

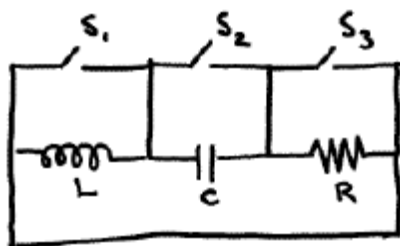
Physics 142 – Fall 2010 – Workshop module 10

1. A stiff wire bent in the form of a semicircle of radius A is rotated with a frequency ν in a uniform magnetic field. What are the frequency and amplitude of the emf induced in the loop?



2. Consider the circuit below. With switch S_1 closed and the other two switches open, the circuit has time constant τ_1 . With switch S_2 closed and the other two switches open, the circuit has time constant τ_2 . With switch S_3 closed and the other two switches open, the circuit oscillates with period T . Show that

$$T = 2\pi\sqrt{\tau_1\tau_2}$$



3. If I hook a large capacitor across an ordinary outlet in my house, will it blow a fuse?
4. What is the impedance of a series LCR circuit at resonance?
5. A circuit consists of a resistor connected in series to a battery; the resistance is 5 ohms and the emf of the battery is 12 volts. The wires (of negligible resistance) connecting these circuit elements are laid out along a square of 20 cm x 20 cm. The entire circuit is placed face on in an oscillating magnetic field. The instantaneous value of the magnetic field is $B=B_0\sin\omega t$, with $B_0=0.15$ T and $\omega=360$ radians/s. a) Find the instantaneous current in the resistor. b) Find the average power dissipated in the resistor.