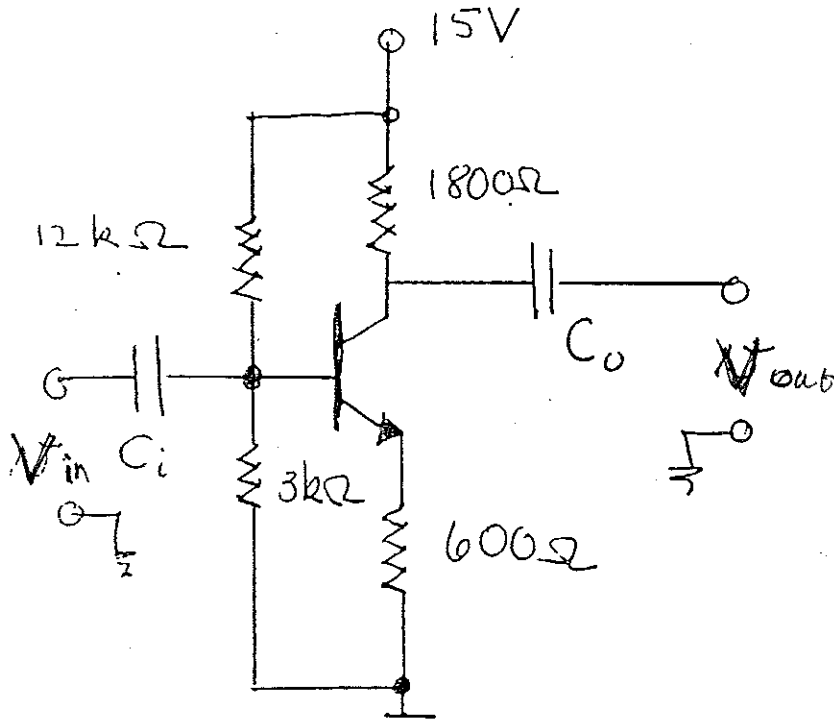


Physics 623 Homework #2

1. For the circuit shown the transistor used has $\beta = 200$ and is made of silicon. Assuming the capacitors offer negligible impedance at the signal frequencies calculate the requested quantities.

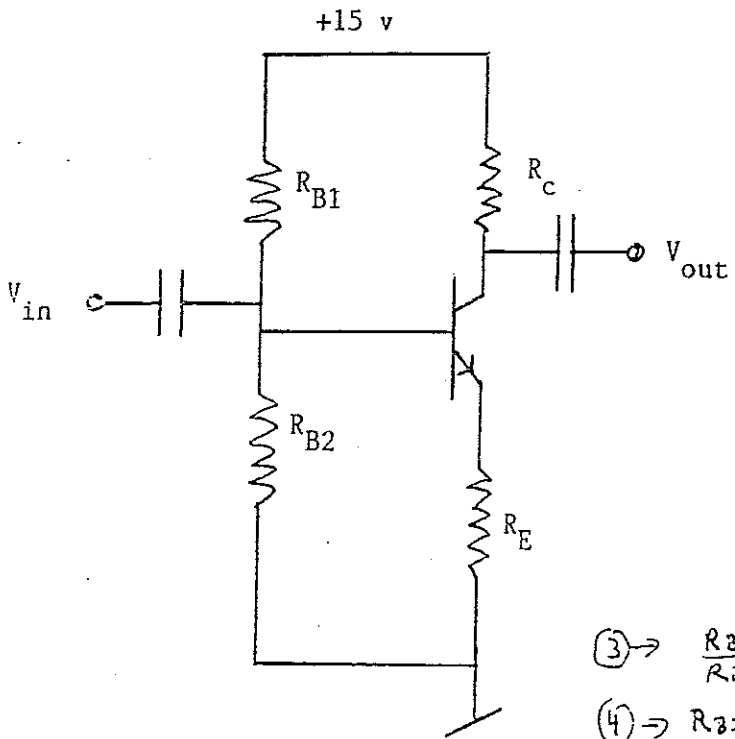


(Suggested order of approach)

- ③ $I_E = \underline{\hspace{2cm}} \text{ mA}$
- ④ $I_C = \underline{\hspace{2cm}} \text{ mA}$
- ⑥ $I_B = \underline{\hspace{2cm}} \text{ mA}$
- ⑤ $V_C = \underline{\hspace{2cm}} \text{ V}$
- ② $V_E = \underline{\hspace{2cm}} \text{ V}$
- ① $V_B = \underline{\hspace{2cm}} \text{ V}$
- ⑦ $r_{tr} = \underline{\hspace{2cm}} \Omega$
- ⑧ $A_v = v_o/v_i = \underline{\hspace{2cm}}$
- ⑨ $R_i = \underline{\hspace{2cm}} \Omega$
- ⑩ $R_o = \underline{\hspace{2cm}} \Omega$
- ① The sign of the power supply =

2. For the circuit shown, supply approximate values for the indicated components. The silicon transistor has a minimum β of 80. The desired characteristics are:

- ② a) Gain = -10
- ① b) Output impedance = 10 K
- ③ c) Output voltage swing = ± 5 V minimum
- ④ d) Input impedance = maximum consistent with stability against variation in transistor parameters ($80 < \beta < \infty$, in this case).



① $R_C =$ _____

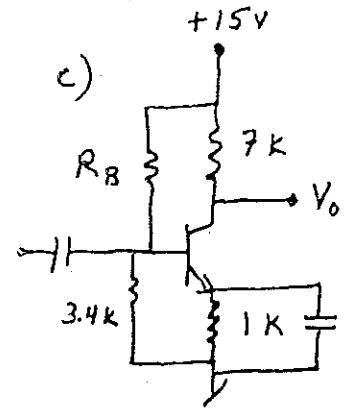
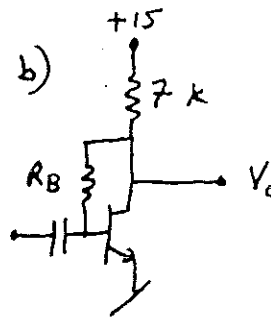
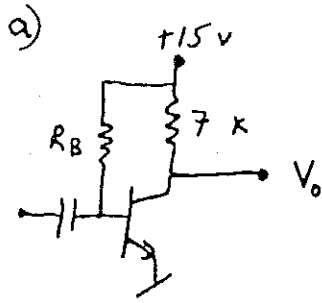
② $R_E =$ _____

③ $\rightarrow \frac{R_{B2}}{R_{B1}}$ $R_{B1} =$ _____

④ $\rightarrow R_{B2} // R_{B1}$ $R_{B2} =$ _____

⑤ input impedance = _____

3.



For each of the biasing schemes shown above, find the value for R_B which will give a quiescent output voltage of about 8 volts at V_o if the transistor has a β of 50. You may assume that $V_{BE} \equiv 0.7$ volts.

If you build the circuits using the values of R_B calculated above, but the transistor actually has $\beta = 200$, what will be the quiescent operating point for each circuit? (A range of 50-200 in β is reasonable for transistors of a given type when both manufacturing tolerances and temperature effects are taken into account.)