2B

Test 3 = CH 21, 22

CH23 = E.C.

4-9-14

1

CH21 Review

Sheet:

(A) ~~see~~ All "dates" with CH21 Lecture notes

(B) Main topics for Quiz 21 HW (online)

see www.nvaphysics.com

Quiz 21 topics

Flux
1

Faraday's Law
4, 5, 7

self inductance
33

Lenz's Law
13, 15, 20

Motional emf
21, 25

Transformers
38

Field Energy

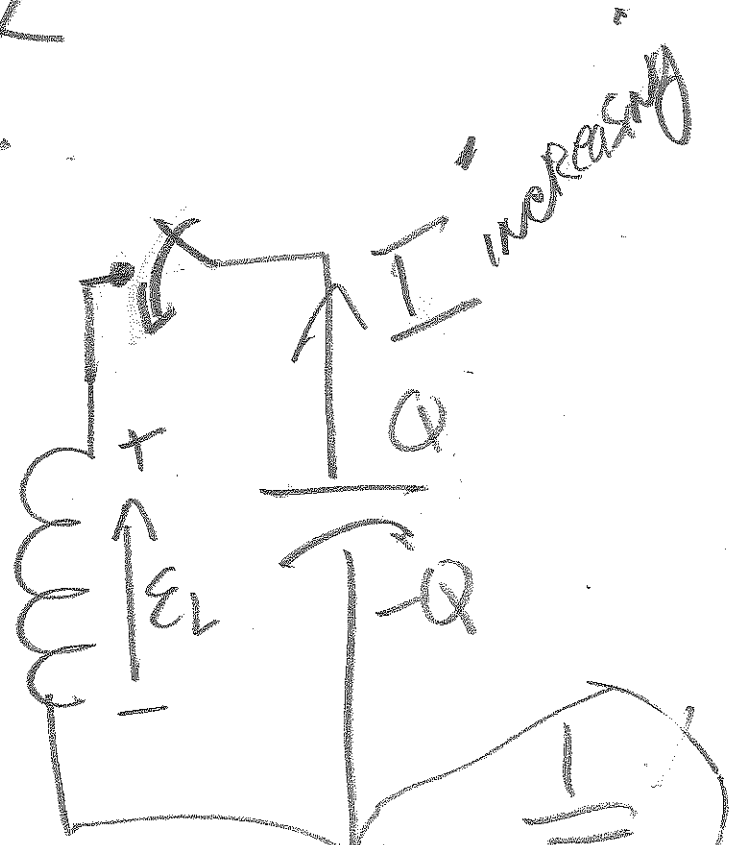
43, 44

R-L circuits

48

LC circuit

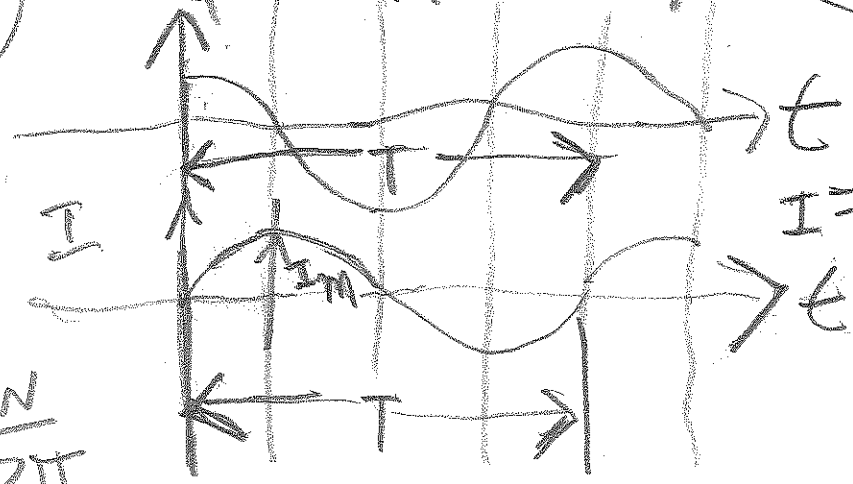
54, 55



$$\frac{1}{2}LI^2 + \frac{1}{2}\frac{Q^2}{C} = \frac{1}{2}\frac{Q_{MAX}^2}{C}$$

54.

