Homework 5

Common Base

1- Derive T-Model from hybrid-π model for common base stage.

Darlington Pair:

2- Determine the dc collector currents in *Q*1 and *Q*2, and then the input resistance and voltage gain for the Darlington emitter follower of Fig. 1. Neglect *ro*. Assume that *VBE*(on) = 0.7V. Check your answer with SPICE and also use SPICE to determine the output resistance of the stage.

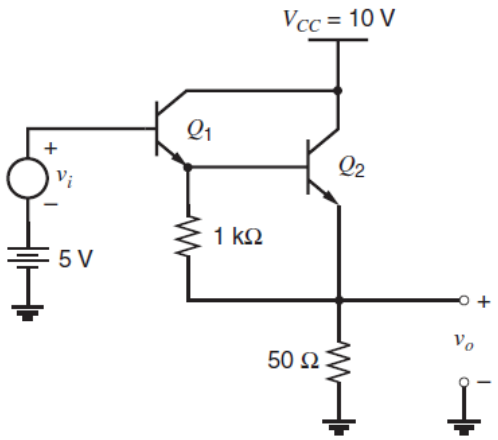


Figure 1. Circuit for Problem 1

3- Calculate the output resistance r_{co} of the common-emitter Darlington transistor of Fig. 2 as a function of I_{BIAS}. Do not neglect either r_{o1} or r_{o2} in this calculation. If I_{C2} = 1mA, what is r_{co} for I_{BIAS} = 1mA? For I_{BIAS} = 0?

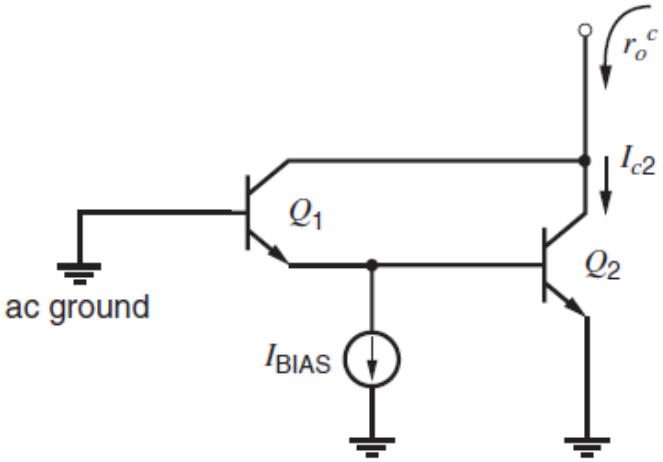
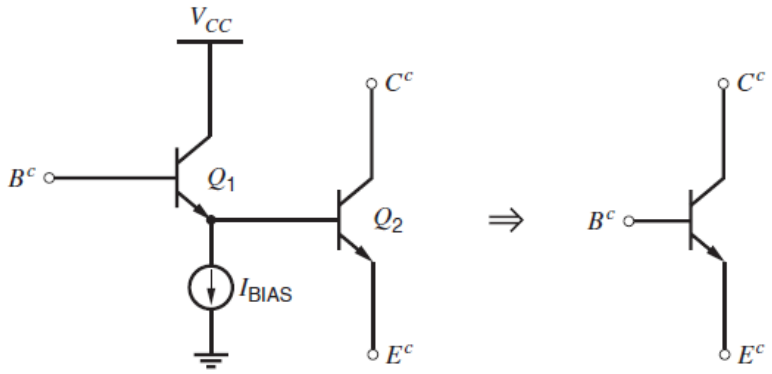


Figure 2. Circuit for Problem 2

Homework 5

4- Find the parameters of an equivalent transistor, known as composite transistor for CC-CE or CC-CC connections



Hint: study Section 3.4 of Gray Book, 5th Edition.

5- Due to a manufacturing error, a parasitic resistor has appeared in the following cascode circuits. Determine the output resistance in each case.