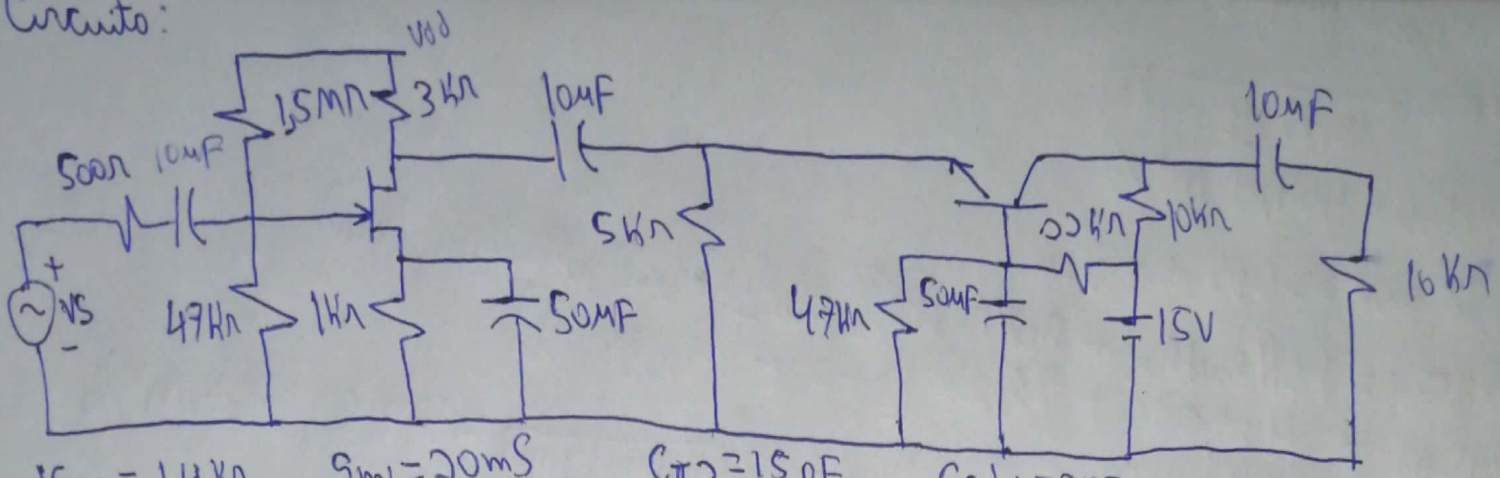
Circuito:



$V_{\pi 2} = 1,4\,k\Omega$ $\quad g_{m1} = 20\,mS$ $\quad C_{\pi 2} = 15\,pF$ $\quad C_{gd1} = 2\,pF$

$\beta_2 = 100$ $\quad g_{m2} = 71,4\,mS$ $\quad C_{\mu 2} = 1\,pF$ $\quad C_{gs1} = 5\,pF$

Calcule las frecuencias de corte inferior y superior a 3 dB.

