

MAGNETIC CIRCUITS

TERMS:

NAME:	SYMBOL / UNITS:	EQUATION:
Magneto-motive Force (mmf)	F (Ampere – Turns) or (A-t)	F = NI
Magnetic Field Intensity	H (A-t/meter)	H = NI/l (l = path length in meters)
Flux Density	B (Tesla) yay! 1Tesla = 1Wb/meter ²	B = μH
Permiability	μ (H/meter)	μ = μ_rμ_o Where μ _r is the relative permeability of the material and μ _o = 4π x 10 ⁻⁷ H/m is the permeability of free space.
Flux	Φ (Webers, Wb)	Φ = BA (A is cross-sectional area in square meters)
Flux Linkage	λ (Weber-turns)	λ = NΦ
Inductance	L (Henries)	L = λ/I = N²/ℜ
Reluctance	ℜ (A-t/Wb)	ℜ = l/μ_rμ_oA

Useful Relationships:

$$\Phi = BA = \mu_r \mu_o HA = \mu_r \mu_o ANI/l = NI/\mathfrak{R}$$

OHM'S LAW ANALOGY:

$$\text{If } V = IR, \text{ then } F = \Phi \mathfrak{R}$$

ELECTRICAL		MAGNETIC	
Current	I (Amps)	Φ (Wb)	Flux
emf	V (Volts)	F (A-t)	mmf
Resistance	R (Ohms)	ℜ (A-t/Wb)	Reluctance
Conductivity	σ (S/m) Siemens/meter	μ (H/m)	Permiability