30 June Wednesday

MAGNETIC FIELD DUE TO A CURRENT IN A LONG STRAIGHT WIRE

a) The magnetic field induction (B) at a point distance h from a straight wire of finite length is given by

$$B = \frac{\mu_0}{4\pi}\left[\frac{I}{h}(\sin\phi_1 + \sin\phi_2)\right] \quad \text{---(1)}$$

Evening

b) For infinitely long straight wire we have $\phi_1 = 90^\circ$ and $\phi_2 = 90^\circ$, therefore.

Memos Notes & Reminders

$$B = \frac{\mu_0}{4\pi}\left[\frac{2I}{h}\right] \quad \text{---(2)}$$

Here, I is in ampere, distance h is in metre, and magnetic field induction B is in tesla or weber/m^2.

c) In C.G.S system the above formula are expressed as follows:

i) For a long wire of finite length

$$B = \frac{I}{h}(\sin\phi_1 + \sin\phi_2)$$

Evening

ii) For a wire of infinite length

$$B = \frac{2I}{h} \quad (\because \phi_1 = \phi_2 = 90^\circ)$$

June 04

Here I is in ab ampere, distance h is in cm, and B is in gauss or maxwell/cm^2.