Eletricidade CA
Lista - Transistor

1º) $X_C = \frac{1}{2\pi \cdot F \cdot C} \approx 0,1 \cdot R$

$C = \frac{1}{2\pi \cdot F \cdot 0,1 \cdot R} = \frac{1}{2\pi \cdot 100Hz \cdot 0,1 \cdot 4K\Omega} = 3,78\mu F$

2º) $R_{eq} = 10K\Omega + 30K\Omega \parallel 20K\Omega \parallel 40K\Omega \parallel 40K\Omega = 17,5K\Omega$

$C = \frac{1}{2\pi \cdot 500Hz \cdot 0,1 \cdot 17,5K\Omega} = 181,7nF$

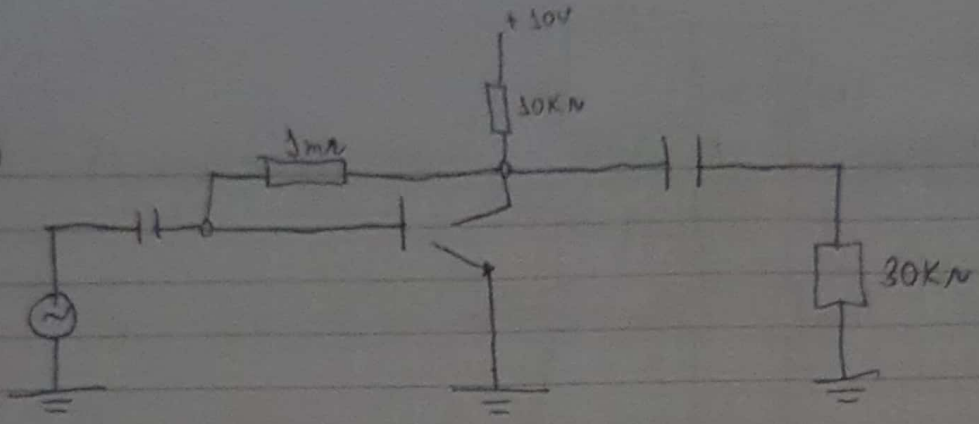
3º) $R_{eq} = 500\Omega \parallel 10K\Omega = 476,2\Omega$

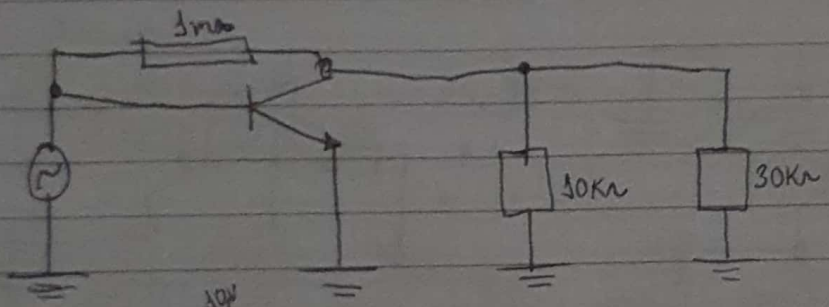
$C = \frac{1}{2\pi \cdot 20Hz \cdot 0,1 \cdot 476,2\Omega} = 167,11\mu F$

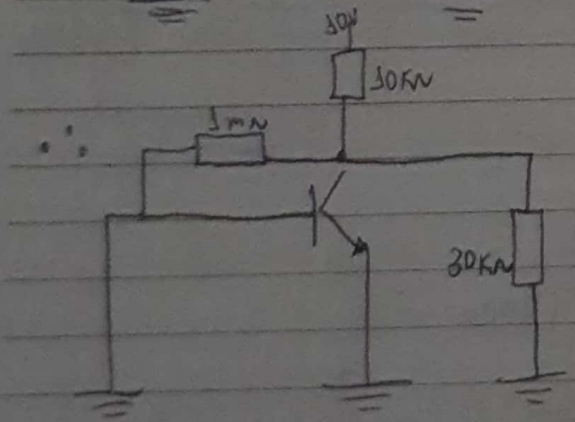
4º) $R_{eq} = 4K\Omega \parallel 1K\Omega = 800\Omega$

