



## 6 - October 9

Energy stored in a capacitor

$$E = 1/2 CV^2$$

If the dielectric constant ( $\kappa$ ) = 3.3, how much energy is stored in a capacitor of area  $2 \text{ cm}^2$  with plate 1 cm apart and a current 0.01A

## 7 - October 10- Reci

Qualitative observations of the differences between series & parallel circuits. Given a 6 V power source - how much more current flows with two  $10\Omega$  resistors in parallel vs. in series.

## 8 - October 11

Ohms Law  $V = RI$  Question: A current has a resistance of  $0.45 \Omega$  and I is 3.7 A. What is voltage? Answer: 1.665 V

## 9 - Lab 8 Batteries, Bulbs, and Circuits

### 10 - October 13

A parallel circuit draws most current from battery.

$$1/R_x = 1/R_1 + R_2 + 1/R_3$$

A series circuit draws the least current from the battery

$$\Sigma R = R_1 + R_2$$

### 11- October 18

Time constant: ( $\tau$ );  $\tau = (t_2 - t_1)/\ln(V_1/V_2)$

A circuit has a capacitor with a capacitance of  $150\mu\text{f}$  and two resistors connected in series with resistances  $250\Omega$  and  $100 \Omega$ . What is the time constant?

## 12 - Lab 9 A Closer Look at Circuits with Capacitors

$$y(x) = A_0 e^{-bx} \quad b = 1/RC, R = 12 \Omega$$

$$C = q/V \quad C = 3 \mu\text{F}$$

$$F = C/V \quad V = IR$$

Use your algebraic expression for  $T_{1/2}$  and values of R and C for each circuit and calculated predicted 1/2 lifetime for a circuit.

## 13 - October 20

Magnetic fields (B) are everywhere near the surface of the earth. Units of B = tesla (T).

Magnetic fields exert forces on moving electric charges.  $F = Bqv\sin\phi$

Moving electric charges have mag. fields around them. \*Note the right hand rule.

Ampere's Law: sum of B times path length around loop =  $\mu_0$ (current inside loop)

$B = \mu_0 I / 2\pi R$ . Problem: p. 633 of the book.

## 14 - October 23

Faraday's law-change in flux induces electric potential.

## 15 - October 24- Reci

Explain the right hand rule and how to use it. If right hand palm up, what is direction of force, velocity and current using the RHR?

## 16 - October 25

Explain what "phase angle" means and give an example of when and how to use it.

## 17 - Lab 10 ~ AC DC ~

Capacitive and inductive reactance and impedance. How do these vary with frequency? Ohm's law for ac circuits,  $V = I/Z$

## 18 - October 27

What is resonance? Occurs when the frequency of a vibrating force exactly matches the natural frequency. This frequency can be found by  $\omega_0^2 = 1/LC$

## 19 - October 30

The nerve has the ability to act as a capacitor. Question: What ions are present inside and outside of axon to create the difference in charge?

## 20 - October 31

EMF radiation may cause such illnesses as cancer and leukemia. Protein batteries behave like double layered capacitors. Multiple choice question:

EMF radiation causes illness depends on:

- (a) distance from body
- (b) frequency of the field
- (c) the altitude
- (d) what's on TV