

ELECTROMAGNETIC INDUCTION

(Notes for Revision)

1 mark each:

Q. What is electromagnetic induction?

Ans: - When there is a change in the number of magnetic lines of force linked with a coil, an induced emf is developed in the coil. This phenomenon is known as electromagnetic induction.

Q. What is short circuiting?

Ans: - An unwanted situation in domestic circuit in which a large current beyond permissible range flows through the circuit due to the direct contact of live wire and neutral wire.

Q. What is overloading?

Ans: - An unwanted situation in domestic circuit in which a large current beyond permissible range flows through the circuit due to a number of high power electric appliances are operated at the same time.

Q. Why is electricity transmitted at higher voltage from power station?

Ans: - To minimize the loss of energy in the transmission line in the form of heat, electricity is transmitted at high voltage from power station.

Q. What is the principle of generator?

Ans: - Electric generator works on the principle that whenever there is a relative motion between a coil and a magnet, an induced current is developed in the coil.

Q. What is the role of commutators in DC motor?

Ans: - To give electrical connector between the source of electricity, i.e., battery and coil.

Q. Why is fuse wire made of material having low melting point?

Ans: - It is because whenever a high current flows in a circuit, the fuse gets heated then melts and disconnects the circuit from main line.

Q. State Fleming's Right Hand Rule.

Ans: - Stretch the thumb, the forefinger, and the middle finger of right hand, so that they are mutually perpendicular to each other. If the thumb shows the direction of the motion of the conductor and the forefinger indicates the direction of the magnetic field, then the middle finger will show the direction of induced current in the conductor.

2 marks each:

Q. What happens to a galvanometer connected to a coil when a bar magnet is

i) pushed towards the coil rapidly?

ii) held at rest inside the coil?

Ans: -

1. There is a momentary deflection in the galvanometer since current flows.
2. There is no deflection in the galvanometer since no current flows.

Q. What are the two ways by which induced current flows in a coil?

Ans: -

- i) By rotating the coil about the magnet.
- ii) By rotating the magnet about the coil.

Q. Why are electric appliances connected to the earth wires?

Ans: -

- i) To prevent from severe electric shock
- ii) To maintain the potential difference of the appliance as same as of the earth.

Q. Why are electric appliances connected in parallel?

Ans: -

- i) Each appliances have some voltage
- ii) When the resistance of one appliance gets fused or switched off, other will work.

Q. Write two differences between fuse wire and copper wire.

Ans: -

Fuse wire	Copper Wire
i) High resistivity	i) Low resistivity
ii) Low melting point	ii) High melting point

3 marks each:

Q. State the three results of Faraday's experiment on electromagnetic induction.

Ans: - The three results of Faraday's experiment on electromagnetic induction are:

- i) Whenever there is a relative motion between a coil and a magnet, an induced current flow in the coil.
- ii) The induced current lasts as long there is change in the magnetic lined of force linking with the coil.
- iii) The strength of the induced emf is directly proportional to the rate of change of magnetic lines of force linked with the coil.

Q. How can you increase the power of generator? Give three points.

Ans: -

- i) By increasing the speed of armature
- ii) By increasing the strength of the magnetic field
- iii) By increasing the number of turns in the coil.

Q. How is electricity produced in thermal power plants?

Ans: - In this power plant, water is boiled in a boiler by using coal as fuel. The resulting steam is used to drive the turbine of a generator and hence armature of the coil. Thus, electricity is produced from the generator.

Q. What is the difference between hydel power plant and nuclear power plant to generate electricity?

Ans: - In hydel power plant, water is released from a reservoir at a great height which is used to drive the turbine of a generator whereas in nuclear power plant, nuclear fission is used to produce steam and the resulting steam is used to rotate the turbine of a generator.

Q. In what respect does A.C. generator different from D.C. generator.

Ans: -

AC Generator	DC Generator
1. The direction of current reverses periodically.	1. The direction of current is one, i.e., uni directional.
2. Two slip rings are connected to the two terminals of the coil.	2. Two split rings are connected to the terminals of the coil.
3. Two brushes are in contact with the rings separately.	3. Two brushes are in contact with the rings alternately.

