrying solenoid.

Ans- In a current carrying solenoid, the strength of the field is the greatest inside. When a soft iron-piece is inserted into the solenoid, the soft iron piece gets magnetised and behaves as an **electromagnet**.

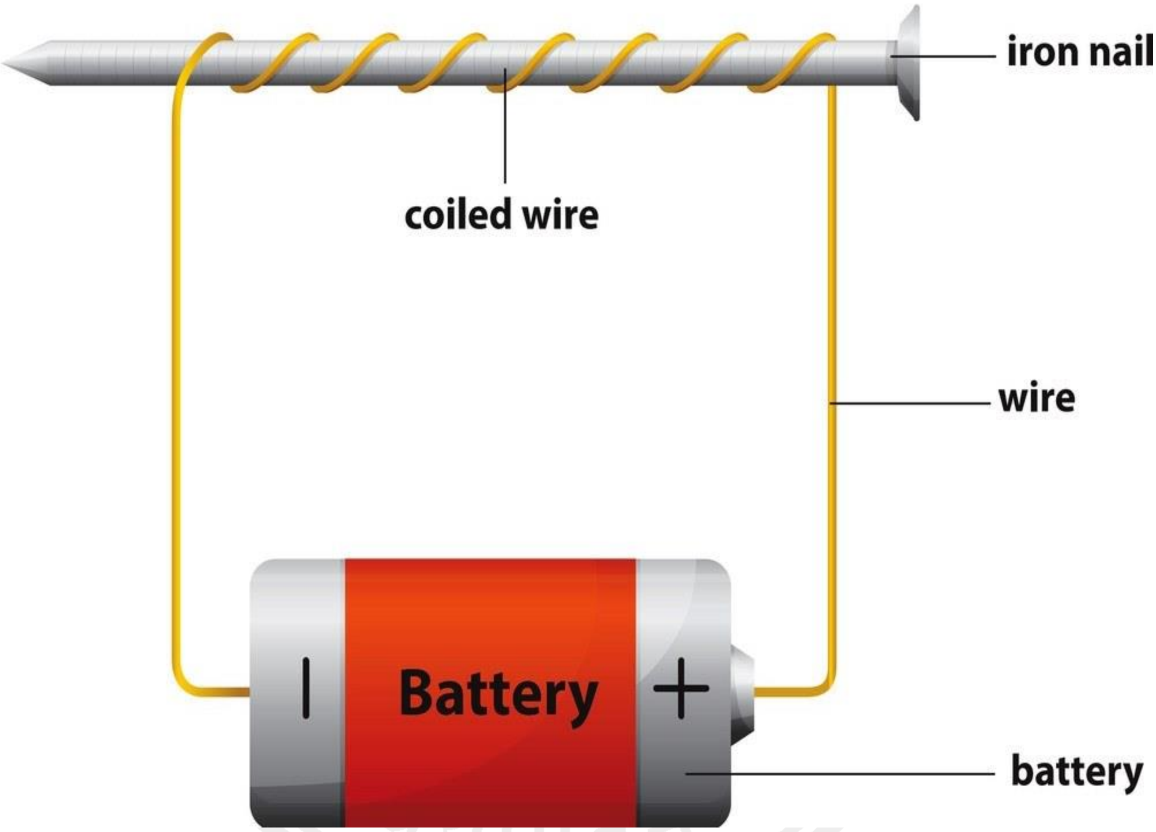


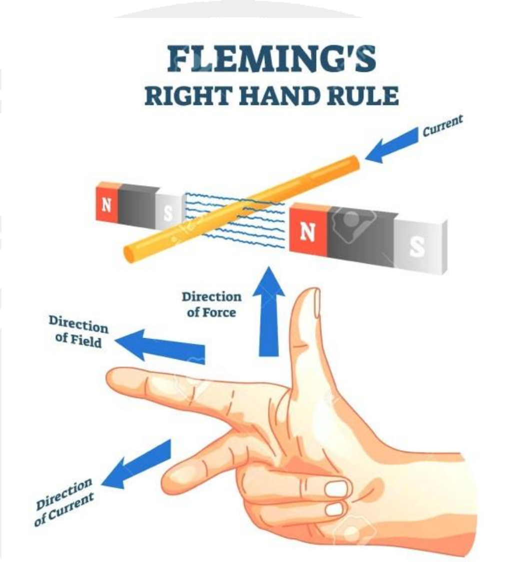
Fig. A Simple Electromagnet

Q4. Describe how you will locate a current carrying wire embedded in a wall.