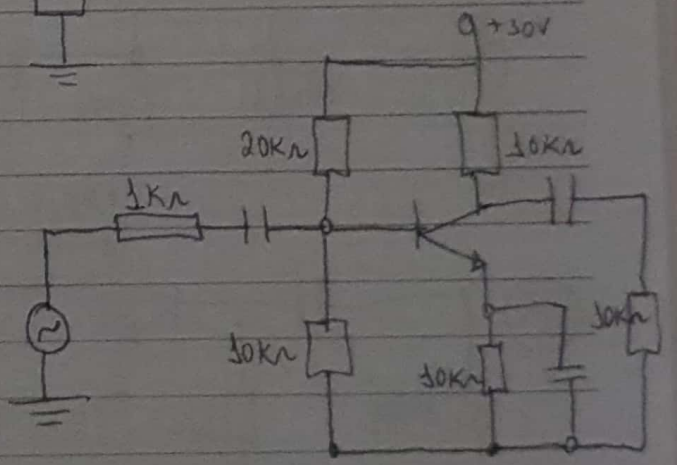
$C = \frac{1}{2\pi \cdot 30Hz \cdot 0,1 \cdot 800\Omega} = 198,9nF$

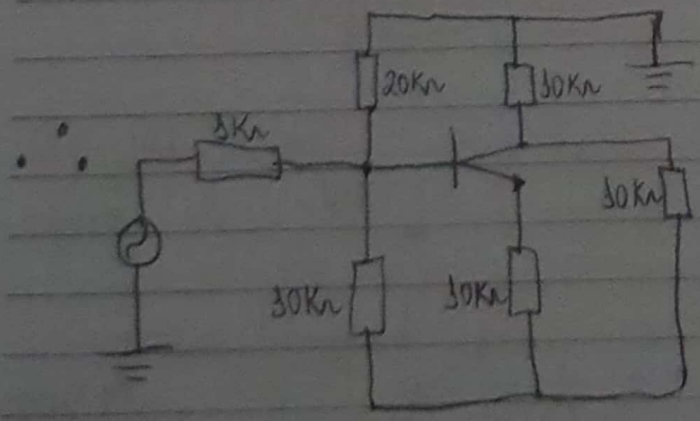
Sg

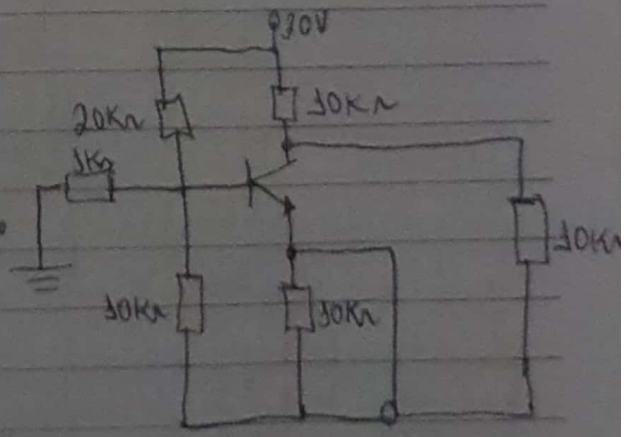




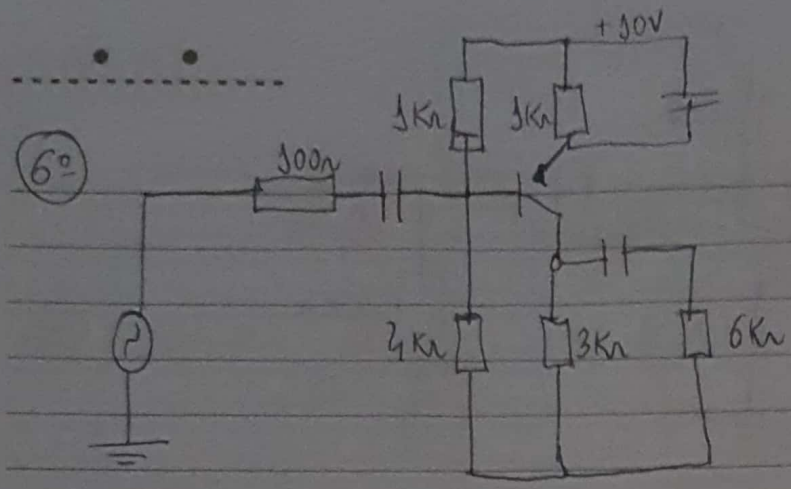


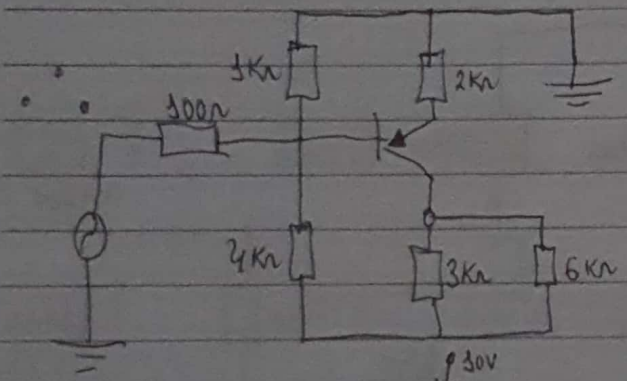


