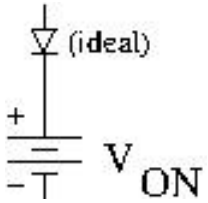


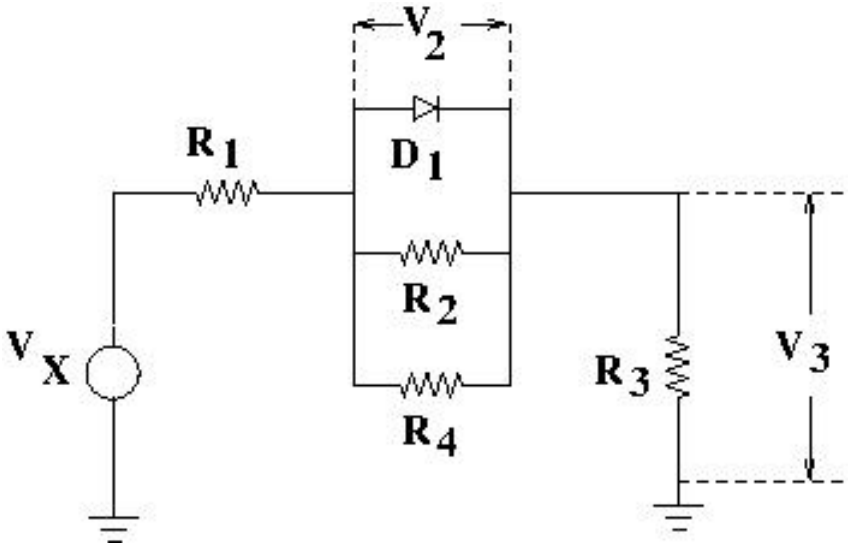
Constant Voltage Source Equivalent Circuit. (V_ON=0.7V)

1. For the diode circuit below, here is what is known:

R_1=1kOhm; R_2=2kOhm;
R_3=2kOhm; R_4=1kOhm

V_X=5V.

Find (assume D1 is ON):



i) Redraw the circuit replacing D1 with the constant voltage source equivalent circuit.

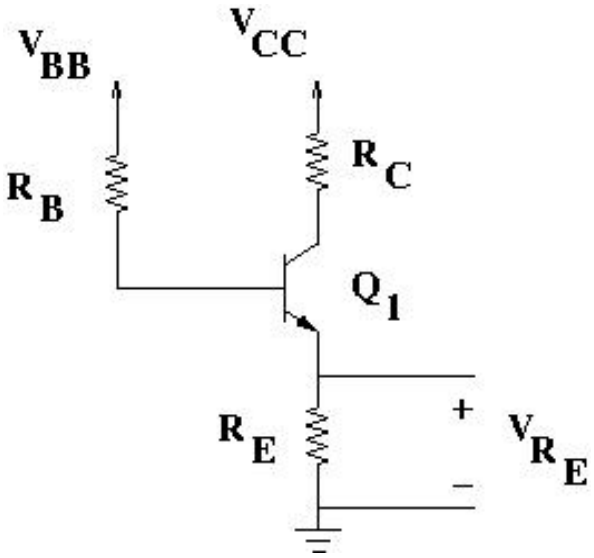
ii) Find V_D, V_R2||R_4 (the voltage drop for R2 & R4.

iii) Find I_R1, I_R2, I_R4, I_D & I_R3

iv) V_R1, V_R3

v) Repeat for D1 1-4 for D1 modeled as an ideal Diode that is ON.

2. In class we used the DC equivalent circuit for the npn Bipolar Junction Transistor (biased in Fwd Active) in our solution to TB Practice Problem 3.12 (p 108). V_BB=5V, V_CC=12V, R_B=10kOhm, R_C=0.5kOhm & R_E=0.2kOhm. (beta=100, V_BE=.7V)



i) Label the C, B, E terminals; Redraw the circuit replacing Q_1 with the DC equivalent circuit given below.

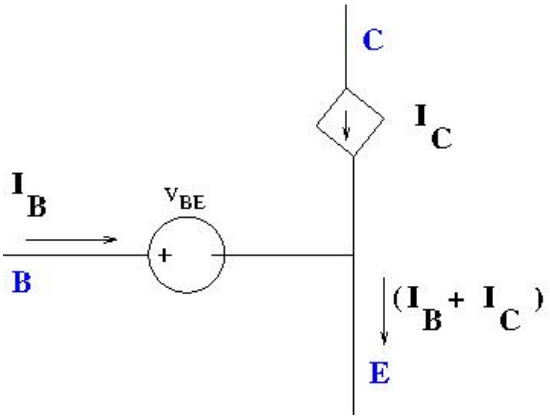
ii) Using KVL, find the equation for I_B.

iii) Find the value of I_C.

iv) Find an expression, again using KVL, for V_CE.

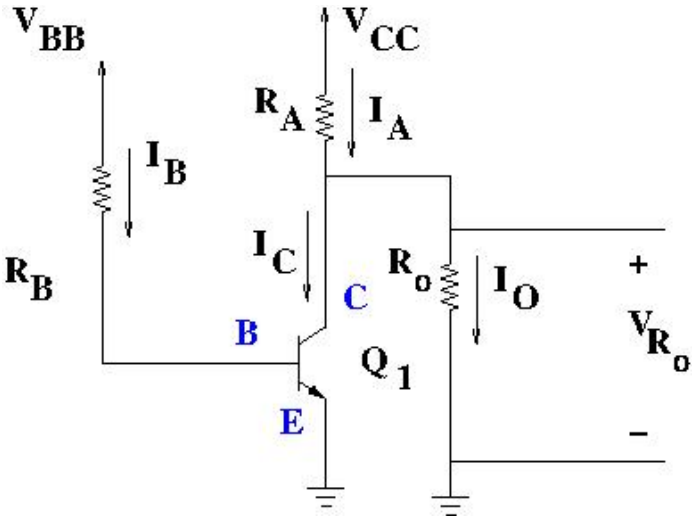
v) What is the DC Operating Point ?

vi) Find V_CE again, using the expression from 4) if R_C=1.5kohm.



DC Equivalent Circuit for the npn BJT.

3. TB Practice Problem 3.13. For the BJT circuit find the DC operating point. V_CC=20V; V_BB=1V; R_B=120kOhm; R_A=R_o=10kOhm; beta=80; V_BE=0.7V. (Note: V_Ro=V_CE)



i) Redraw the circuit replacing Q_1 with the DC equivalent circuit above.

ii) Using KVL find I_B. Use I_B to find I_C. (note: I_B=0.0025mA; I_C=0.2 mA).

iii) Find the nodal equation at the collector terminal. (to start, use I_A, I_C & I_o); then replace with expressions using voltages. (V_Ro=V_CE=9V; I_o=0.9mA).