Ans- A current carrying wire embedded in a wall produces a magnetic field and can exert a force on a magnet .So when a compass needle is brought near the wall the needle will deflect. Thus, we can locate a current carrying wire embedded in a wall.

Q5. State right hand thumb rule.

Ans- Right hand thumb rule: A current carrying conductor is held with the right hand such that the thumb points towards the direction of the current in the conductor. Then the direction in which the other fingers curl gives the direction of the magnetic field.



Q6. What is a solenoid? Draw a sketch to show the magnetic lines of force produced by a current carrying solenoid.

Ans- A solenoid is a long coil of many circular turns of insulated copper wire wrapped closely in the shape of cylinder whose radius is very small in comparison with the length of the winding.

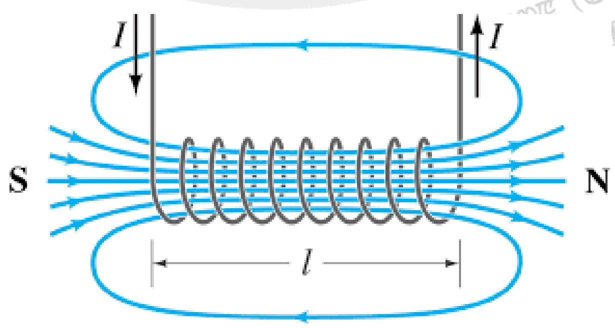


Fig.Magnetic lines of force produced by a current carrying solenoid.

Q7. What is an electric motor? With the help of a diagram, describe the working of an electric motor.

Ans - An electric motor is a rotating device which can convert electrical energy into mechanical energy.

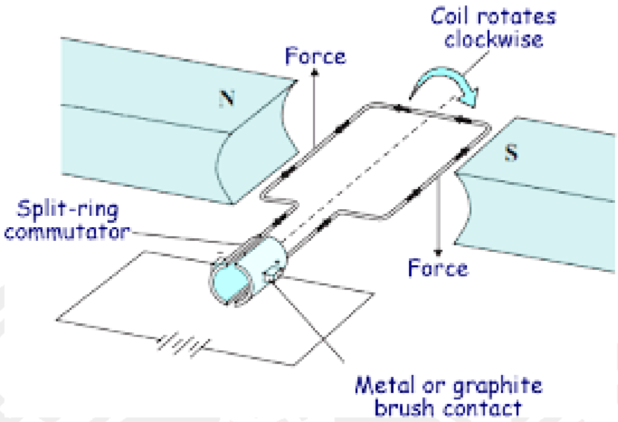


Fig. Working of an Electric Motor

Construction:

An electric motor consists of a coil of insulated copper wire. The copper wire is tightly wound over a soft iron core to form a coil of a large number of turns called armature. The armature is fixed on the shaft of the motor. The coil is placed between the N-S poles of a strong permanent magnet. The ends of the coil are connected to the two halves of a split ring. The external conducting edges of the split ring touche two conducting brushes. The brushes are connected to a battery.

Working Principle:

When a current carrying conductor is placed in a magnetic field, it experiences a force whose direction is given by Fleming's left hand rule.

Working:

During the first half-rotation of the coil the armature moves up and down across the magnetic field which produces current through the coil by Fleming’s left hand rule.

In the next half-rotation of the coil, the armature moves up and down in the opposite direction across the magnetic field that produces current.

Therefore the coil and the shaft together rotates half a turn more in the same direction. The reversing of direction of a current flow is repeated at each half-rotation and it gives rise to a continuous rotation of the armature so long as the current passes through it.

Q8.What is the function of commutator in an electric motor?

Ans- The commutator changes the direction of the current flow through the circuit for every half-rotation.

