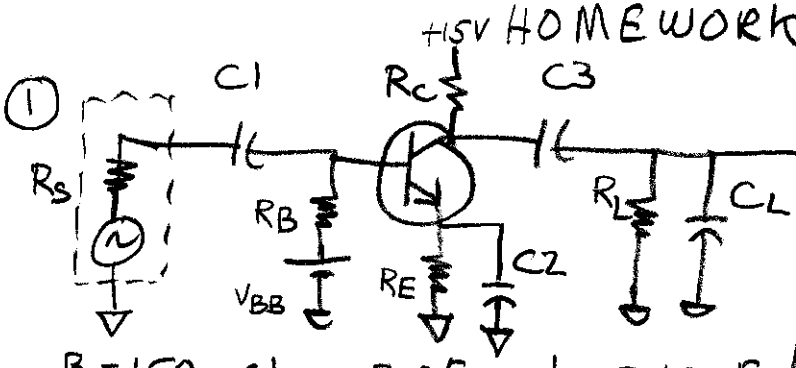
FREQUENCY RESPONSE HOMEWORK

12/2/07



Note: Bias Calculations are already done

$r_e = 2.9\Omega$

$\beta = 150$, $c_{bc} = 2pF$, $c_{be} = 10pF$,

$R_s = 50\Omega$ $R_B = 1.5K$ $R_E = 100$ $R_C = 1K$ $R_L = 2K$

$C_1 = 4.7\mu F$ $C_2 = 1000\mu F$ $C_3 = .47\mu F$ $C_L = 22pF$

Find the net low and high cutoff frequencies.

Answers: $F_{cl_1} = \underline{87.1\,Hz}$ (input) $F_{cl_2} = \underline{54.9\,Hz}$ (emitter) $F_{cl_3} = \underline{112.9\,Hz}$ (output)

$F_{clnet} \approx \underline{153\,Hz}$ $C_{miller} = \underline{457pF}$

$F_{ch_1} = \underline{7.8\,MHz}$ (input) $F_{ch_2} = \underline{10.8\,MHz}$ (output) $F_{chnet} = \underline{6.3\,MHz}$

$C_{in} = 467pF$

$A_{vl} = 228$

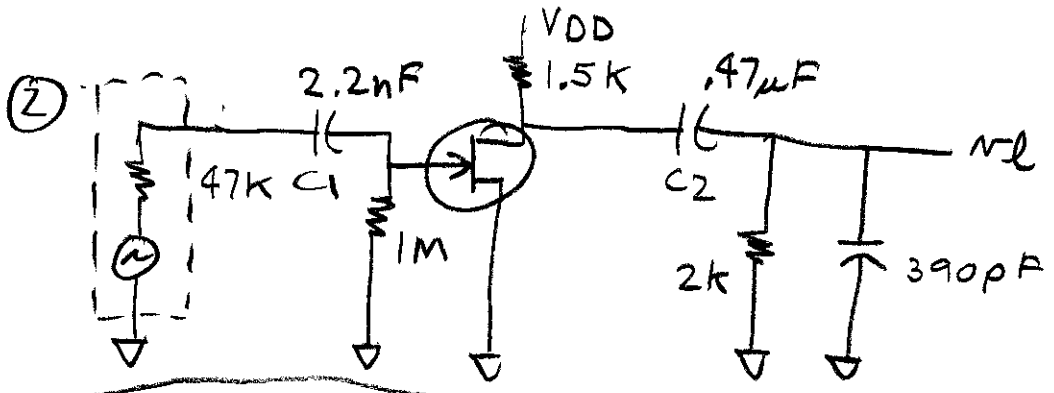
$r_{bt} = 438\Omega$

$R_{in} = 339\Omega$

Design problem: Determine C_1, C_2, & C_3 for an $F_{clnet} = 20\,Hz$

Answers: (standard values) $C_1 = \underline{47\mu F}$ $C_2 = \underline{6800\mu F}$ ($5380\mu F$ calc) $C_3 = \underline{6.8\mu F}$ ($5.2\mu F$ calc)

