Experiment 6:

To draw the characteristic curve of toriod coil and calculate power dissipation.

Apparatus:

- → Toriod
- → Battery
- → Digital meter
- → CRO
- → Two resistances
- → Capacitor
- → Connecting wires

Theory

Magnetic field

The magnetic field around a moving charge was formed by Danis Scientist "Han's Christian oersted". He showed that an electric current in wire deflects a merely compass needle. It means that an electric current in wire produces a magnetic field along it. The magnetic field is represented by magnetic field lines of forces concentric circles around the current carrying wire. The magnetic field is denoted by B and it is a vector quantity.

The field exists as long as the current continues to flow. The lines of forces are circular. The strength of magnetic field is greater near the wire and decreases as the distance increases from current carrying wire. The

direction of magnetic field is formed by right hand rule.

Magnetic field due to a toroidal solenoid

A long solenoid shaped in form of closed ring is called toroidal solenoid. let n be number of turns per unit length of toriod and I is current flowing through it. The magnetic lines of force inside the toroid are in form of concentric circles. By symmetry the magnetic field has same magnitude at each point of circle and is along the tagent at every point on the circle.

If we consider a circular path of radius r inside the toroid, then current closed by path is equal to zero. because each turn of winding passes twice through the asea enclosed by circular path of radius carrying equal and opposite currents. The magnetic field strength at all points outside the core of toroid is zero.

Types of magnetic material

There are three Types of magnetic materials
Fesro magnetic material
Dia magnetic material
Para magnetic material
Ferromagnetic material

The ferromagnetic materials are highly magnetize in a magnetic field. The examples of such materials are iron, nickel and cobalt.

Properties

They are highly attracted by magnets
A ferromagnetic rod, freely suspended in a magnetic field, turns fast to set along the applied field
The magnetic stability is positive and very high and varies with applied field.
Their relative permeability is very high in order of 1000 to 10,000
Each atom of ferromagnetic substance

has permanent magnetic substance in the non-magnatized state, the atomic and molecular dipoles are arranged in random So the net magnetic moment is zero There is a strong interaction with neighbouring atoms which keeps the magnetic moment alligned pasallel.

Diamagnetic material

These substances which are freely magnetized in the direction opposite to the applied field are called diamagnetic material. Examples of diamagnetic materials are bismuth, copper, water, mercury, alcohol etc. The magnetic moment of atoms of a diamagnetic material is zero. They acquire induced dipole moments when the material placed in an external magnetic field. These moments are in opposite in direction to the applied field.

Properties

These are repelled by magnets. They move from a stronger to weaker field.
They have small value for the intensity of magnetization.
These materials are independent of temperature.

Paramagnetic material

These materials are weekly magnetized in the same direction of applied magnetic field are called paramagnetic materials. These examples are aluminium, oxygen, maganese etc.

They have permanent magnetic moments these moments interacts weekly with each other and randomly orient in different direction.

Properties

They are feebly attracted by magnets

Their relative permeability is low in order of 0.10001 to 0.1003.

A paramagnetic rod, freely suspended in a magnetic field, aligns along field.

The susceptibility of paramagnetic substances have small positive value.