Last Lecture → BJT: Large Signal Analysis

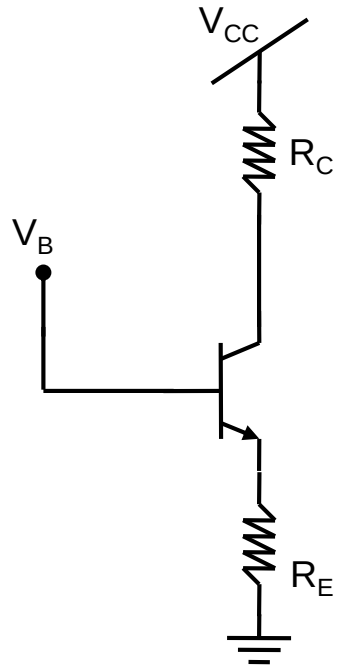
9/16/2019

1) When applicable, simplify the circuit
2) Determine if BE/EB junction is forward (transistor = "on")
   - If reverse, transistor → cut off
   - If forward, transistor → active / saturation

     ∴ Make an educated guess of the region of operation
3) Substitute the appropriate model and or assumptions
4) Solve for the transistor operating point (I_C & V_{CE})
5) Verify proper operation @ the assumed region
   - If cut off → $V_{BE} < 0.5V$
   - If active → $V_{BE} >= 0.5V$, $V_{CE} >= 0.3V$
   - If saturation → $V_{BE} >= 0.5V$, $I_C / I_B < \beta$

Example 6.5

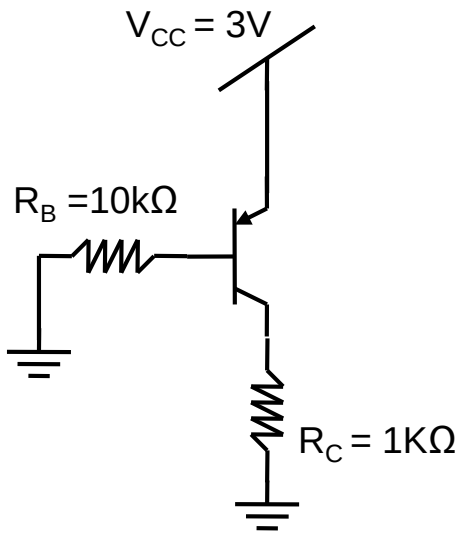
For the given circuit (R_C=4.7kΩ, R_E=3.3kΩ, V_{cc}=10V, V_B=6V) determine the voltages at all nodes and the currents through all branches. Assume that the transistor β is specified to be at least 50 and V_{BE}=0.7V for all currents.



Problem 6.51

9/16/2019

For the following circuit, assuming β=50 and V_{EB}=0.7V for all currents, determine the voltage V_c at the collector terminal. To what value should R_B be increased or decreased in order for the transistor to change operating modes.



Example 6.12

9/16/2019

For the following circuit determine the voltages at all nodes and the current through all branches assuming:

a) V_{BE}=0.7V, β=100, V_{dd} = -V_{ss} =5V, and V_B =5V

b) V_{BE}=0.7V, β=100, V_{dd} = -V_{ss} =5V, and V_B =0.3V