PHYS 1220 Study Guide for Exam 2

Exam information: Bring Accuscan #20140 Bubble sheets (the green ones) to the exam. Also acceptable (but older) are the #100643 or #6703 bubble sheets.
#2 pencils are required. Calculators are allowed. However, equation/formula sheets are not allowed.
November 3rd, 2016. Exam time: 5:00 pm to 7:00 pm in CR310.
The exam will cover chapters 24–27.

Concepts that you should be very familiar with:
Capacitors and capacitance
How to find effective capacitance (adding capacitors in series and parallel)
Energy density (what is it and how to calculate it)
Dielectrics: breakdown voltage and how they modify capacitance and energy density
Gausss law in dielectrics
Current and current density
Resistance and resistivity (difference between the two)
Ohm's law
Concept of drift velocity
Electromotive force
How to handle internal resistance in a battery/source
How to find effective resistances (adding resistors in series and parallel)
Kirchoff's rules and the difference between loops and junctions
How to solve RC circuits
Discharging and charging of a capacitor
How to determine power and energy in a circuit
What is a magnetic field
Magnetic flux
How to use Gausss law for magnetism
Magnetic forces on current-carrying conductors
Magnetic dipoles: what is it, how to solve for torque and energy
Hall effect

Equations and constants that will provided on the exam:

$e = 1.60 * 10^{-19}$ C

$m_e = 9.11 * 10^{-31}$ kg

$\epsilon_0 = 8.85 * 10^{-12}$ C^2/N-m^2

$\oiint \vec{E} \cdot d\vec{A} = \frac{1}{\epsilon} Q_{\text{free}}^{\text{enclosed}}$, where $\epsilon = K\epsilon_0$

$Q = CV$

$U = \frac{Q^2}{2C} = \frac{1}{2}CV^2 = \frac{1}{2}QV$

$\vec{J} = nq\vec{v}_d$

$V = IR$

$\vec{E} = \rho\vec{J}$

$R = \frac{\rho L}{A}$

$P = I^2R$

$\vec{F} = q\left(\vec{E} + \vec{v} \times \vec{B}\right)$

$\Phi_{\text{B}} = \iint \vec{B} \cdot d\vec{A}$

$\oiint \vec{B} \cdot d\vec{A} = 0$

$\vec{F} = I\left(\vec{\ell} \times \vec{B}\right)$

$\vec{\mu} = I\vec{A}$

$\vec{\tau} = \vec{\mu} \times \vec{B}$

$U = -\vec{\mu} \cdot \vec{B}$