$20 \times .51 = \underline{10.2\,Hz}$



$g_{mo} = 0.008$ $C_{gd} = 1pF$, $C_{gs} = 3pF$

Note Bias Calculation already done

Find the net low and high cutoff frequencies

Answers: $F_{cl_1} = \underline{69.1\ Hz}$ (input) $F_{cl_2} = \underline{96.8\ Hz}$ (output)

$F_{cl\,net} \cong \underline{119\ Hz}$ $A_{vl} = -0.008 \times 1.5K \| 2K = 6.86$ (857)

$C_{miller} = \underline{7.86\ pF}$ $C_{input} = \underline{10.86\ pF}$

$F_{ch1} = \underline{327\ kHz}$ (input) $F_{ch2} = \underline{476\ kHz}$ (output)

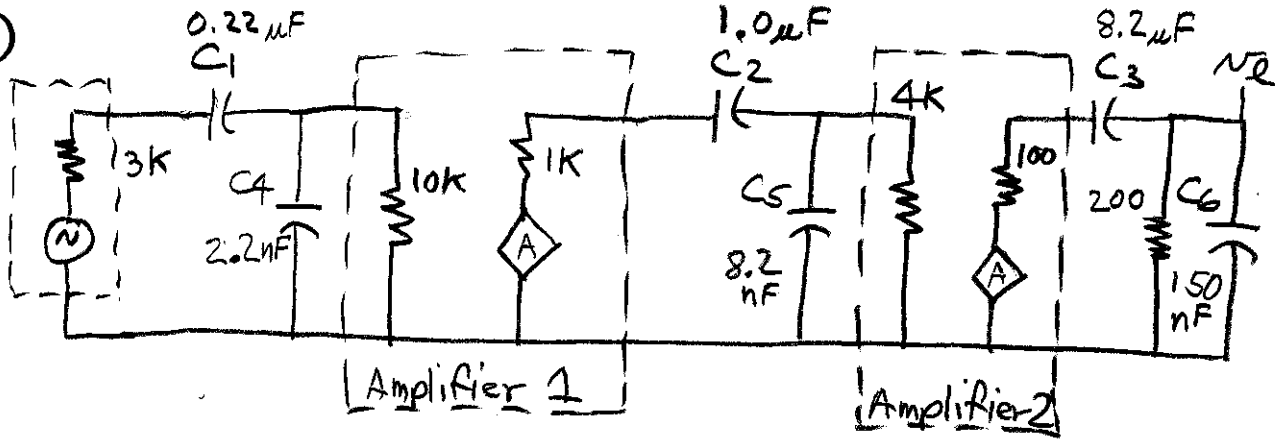
$F_{ch\,net} \simeq \underline{270\ kHz}$

Design Problem: Determine C_1 & C_2 for an $F_{cl\,net} = 20\ Hz$

Answers: (standard values) $C_1 = \underline{12\ nF}$ $C_2 = \underline{3.9\ \mu F}$

$20 \times .644 = 12.9\ Hz = F_L$

(3)



Find the net low and high cutoff frequencies

Answers: $F_{cl1} = \underline{55.7\ Hz}$ input $F_{cl2} = \underline{31.8\ Hz}$ middle $F_{cl3} = \underline{64.7\ Hz}$ last

$F_{clnet} \cong \underline{91\ Hz}$

$F_{ch1} = \underline{31.4\ kHz}$ input $F_{ch2} = \underline{24.3\ kHz}$ middle $F_{ch3} = \underline{15.8\ kHz}$ last

$F_{chnet} \cong \underline{12.2\ kHz}$

Design problem: Determine C_1, C_2, C_3 for an $F_{clnet} = 20\ Hz$. Determine C_4, C_5, C_6 for an $F_{chnet} = 20\ kHz$

Answers (std values) (52 μF calc)

$C_1 = \underline{1.2\ \mu F}$ $C_2 = \underline{3.3\ \mu F}$ $C_3 = \underline{68\ \mu F}$

$C_4 = \underline{1.5\ nF}$ $C_5 = \underline{4.7\ nF}$ $C_6 = \underline{56\ nF}$

$20 \times 0.51 = \underline{10.2\ Hz}\ F_L$ — round C up

$\frac{20\ kHz}{0.51} = 39.2\ kHz\ F_H$ — round C down