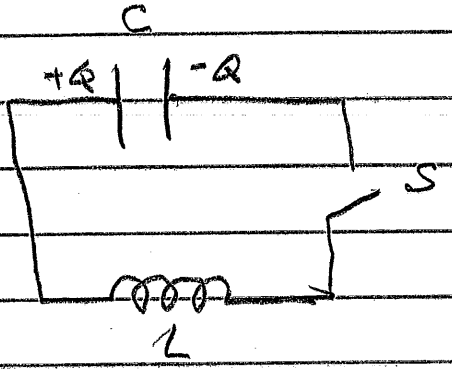
Test Questions - Last bit.

1. What is a "bar magnet"? Starting with the knowledge that a single electron has a magnetic moment of 9.27×10^{-24} N-m how would you "build" a bar magnet?

2. In the circuit shown the capacitor has charge Q on its plate when the switch is closed. Show that the system is an exact electrical equivalent of a spring-mass oscillator.



3. Write down the dimensions of
   i) Magnetic Moment
   ii) $\underline{B}$-field
   iii) μ_0
   iv) ε_0
   v) Inductance
   vi) Capacitance
   vii) potential

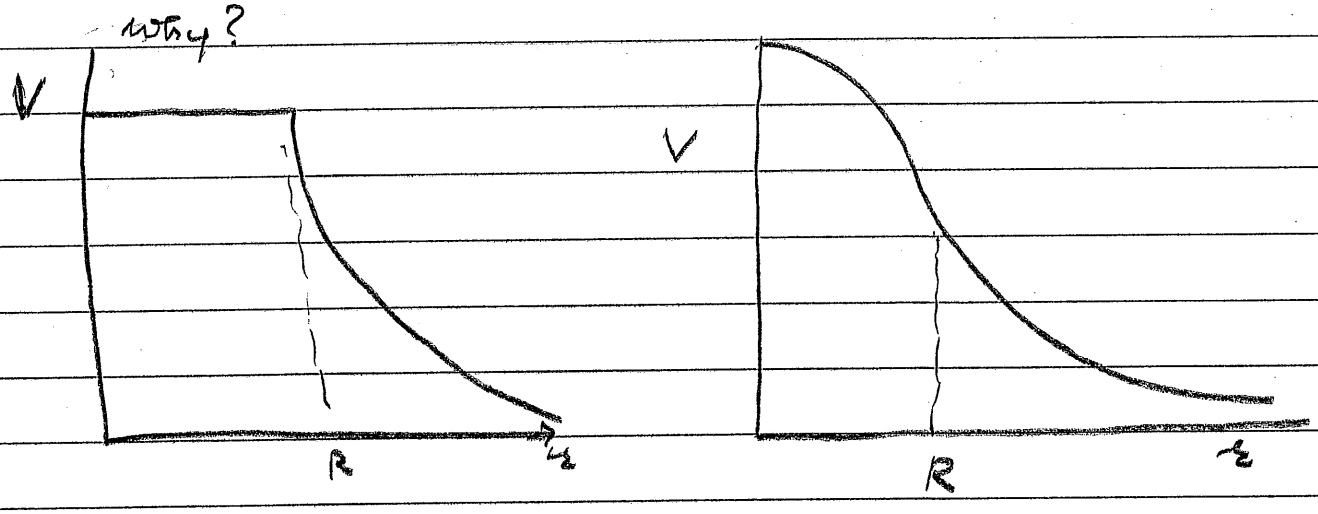
4. What is a travelling wave?

5. A wave is written as $\underline{y} = A \cos kx \sin \omega t \hat{y}$.
   i) Is this wave longitudinal or transverse? Why?
   ii) Is it travelling or stationary? Why?

6. Why does the time constant of an L-R circuit ($T = \frac{L}{R}$) depend on both L and R.

7. An oscillator is described by the equation $x = 0.05 \sin\left(6.28t + \frac{\pi}{4}\right)$ m. Write down (i) amplitude, (ii) period, (iii) phase angle.

8. The pictures show potentials due to two charged spheres. Which one is hollow? Why? Is the charge +ive or -ive? Why?



9. Draw the potential energy due to the spheres of prob 8 and a -ive charge q as a function of r.

10. What is the "current-current" force? Explain its physical basis.