Homework 6 Due Thursday, March 7th, 2013 In Class

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ECE 322L Spring 2013

Problem 5.33

(a) The current gain of the transistor in Figure P5.33 is $\beta = 75$. Determine V_O for:
(i) $V_{BB} = 0$, (ii) $V_{BB} = 1$ V, and (iii) $V_{BB} = 2$ V. (b) Verify the results of part (a) with a computer simulation.
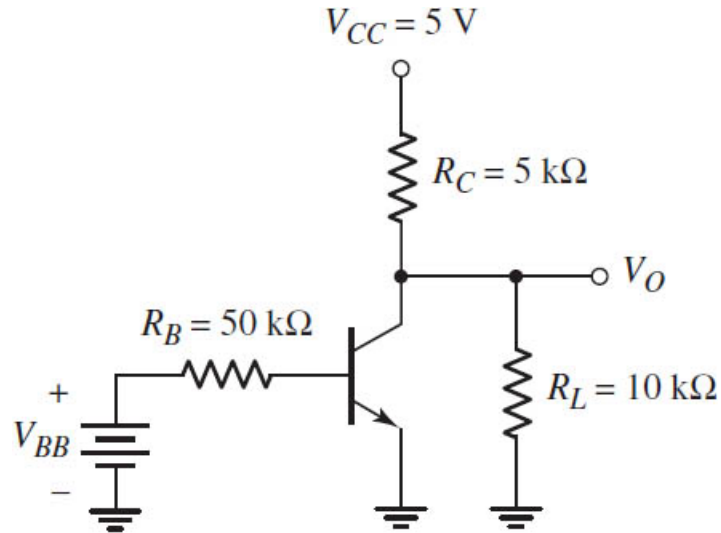
$$V_{CC} = 5 \text{ V}$$

$$R_C = 5 \text{ k}\Omega$$

$$\circ V_O$$

$$R_B = 50 \text{ k}\Omega$$

$$R_L = 10 \text{ k}\Omega$$

$+$

V_{BB}

$-$

Figure P5.33

Problem 5.57

(a) Determine the Q-point values for the circuit in Figure P5.57. Assume $\beta = 50$.
(b) Repeat part (a) if all resistor values are reduced by a factor of 3. (c) Sketch the load lines and plot the Q-point values for parts (a) and (b).
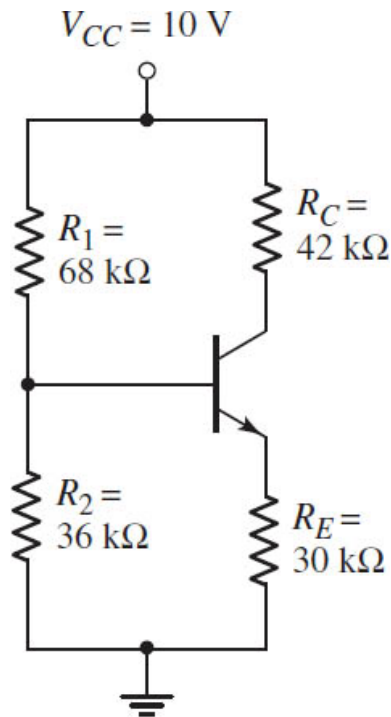
$V_{CC} = 10$ V

