

ENEE3304 CH6 Homework Problems

6.34 Find the voltages at all nodes and the currents through all branches in the circuit of Fig. P6.34. Assume $|V_{BE}| = 0.7$ V and $\beta = \infty$.

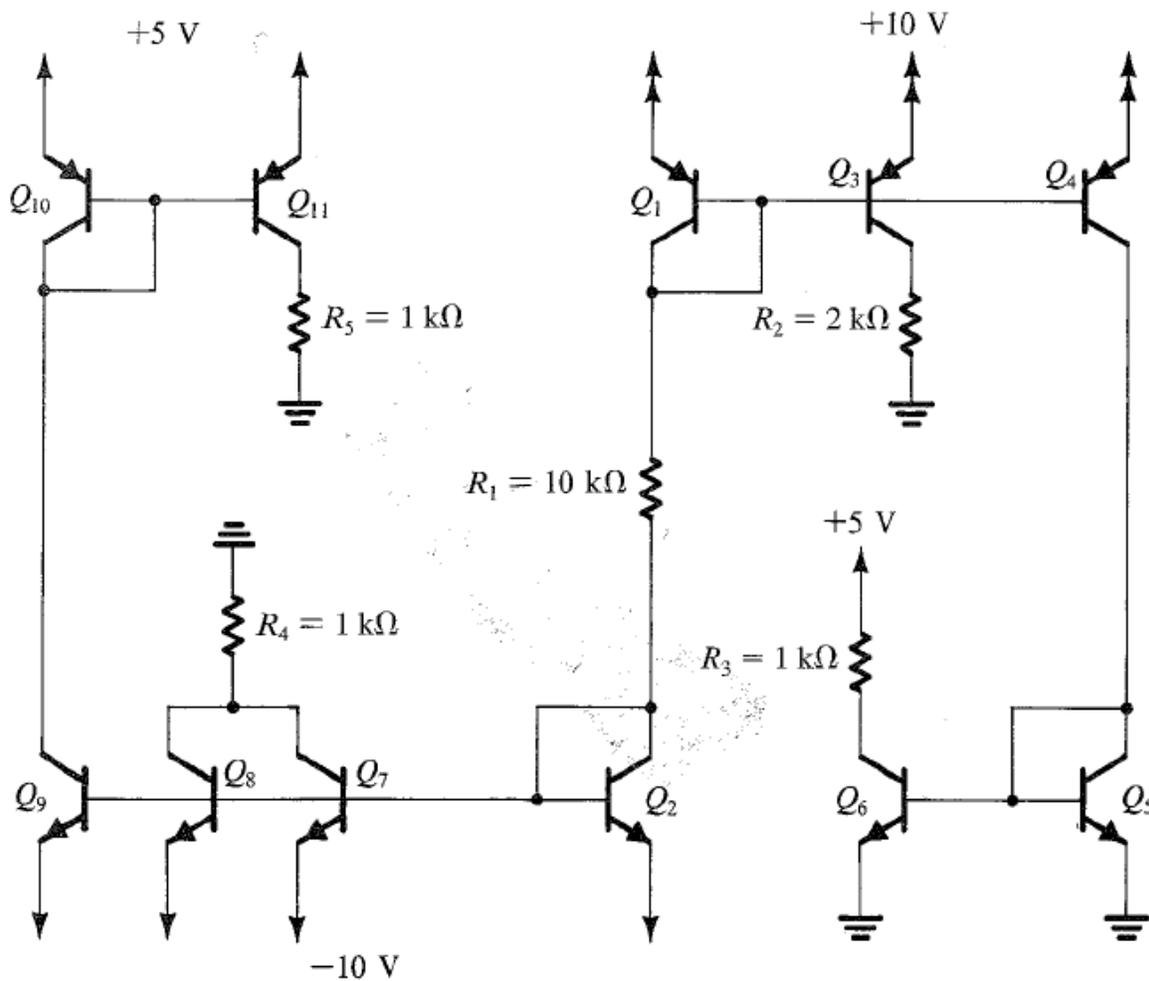


FIGURE P6.34

6.61 Figure P6.61 shows an IC MOS amplifier formed by cascading two common-source stages. Assuming that $V_{An} = |V_{Ap}|$ and the biasing current-sources have output resistances equal to those of Q_1 and Q_2 , find an expression for the overall voltage gain in terms of g_m and r_o of Q_1 and Q_2 .

