



- INDUCTOR: A COIL OF WIRE THAT GENERATES A MAGNETIC FIELD WHEN CURRENT IS PASSED THROUGH IT.

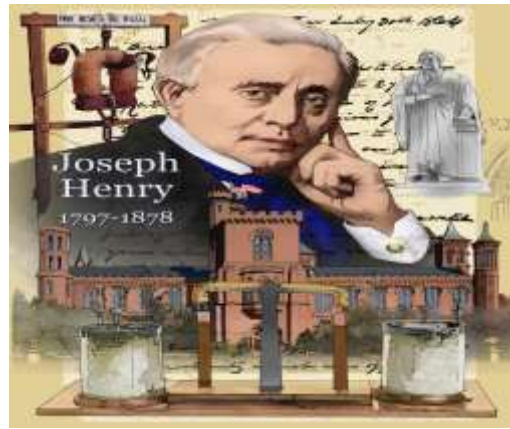
- THE STRENGTH OF THE MAGNETIC FIELD IS MEASURED IN HENRYS (H).

WHEN THE CURRENT IS CUT OFF, THE MAGNETIC FIELD EVANESCE IT "INDUCES" A BRIEF CURRENT IN THE OPPOSITE DIRECTION OF THE ORIGINAL. THUS, "INDUCTION" IS CAUSED BY THE OPENING AND CLOSING OF A DC CIRCUIT OR THE CONTINUOUSLY CHANGING DIRECTIONS IN AN AC CIRCUIT.

THUS, "INDUCTION" IS CAUSED BY THE OPENING AND CLOSING OF A DC CIRCUIT OR THE CONTINUOUS CHANGING OF DIRECTIONS IN AN AC CIRCUIT.

- INDUCTOR IS AN ELECTRIC DEVICE CONSISTING OF ONE OR MORE TURNS OF WIRE AND TYPICALLY HAVING TWO TERMINALS.

- AN INDUCTOR IS USUALLY CONNECTED INTO A CIRCUIT IN ORDER TO RAISE THE INDUCTANCE TO A DESIRED



JOSEPH HENRY

## Joseph Henry

While building electromagnets, Henry discovered the electromagnetic phenomenon of self-inductance. He also discovered mutual inductance independently of Michael Faraday, though Faraday was the first to make the discovery and publish his results. Henry developed the electromagnet into a practical device. He invented a precursor to the electric doorbell (specifically a bell that could be rung at a distance via an electric wire, 1831) and electric relay (1835). His work on the electromagnetic relay was the basis of the practical electrical telegraph, invented separately by Samuel F. B. Morse and Sir Charles Wheatstone. In his honor, the SI unit of inductance is named the henry (plural: henries; symbol: H).

# Inductance

Name of experiment: A.C. circuit with inductance and resistance





**AIM:**

- 1-Find Inductive reactance.
- 2- Find Induction coil.

**APPARATUSES**

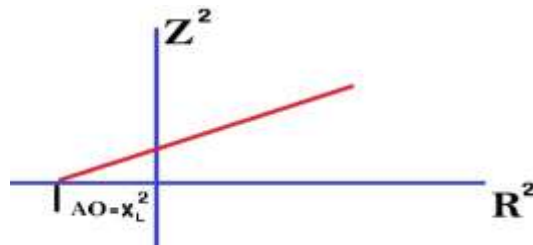
- 1-coil. 2- resistance box. 3-voltmeter A.C.
- 4- ammeter A.C.5- A.C. source.
- 5- connecting wires.

**TABLE OF DATA**

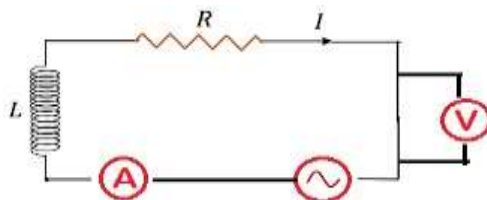
R(Ω)	I(AMP)	Z(Ω)	R <sup>2</sup>	Z <sup>2</sup>

WHERE V=220 VOLT, f=50Hz.

**GRAPH**



**DIAGRAM**



**METHOD**

CONNECT THE CIRCUIT AS SHOWN IN THE DIAGRAM, READ AND RECORD THE DATA ON THE TABLE THEN PLOT THE GRAPH TO FIND X<sub>L</sub> AND L OF THE COIL.

## INDUCTIVE REACTANCE

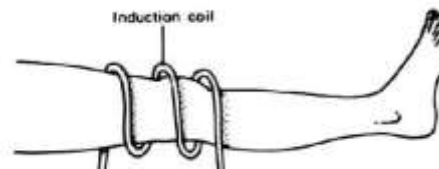
•INDUCTIVE REACTANCE IS DEFINED AS: -

$$X_L = 2\pi f L$$

WHERE XL IS THE INDUCTIVE REACTANCE IN OHM, F IS THE FREQUENCY IN HERTZ, AND L IS THE INDUCTANCE IN HENRYS.

### MEDICAL APPLICATIONS OF INDUCTANCE:

1. **IN INDUCTANCE METHOD OF SHORT-WAVE DIATHERMY:** - IT IS CONSIDERED ONE OF THE METHODS THAT ARE USED FOR TRANSFERRING THE ELECTROMAGNETIC ENERGY INTO THE BODY IN SHORT-WAVE DIATHERMY.



2. **IN MICRO ENGINE:** THE SOPHISTICATED ELECTRONICS OF THIS DENTAL LABORATORY UNIT, TOGETHER WITH THE RUGGED MOTOR HANDPIECE, GUARANTEE A WIDE RANGE OF APPLICATION IN DENTAL TECHNOLOGY.



## INDUCTANCE

•AN INDUCTOR IS A PASSIVE ELECTRICAL DEVICE THAT STORES ENERGY IN A MAGNETIC FIELD, TYPICALLY BY COMBINING THE EFFECTS OF MANY LOOPS OF ELECTRIC CURRENT.

•INDUCTANCE THE INDUCTOR'S INDUCTANCE (L) IS THE MEASUREMENT OF THE PERCENTAGE BETWEEN THE INDUCTIVE ELECTROMOTIVE FORCE IN INDUCTANCE (E.M.F.) AND THE TIME AVERAGE OF THE CURRENT CHANGE (ΔI/ΔT) THAT FLOW THROUGH IT: -

$$L = \frac{-e.m.f}{\Delta I / \Delta t}$$

•IN SI UNITS IS HENRY, SINCE THE HENRY IS A VERY LARGE UNIT, VALUES OF INDUCTORS ARE USUALLY EXPRESSED IN MICROHENRYS (μH), NANOHENRYS (NH) OR PICOHENRYS (PH).

•IN D.C. CIRCUIT COIL ACTS AS RESISTANCE.

•IN A.C. CIRCUIT COIL ACTS AS IMPEDAN