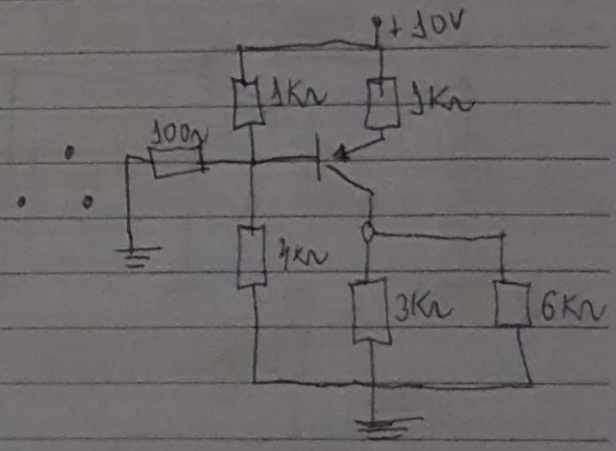




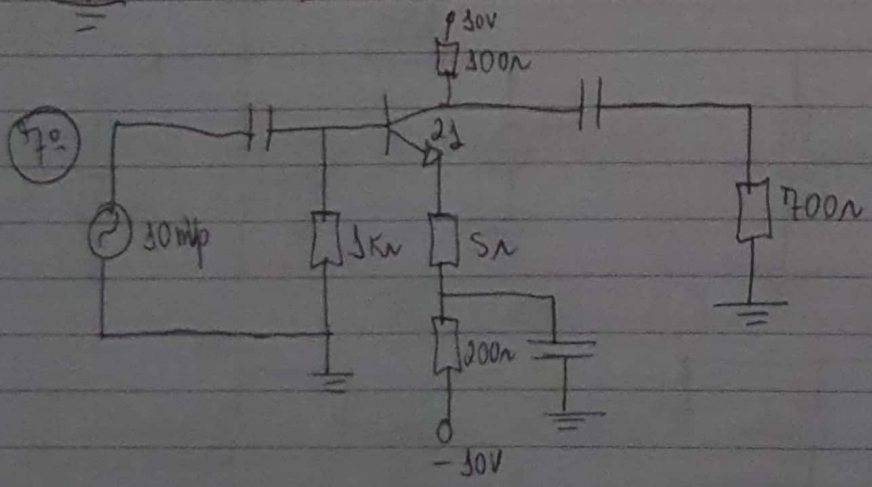
6º

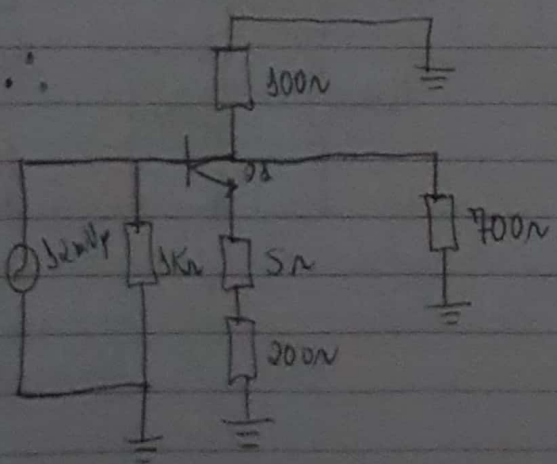


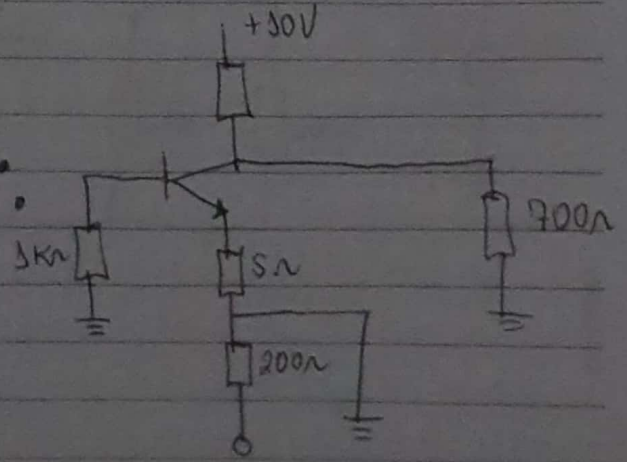




7º







8º) I) $V_B = V_{10K\Omega} = 30V \cdot \frac{10K\Omega}{10K\Omega + 20K\Omega} = 10V$

