



CLASS X
PHYSICS
CHAPTER 10 – ELECTROMAGNETIC INDUCTION

SOLUTIONS

TEXTUAL QUESTIONS AND ANSWERS
EXERCISES

Q1. A coil of copper wire is connected to a galvanometer. What would happen if a bar magnet is?

- i) Pushed into the coil very slowly?**
- ii) Pushed into the coil very rapidly?**
- iii) Held at rest inside the coil?**
- iv) Pulled out again rapidly?**

Ans:

- i)** When the bar magnet is pushed into the coil very slowly, the needle of the galvanometer slightly deflects due to the presence of negligible induced current in the coil.
- ii)** When the bar magnet is pushed into the coil very rapidly, the needle of the galvanometer highly deflects in one direction.
- iii)** When the bar magnet is held at rest inside the coil, there will be no deflection in galvanometer needle.
- iv)** When the bar magnet is pulled out again rapidly there will be momentary deflection but in a direction opposite to that when magnet was pushed.



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Q2. State the principle of the electric generator.

Ans: Electric generator works on the principle of electromagnetic induction.

Q3. Explain with diagram the action of either AC generator or DC generator.

Ans: **An AC generator** converts the mechanical energy into electrical energy on the principle of electromagnetic induction.

Working:

When the armature rotates, the magnetic field linked with it changes and an electric current is induced in the coil.

During the first half rotation of the coil, the armature moves up and down across the magnetic field which produces current through the coil.

And, during the next half rotation of the coil, the armature moves up and down in the opposite that produces current.

In doing so, the currents are alternately collected by the brushes and AC(alternating current) is generated.

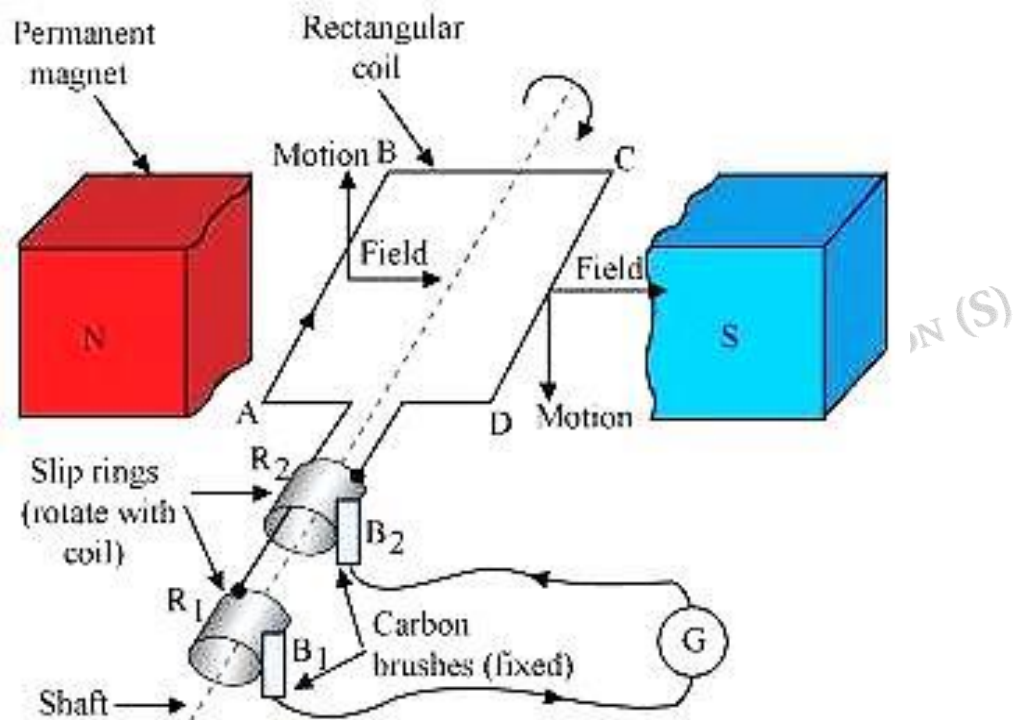


Fig. AC generator



DC Generator: In this generator a split ring is used to produce the current in the same direction. And it is based on the principle of electromagnetic induction. When the coil rotates in the uniform magnetic field, the field through the coil changes and an induced emf is produced in the coil.

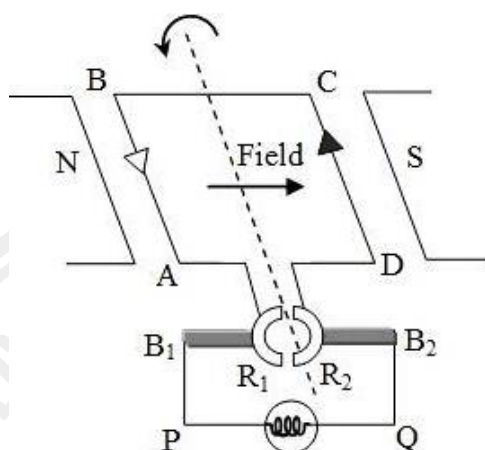


Fig. 2 DC generator

During the first half of rotation the induced current passes from the coil to the external circuit through one brush returning through the other brush.

