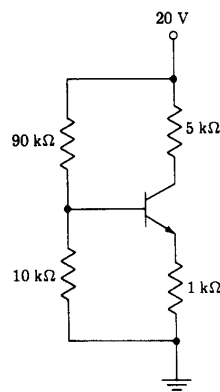


Physics 517/617 Homework 3

Simpson, *Introductory Electronics for Scientists and Engineers*,
Problems 5-11,5-34

Plus the following three problems:

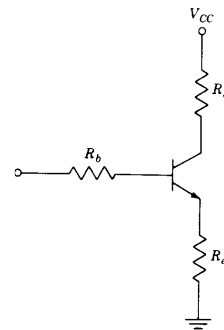
- 1) (Millman 3-11) Calculate the collector and base currents in the transistor shown. Assume $h_{fe} = 50$. Verify any assumptions you make (e.g. the transistor is saturated or in the operating region). *Hint: Apply Thevenin's theorem looking to the left of the base terminal.*



Prob. 3-11

- 2) (Millman 3-15) The silicon transistor shown has an $h_{fe} = 50$. Let $V_{CC} = 25$ V, $V_{BB} = 10$ V, $R_b = 40$ K Ω , $R_c = 15$ K Ω , and $R_e = 5$ K Ω .

- a) Assume that Q is in the active region and find I_B and I_C .
- b) Verify that the assumption in part (a) is not correct. Explain briefly.
- c) Assume that Q is in saturation and find I_B and I_C .
- d) Verify that the assumption in part (c) is justified. Explain briefly.



Prob. 3-15

- 3) Use the BSPICE program on the computers to simulate the output of the full wave rectifier in Fig. 4.28, page 190 of Simpson. Pick reasonable values for R and C to smooth out the 60 Hz input voltage. There is a manual describing the BSPICE program in the lab. When you analyze the circuit with BSPICE you will want to use the transient option.