ENGR-356
Lab 7

Goals

A goal of this lab is to optimize the design of a voltage regular shown in figure 1.

Specifications

The voltage regulator should perform as follows.

1) Input voltage range is 7 to 15 volts
2) Output current 0 to 50 mA
3) Load regulation should be made as good as possible. By load regulation we mean that when the output current is changed the output voltage should change as little as possible.
4) The output voltage should be as close to 5.0 volts as possible

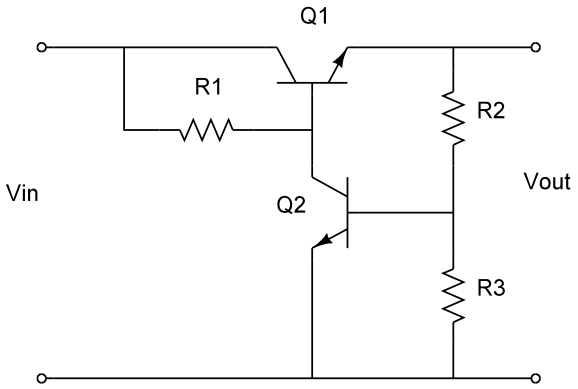

Figure 1

Design methodology

A suggested approach is to first redraw the circuit using equivalent circuit models from Fig. 6.5 of the text and show a load resistor. Note that the desired output voltage is known. Assume a Vin and a load current. Then work from output backward to find base and collector currents and base-emitter voltages. Resistor values can then be found. Build the circuit and measure circuit voltages and currents to see how they compare with calculated values. Check operation with the four permutations of Vin min, max and load current min, max.

Carefully and neatly document your work directly in your notebooks.

Write a one paragraph abstract about this lab to turn in. A table of performance data should accompany the abstract.

---------- 2n2222 model data ----------
.model 2N2222T NPN(IS=5.7E-14 BF=164 NF=1 VAF=67.8 IKF=5
+ ISE=1.51E-13 NE=1.5 BR=5.4 NR=1.02 VAR=9.16 RB=32.8 RE=0.71 RC=0.1
+ CJE=2.46E-14 VJE=0.727 MJE=0.348 CJC=13.2E-12 VJE=0.218 MJC=0.266 ISC=767E-15
+ NC=2.83 TF=450E-12 TR=51E-9 Vceo=30 Icrating=800m mfg=NXP)