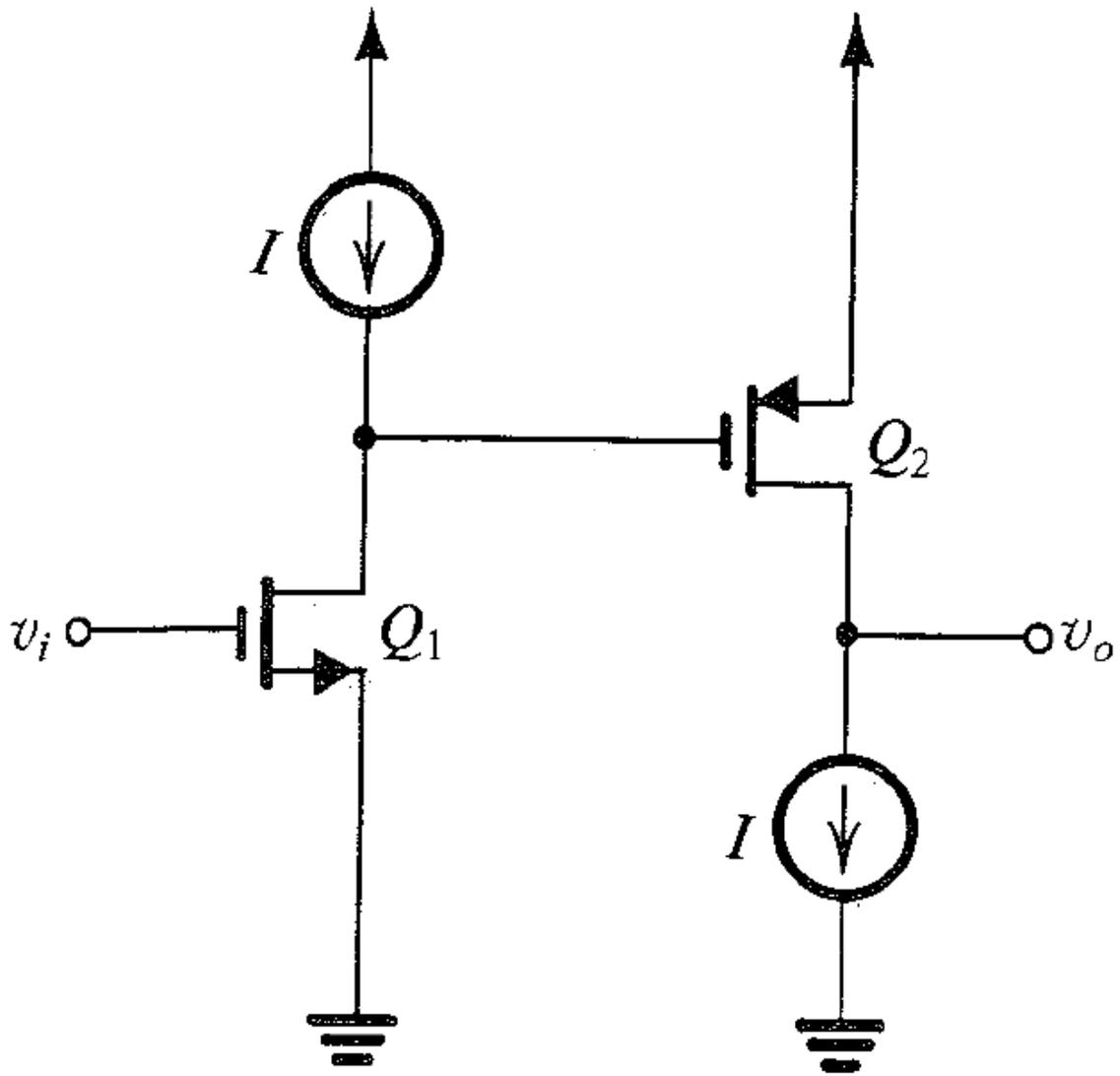


FIGURE P6.61

6.65 Transistor Q_1 in the circuit of Fig. P6.65 is operating as a CE amplifier with an active load provided by transistor Q_2 , which is the output transistor in a current mirror formed by Q_2 and Q_3 . (Note that the biasing arrangement for Q_1 is *not* shown.)

