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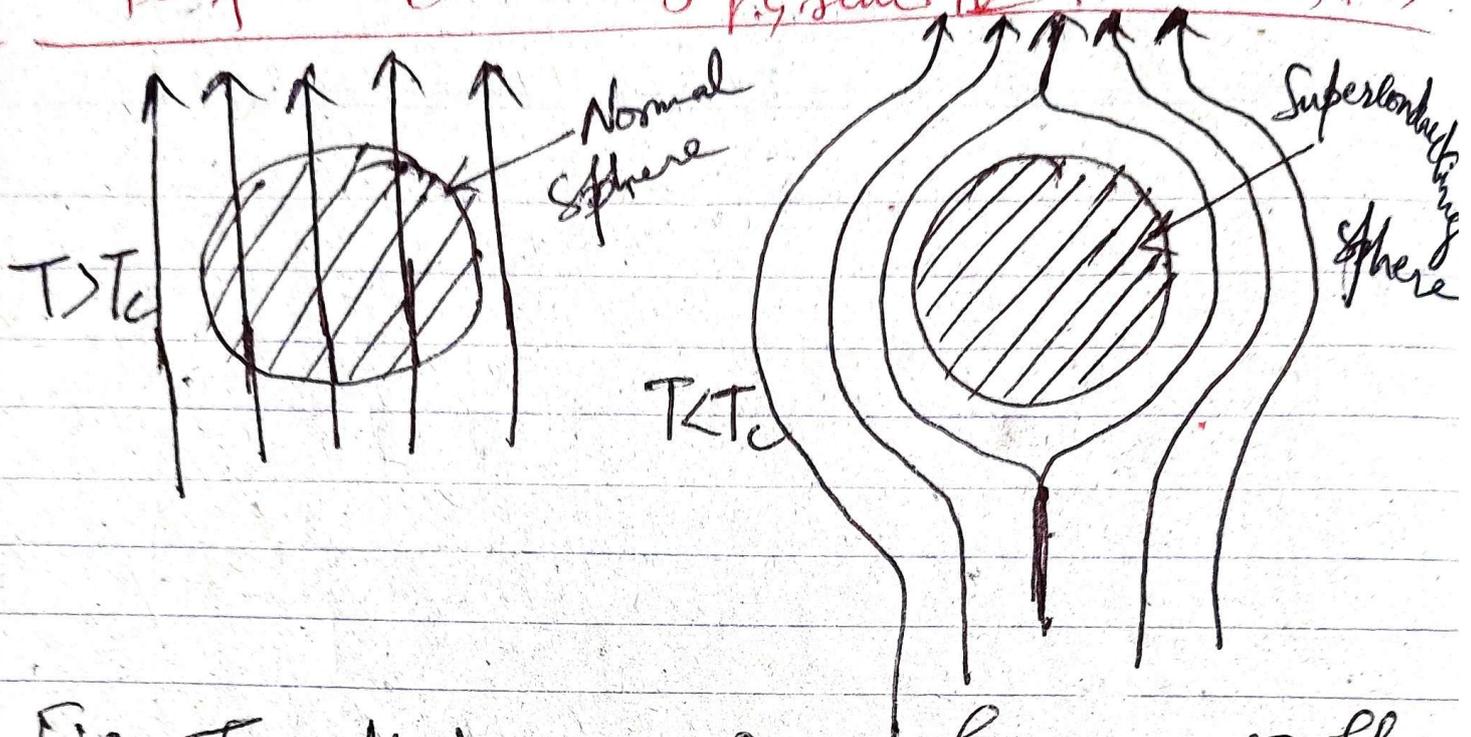# Perfect Diamagnetism (Meissner Effect)
P.G. Sem IV

Fig: The Meissner effect: the magnetic flux is expelled from a superconductor in for $T < T_c$.

For superconductors, as the temperature is lowered to T_c, the flux is suddenly and completely expelled below temperatures below the critical temp i.e., $T < T_c$. This effect is reversible.

The magnetic induction inside the substance is given by

$$B = \mu_0 (H + M) = \mu_0 (1 + \chi) H \quad —①$$

Since $B = 0$ in the superconducting state;

$$M = -H \quad — ②$$

i.e., the magnetization is equal to and opposed to H. The medium is therefore diamagnetic, and the susceptibility is $\boxed{\chi = -1}$

This is referred to as perfect diamagnetism.

magnetization curve for a superconductor Fig② $M = -\chi$