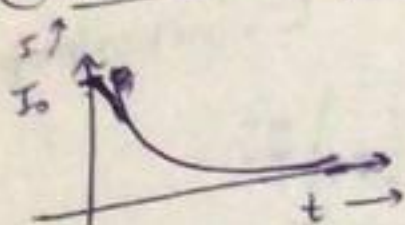


⑥ Decay

$$I = I_0 e^{-\frac{Rt}{L}}$$

$t = \infty \quad (I = 0)$



⑧ Energy stored in the inductor

$$U = \frac{1}{2} LI^2 = \frac{B_0^2 AL}{2\mu_0} \quad \frac{U}{V} = \frac{B_0^2}{2\mu_0}$$

$\frac{U}{V}$ = energy per unit volume or Energy Density

⑨ Mutual Inductance (M)

$$\Phi_2 \propto i_1 \quad \Phi_2 = M i_1 \quad \text{Henry}$$

$$e_2 = -M \frac{di_1}{dt} \quad \Phi_2 = N_2 B_1 A_2$$

concentric circle

$$M \propto \left(\frac{N_1 N_2}{B_0 A_0}\right)^2$$

2 Co-axial solenoids

$$M = \mu_0 \frac{N_1 N_2 A}{l}$$

2 solenoid system

$$K = \frac{\Phi_s}{\Phi_p}$$

$$M = K \sqrt{L_1 L_2} \quad M = \sqrt{L_1 L_2}$$

⑩ Induced Electric field

- Non conservative
- cause = change in MF
- forms closed circular loop
- closed path $\oint \vec{E} \cdot d\vec{l} \neq 0$

$$\oint \vec{E} \cdot d\vec{l} = -\frac{d\Phi}{dt}$$

→ $\vec{F} = q\vec{E}$ (valid)

→ Direction = along induced current

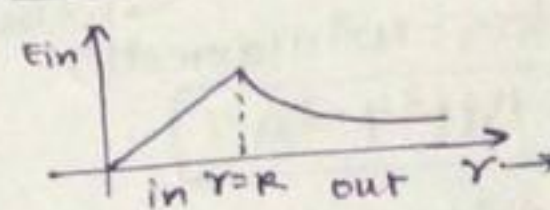


$$E_{in} = \frac{r}{2} \frac{dB}{dt} \quad \text{inside}$$



$$E_{in} = \frac{R^2}{2r} \frac{dB}{dt} \quad \text{outside}$$

$r > R$



⑪ Transformer

- Based on Mutual inductance
- Never work on DC

$$\frac{e_1}{e_2} = \frac{N_1}{N_2}$$

Ideal

$$P_{in} = P_{out}$$

$$e_1 I_1 = e_2 I_2$$

Step up: $e_2 > e_1$
Step down: $e_1 > e_2$

Efficiency

$$\eta = \frac{P_{out}}{P_{in}} \times 100$$

⑫ AC Generator

$$\Phi = NBA \cos \omega t$$

$$e = NBA \omega \sin \omega t$$

$$e_0 = NBA \omega$$

$$e = e_0 \sin \omega t$$

e_0 → Max value / Amplitude / peak value.

$$I_0 = \frac{e_0}{R}$$

→ 1 poore chakkar me AC/emf 2 Bar apni direction change karke hai.

⑬ Motional emf

$$\Delta V = B v l$$

$\vec{l}$ → Displacement vector.

$$\left. \begin{array}{l} \vec{v} \parallel \vec{B} \\ \vec{v} \parallel \vec{l} \\ \vec{l} \parallel \vec{B} \end{array} \right\} \rightarrow \boxed{EMF_{in} = 0}$$

All 3 vectors must be $\perp$ to each other.

→ Polarity ka idea Right hand palm se