Bajo Freq. Cap. parasitos $\rightarrow$ Ckt abierto

Si $C_1 \ll C_s, C_B, C_2$ y C_3

$R_{eq}C_1 = (R_s + R_{11} // R_{21})$

$R_{eq}C_1 = [0,5k + (1,5M // 47k)]$

$R_{eq}C_1 = 46,072\,k\Omega$

$$w_{pC_1} = \frac{1}{C_1 * R_{eqC_1}} = \frac{1}{(10\mu F)(46,072k\Omega)}$$

$w_{pC_1} = 2,17\ rad/s$

Si $C_s \ll C_1, C_B, C_2$ y C_3

$$R_{eqC_s} = R_{sA} // \frac{1}{g_{m1}} = 1k\Omega // \frac{1}{20mS}$$

$R_{eqC_s} = 1k\Omega // 50\Omega = 47,62\,\Omega$

$$w_{pC_s} = \frac{1}{C_s * R_{eqC_s}} = \frac{1}{(50\mu F)(47,62\Omega)}$$

$w_{pC_s} = 420\ rad/s$

Si $C_2 \ll C_1, C_s, C_B$ y C_3

$R_{eq_{C_2}} = R_D + R_E // r_\pi // \frac{1}{g_{m2}}$

$R_{eqC_2} = 3013,83\,\Omega$

$$w_{pC_2} = \frac{1}{C_2 * R_{eqC_2}} = \frac{1}{10\mu F(3013,83)}$$

$w_{pC_2} = 33,18\ rad/s$

Si $C_B \ll C_s, C_1, C_2$ y C_3 *

$R_{eqC_B} = ?$ * $R_{eqC_B} = 13,9k\Omega$

$$w_{pC_B} = \frac{1}{C_B * R_{eqC_B}}$$

$w_{pC_B} = 1,439\ rad/s$

Si $C_3 \ll C_s, C_B, C_1, C_2$

$R_{eqC_3} = R_C + R_L = 10k\Omega + 10k\Omega$

$R_{eqC_3} = 20k\Omega$

$$w_{pC_3} = \frac{1}{C_3 * R_{eqC_3}} = \frac{1}{10\mu F(20k\Omega)}$$

$w_{pC_3} = 5\ rad/s$

Verificación de Frecuencias

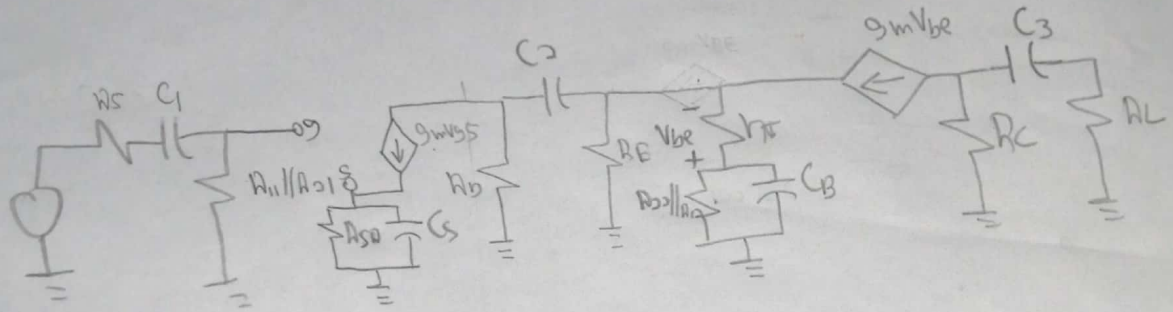
$w_{pC_2} = 33,18\ rad/s$

$w_{pC_s} = 420\ rad/s$

$\frac{w_{pC_s}}{w_{pC_2}} = \frac{420}{33,18} = 12,66$ ✓

Polo dominante

$w_{C_i} = 420\ rad/s \Rightarrow F_{C_i} = \frac{420\ rad/s}{2\pi} = 66,85\,Hz$



Integrantes
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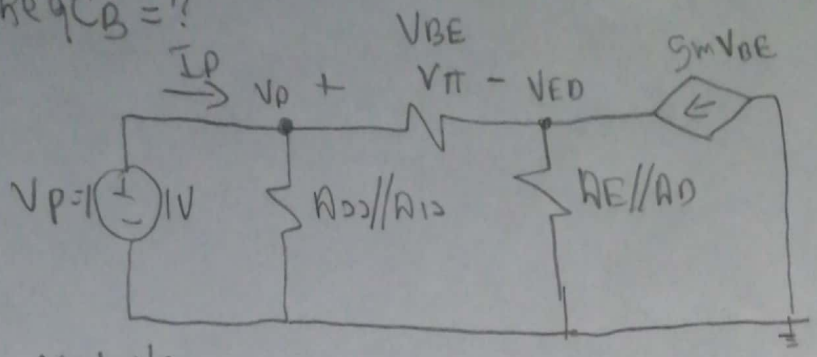
Tarea:

