



Determination of susceptibility and permeability of ferromagnetic material by drawing M-H curve (B-H curve):-

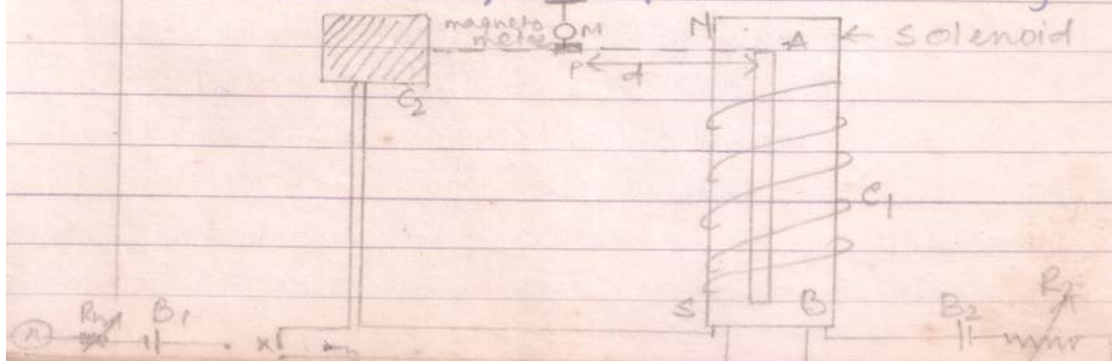
This can be done by two methods

- (1) Magnetometer method.
- (2) Ballistic galvanometer method.

(1) Magnetometer method: This method is most suitable when the specimen supplied is in the form of rod.

Description: The given rod AB is magnetised by placing it in the solenoid carrying current. Since the magnetic field of a solenoid due to current is nearly uniform at its middle region, the length of the solenoid should be much longer than the rod AB.

A deflection magnetometer of reflection type is placed at a suitable distance from the specimen such that upper end of the specimen is in level with and due east of the magnetometer needle at P. The deflection of the needle is measured by lamp and scale arrangement.





reflection taking place from a tiny mirror M fixed in the suspension wire. C_2 is a compensating coil connected in series with solenoid S and a series circuit consisting of battery B_1 , rheostat R_1 , ammeter A and a commutator K .

Function of compensating coils: It is employed to neutralise the effect of the magnetic field of the solenoid alone on the magnetometer. The axis of this coil is set in the line of the magnetometer needle and its distance is adjusted till the deflection of the needle is zero when the current is passed and the rod is removed from the solenoid.

Function of coil C_1 : A separate coil C_1 is closely wound over the solenoid & is supplied with a small current from the circuit containing a battery B_2 and a resistance box R_2 . The magnitude and direction of the current in the coil is so adjusted that the vertical magnetic field produced by this current neutralises the magnetisation induced in the specimen rod AB by the vertical component of earth's magnetic field. This is indicated by no deflection of the magnetometer with the specimen inside the solenoid and the solenoid circuit is opened. The current in the coil C_1



is kept constant after proper adjustment.

Experiment:

- (1) The specimen rod is completely demagnetised by passing suitable A.C through a coil surrounding the specimen.
- (2) The preliminary adjustments described above are completed and demagnetised rod is placed in the solenoid.
- (3) The solenoid current 'i' is gradually increased in steps to a maximum value each step being noted from the ammeter and for each value of current the corresponding deflection of the magnetometer is noted from the scale.
- (4) Current is then decreased from maximum to zero in steps and corresponding deflections of the magnetometer are noted.
- (5) Current is then reversed by the commutator K and steps (3) & (4) are repeated.
- (6) This data can be used for plotting a complete M-H or $B-H$ curve.