$R_1 = 68$ kΩ

$R_C = 42$ kΩ

$R_2 = 36$ kΩ

$R_E = 30$ kΩ

Figure P5.57

Problem 5.73

For the circuit in Figure P5.73, let $\beta = 100$. (a) Find V_{TH} and R_{TH} for the base circuit. (b) Determine I_{CQ} and V_{CEQ}.
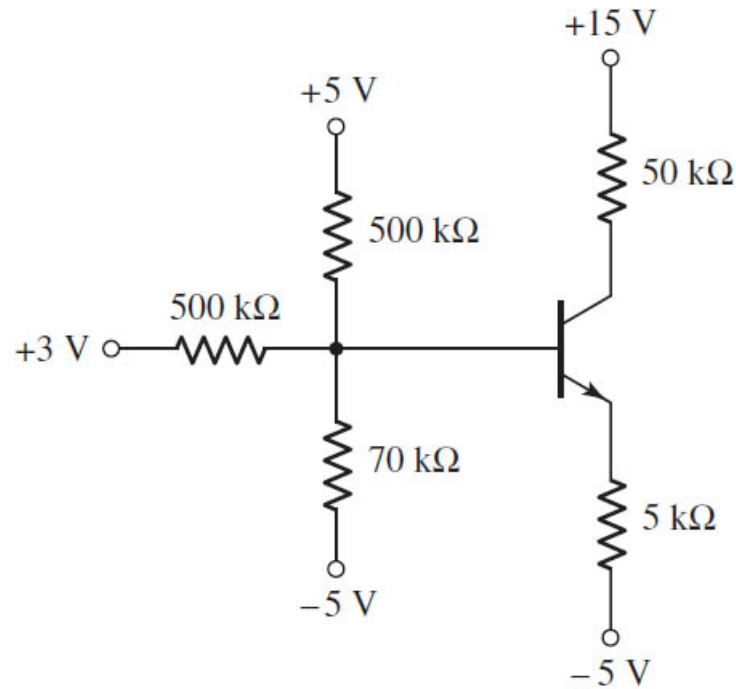

Figure P5.73

Problem 5.79

For each transistor in the circuit in Figure P5.79, $\beta = 120$ and the B–E turn-on voltage is 0.7 V. Determine the quiescent base, collector, and emitter currents in Q_1 and Q_2. Also determine V_{CEQ1} and V_{CEQ2}.
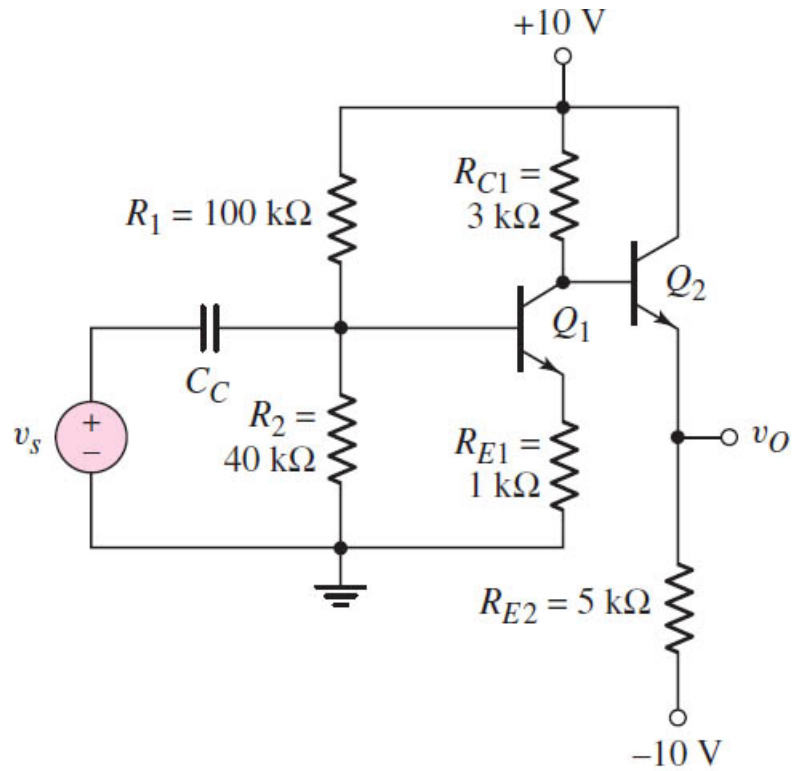

Figure P5.79

Problem 6.1

(a) Determine the small-signal parameters g_m, r_π, and r_o of a transistor with parameters $\beta = 180$ and $V_A = 150$ V for bias currents of (i) $I_{CQ} = 0.5$ mA and (ii) $I_{CQ} = 2$ mA. (b) Repeat part (a) for $\beta = 80$ and $V_A = 100$ V when biased at (i) $I_{CQ} = 0.25$ mA and (ii) $I_{CQ} = 80 \mu$ A.