$Req_{CB} = ?$



$R_E // R_D = 1875\,\Omega$

$R_{22} // R_{12} = 14{,}985\,K\Omega$

Nodo Vp

$$I_p = \frac{V_p}{R_{22} // R_{12}} + \frac{V_p - V_{ED}}{r_\pi}$$

$$I_p = \frac{1}{14{,}985\,K\Omega} + \frac{1 - 0{,}9937}{1{,}4\,K\Omega}$$

$$I_p = 71{,}948\,mA$$

$$Req_{CB} = \frac{V_p}{I_p} = \frac{1V}{71{,}948\,mA}$$

$$Req_{CB} = 13{,}9\,K\Omega$$

Nodo VED

$$g_m V_{BE} + \frac{V_p - V_{ED}}{r_\pi} = \frac{V_{ED}}{R_E // R_D}$$

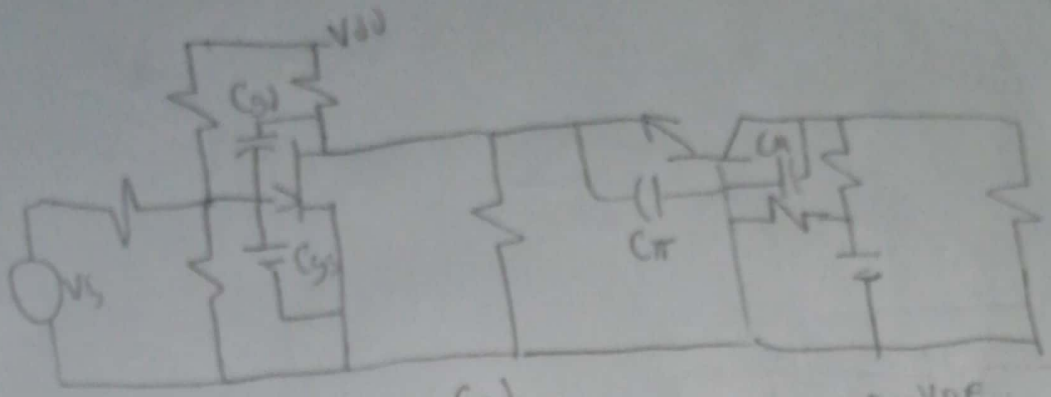
$$g_{m2}(V_p - V_{ED}) + \frac{V_p}{r_\pi} - \frac{V_{ED}}{r_\pi} = \frac{V_{ED}}{R_E // R_D}$$

$$g_{m2} V_p + \frac{V_p}{r_\pi} = \frac{V_{ED}}{R_E // R_D} + \frac{V_{ED}}{r_\pi} + g_{m2} V_{ED}$$

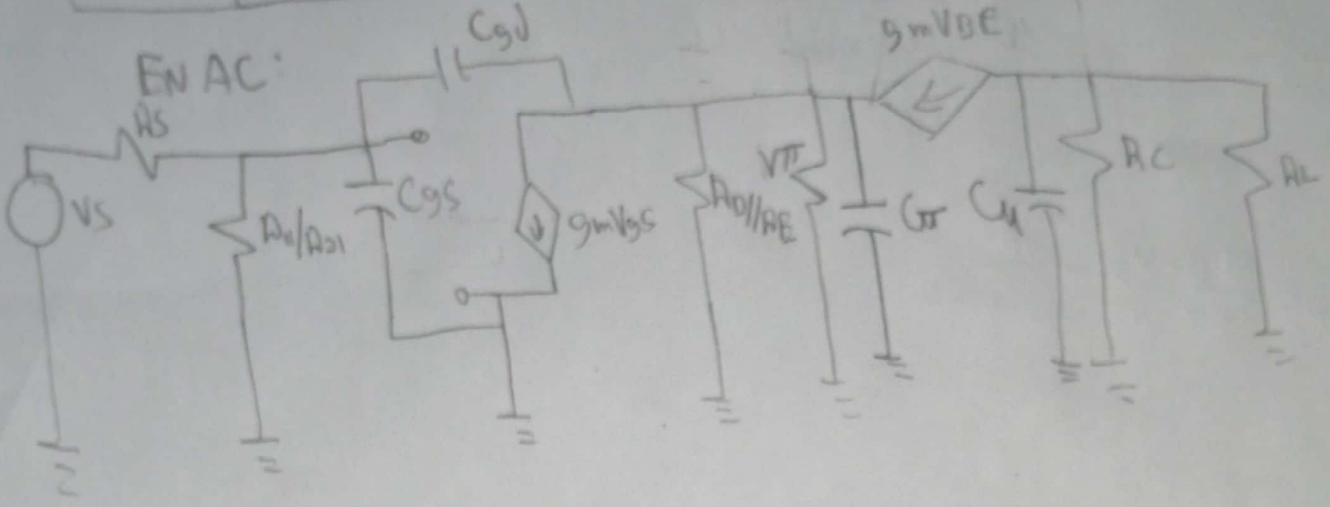
$$\frac{\left(g_{m2} + \frac{1}{r_\pi}\right) V_p}{\left(\frac{1}{R_E // R_D} + \frac{1}{r_\pi} + g_{m2}\right)} = V_{ED} \quad (V_p = 1V)$$

