SUMMARY OF UNITS

6/9/96

$q = it$ (p. 511)

p. 423 **Coulomb C** = amount of charge that flows thru any cross section of wire in 1 sec if there is a steady current of 1 Amp.

$C = \text{Amp} \cdot \text{sec}$

$\text{Amp} = \frac{C}{\text{sec}}$

Thus Amp·hr is a quantity of Coulombs!

Permittivity const $\varepsilon_0 \doteq 8.854 \times 10^{-12} \frac{C^2}{N m^2}$ see LCL p. 43

$\frac{1}{4\pi\varepsilon_0} \doteq 8.99 \times 10^{9} \frac{N m^2}{C^2}$

p. 424 electric charge $e \doteq 1.602 \times 10^{-19}$ C mass of $e^- \doteq 9.11 \times 10^{-31}$ kg mass of proton = 1846 × mass of e^-

Force per unit charge

p. 433 electric field $\vec{E}$ = N/C or volt/m $N = \frac{kg\,m}{s^2}$

p. 450 electric flux Φ_E $N \cdot m^2/C$

p. 463 1 volt = 1 Joule / Coulomb (work per unit charge = Watt/Amp) $J = Nm$ p. 95

p. 477 electron volt = (1 quantum of charge)(1 volt) = 1.60×10^{-19} J

Capacitance

p. 485 **Farad F** = 1 coulomb / 1 volt (Huge unit) microfarad $\mu F = 10^{-6}$ F pico farad $pF = 10^{-12}$ F

p. 506 **Ohm Ω** = volt/amp = Watt/(amp)² Also $\frac{\text{Volt}}{\text{Amp}} = \frac{J/C}{C/s} = \frac{J \cdot sec}{C^2}$

Resistivity $\rho = \frac{|\vec{E}|}{|\vec{j}|}$ units Ω·m [conductivity $\sigma := \frac{1}{\rho}$]

p. 507 $R = \rho \frac{\text{length}}{\text{Area}}$ (R: resistance; ρ: "resistivity")

Power

p. 512 **Watt** = Joule/sec = volt · ampere

kW·hr = $10^3 \cdot 3600$ J

p. 539 magnetic field **Tesla** = $\frac{N}{A\,m}$ gauss = $\frac{1}{10^4}$ Tesla

p. 558 permeability constant $\mu_0 = 4\pi \times 10^{-7} \frac{T \cdot m}{A}$ → $\mu_0 = \frac{1}{\varepsilon_0 c^2}$ I think

p. 576 magnetic flux **Weber** = Tesla · m^2 = $\frac{N}{A\,m} \cdot m^2 = \frac{N \cdot m}{A}$

p. 595 inductance **henry** = 1 volt · second / ampere

p. 561 Ampere = amount of (common) current in 2 wires 1 meter apart ∋ Force of attraction 2×10^{-7} N/m.
= 1 coulomb / sec [Lorrain, Corson, Lorrain p. 44 but the unit is not Defined this way]

inspired by Fowles AM p. 87

[The amount of work done = the amount of energy changed from potential to kinetic & heat, say.]