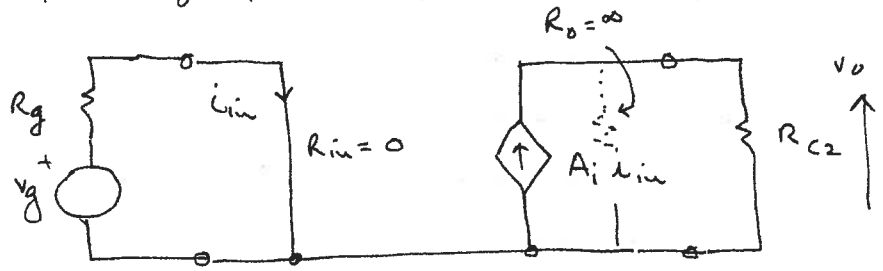
Solutions to Problems II

2. Fdbk is thro R_f; current sensing at o/p, current summing at i/p } → amp tends to ideal current amp with $R_{in} = 0$; $R_o = \infty$

∴ Replace by equivalent ckt

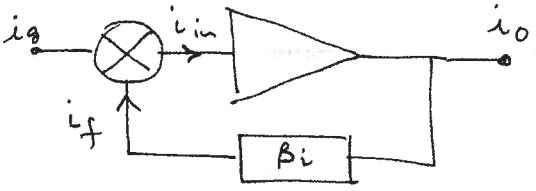


$A_i = \frac{1}{\beta_i}$ if loop gain $A_i \beta_i \gg$

$v_o = R_{C2} \cdot A_i\, i_{in}$; $i_{in} = \frac{v_g}{R_g}$.

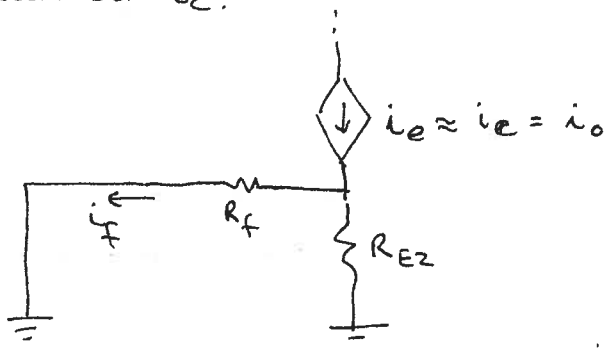
$$\therefore \boxed{\frac{v_o}{v_g} = \frac{R_{C2} A_i}{R_g}}$$

What is β_i?



$\beta_i = \frac{x_f}{x_o} = \frac{i_f}{i_o}$ in this case.

Since R_f is actually sensing voltage at emitter of last stage TX, then really sensing emitter current of TX not the collector current which flows thro' load R_{C2}. BUT since $i_c \approx i_e$ to within 1% for TXs with current gain $h_{fe} \geq 100$, then can say we are sensing output current i_c.



This side of R_f connects to ground since $R_{in} = 0$

$$\therefore \beta_i = \frac{i_f}{i_o} = \frac{R_{E2}}{R_{E2} + R_f}$$ by current division

$$\therefore A_i = \frac{1}{\beta_i} = \frac{R_{E2} + R_f}{R_{E2}}$$

& so $$\frac{v_o}{v_g} = \frac{R_{C2}}{R_g} \cdot \frac{R_f + R_{E2}}{R_{E2}}$$.