$Q = Q_{max}\cos\omega t$,



$I = I_m \sin\omega t$

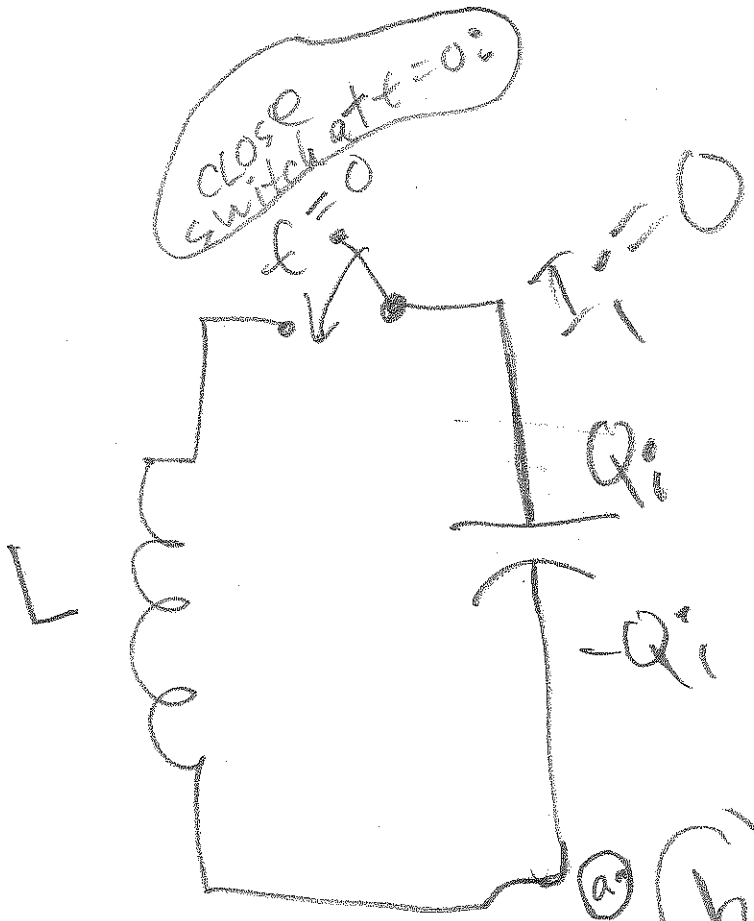
$T = \frac{1}{f}$

$f = \frac{1}{T} = \frac{\omega}{2\pi}$

55.

CH 21

(a.) $U_{total} = \frac{Q_i^2}{2C} = \frac{1}{2}CV_i^2$



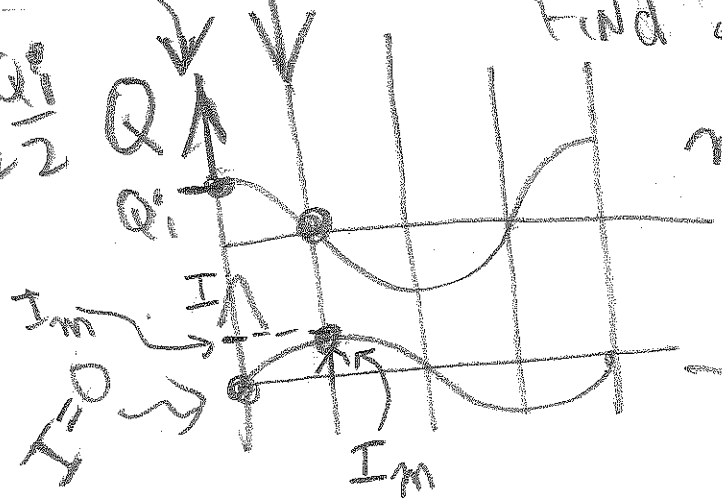
$Q_i = C \cdot V_i$

$V_i = 16.0\,(V)$

(b.) $\frac{1}{2}LI_m^2 = \frac{1}{2}\frac{Q_i^2}{2}$

Find I_m.

$\frac{1}{2}LI^2 + \frac{1}{2}\frac{Q}{C} = \frac{1}{2}\frac{Q_i^2}{2}$



note: $I = I_m$

$Q = 0$

$Q = 0$

when $I = I_m$

Objective: You will verify Faraday's and Lenz's' Law for magnetic induction.

Procedure:

1. With wires, connect the large copper coil in series with the galvanometer.
2. Hold a bar magnet near the coil with the magnet's North Pole facing the coil area face.
3. Move the magnet toward the coil. What direction does the Galvanometer needle deflect ? _____
   Explain why the needle deflects_____

4. Hold the bar magnet near coil and keep your hand at rest.
   What does the galvanometer do?_____
   Explain _____

5. Move the magnet away the coil. What direction does the Galvanometer needle deflect ? _____
   Compare your answer with 3. and explain the difference_____

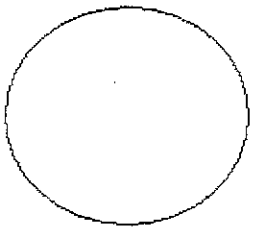
6. Repeat 3. , but move the magnet toward the coil faster.

   Does the needle reflect more or less than in 3. ? _____
   Explain_____

7. Repeat 3., but with the magnet's South pole facing the coil.
   What direction does the Galvanometer needle deflect ? _____
   Explain the difference with 3._____

Read Sections 29.1, 29.2. Please refer to figure 29.2, 29.5, 29.6. Assume in this lab that the North Pole of the plunging magnet faces *into* the page for questions 3, 4, 5, and 6. The changing magnetic field (except for part 4) from the moving magnet is pointing *in*. In 7, the South pole of the plunging magnet faces in, thus the changing magnetic field from the moving magnet points *out*.

Each response will illustrate your reasoning with a sketch on a loop in the plane of your data sheet. The loop represents the coil of wire.



The explanation requested in the procedure can be summarized with pictures. For each response indicate on the loop supplied with the data sheet for each part:

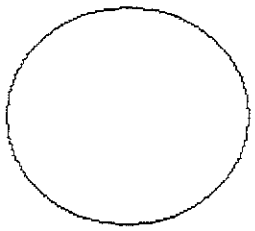
 # The direction of the induced current I , CW or CCW, around the loop. Draw a curved arrow on the loop , clockwise (CW) or counterclockwise (CCW) . Correlate that direction with the direction the needle deflects, either left or right. If the current happens to be zero, just say so and explain why.

 # The direction of the changing magnetic field due to the moving magnet which you are plunging into or out of the coil. The symbol you use will be either in or out. i.e. ⊗ or ⊙. Label this vector with the symbol B.

 # Show the direction , in or out, of the induced magnetic field produced by the induced current I using the concepts of example 28-12. Label this vector with the symbol B_{IND}.

DATA SHEET

3.
4.
5.
6.



7.