

# **ELECTRICAL MEASUREMENT & MEASURING INSTRUMENTS**

# UNIT 4 Part (ii)

## **MAGNETIC MEASUREMENT**

# DETERMINATION OF HYSTERESIS LOOP

- The magnetic properties of a material by studying by its hysteresis loop.
- A hysteresis loop shows the relationship between the induced magnetic flux density (B) and the magnetizing force (H).
- The loop is generated by measuring the magnetic flux of a ferromagnetic material while the magnetizing force is changed.
- A ferromagnetic material that has never been previously magnetized or has been thoroughly demagnetized will follow the dashed line as H is increased.
- As the line demonstrates, the greater the amount of current applied (H+), the stronger the magnetic field in the component (B+).
- At point "a" almost all of the magnetic domains are aligned and an additional increase in the magnetizing force will produce very little increase in magnetic flux.

# Primary magnetic properties of a material by Hysteresis Loop

- **Retentivity:** A measure of the residual flux density corresponding to the saturation
- **Residual Magnetism or Residual Flux:** The magnetic flux density that remains in a material when the magnetizing force is zero.
- **Coercive Force:** The amount of reverse magnetic field which must be applied to a magnetic material to make the magnetic flux return to zero.
- **Permeability:** A property of a material that describes the ease with which a magnetic flux is established in the component.
- **Reluctance:** Is the opposition that a ferromagnetic material shows to the establishment of a magnetic field.

# METHODS OF MEASUREMENT OF IRON LOSSES

- Wattmeter method
- Bridge method
- Potentiometer method

# Wattmeter method

- The most commonly used and simple method of measuring iron loss in a strip steel material.
- The material is arranged in a form of closed magnetic circuit, in a shape of a square.
- There are two types of such squares: