Physics Formula Sheet

Chapter by chapter, topic by topic. Written by the PadhoNa team for quick revision.

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CHAPTER 23

Electromagnetic Induction

Faraday's and Lenz's laws

$$\varepsilon = -N\frac{d\phi}{dt}, \qquad \phi = \vec{B}\cdot\vec{A}$$

MOTIONAL EMF

$$\varepsilon = Blv; \qquad \text{rotating rod: } \tfrac{1}{2}B\omega l^2$$

ROTATING COIL

$$\varepsilon = NBA\omega\sin\omega t$$

CHARGE THROUGH A CIRCUIT

$$q = \frac{\Delta\phi}{R}$$

Self and mutual inductance

$$\phi = LI, \qquad \varepsilon = -L\frac{dI}{dt}; \qquad \text{solenoid } L = \mu_0 n^2 Al$$

$$\phi_2 = MI_1, \qquad \varepsilon_2 = -M\frac{dI_1}{dt}, \qquad M \le \sqrt{L_1 L_2}$$

COMBINATIONS (NO COUPLING)

$$\text{series } L = L_1 + L_2; \qquad \text{parallel } \frac{1}{L} = \frac{1}{L_1} + \frac{1}{L_2}$$

LR circuits and energy

$$I = I_0\left(1 - e^{-tR/L}\right)\ (\text{growth}), \qquad I = I_0 e^{-tR/L}\ (\text{decay}), \qquad \tau = \frac{L}{R}$$

ENERGY

$$U = \tfrac{1}{2}LI^2, \qquad u = \frac{B^2}{2\mu_0}$$

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