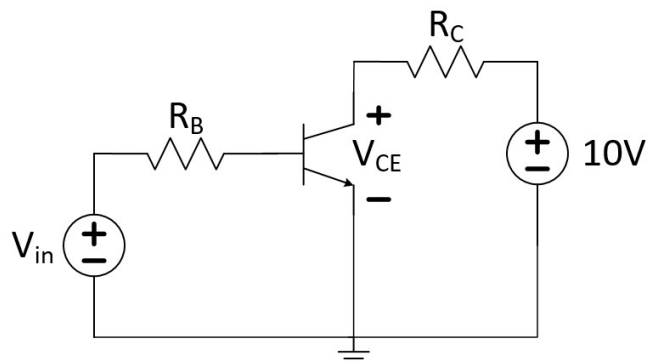


HKN ECE 110 Exam 3 Review Worksheet

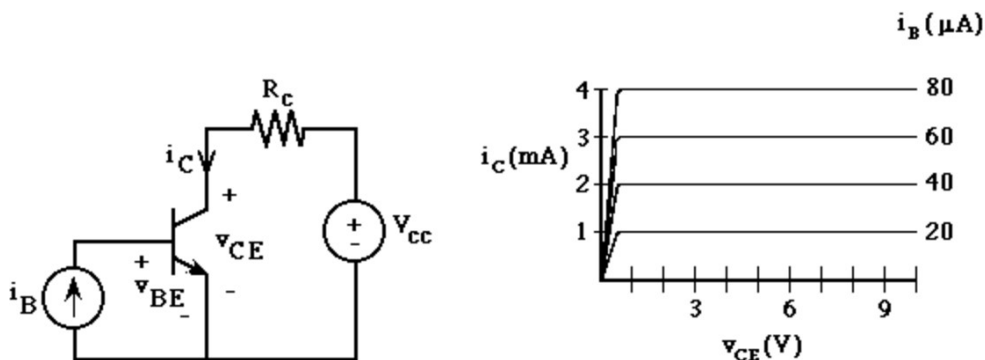
1. For the following circuit, $V_{BE,ON} = 0.4V$, $V_{CE,SAT} = 0.2V$, $R_B = 20k\Omega$, $R_C = 2k\Omega$ and $\beta = 100$. Find V_{CE} for the following input voltages.

- a. $V_{in} = 0.3V$
- b. $V_{in} = 1.0V$
- c. $V_{in} = 1.4V$
- d. Repeat a-c if there is now a diode with $V_{on} = 0.7V$ placed between R_B and the BJT



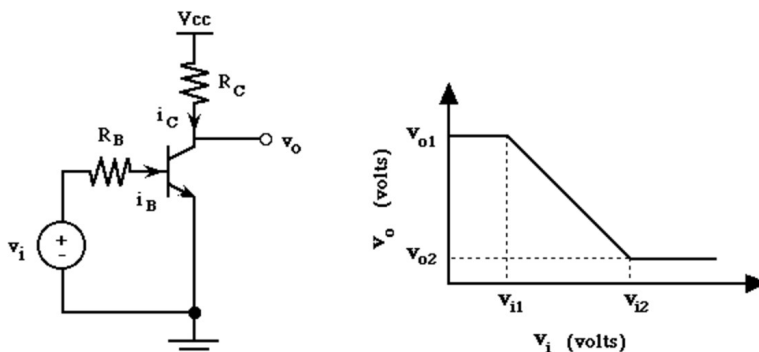
2. For the following circuit: $V_{CC} = 8V$, $R_C = 2k\Omega$, and $V_{CE,SAT} = 0.2V$

- a. Label the three regions of the i_c vs. V_{CE} curves. Hint: what are the regions of operation for a BJT?
- b. What is β of the transistor?
- c. Which of the values of i_B (20, 40, 60, 80 μA) force the transistor into saturation?

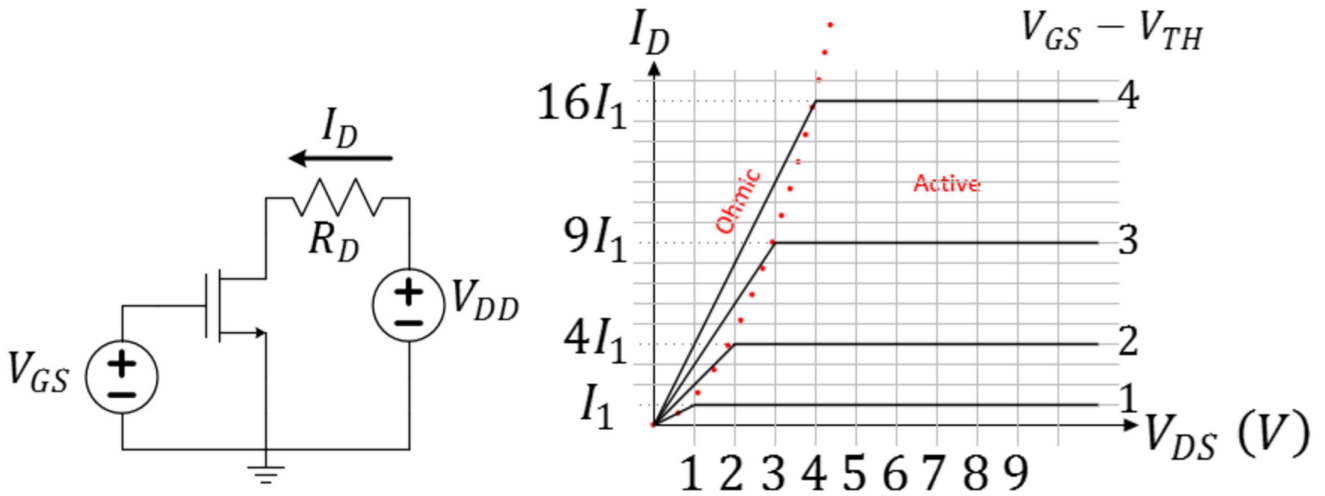


3. For the following circuit, $V_{CC} = 5.2V$, $V_{BE,ON} = 0.7V$, $V_{CE,SAT} = 0.2V$, $R_B = 20k\Omega$, $R_C = 1k\Omega$ and $\beta = 100$.

- a. Determine the values of V_{o1} , V_{o2} , V_{i1} , and V_{i2} .
- b. What is the maximum value of A that keeps the BJT in the active region when:
 - i. $V_i = 1.2 + A\sin(\omega t)$
 - ii. $V_i = 0.9 + A\sin(\omega t)$
 - iii. $V_i = 1.4 + A\sin(\omega t)$
- c. What is the voltage gain in the active region?



4. For the following circuit, $V_{DD} = 6V$, $R_D = 100\Omega$ and $I_1 = 5mA$.
- List the equations for I_D in the Ohmic and Active regions.
 - Using the equations from part (a), determine the value of k .
 - Find the values of I_D and V_{DS} when:
 - $V_{GS} = 4V$ and $V_{TH} = 2V$
 - $V_{GS} = 5V$ and $V_{TH} = 1V$



5. Fill in the truth table for the following CMOS circuit where A, B and C are inputs and Z is the output.

