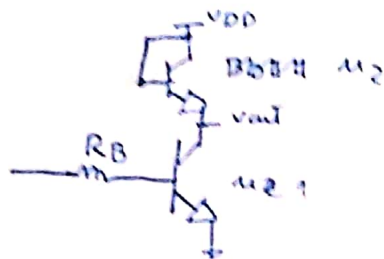


Diode connected CB stage



since there is no body effect
IBSIS

since VDD is constant
The Impedance of M2 can be seen as

$V_2 = -V_x$

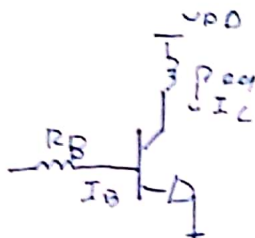
$$\frac{V_{DC}}{r_{o2}} + \frac{V_x}{r_{\pi}} - g_{m2}(-V_{DC}) = I_x$$

$$V_{DC} \left(\frac{r_{o2} + r_{\pi} + g_{m2} r_{o2} r_{\pi}}{r_{o2} r_{\pi}} \right) = I_x$$

$$\frac{V_{DC}}{I_x} = R_{eq} = \frac{r_{o2} r_{\pi}}{r_{o2} + r_{\pi} + g_{m2} r_{o2} r_{\pi}}$$

$$\frac{V_{DC}}{r_{o2}} + \frac{V_{DC}}{r_{\pi}} = I_x$$

$$\frac{V_{DC}}{I_x} = R_{eq} = \frac{r_{o2} + r_{\pi}}{1 + g_{m2} r_{o2} r_{\pi}}$$



The rest are equivalent
to a resistive Emitter common emitter

$$A_V = \frac{-g_{m1} r_{\pi1} R_{eq} r_{o1}}{(R_B + r_{\pi1}) (R_{eq} + r_{o1})}$$

Input Impedance = $R_B + r_{\pi2}$

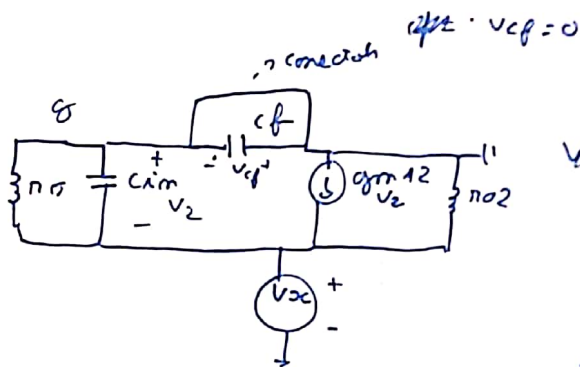
$$g_m = \frac{g_{m1} r_{\pi2}}{R_B + r_{\pi2}}$$

$$R_{out} = r_{o2} || R_{eq2}$$

Now with frequency

again Z_{eq} can

$$\frac{\frac{1}{n\pi} \parallel \frac{1}{n\pi_2} \parallel \frac{1}{C\Delta}}{\frac{1}{C\Delta} + 1} = \frac{1}{C\Delta(n\pi + n\pi_2)}$$



$$V_{DC} \left(\frac{1}{n\pi \parallel \frac{1}{C\Delta} \parallel n\pi_2} + g_{m2} \right) = I_{DC}$$

$$\frac{V_{DC}}{I_{DC}} = \frac{1}{n\pi \parallel \frac{1}{C\Delta} \parallel n\pi_2 + g_{m2}}$$

$$V_{DC} \left(\frac{1}{n\pi \parallel \frac{1}{C\Delta} \parallel n\pi_2} + g_{m2} \right) = I_{DC}$$

$$\frac{V_{DC}}{I_{DC}} = R_D Z_{eq} = \frac{1}{\frac{1}{n\pi \parallel \frac{1}{C\Delta} \parallel n\pi_2} + g_{m2}} = \frac{1}{\frac{1}{n\pi} + \frac{1}{n\pi_2} + C\Delta + g_{m2}}$$

Rest is Equal to as with $C\Delta$ But Z_{eq} as R_D