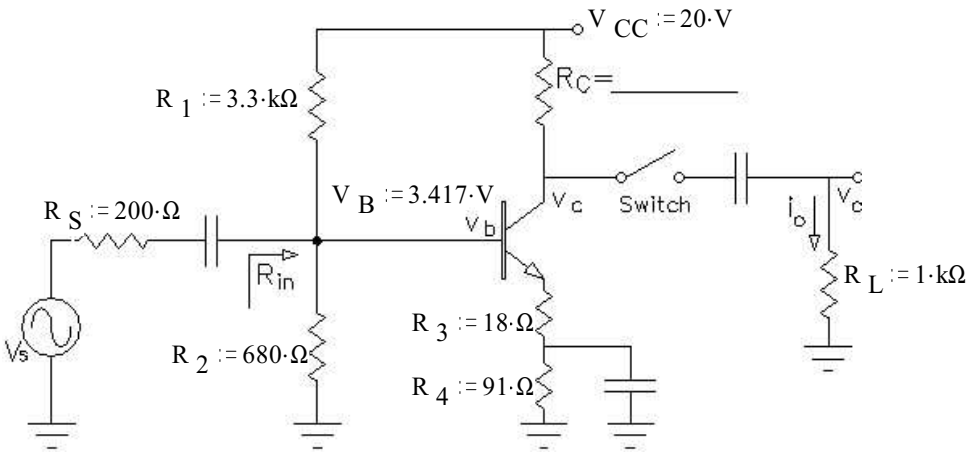
ECE 2100 homework # 18 Due: Fri, 3/28/03

A.Stolp
4/12/02
3/13/03

1. Consider the circuit below. You may neglect the base bias current (I_B) and the Early effect (r_o).



a) When the switch is open, the peak-to-peak output signal voltage at the collector is 4 Vpp. When the switch is closed this voltage drops to 2.88 Vpp. What is the output resistance of this amplifier?

no load collector signal: $v_{c.nl} := 4 \cdot V$ loaded collector signal: $v_{c.l} := 2.88 \cdot V$

b) What is the value of R_C?

c) What is the peak-to-peak voltage at the base? v_b = ?

d) The input resistance (R_{in}) has been measured as 452 Ω. What is the peak-to-peak voltage at the source?

e) The input resistance (R_{in}) has been measured as 452 Ω. Find β. $R_i := 452 \cdot \Omega$ β = ?

f) When the switch is closed, what is the maximum peak-to-peak output voltage you can get from this amplifier without clipping? V_{oppmax} = ?

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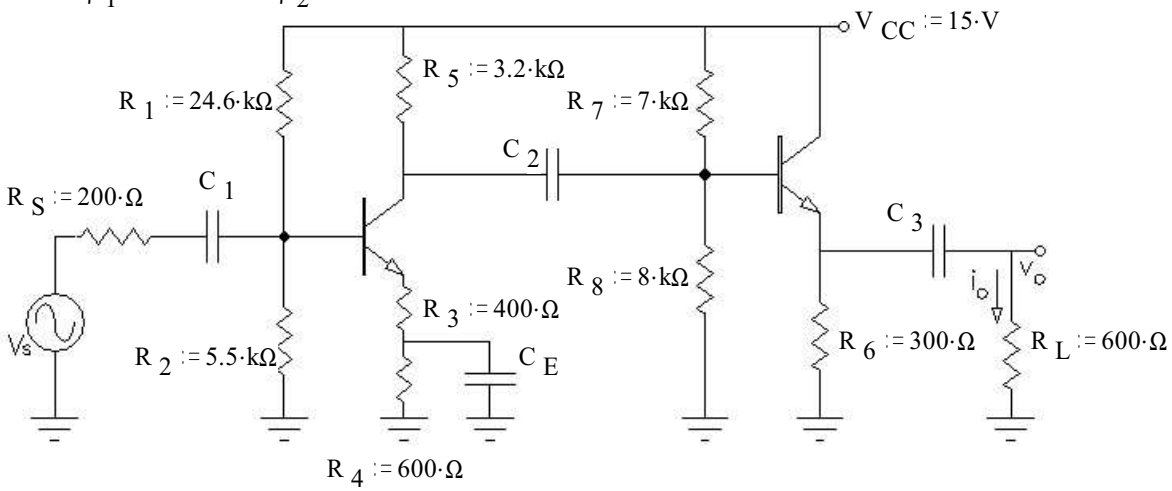
2. Consider the circuit below. You may neglect the base bias currents (I_B) and the Early effects (r_c).

Assume that $\beta_1 := 112$ and $\beta_2 := 112$



a) What is the output resistance of the first stage? R_{o1} = ?

b) What is the output resistance of the second stage? R_{o2} = ? You may neglect r_e for this stage

c) What is the approximate voltage gain of the second stage? A_{v2} = ? You may neglect r_e for this stage

d) This amplifier should have a low corner frequency of 40 Hz. What is the minimum allowable value of C_3?

$f_{CL} := 40·Hz$ C_3 = ? You may neglect r_e for the second stage

Answers

1a) $R_o := 389·\Omega$ b) $R_C := 389·\Omega$ c) $v_b := 195·mV$ d) $v_s := 282·mV$ e) $\beta := 120$ f) $V_{oppmax} := 13.3·V$

2a) $R_{o1} := 3.2·k\Omega$ b) $R_{o2} := 14.6·\Omega$ c) A_{v2} = 1 d) $C_3 := 6.47·\mu F$

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