

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Department of Electrical Engineering¹

6.301 Solid State Circuits

Spring Term 2003
Problem Set 7

Issued : April 11, 2003
Due : Friday, April 18, 2003

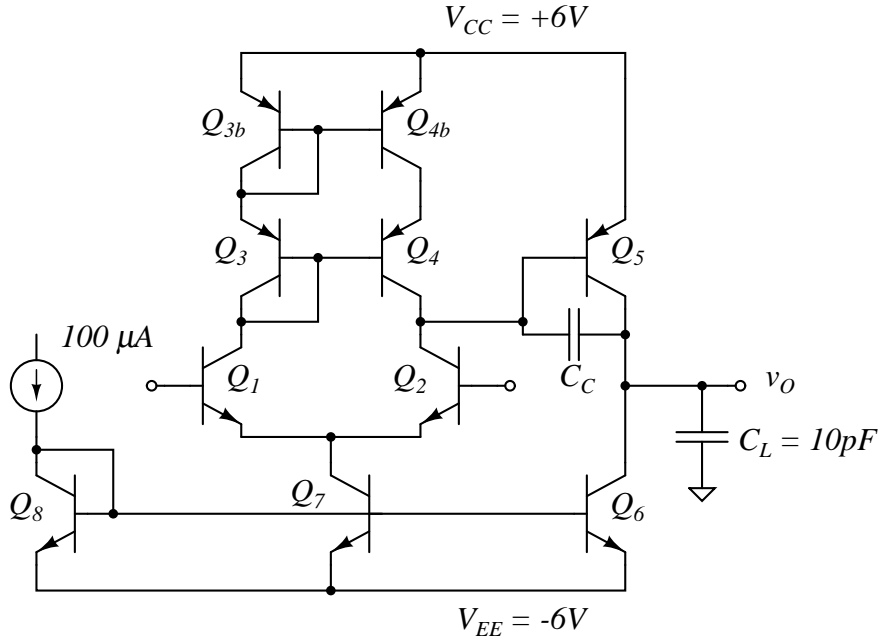
Problem 1 A basic operational amplifier circuit with an NPN input stage is shown on the next page. Calculate the following amplifier parameters.

- (a) Input bias current
- (b) Open-loop input resistance
- (c) Open-loop output resistance
- (d) DC small-signal differential gain
- (e) Compensation capacitor size to achieve 45 degrees of phase margin for unity-gain feedback.

Assume the following transistor parameters

	NPN	PNP
β	250	50
V_A	50 V	20 V
τ_F	2.5 ns	25 ns
c_μ, c_{je}, c_{cs}	0	0

¹Some Electrical Engineers find computers to be useful in the analysis on complex circuits and systems. Computer Science is mentioned here for that reason.



Problem 2 Repeat Problem 1 for the following PNP input operational amplifier.

