Magnetic induction formulas

Faraday-Lenz's law of induction: *emf* (ε) induced in N loops by flux variation (ϕ)	$\varepsilon = -N\frac{\Delta\phi}{\Delta t}, \quad \varepsilon = -N\frac{d\phi}{dt}$
Self-inducted *emf* (ε) in a loop by current variation (I)	$\varepsilon = -L\frac{\Delta I}{\Delta t}, \quad \varepsilon = -L\frac{dI}{dt}$
Self-inducted *emf* (ε) in a mobile conductor of length (l) and speed (v) inside a magnetic field (B)	$\varepsilon = B{\cdot}l{\cdot}v{\cdot}\sin\theta$
Self-inductance of a coil of (N) loops with section (S) and length (l)	$L = \frac{\mu N^2 S}{l}, \; L = \frac{NBS}{I}, \; L = \frac{N\phi}{I}$ $\mu = \mu_r \, \mu_0$
Energy of coil with electrical current (I) and self-inductance (L)	$T = \frac{1}{2}L{\cdot}I^2$
Transformer (P=Primary winding, S=Secondary winding)	$\frac{V_S}{V_P} = \frac{N_S}{N_P} = \frac{I_P}{I_S}$
Flux through a loop	$\phi = B{\cdot}S{\cdot}\cos\alpha$

Symbol	Magnitude	S.I. unit
ε	Emf (electromotive force) (Volt)	V
B	Magnetic field (Tesla)	T = $N{\cdot}A^{-1}{\cdot}m^{-1}$
I	Current intensity (Ampere)	A = $C{\cdot}s^{-1}$
ϕ	Magnetic flux (Weber)	Wb = $T{\cdot}m^2$
N	Number of loops in a coil	
L	Self-inductance of a coil (Henry)	H
t	Time	s
v	Speed	$m{\cdot}s^{-1}$
V	Voltage in a transformer (Volt)	V
l	Length of conductor or solenoid	m
S	Loop section	m^2
α	Angle between magnetic field vector and normal vector of loop	rad *or* degrees
θ	Angle between magnetic field vector and velocity vector	rad *or* degrees
T	Coil energy	J
μ_0	Permeability of vacuum (constant) = $4{\cdot}\pi{\cdot}10^{-7}$	$T{\cdot}m{\cdot}A^{-1}$
μ	Permeability of material	$T{\cdot}m{\cdot}A^{-1}$
μ_r	Relative permeability of material	