$0{,}9937V = V_E$

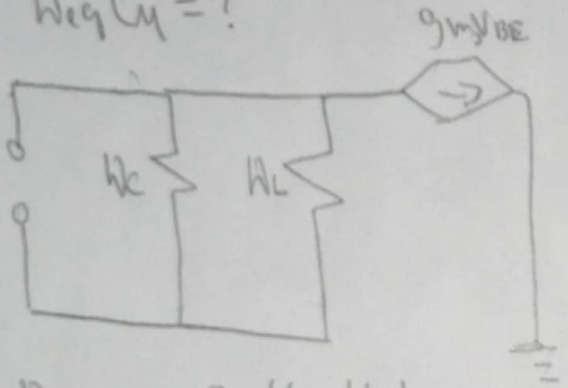
Para Frecuencias altas



EN AC:



$R_{eq}C_4 = ?$



$R_{eq}C_4 = R_C // R_L // \frac{1}{g_{m3}}$

Si $C_{GS} \gg C_{GD}, C_\pi$ y C_M

$Req_{CS} = Rs // R_{11} // R_{21} = 500 // 47K\Omega // 1,5M$

$Req_{CGS} = 494,57\Omega$

$wpC_{GS} = \frac{1}{(5pF)(494,57\Omega)}$

$wpC_{GS} = 404,4\ M\frac{rad}{s}$

Si $C_{GD} \gg C_{GS}, C_\pi$ y C_M

$Req_{CGD} = Rs // R_{11} // R_{21} + R_D // R_E // r_\pi // \frac{1}{g_{m2}} [1 + g_{m1}(Rs // R_{11} // R_{21})]$

$Req_{CGD} = 494,57\Omega + 13,76 [1 + 20m(494,57\Omega)]$

$Req_{CGD} = 644,44\Omega$

$wc_{GD} = \frac{1}{(644,44\Omega)(2pF)} = 775,867\ M\frac{rad}{s}$

Si $C_\pi \gg C_{GD}, C_{GS}, C_M$

$Req_{C\pi} = r_\pi // R_E // R_D // \frac{1}{g_{m2}} = 1,4k // 5k // 3k // 71,4m$

$Req_{C\pi} = 13,76\Omega$

$wc_\pi = \frac{1}{Req_{C\pi} C_\pi} = \frac{1}{(13,76)(15pF)}$

$wc_\pi = 4844,96\ K\frac{rad}{s}$

Si $C_M \gg C_\pi, C_{GD}, C_{GS}$

$Req_{CM} = R_C // R_L // \frac{1}{g_{m2}}$

$Req_{CM} = 13,97\Omega$

$W_pC_M = \frac{1}{Req_{CM} * C_M} = \frac{1}{(13,97\Omega)(1pF)}$

$W_{pCM} = 71,582\ G\frac{rad}{s}$

$wc_S = wc_{GS} // wc_{GD} // wpC_\pi // wpC_M$

$wc_S = 251,3\ M\frac{rad}{s}$

$F_{CS} = \frac{wc_S}{2\pi}$

$F_{CS} = 39,968\ MHz$

Verificación de polos:

$\frac{775,867M}{404,4M} = 1,93 > 0$

$66,85Hz < f_C < 39,968MHz$