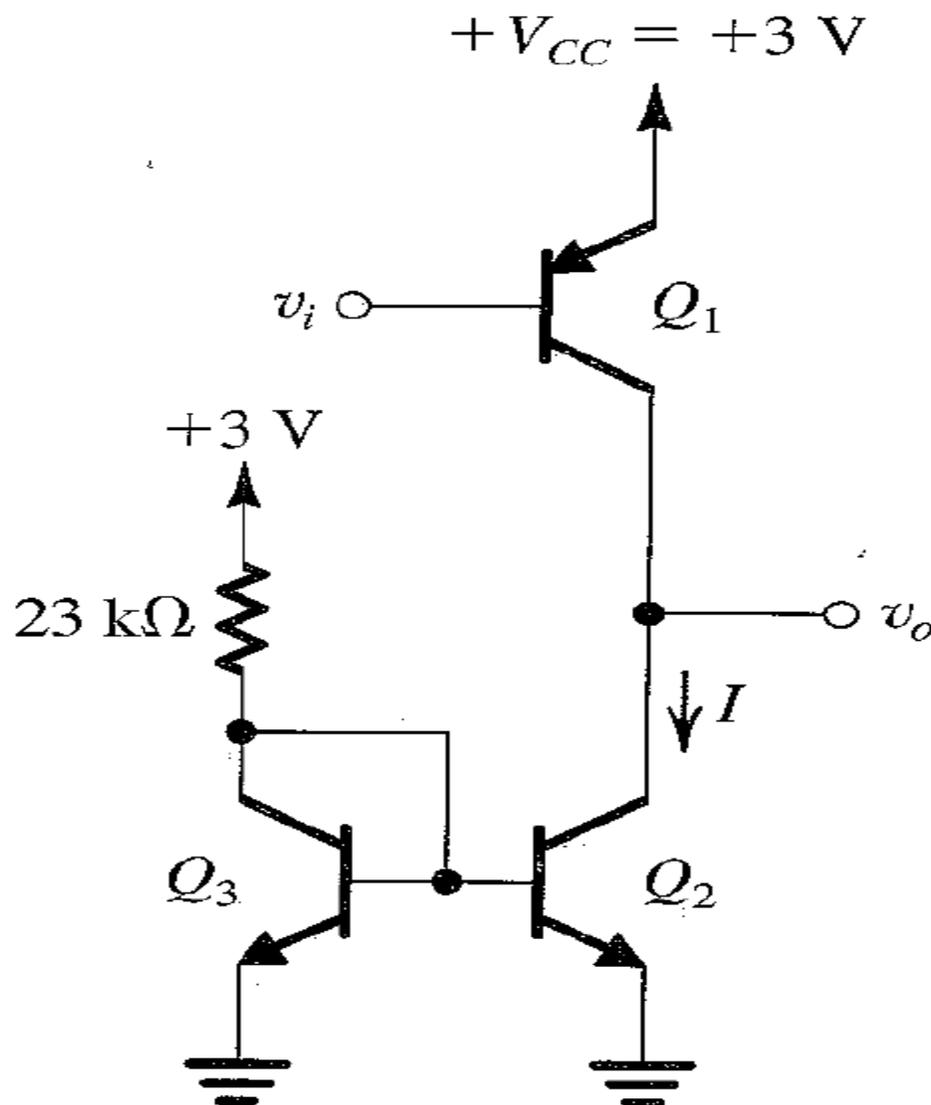
