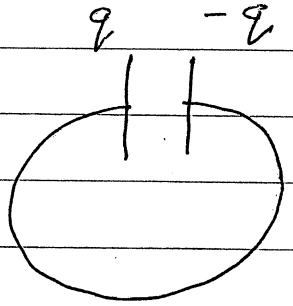
Exam III Test Questions [Part II]

1. What is displacement current? Why did Maxwell postulate it?

2. Show that $\varepsilon_0 \frac{\Delta \Phi_E}{\Delta t}$ has the dimensions $Q T^{-1}$

3. At $t=0$, a capacitor is charged to $\pm q$ and a wire is connected as shown. Show that the displacement current between the plates is equal to the conduction current ~~between the plates~~ in the wire.



4. Light and Sound are both waves, list 5 differences between them.

5. What is light?

6. If you are sitting 1m away from a 60 watt bulb (taken to be a point source) what is the amplitude of the $\vec{E}$ field entering your eye?

7 Show that the average intensity of an E-M wave can be written as $\frac{c B_m^2}{2\mu_0}$, $\frac{1}{2} c \varepsilon_0 E_m^2$ or $\frac{E_m B_m}{2\mu_0}$ where E_m and B_m are the amplitudes of the $\vec{E}$ and $\vec{B}$ fields.

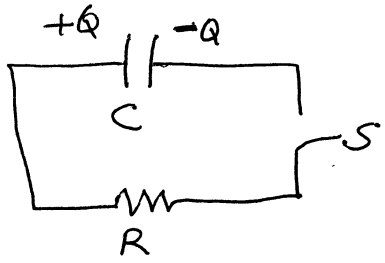
8. You "see" a lightning flash and 10 secs later "hear" the thunder. If the speed of sound is 340 m/s how far away was the flash? why?

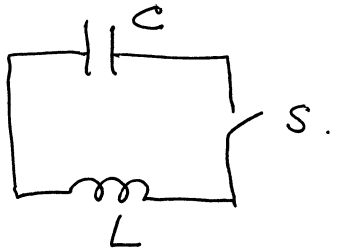
9. What is Radiation. How do you distinguish between heat, radio waves and x-rays?

10. Show that $\frac{1}{\sqrt{\mu_0 \varepsilon_0}}$ has the dimensions LT^{-1}.

11. Probs. 6, 7, 8, 9, 10, 11 from Test Q's 16 Part II of Exam II.

17 Two circuits are shown. In both C is charged to $\pm Q$ and then switches are closed. Describe the time variation of the charge on C as a fn. of time.





18. WRITE DOWN MAXWELL'S EQUATIONS AND IN EACH CASE DEFINE THE QUANTITIES WHICH APPEAR.

[redacted]

19 Under what conditions is it legitimate to claim that light travels in straight lines? (Hint: use results of your Expt. on diffraction)

[redacted]

20. Given a point object what construct would you use to locate its image formed by an optical system (mirrors and lenses).

21. In an Electromagnetic wave which field carries the larger energy? why? [Compare to Potential and kinetic Energies in waves on strings and Sound waves]. {Compare average values}