$V_e = V_B - 0,7V = 9,3V$

$I_E = \frac{V_e}{10K\Omega} = \frac{9,3V}{10K\Omega} = 0,93mA$

$r'_e = \frac{25m\Omega}{0,93mA} = 26,88\Omega$

II) $V_{R2} = 10V \cdot \frac{1K\Omega}{1K\Omega + 4K\Omega} = 2V$

$V_{re} = V_{1K\Omega} - 0,7V = 2V - 0,7V = 1,3V$

$I_E = \frac{1,3V}{1K\Omega} = 1,3mA$

$r'_e = \frac{25mV}{1,3mA} = 19,23\Omega$

9º) $10V = 10K\Omega \cdot I_C + 1m\Omega \cdot I_B + 0,7V$

região ativa:

$I_C \cong I_E$

$I_B = \frac{I_C}{\beta_{CC}}$

$10V = 10K\Omega \cdot I_C + 1m\Omega \cdot \left(\frac{I_C}{\beta_{CC}}\right) + 0,7V$

$I_C = \frac{10V - 0,7V}{\frac{1m\Omega}{100} + 10K\Omega} = 0,465mA$

$I_e = 0,465\ mA$

$r_e' = \frac{25mV}{0,465mA} = 53,76\Omega$

10º) $V_B = V_{10K\Omega} = 15V \cdot \frac{10K\Omega}{10K\Omega + 56,12\Omega} = 2,27V$

$I_e = \frac{2,27V - 0,7V}{1,512\Omega} = 1,05\ mA$

$r'_e = \frac{25mV}{1,05mA} = 23,8\Omega$

$A_V = \frac{-R_C}{r'_e} = \frac{-6,2K\Omega}{23,8\Omega} = (-260,5)$

$V_{saída} = A_V \cdot V_{entrada} = (-260,5) \cdot 1mV = (-260,5mV)$

13º) $V_e = 30V \cdot \frac{10K\Omega}{10K\Omega + 20K\Omega} - 0,7V = 9,3V$

$I_e = \frac{9,3V}{10K\Omega} = 0,93mA$

$r'_e = \frac{25mV}{0,93mA} = 26,88\Omega$

$Z_{in} = 10K\Omega // 20K\Omega // \beta \cdot r'_e = Z_{in} =$
$10K\Omega // 20K\Omega // 125 \cdot 26,88\Omega = 2,2K\Omega$

$V_{in} = 5mV \cdot \frac{2,2K\Omega}{2,2K\Omega + 1K\Omega} = 3,43\,mV$

$Hv = \frac{5V\Omega}{26,8\Omega} = (-187,3)$

$V_{saída} = (-187,3) \cdot 3,43\,mV = (-642,44\,mV)$

15) $V_G = 7,3V$

$I_D = \frac{9,3V}{10K\Omega + 100\Omega} = 0,92mA$

$Z_{in} = 1012 // 20K // 242K = 5,08K\Omega$

$AV = \frac{-5K\Omega}{127,17\Omega} = (-39,3)$

$r'_e = \frac{25mV}{0,92mA} = 27,17\Omega$

$V_{in} = 1mV \cdot \frac{5,08K\Omega}{5,08K\Omega + 1\Omega} = 0,835\,mV$

$V_{saída} = (-39,3) \cdot 0,835\,mV = (-32,8\,mV)$

18-) $V_e = 15V \cdot \frac{3,9K\Omega}{3,9K\Omega + 22K\Omega} - 0,7V = 1,56V$

$I_e = \frac{1,56V}{2K\Omega} = 0,78mA$

$r'_e = \frac{25mV}{0,78mA} = 32,05\Omega$

$Z_{in} = 22K\Omega // 3,9K\Omega // \beta \cdot 32,05\Omega =$
$Z_{in} = 22K\Omega // 3,9K\Omega // 100 \cdot 32,05\Omega = 1,63K\Omega$

$Av = -\frac{(8,2K\Omega // 1,631K\Omega)}{32,05\Omega} = (-42,4)$

$V_{e2} = 15 \cdot \frac{3,9K\Omega}{1,63K\Omega + 22K\Omega} - 0,7V = 1,56V$

$I_{e2} = \frac{1,56V}{2K\Omega} = 0,78mA$

$r'_e = \frac{25mV}{0,78mA} = 32,05\Omega$

$Z_{in2} = 22K\Omega // 3,9K\Omega // \beta \cdot 32,25\Omega$
$Z_{in2} = 22K\Omega // 3,9K\Omega // 100 \cdot 32,25\Omega = 1,63K\Omega$

$V_{51K\Omega} = V_{para\,a\,2} = Av_2 - V_{in2} =$

$(-220,4) \cdot 0,31mV = 68,22mV_p$