Physics 221 **Lecture 23 – Exam 3 Review** **March 17th, 2003**

Today:	**Review for Exam 3**	**HW20, HW18Redo**
Tuesday 1pm:		**HW19-20 Redo's**
Wednesday	**Exam 3**	**Equation Sheet**

Administrative

- I will grade HW 20 immediately & put it outside my door. Pick it up at your leisure, correct it, and slip it and HW19Redo under my door by Tuesday at 1pm to get them graded.
- I will post HW 19 & 20 solutions on the web at that time.
- Today's review material is posted; I will add a sample equation sheet to it
- a copy of last year's test with solutions is posted

Exam 3 Review

Covered: Ch 20.5, 21, 22, 23

Not: 21.6*, 21.7.2,3**, 21.8, 21.9, 22.6, 22.7, 23.5

*we worked with similar material in lab, but discussed it in terms of forces, not torques

**Yes –straight wire, No – current loop or solenoid.

Format:

Same as Exam 2 but no longer problems – all worth the same

Must know:

Especially: Anything that you saw in Lab + Lecture + Homework

Anything the book presents in a beige box

Lab: Principles, Techniques, and Math employed in Lab

Equation Sheet:

- Hand in with test
- No words
- No pictures beyond a triangle for the trig functions, and the symbols for circuit elements
- An equation can appear only once, in a single form

Ex. $F = ILB\sin q_{IB}$ $I = \dfrac{F}{LB\sin q_{IB}}$ one or the other, not both.

You will hand in your equation sheet with the test.

If I see anything that shouldn't be there, the pertinent exam questions will receive 0 points.

- You'll be given the following units and constants

Units

B	Tesla $= \dfrac{N}{Amp \cdot m}$	Emf	Volt $= \dfrac{J}{Coul}$	L, M	Henry $= \Omega \cdot s$
C	Farad $= \dfrac{\sec}{\Omega}$	I	Amp $= \dfrac{Amp}{\sec}$	F	Weber $= Tesla \cdot m^2$

Constants

e = 1.60×10^{-19}C, $\varepsilon_o = 8.85\times10^{-12} C^2/(N \cdot m^2)$, $m_o = 4p \times 10^{-7} T \cdot m / Amps$

Sample equation sheet

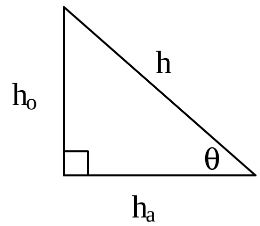
Useful Mathematical Relations

$(\sin(q))^2 + (\cos(q))^2 = 1$, $\sin(2q) = 2\sin(q)\cos(q)$

For small angles: $\sin(q) \approx q$, $\cos(q) \approx 1 - \frac{q^2}{2}$

For circles: $C = 2pR$, $A = pR^2$ For Spheres: $A = 4pR^2$, $V = \frac{4}{3}pR^3$

If $Ax^2 + Bx + C = 0$, then $x = \frac{-B \pm \sqrt{B^2 - 4AC}}{2A}$



$h = \sqrt{h_a^2 + h_o^2}$

$\cos q = \frac{h_a}{h}$

$\sin q = \frac{h_o}{h}$

$\tan q = \frac{h_a}{h_o}$

$q = \tan^{-1}\left(\frac{h_a}{h_o}\right)$

Physical Relations

$Emf = emf_o \sin(2pft)$ $I = I_o \sin(2pft)$ $\langle P \rangle = \frac{1}{2} I_o \Delta V_o = I_{rms} \Delta V_{rms}$ $I_{rms} = \frac{I_o}{\sqrt{2}}$

$Emf_{rms} = \frac{Emf_o}{\sqrt{2}}$ $\Delta V_{rms} = I_{rms} R$ $\Delta V_o = I_o R$ $F_{\to q} = qvB \sin q_{vB}$ $F_C = \frac{mv^2}{r}$

$r = \frac{mv}{qB}$ $m = \left(\frac{qr^2 B^2}{2\Delta V}\right)$ $F = ILB \sin q_{IB}$ $B = \frac{m_o I}{2pr}$ $Emf = v_\perp B_\perp L_\perp$

$\Phi = BA \cos f_{B\perp A}$ $Emf = (-)N \frac{\Delta \Phi}{\Delta t}$ $emf_s = (-)M \frac{\Delta I_P}{\Delta t}$ $emf = -L \frac{\Delta I}{\Delta t}$ $X_C = \frac{1}{2pfC}$

$\Delta V_{o.C} = I_{o.C} X_C$ $X_L = 2pfL$ $\Delta V_{o.L} = I_{o.L} X_L$ $emf_o = I_o Z$ $Z = \sqrt{R^2 + (X_L - X_C)^2}$

$I_C = I_{oC} \cos(2pft)$ $I_L = -I_{oL} \cos(2pft)$

Units

B	Tesla $= \frac{N}{Amp \cdot m}$	Emf	Volt $= \frac{J}{Coul}$	L, M	Henry $= \Omega \cdot s$
C	Farad $= \frac{\sec}{\Omega}$	I	Amp $= \frac{Coul}{\sec}$	F	Weber $= Tesla \cdot m^2$
R, Z, X_C,, X_L	Ohm = $\Omega = \frac{Volt}{Amp} = \frac{J \cdot s}{Coul^2}$				

Constants

e = 1.60×10^{-19}C, $\varepsilon_o = 8.85\times10^{-12} C^2/(N \cdot m^2)$, $m_o = 4p \times 10^{-7} T \cdot m / Amp$s