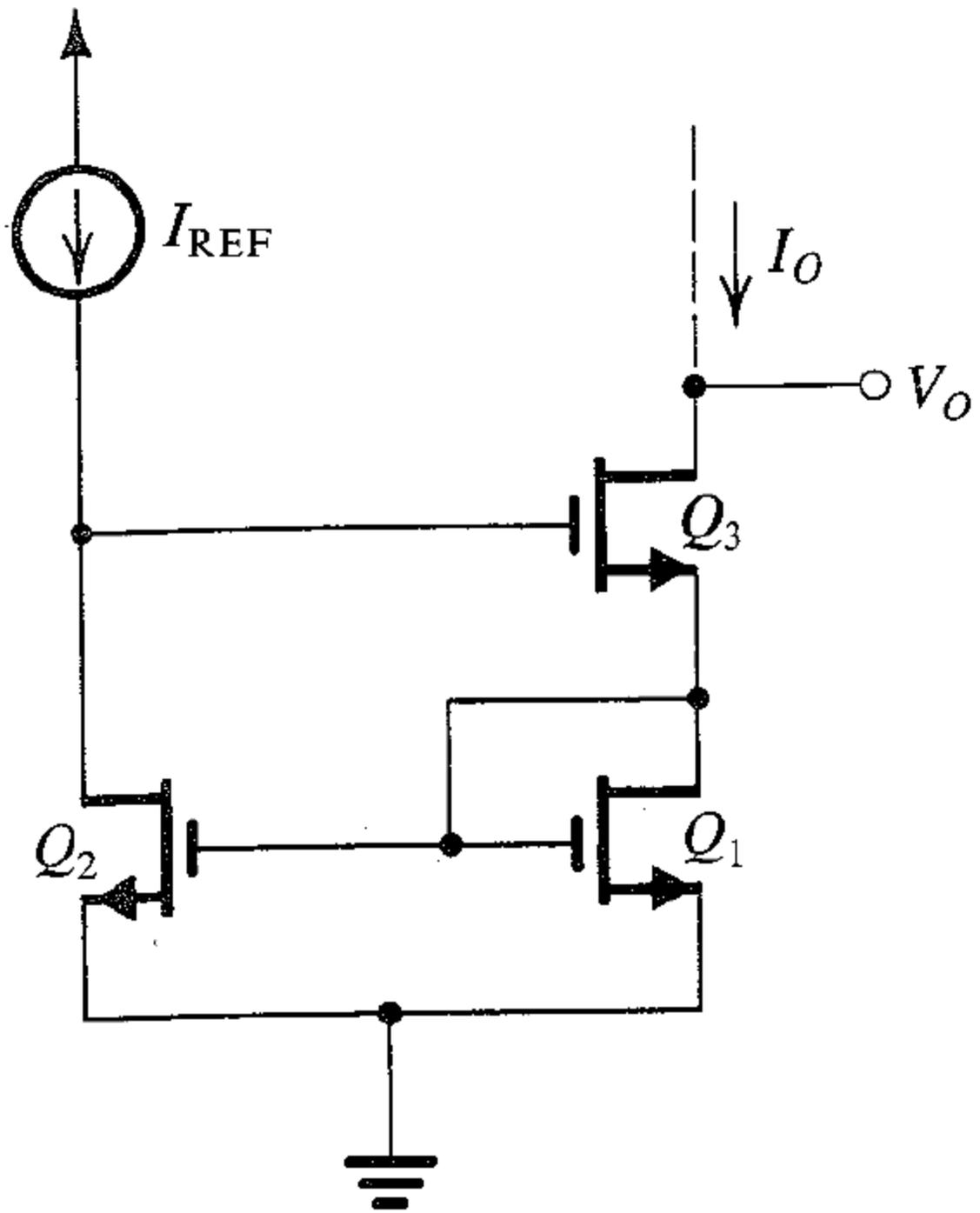


