MAGNETIC EFFECT OF ELECTRIC CURRENT
Faraday's Experiment for Electro Magnetic Induction

Faraday's Experiments:

Wind an insulated copper wire on a wooden cylinder so as to form a solenoid coil. Connect the two ends of the coil to the centre of galvanometer. A magnet is placed along the axis of the coil.

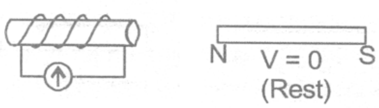
(i) When the magnet is stationary, there is no deflection in the galvanometer. The pointer reads zero as shown in figure (A).

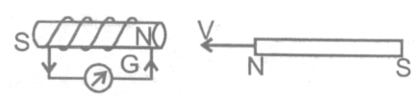
(ii) When the north pole of the magnet is brought near the coil, the current flows in the coil in direction shown in the figure (B) and the galvanometer shows the deflection towards the right.

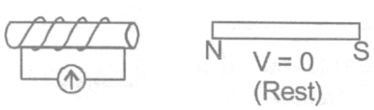
(iii) If we stop the motion of the magnet, the pointer of the galvanometer comes to the zero position as shown in figure (C). Thus, the current in the coil flows so long as the magnet is moving. If the magnet is taken away from the coil, the current again flows in the coil but in the direction opposite to that shown in figure (D) and therefore the pointer of the galvanometer deflects towards the left side.

(iv) If south pole of the magnet is brought towards the coil, the current in the coil flow in the direction opposite to that shown in figure (E) and so the pointer of the galvanometer deflects towards the left.

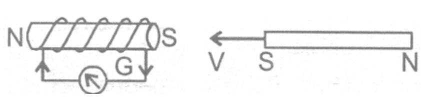
(v) Similar deflection is observed in the galvanometer if the magnet is kept stationary and the coil is moved.

(A)


(B)


(C)


(D)


(E)


From this experiment Faraday concluded that :

(i) The galvanometer shows a deflection (i.e. current flow in the coil) only when there is relative motion between the coil and the magnet.

(ii) The direction of deflection is reversed if the direction of motion is reversed.

(iii) The value of the current in the coil (i.e. deflection of the pointer) is increased by :

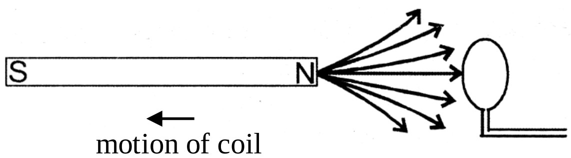
(A) The rapid motion of the magnet or the coil.

(B) the use of a strong magnet.

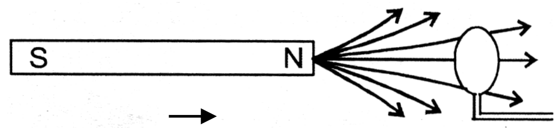
(C) increasing the area and number of turns in the coil.

When the magnet and coil are relatively at rest, the total number of magnetic lines of force due to the magnet passing through the coil (i.e. the magnetic flux linked with the coil) remains constant, therefore no e.m.f. is induced in the coil and the galvanometer shows no deflection.

When there is relative motion between the coil and magnet, the magnetic flux linked with coil changes. If the coil is moved towards the magnet, the magnetic flux through the coil increases as shown in fig. Due to change in magnetic flux linked with the coil, an e.m.f. is induced in the coil. This e.m.f. causes a current to flow if the circuit of the coil is closed.



motion of coil



motion of coil