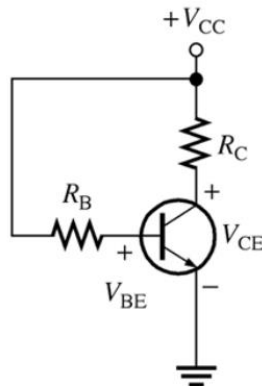


ENGR338 HW7 BJTs (100 points)

1. Consider an npn transistor with $V_{BE} = 0.7V$ at $I_C = 1mA$. Find V_{BE} at $I_C = 10mA$ ($V_T = 25 mV$). (20 points)
2. BJT transistors of a certain type are specified to have β values in the range of 50 to 150. Find the range of their α values. (20 points)
3. Calculate β for two transistors for which $\alpha = 0.99$ and 0.98 . For collector currents of $10 mA$, find the base current of each transistor. (20 points)
4. (a) Assume $V_{CC} = 8 V$, $R_B = 300 k$ and $R_C = 1 k$, $\beta = 100$. Determine whether the transistor is biased in cutoff, saturation or linear region. (b) Determine the Q-point values of I_C and V_{CE} for the following circuit. (c) Find $I_{C_{sat}}$ and $V_{CE(cutoff)}$ (V_{CE} when $I_C = 0A$) and hand draw the DC load line and label the Q-point (just simply label the I_C and V_{CE} of the Q point on the load line). (d) Find the maximum peak value of base current for linear operation. (20 points)



5. Select appropriate R_1 , R_2 , and R_E to bias the following amplifier in linear region. Given that $R_L = 2k$, $V_{CC} = 15V$, $V_{RE} = 1V$, $\beta = 100$. (Assume the current flows through R_2 is 10 times higher than the Base current). (20 points)

