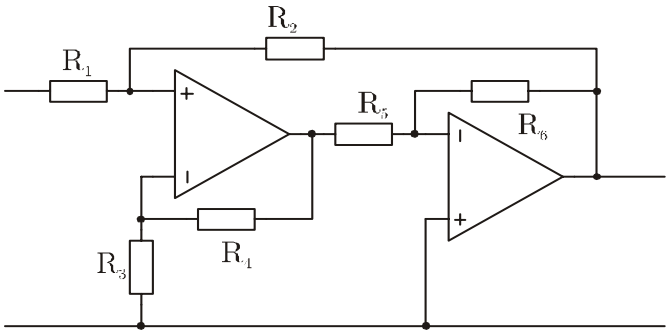
Komunikacijska vezja - rešitve nalog 26.1.2004

1. Izračunajte vhodno upornost in napetostno ojačenje vezave na sliki !



$$Par(R1,R2) := \frac{R1 \cdot R2}{R1 + R2}$$

$R1 := 1000 \quad R2 := 10000$

$R3 := 1000 \quad R4 := 10000$

$R5 := 1000 \quad R6 := 10000$

$A1 := 100 \quad A2 := 100$

$$T1 := A1 \cdot \frac{R3}{R3 + R4} \qquad Aoz1 := A1$$

$T1 = 9.091 \qquad Aoz1 = 100$

$$A\beta1 := \frac{Aoz1}{1 + T1} \qquad A\beta1 = 9.91$$

$$T2 := A2 \cdot \frac{R5}{R5 + R6} \qquad Aoz2 := \frac{R6}{R5 + R6} \cdot A2$$

$T2 = 9.091 \qquad Aoz2 = 90.909$

$$A\beta2 := \frac{Aoz2}{1 + T2} \qquad A\beta2 = 9.009$$

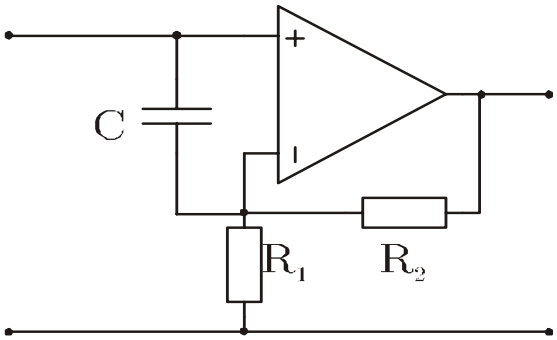
$$T := \frac{R1}{R1 + R2} \cdot A\beta1 \cdot A\beta2 \qquad T = 8.116$$

$$Aoz := \frac{R2}{R1 + R2} \cdot (A\beta1 \cdot A\beta2) \qquad Aoz = 81.162$$

$$A\beta := \frac{Aoz}{1 + T} \qquad A\beta = 8.903$$

$$Rvh := R1 + \frac{R2}{1 + A\beta1 \cdot A\beta2} \qquad Rvh = 1.111 \cdot 10^3$$

2. Ojačevalnik kompenzirajte tako, da bo fazna varnost 60 stopinj!
Izračunajte zgornjo mejno frekvenco ojačevalnika !



$$\Phi m := \pi \cdot \frac{60}{180}$$

$R1 := 10000 \quad R2 := 90000$

podatki o ojačevalniku:

$A0 := 10^6$

$fp1 := 2 \cdot 10^6 \quad fp2 := 20 \cdot 10^6$

$$T0 := A0 \cdot \frac{R1}{R1 + R2} \qquad T0 = 1 \cdot 10^5$$

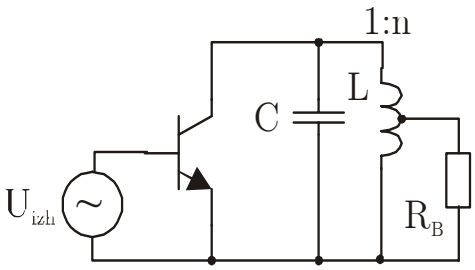
$$fzg := \frac{fp1}{\sqrt{3}} \qquad fzg = 1.155 \cdot 10^6$$

$$fpk := \frac{fzg}{T0} \qquad fpk = 11.547$$

$$\theta := \frac{180}{\pi} \cdot \left(\operatorname{atan}\left(\frac{fzg}{fpk}\right) + \operatorname{atan}\left(\frac{fzg}{fp1}\right) + \operatorname{atan}\left(\frac{fzg}{fp2}\right) \right) \qquad \theta = 123.304$$

$$C := \frac{1}{2 \cdot \pi \cdot fpk \cdot Par(R1, R2)} \qquad C = 1.531 \cdot 10^{-6}$$

2. Izračunajte ojačenje in pasovno širino selektivnega ojačevalnika, če je induktivni sklop breme optimalen !



$C22 := 3 \cdot 10^{-12}$ $\qquad Qok := 150$

$g22 := 10 \cdot 10^{-6}$

$g21 := 40 \cdot 10^{-3}$

$L := 10 \cdot 10^{-6}$ $\qquad RB := 5 \cdot 10^{3}$

$C := 100 \cdot 10^{-12}$

$$\omega 0 := \frac{1}{\sqrt{L \cdot (C + C22)}} \qquad gk := \frac{1}{Qok \cdot \omega 0 \cdot L} \qquad gk = 2.14 \cdot 10^{-5} \qquad n := \sqrt{g22 \cdot RB} \qquad n = 0.224$$

$$f0 := \frac{\omega 0}{2 \cdot \pi} \qquad f0 = 4.959 \cdot 10^{6} \qquad Qeff := Qok \cdot \frac{gk}{gk + 2 \cdot g22} \qquad B := \frac{f0}{Qeff}$$

$Qeff = 77.529$ $\qquad B = 6.396 \cdot 10^{4}$

$$A0 := \frac{g21}{gk + 2 \cdot g22} \cdot n \qquad A0 = 216.067$$