Q9.A magnetic line of force is used to show the direction of

(A) south-north (B) a bar magnet (C) a compass needle (D) magnetic field

Ans- (D) magnetic field

Q10.The magnetic lines of force inside a solenoid due to an electric current in it are nearly

(A) straight lines (B) circular lines (C) parabolic lines (D) elliptic lines

Ans- (A) straight lines

Q11. If the number of turns in a solenoid is increased ,the strength of the electromagnet so formed will

(A) decrease (B) increase (C) remain constant (D) become zero

Ans- (B) increase

TRY TO ANSWER SECTION

Q1.Why don't two magnetic lines of force belonging to the same field intersect each other?

Ans- If two magnetic lines of force intersect then there will be two tangents and hence two directions of magnetic field at the point of intersection-which is impossible.

Q2. Write the properties of magnetic lines of force.

Ans- Properties of Magnetic lines of Force:

1. Two lines of force never intersect each other.
2. They are closed and continuous curve.
3. The field lines are closer in the region of stronger magnetic field.
4. The direction of the magnetic field lines is from north to south.
5. The direction of the magnetic field lines inside the magnet is from south to north.

Q3. State Fleming's left hand rule.

Ans- If the thumb, forefinger and middle finger of the left hand are stretched mutually perpendicular to each other such that the forefinger points in the direction of magnetic field and middle finger points in the direction of current, then the thumb gives the direction of force acting on the conductor carrying current.

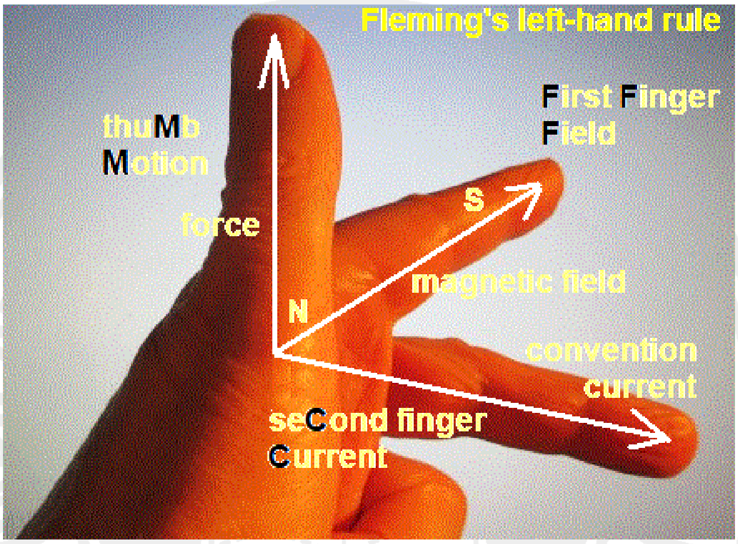


Fig. Fleming's left hand rule

Q4. What is the principle of an electric motor?

Ans- If a current carrying conductor is placed in a magnetic field, a force acts on the conductor.

Q5. What is the role of commutator?

Ans- The role of commutator is to reverse the direction of current at every half- rotation of the coil.

EXTRA QUESTIONS & ANSWERS

Q1. What is the role of two conducting stationary brushes in a simple electric motor?

Ans- The brushes provides electrical contact between the commutator and terminals of the external battery.

Q2. How can the strength of the magnetic field produced by a current carrying circular coil be increased?

Ans- The strength of the magnetic field produced by a current carrying circular coil can be increased by increasing.

1) the number of turns of the coil

2) the current in the coil

3) the radius of the circular coil.

Q3. How can we increase the strength of the electromagnet?

Ans- **1.** By increasing the number of turns of the coil

2. By increasing the strength of the current

Q4. Give some points of difference between an electromagnet and a permanent magnet.

Ans-

DIFFERENCE	
Electromagnet	**Permanent magnet**
1. It is a temporary magnet	1. It is permanent magnet
2. It produces very strong magnetic field	2. It produces much weaker field
3. Its strength can be easily varied by changing the strength of the current	3. Its strength cannot be changed.
4.The polarity of an electromagnet can be reversed by reversing the direction of the current	4. The polarity of a permanent magnet cannot be changed.

Q5. How can you increase the power of an electric motor?

Ans:

i) By using an electromagnet in place of permanent magnet.

ii) By increasing the number of turns of the coil.

iii) By winding the coil on a soft iron core.

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