FIGURE P6.65

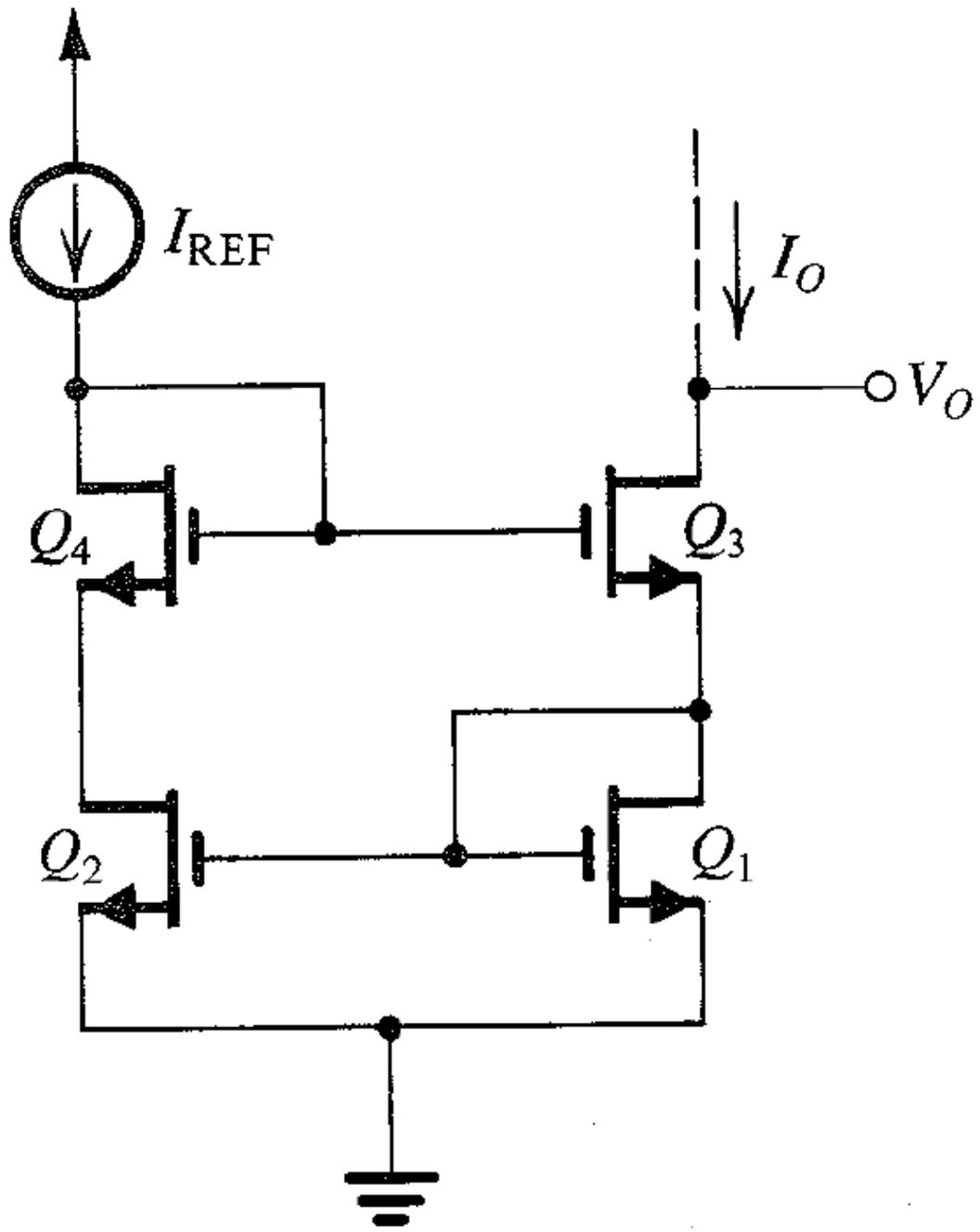
- (a) Neglecting the finite base currents of Q_2 and Q_3 and assuming that their $V_{BE} \cong 0.7$ V and that Q_2 has five times the area of Q_3 , find the value of I .
- (b) If Q_1 and Q_2 are specified to have $|V_A| = 50$ V, find r_{o1} and r_{o2} and hence the total resistance at the collector of Q_1 .
- (c) Find $r_{\pi1}$ and g_{m1} assuming that $\beta_1 = 50$.
- (d) Find R_{in} , A_v , and R_o .

***6.140** A Wilson current mirror, such as that in Fig. 6.61(a), uses devices for which $V_t = 0.6$ V, $k'_n W/L = 2$ mA/V², and

$V_A = 20$ V. $I_{REF} = 100$ μ A. What value of I_O results? If the circuit is modified to that in Fig. 6.61(c), what value of I_O results?



(a)



(c)