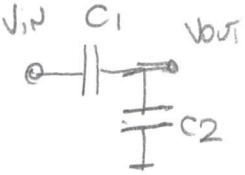
APLICADA P1 2017.2

① 

(a) $\left|\frac{V_{OUT}}{V_{IN}}\right| = \frac{|X_{C2}|}{|X_{C1}+X_{C2}|} = \frac{1/j\omega C_2}{\frac{1}{j\omega C_2}+\frac{1}{j\omega C_1}} = \frac{1/j\omega C_2}{\frac{j\omega C_1 + j\omega C_2}{(j\omega C_2)(j\omega C_1)}}$

$\frac{V_{OUT}}{V_{IN}} = \frac{1}{j\omega C_2} \cdot \frac{j\omega C_2 \cdot j\omega C_1}{j\omega C_1 + j\omega C_2} = \frac{C_1}{C_1+C_2} = \frac{10}{127}$

escolho p/ ex $C_2 = 10\,\mu F \rightarrow 127 C_1 = 10(C_1+10) \rightarrow C_1 = \frac{100}{117}\,\mu F$

(b) Relação $\frac{V_{OUT}}{V_{IN}} = \frac{C_1}{C_1+C_2}$ Logo independe da frequência, relação será a mesma!

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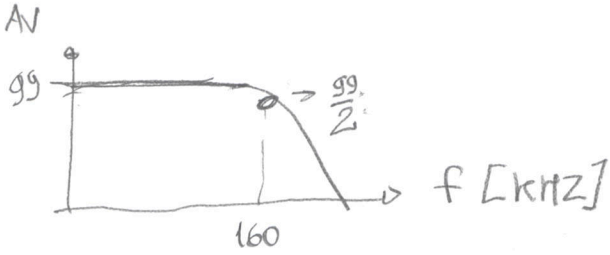
② (a) $C_M = (A_V+1)A_V$ se INVERSOR $A_V \simeq \frac{R_C}{R_E} = \frac{99K}{100} = 99$

$C_M = (99+1).1pF = 100pF$

(b) pólo alta $f = \frac{1}{2\pi R C_M} = \frac{1}{2\pi.(100.100).100E-12} = 159\,KHZ$

$Z_{IN} \simeq \beta R_E = 100.100$

(c) 

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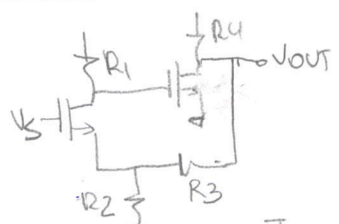
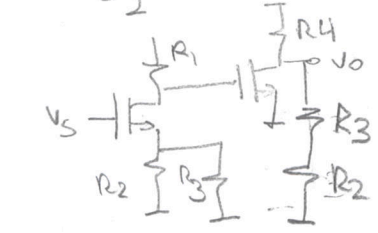
③ 

(a) Amostra V Compara V

Amostra V → CKT INPUT MAKE $V_b = 0$

Compara V → CKT OUTPUT MAKE $I_i = 0$

(b) 

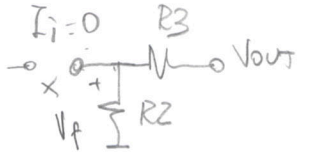
(c) Fórmula

$A_{V\,STAGE\#1} = \frac{-g_m R_O}{1+g_m R_S} = \frac{-g_m R_1}{1+g_m(R_2 // R_3)} = -8.7$

$A_{V\,STAGE\#2} = -g_m R_4 // [R_2+R_3] = -220$

$A_{VTOTAL} = A_{VSTAGE\#1} \cdot A_{VSTAGE\#2} = -8.7 \cdot -20 = 174$ V/V

(d) $\beta = \frac{V_f}{V_o}$

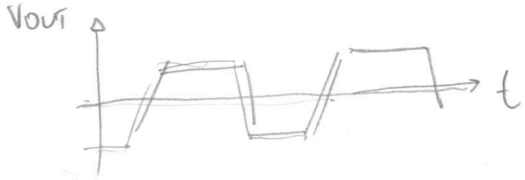


$V_F = V_{OUT} \cdot \frac{R2}{R3+R2} = \frac{9000}{10000} = 0.9$

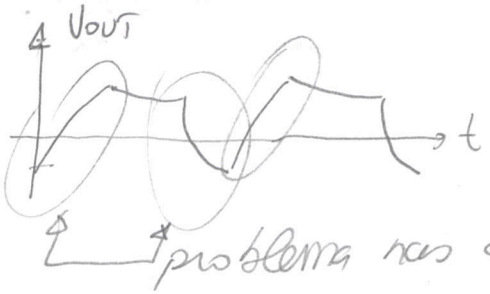
$\beta = \frac{V_F}{V_{OUT}} = 0.9$

$A_{VF} = \frac{A}{1+\beta A} = \frac{174}{1+174(0.9)} = 1.10$ V/V

((4)) (a) CKT possui capacitores não deixarão passar o nível DC da onda.



(b) $t_r = t_f = 1$ ns $\quad BW \approx \frac{0.35}{1\text{ns}}\text{GHz} = 350$ MHz $\quad$ como $f_T \approx 100$ MHz transistor não responde



(c) Achar K com f_T maior aumentar I_{CQ} p/ ganho A

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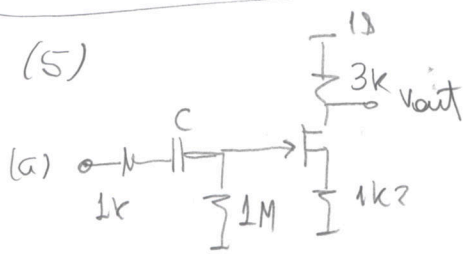
(5) $V_P = -6 \quad V_{GSQ} = -2.45$ V

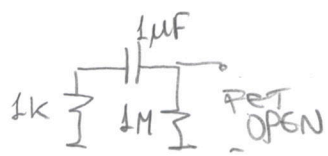


$\frac{V_{OUT}}{V_{IN}} = -g_m \frac{R_D}{1+g_m R_S}$

(a) $g_m = g_{mo}\left[1 - \frac{V_{GSQ}}{V_P}\right] = \frac{2I_{DSS}}{|V_P|}\left[1 - \frac{(-2.45)}{(-6)}\right] = 1.18$ mS

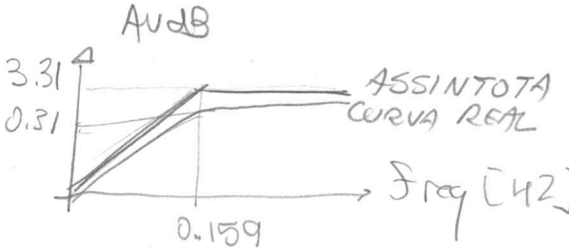
$A_{V\text{medias}} = -\frac{1.18 \times 3}{1+1.18 \cdot 1.2} = 1.46$

(b) pólo C = 1μF



$f_L = \frac{1}{2\pi(1M+1k)\mu F} \cong 0.159$ HZ

(c) $A_{V_{DB}} = 20 \log 1.46 = 3.31$ dB



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