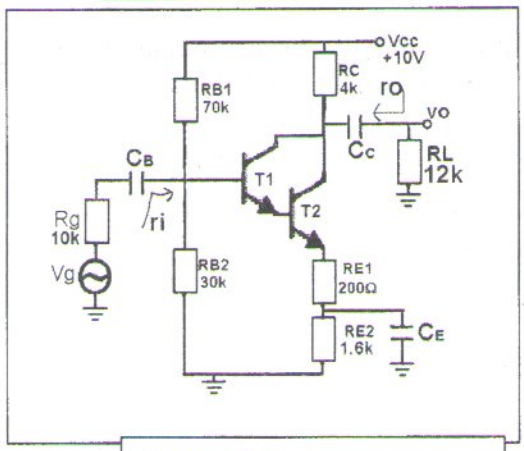
Ele.II summer15 mt3 Name:	SurName:	Number:

İmza:

P1 $V_{BE1}=V_{BE2}=0.6V$, $\beta_{F1}=\beta_{F2}=100$, $V_T=25mV$ are given for the Transistors in the figure.



P1a) Find I_{E2Q}.(2p)

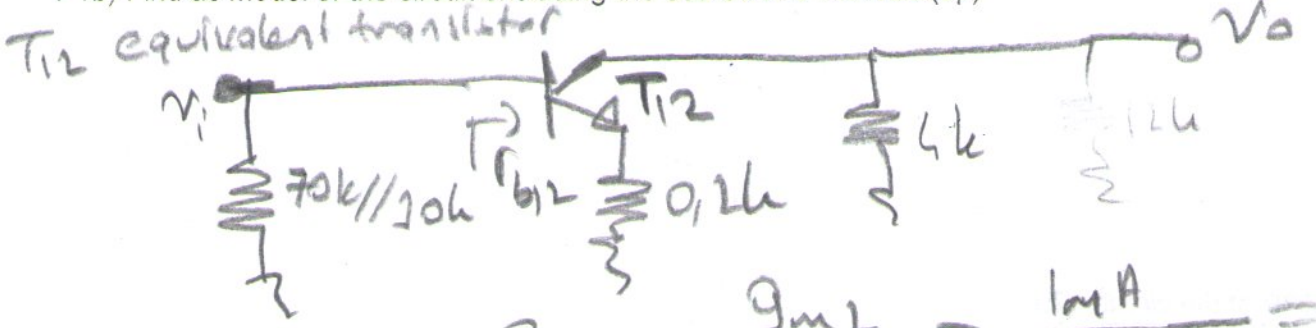
$V_{B12}=\frac{2}{10}\cdot 10=2V$

$V_{E22}=2-2\cdot 0,6V=1,8V$

$I_{E2Q}=\frac{1,8V}{1,6k+0,2k}=1mA\cong I_{C2Q}$

Answer-1a
$I_{E2Q}=$ 1mA

P1b) Find ac model of the circuit excluding the source and the load.(3p)



$g_{m12}=\frac{g_{m2}}{2}=\frac{1mA}{2.25mV}=\frac{1}{50}S$

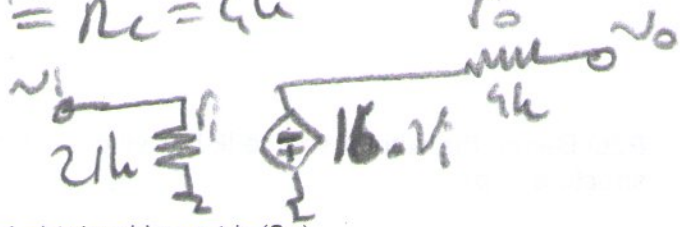
$\beta_{F12}=\beta_{F1}\cdot\beta_{F2}=10^4$

$\frac{v_o}{v_i}=\frac{-g_{m12}\cdot(4k//12k)}{1+g_{m12}\cdot 0,2k}=\frac{-60}{5}=-16$

$r_i\cong 10k//70k//r_{b12}\cong 2k$

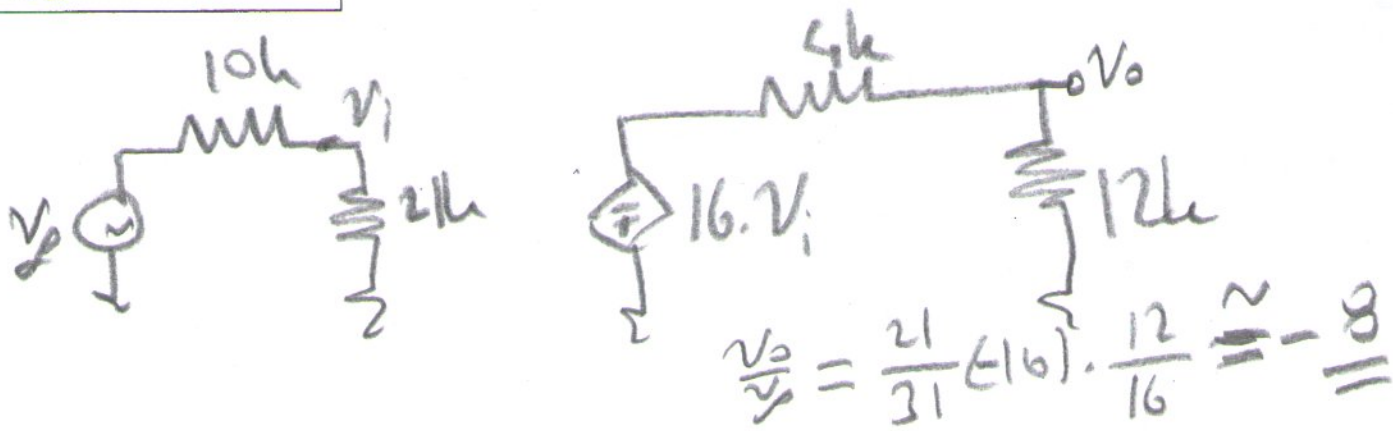
$r_{b12}=\beta_{F12}\cdot\left(\frac{1}{g_{m12}}+0,2k\right)=2,5M$

$r_o\cong R_C=4k$



P1c) Find ac gain of the circuit (vo/vg) by using the ac model obtained in part b.(2p)

Answer-1c
(vo/vg)=



$\frac{v_o}{v_g}=\frac{21}{31}(-16)\cdot\frac{12}{16}\cong -8$