During the next half rotation of the coil, the brushes are interchanged. In this half cycle, the current changes direction. Hence, the direction of the current is unidirectional in the external circuit.

Q4. Distinguish between AC and DC generator

Ans:

- i) In AC generator, the directions of the electric current reverses periodically while in DC the current flows in one direction only.
- ii) In AC generator, there are two metal slip rings connected to the terminals of the coil separately while in DC generator there are two halves of a split ring connected to the terminals of the coil.
- iii) In AC generator, the two metal brushes are in contact with the two rings separately, while in DC generator, the brushes are in contact with the two halves of a split ring alternately at every half rotation of the coil.



Q5. What is the purpose of Fleming Right Hand rule?

Ans: The purpose of Fleming's Right Hand rule is to determine the direction of the induced current generated by a generator.

Q6. A dynamo converts energy from one form to another. Name the two forms of energy in proper sequence.

Ans: The two forms of energy are the mechanical energy and electrical energy.

Q9. Name two devices in which the principle of electromagnetic induction is used.

Ans: The devices are generator, microphone, electric guitar etc.

Q10. Many electrical appliances and circuits are earthed? What is the reason?

Ans: The earth wire is connected to the metallic body of the appliances. If the live wire touches the metallic body of appliances, the current directly passes to the earth preventing severe electric shocks.

Q11. What is the usual colour code followed for connecting live, neutral and earth wire?

Ans: The usual colour codes are given below:

- i) Live line – Red insulation.
- ii) Neutral line – Black insulation.
- iii) Earth line – Green insulation.

Q12. What is meant by overloading in an electric supply? How can it be prevented?

Ans: When the total current drawn by all the appliances at a particular time exceeds the bearing capacity of the connecting wires, the wires get heated to a very high temperature and may cause fire. This is called overloading.

Prevention- i) Proper fuse should be used.

ii) All wires in the circuit should be well insulated.

Q13. What precautions should be taken to avoid overloading of domestic electric circuits?

Ans: The precautions to avoid overloading of domestic electric circuits are as follows –

- i) All household wires must be of good quality and properly insulated.
- ii) There should be division of circuits into different sections.
- iii) Electric fuse should be used in each section.



Q14. Why is material of low melting point chosen for fuse wire?

Ans: A material of low melting point is chosen for fuse wire because whenever a high current flows in a circuit due to overloading or short circuiting, the fuse wire gets heated and melts. Thus the circuit is disconnected from the main supply line.

Q15. What is short circuiting? Mention the possible consequences of short circuiting.

Ans: Short Circuiting –It is the direct connection of the live and neutral wires.

Consequences – Whenever there is short circuiting, wires may be overloaded and sparking may occur which may cause a fire.

Q16. Explain two safety measures commonly used in electric circuit and appliance.

Ans: The two safety measures are –

- i) All wires used in domestic electric circuits are coated with a layer of insulating material like rubber or plastic.
- ii) Fuse must be used.

Q17. What are the advantages of parallel connection of the domestic appliances in house hold wiring?

Ans: - Advantages of parallel connection –

- i) The parallel connection provides the same voltage to all the appliances.
- ii) When one of the components gets fused, the other components are not affected.
- iii) In parallel connection, the total resistance is less than the least of the individuals. So total current drawn from the mains will be increased. Thus, each appliance will get necessary power to function properly.

Q18. For domestic wiring, give reasons why sections are separated.

Ans: i) It makes easy when repairing.

ii) It prevents from damages in huge scale.

Q19. In a switchboard there are three switches no socket or any other element. How many wires will be going in the switch board?

Ans: Four wires will be going in the switch board, one for main line and other three lines for the switches used.



Q20. Is it possible to step up DC using a transformer?

Ans: No, it is not possible to step up DC using a transformer.

Q21. What is the use of a commutator in generator?

Ans: In generator, a commutator is used to produce the current in the same direction.

Q22. Mention an important advantage of AC over DC.

Ans: Important advantage of AC over DC is given below –

- i) Voltage of AC can be stepped up or down easily with the help of a device called transformer. So, energy loss in long distance transmission can be minimised by stepping up the voltage and reducing the current.
- ii) AC can be converted to DC more easily.

Q23. Name three main types of power plants.

Ans: Three main types of power plants are:

- i) Hydro power plant.
- ii) Thermal power plant.
- iii) Nuclear power plant.

Q24. Which device is used to change the A.C voltage?

Ans: Transformer

Q25. In thermal power plant, how is the turbine rotated?

Ans: In a thermal power plant, water is boiled using coal as fuel. Steam is produced at high pressure in the boiler and it is used to spin the turbine.

Q26. How is the turbine rotated in a Hydel Power Plant?

Ans: In Hydel power plant, water at the higher level is allowed to fall on the blades of the turbine. The pressure of the water makes the blades of the turbine move making the armature (coil) of the generator rotate with a great speed.

Q27. What is the basic difference between thermal power plant and Hydel power plant?

Ans: In Hydel Power plant, the flow of water rotates the turbine while in the thermal power plant, steam is used to rotate the turbine.



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Q28. How is the core of the coil of a Genset rotated to produce electricity?

Ans: In a Genset diesel, petrol or kerosene engine is used to rotate the armature coil of the generator that produces electricity.



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