* EMF Equation of a T/F :

माना कि -

E_1 = वोल्ट मात्रक में Primary Wdg का स्व - प्रेरित E.M.F.

E_2 = Volt मात्रक में द्वितीयक कुण्डलन का पारस्परिक प्रेरित E.M.F.

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N_1 = number of turns in primary wdg

N_2 = number of turns in secondary wdg

ϕ = Wb में flux का तात्क्षणिक मान ($\phi = \phi_m \sin \omega t$ Wb)

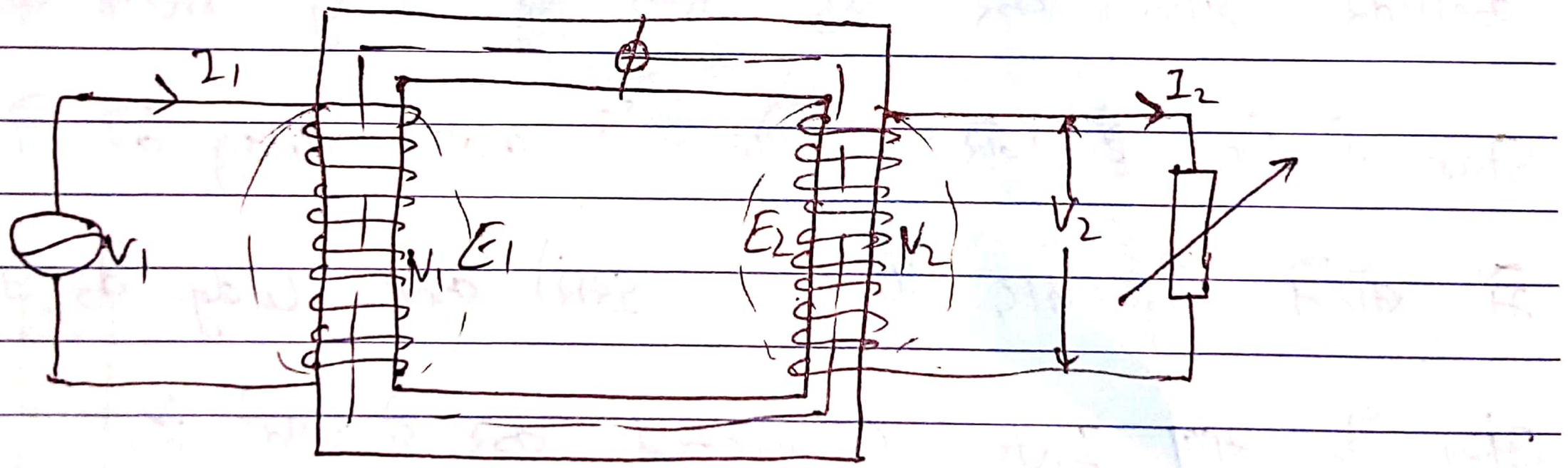
ϕ_m = Wb में flux का maximum Value

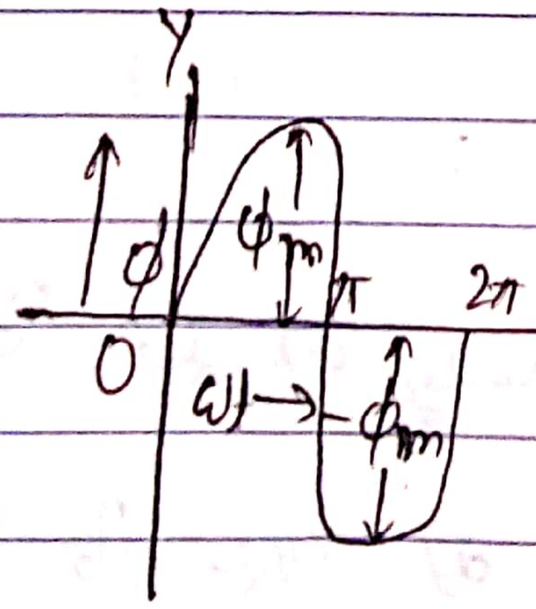
B_{max} = maximum value of flux density in weber per square meter unit

A_i = वर्ग मीटर में आपरेन कोड का सही अनुप्रस्थ काट-क्षेत्र

ω = रेडियन प्रति सेकण्ड मात्रक में अक्षीय वेग

f = frequency of induced e.m.f. in cycle per second unit





emf induced in T/F

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Farade के नियमानुसार, N turns की Wdg में तात्क्षणिक Induced emf.

$$e = -N\frac{d\phi}{dt}$$

$$= -N\frac{d}{dt}(\phi_m \sin\omega t)$$

$$= -N\phi_m \frac{d}{dt}\sin\omega t$$

$$= -N\phi_m \cos\omega t \cdot \omega$$

$$= -\omega N\phi_m \sin\left(\frac{\pi}{2} - \omega t\right)$$

$$= \omega N\phi_m \sin\left(\omega t - \frac{\pi}{2}\right) \quad \text{---} (i)$$

equation (ii) से induced maximum emf

$$E_{max} = \omega N\phi_m = 2\pi f N\phi_m$$

∴ Induced emf का root mean square value

$$E_{rms} = \frac{E_{max}}{\sqrt{2}} = \frac{\omega N\phi_m}{\sqrt{2}}$$

$$E = \frac{2\pi f N\phi_m}{\sqrt{2}}$$

$$\boxed{E = 4.44 f N\phi_m} \text{ Volt}$$

Root mean square value of emf in primary Wdg

$$\boxed{E_1 = 4.44 f N_1\phi_m} \text{ Volt}$$

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Root mean square value of e.m.f. in sec. wdg

$$E_2 = 4.44 f N_2 \phi_m \text{ Volt}$$