King Fahd University of Petroleum and Minerals
Electrical Engineering Department
EE-303 Electronics II
Exam I (041)

Name:	I.D#	No.	Sec.# 05

Q1) The amplifier in Fig. 1 is biased to operate at I_D=1mA and g_m=1mA/V. Neglecting r_o, Find the value of C_S that places the corresponding pole at 10Hz. What is the frequency of the transfer function zero introduced by C_S? [40 Marks]

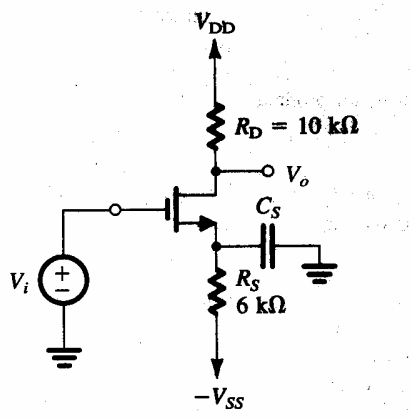

Fig. 1

Q2) For the current mirror in Fig. 2 derive expressions for high frequency pole(s) due to the BJT internal capacitances and neglecting r_x and r_o. Assume the transistor to be identical. If the mirror is biased at 1mA and the BJTs at this operating point are characterized by f_T=400MHz, C_μ=2pF, and β_0=200, find the frequency of the pole(s).

(Hint: $f_T = \frac{g_m}{2\pi (C_\pi + C_\mu)}$) [50 Marks]

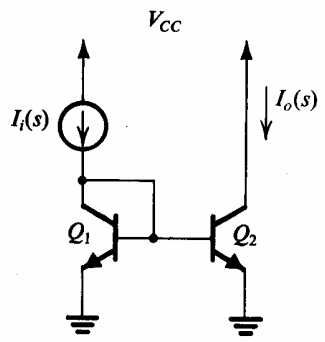

Fig. 2

Q3) (a) The circuit of Fig. 3 is usually used to measure the DC gain of the op-amp. Assume the op-amp is ideal except for having a finite gain A. Measurements indicate v_o=3.5V when v_I=3.5V. What is the op-amp gain A? [30 Marks]
(b) An inverting amplifier with nominal gain of –20V/V employs an op amp having a dc gain of 10^4 and unity-gain frequency of 10^6 Hz. Draw the Bode plot of the closed loop amplifier transfer function (only magnitude response). [30 Marks]

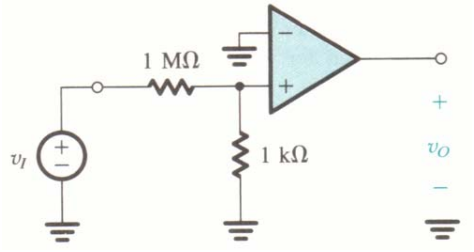

Fig. 3