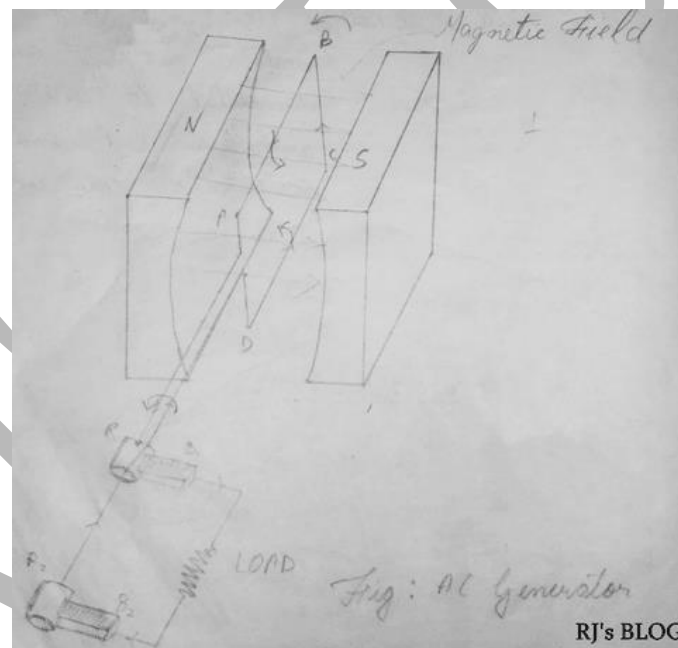
5 marks each:

Q. Describe the construction and working of an AC Generator with the help of a neat, labelled diagram.

Ans: - CONSTRUCTION:

- i) Two pole-pieces, North-South of a permanent magnet (Field Magnet)
- ii) An armature of a rectangular coil of insulated copper wire placed between the two poles.
- iii) Two similar rings are connected to the terminal of the coil, for output of energy.
- iv) Two melted brushes, B_1 and B_2 are in contact with the rings, R_1 and R_2 respectively.

DIAGRAM:



WORKING:

- i) At Start, the side AB is in the uppermost position and the side CD is in the lowermost position. When the armature rotates, the side AB is pushed down and the side CD is pushed upwards across the magnetic field by the Fleming's Right Hand Rule. According to electromagnetic induction, electric current flows along ABCD, through ring R_1 and R_2 respectively.

- ii) After half-cycle, the side AB occupies lowermost position and the side CD occupies uppermost position. As rotation continues, the side AB is pushed down and the side CD is pushed up across the magnetic field. According to Fleming's Right Hand Rule, current flows along DCBA through rings R_2 to R_2 alternately.

Q. Write five measures/precautions to be taken up while handling electric circuit.

Ans: - Five measures to be taken up are:

- i) Certain metallic appliances must be connected to the Earth wire.
- ii) All household wires must be of quality and properly insulated.
- iii) No direct handling must be done while repairing any part of a circuit.
- iv) The tools like tester, screw drivers, etc. used in repairing should have proper insulation.
- v) Electric fuse should be used in each section. Proper fuse should be used.

EXTRA:

Q. Despite of all precautions, if someone touches the live wire and get electric shock, what should be the immediate response to save the person?

Ans: - The steps to be taken are:

- i) One should try to provide such a person with a support of some non-conducting materials like dry-wood, plastic, rubber, etc.
- ii) One should try to pull away the person, who has contacted the live wire by not touching directly.
- iii) The first and most appropriate step is to switch off the current at once.

Q. A galvanometer is connected to the ends of a metal rod. The rod falls with its length horizontally east-west. What changes will you observe in the galvanometer? Explain the reason.

Ans: - When a metal rod falls towards the ground, there is a change of Earth's magnetic lines of force linked with the rod. Therefore, induced current is developed in the metal rod, and hence the needle of the Galvanometer will be deflected from its normal position.