Question 1 (10 points)
Assuming discrete silicon diodes at 300°K, and the bias conditions shown below, find the *small signal* Thevenin resistance $R_T$ at the indicated terminal.
Question 2 (10 points)
For this transistor, $V_T=1 \text{ V}$, $k_n'(W/L)=1 \text{ mA/V}^2$ and $\lambda=0.05 \text{ V}^{-1}$. Find the small signal Thevenin resistance $R_T$ at the indicated terminal. You may neglect $\lambda$ for the purpose of determining the bias, but you must include it for the small signal resistance.
Question 3 (10 points)
Design a bias circuit for a PNP BJT using emitter degeneration with a voltage divider at the base. The supply voltage is 10 V. Design the bias circuit so that $V_{EC}$ is 5 V and $I_C=1$ mA, and so that the bias is stable for variations in $\beta$ over a range of 50 to 200, and for variations in $V_{EB}$ of +/-0.1 V. Determine the values of all resistors for your design. Do not worry about choosing standard commercially available resistor values.