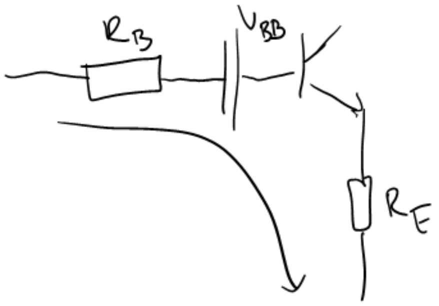
3. a)



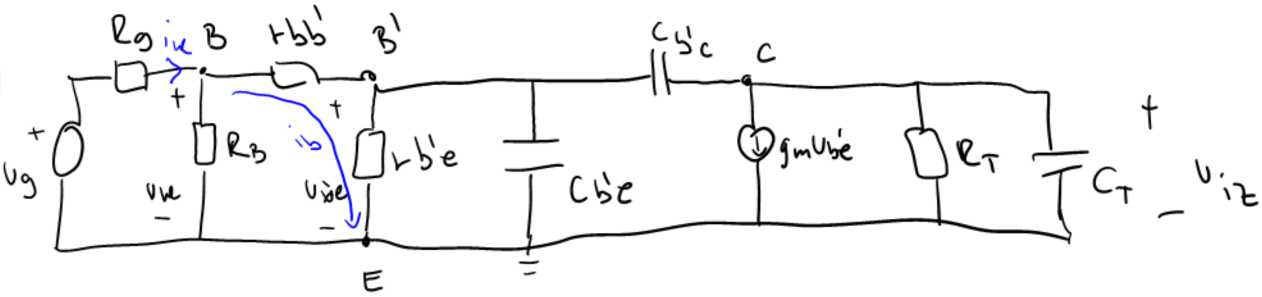
$$U_{BB} = U_{BEQ} + I_E R_E + I_B R_B \qquad U_{BB} = \frac{U_{CC}}{R_1+R_2} \cdot R_2$$

$$I_B = \frac{U_{BB} - U_{BEQ}}{(1+\beta) R_E + R_B} \qquad R_B = \frac{R_1 R_2}{R_1 + R_2}$$

$$U_{CE} = U_{CC} - \left(\beta R_T + (1+\beta) R_E\right) I_B$$

$$I_E = (1+\beta) I_B \,, \quad I_C = \beta I_B$$

b)



c) $A_{Vg} = \dfrac{v_{iz}}{v_g}$

$$i_b = \frac{v_{b'e}}{r_{b'e}} \qquad v_{ul} = \frac{v_{b'e}}{r_{b'e}} \cdot (r_{bb'} + r_{b'e})$$

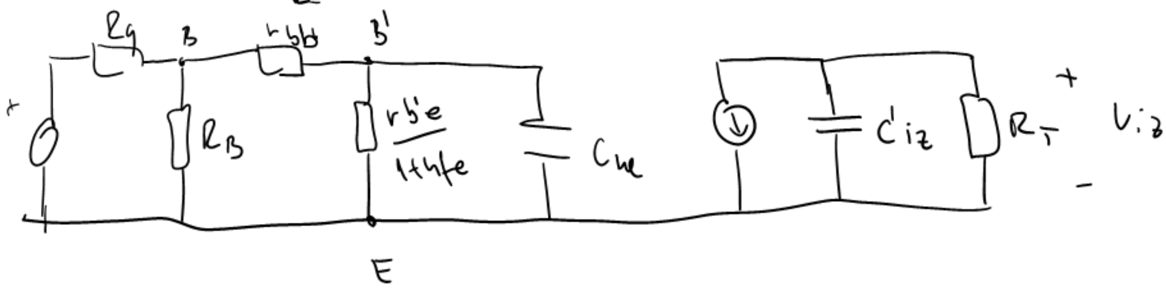
$$R_{ul} = R_B \,\|\, (r_{bb'} + r_{b'e})$$

$$i_{ul} = \frac{v_{ul}}{R_{ul}} \qquad v_g = i_{ul} \cdot (R_g + R_{ul})$$

$$v_{iz} = - g_m v_{b'e} R_T$$

d) $C_{b'c,ul} = C_{b'c}(1-k)$ $\qquad C_{ul} = C_{b'c}(1-k) + C_{b'e}$

$C_{b'c,iz} = C_{b'c} \dfrac{k-1}{k}$ $\qquad C_{iz} = C_{b'c} \dfrac{k-1}{k}$ $\qquad C'_{iz} = C_{iz} + C_T$



$$\tilde{\tau}_{ul} = C_{ul} \left(r_{bb'} \,\|\, \frac{r_{b'e}}{1+h_{fe}} \right)$$

$$\tilde{\tau}_{iz} = C'_{iz} \cdot R_T$$