Faraday's law of electromagnetic induction, also known as Faraday's law, is the basic law of electromagnetism which helps us predict how a magnetic field would interact with an electric circuit to produce an electromotive force (EMF). This phenomenon is known as electromagnetic induction.

Michael Faraday proposed the laws of electromagnetic induction in the year 1831. Faraday's law or the law of electromagnetic induction is the observation or results of the experiments conducted by Faraday. He performed three main experiments to discover the phenomenon of electromagnetic induction.

# Faraday's Laws of Electromagnetic Induction

Faraday's Laws of Electromagnetic Induction consists of two laws. The first law describes the induction of emf in a conductor and the second law quantifies the emf produced in the conductor

Faraday's First Law of Electromagnetic Induction

The discovery and understanding of electromagnetic induction are based on a long series of experiments carried out by Faraday and Henry. From the experimental observations, Faraday concluded that an emf is induced when the magnetic flux across the coil changes with time. Therefore, Faraday's first law of electromagnetic induction states the following:

Whenever a conductor is placed in a varying magnetic field, an electromotive force is induced. If the conductor circuit is closed, a current is induced, which is called induced current.

Changing the Magnetic Field Intensity in a Closed Loop
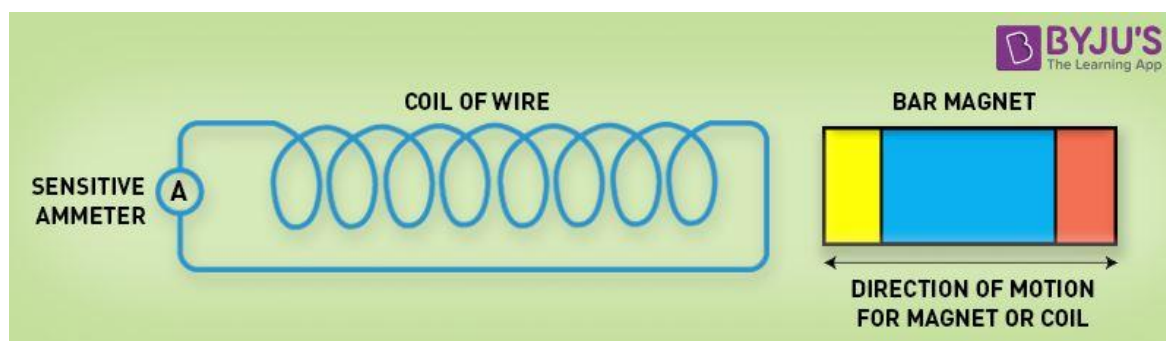
Magnetic field intensity in a closed loop

Mentioned here are a few ways to change the magnetic field intensity in a closed loop:

- By rotating the coil relative to the magnet.

- By moving the coil into or out of the magnetic field.
- By changing the area of a coil placed in the magnetic field.
- By moving a magnet towards or away from the coil.

Faraday's Second Law of Electromagnetic Induction

Faraday's second law of electromagnetic induction states that

The induced emf in a coil is equal to the rate of change of flux linkage. The flux linkage is the product of the number of turns in the coil and the flux associated with the coil. The formula of Faraday's law is given below:

$$\varepsilon = -N\, \Delta\phi/\Delta t$$

Where ε is the electromotive force, Φ is the magnetic flux, and N is the number of turns.