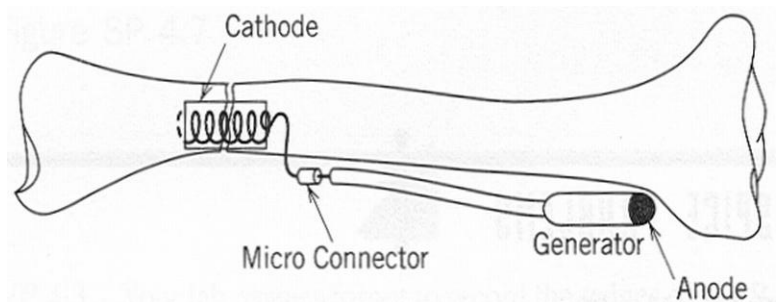


EGR 215 Homework 4 Winter 2008 Additional Problems

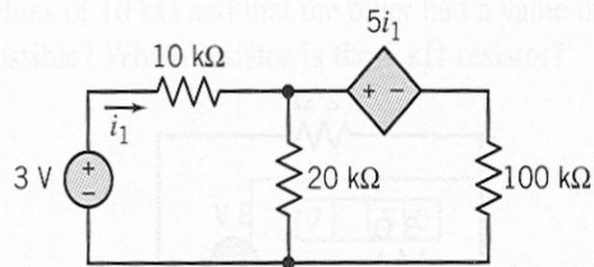
1. Although scientists continue to debate exactly why and how it works, the process of utilizing electricity to aid in the repair and growth of bones—which has been mainly used with fractures—may soon be extended to an array of other problems such as osteoarthritis, skin ulcers and spinal fusions.

An electric current is applied to bone fractures that have not healed in the normal period of time. The process seeks to imitate natural electrical forces within the body. It only takes a small amount of electrical stimulation to accelerate bone recovery. The direct current method uses an electrode that is implanted at the bone. This method has a success rate approaching 80%.

The implant is shown in the figure below and the circuit model is shown as well. Find the energy delivered to the cathode during a 24-hour period. The bone fissure and cathode model is represented by the dependent voltage source and the 100 kΩ resistor.



(a)



(b)

2. The model of a BJT (Bipolar Junction Transistor) amplifier is shown below.
  - (a) Find the gain  $v_o/v_1$
  - (b) Find the required value of  $g$  in order to obtain a gain  $v_o/v_1 = -170$  when  $R_L = 5\text{k}\Omega$ ,  $R_1 = 100\ \Omega$ , and  $R_2 = 1\ \text{k}\Omega$ .

