The University of Portland
Donald P. Shiley School of Engineering

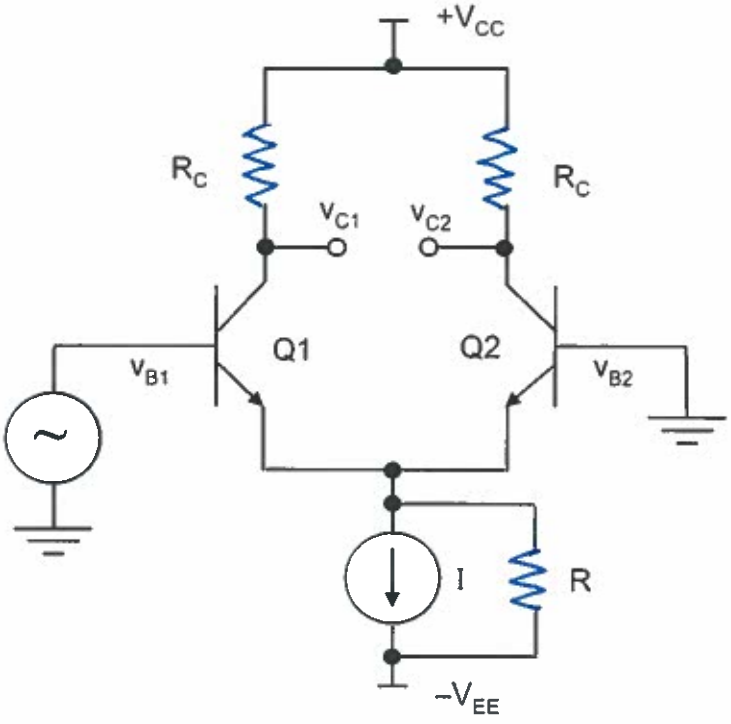
EE352
Electronic Circuits II
HOMEWORK 1

Assigned: Mon, Jan 13, 2020
Due: Friday, Jan 24, 2020

Problems:

1. Consider the BJT Diff Amp with Passive Load on the next page. Consider that this Diff Amp is to be used in the "single-ended" output mode (SEOM) with the output at V_{C2}. (Note that the output load, R_L, is infinite in this problem). Determine the SEOM differential configuration parameters: A_d ($=A_{d0}$), R_{id} and R_{od}. Determine the SEOM common-mode configuration parameters: A_{cm} ($=A_{cm0}$), R_{icm} and R_{ocm}. Calculate the CMRR. Assume $I=20\mu A$, $R=10M\Omega$, $R_C=100k\Omega$, $\beta=100$, $+V_{CC}=+5V$ and $-V_{EE}=-5V$.

2. Using PSPICE, verify all your hand-calculations in Problem 1, above. You will need to run PSPICE Transfer Function Analysis twice: (1) with your circuit configured in the SEOM differential configuration and, (2) with your circuit configured in the SEOM common-mode configuration. In PSPICE, use QbreakN3 and edit its model such that BF=100. Use a simple VDC voltage source (name it VIN) set to 0V at the input for each case (i.e., First, for the SEOM differential configuration simulation, connect V_{B1} to VIN=0V and V_{B2} to GND_EARTH. Then, second, for the SEOM common-mode configuration simulation, connect both V_{B1} and V_{B2} together and to VIN=0V). Use Transfer Function Analysis and set Bias Point Details on for both cases. You will then be able to simply read your two xxx.out PSPICE files to get A_d, R_{id} and R_{od} for the SEOM differential configuration and A_{cm}, R_{icm} and R_{ocm} for the SEOM common-mode configuration, respectively. Please hand-in both your *labeled* PSPICE schematics and both your *edit'ed and labeled* PSPICE xxx.out files.


+V_{CC}
R_C
R_C
V_{C1}
V_{C2}
Q1
Q2
V_{B1}
V_{B2}
I
R
$-V_{EE}$