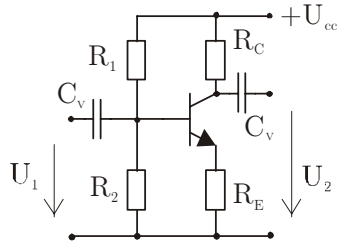


## Komunikacijska vezja - rešitve nalog 22.4.2002

1. Izračunajte spodnjo mejno frekvenco, ojačenje pri SF in stopnjo nelinearnega popačenja !



$$R1 := 40000 \quad R2 := 10000 \quad R_c := 5000 \quad R_e := 1000 \quad \beta := 100 \quad \text{Par}(R1, R2) := \frac{R1 \cdot R2}{R1 + R2}$$

$$C_v := 10^{-6} \quad U_{cc} := 10 \quad U1 := 0.1 \quad f1 := 10000$$

$$R_B := \text{Par}(R1, R2) \quad U_{be0} := 0.6$$

$$I_e := \frac{U_{cc} \cdot \frac{R2}{R1 + R2} - U_{be0}}{R_e + \frac{R_B}{\beta + 1}} \quad g_m := 40 \cdot I_e \quad r_{be} := \frac{\beta}{g_m} \quad I_e = 1.297 \cdot 10^{-3}$$

$$g_m = 0.052 \quad r_{be} = 1.927 \cdot 10^3$$

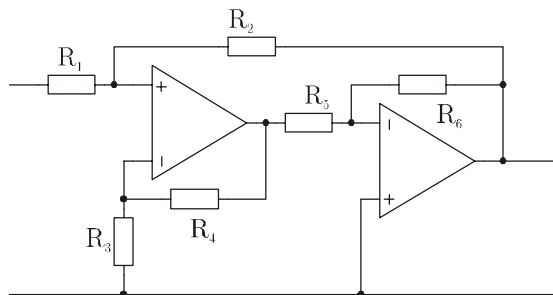
$$A_{SF} := -g_m \cdot R_c \cdot \frac{r_{be}}{r_{be} + R_e \cdot (\beta + 1)} \quad \boxed{A_{SF} = 4.858}$$

$$R_{nv} := \text{Par}(R_B, r_{be} + R_e \cdot (\beta + 1)) \quad R_{nv} = 7.423 \cdot 10^3 \quad I_e \cdot (R_e + R_c) = 7.783$$

$$f_{pv} := \frac{1}{2 \cdot \pi \cdot C_v \cdot R_{nv}} \quad \boxed{f_{pv} = 21.441} \quad f_{pv} \cdot 2 \cdot \pi = 134.716$$

$$U_{be} := U1 \cdot \frac{r_{be}}{r_{be} + R_e \cdot (\beta + 1)} \quad U_{be} = 1.872 \cdot 10^{-3} \quad k2(u) := \frac{u}{0.1} \quad \boxed{k2(U_{be}) = 0.019}$$

## 2. Izračunajte natančno ojačenje in vhodno upornost ojačevalnika!



$$R1 := 1000 \quad R2 := 10000 \quad R3 := 1000$$

$$R4 := 10000 \quad R5 := 1000 \quad R6 := 10000$$

$$A1 := 10000 \quad A2 := 10000$$

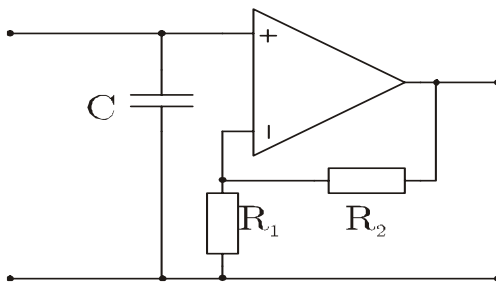
$$Ab1 := 11 \quad Ab2 := 10 \quad A12 := Ab1 \cdot Ab2$$

$$T := \frac{1}{10} \cdot A12 \quad T = 11 \quad Aoz := -A12 \cdot \frac{10}{11} \quad Aoz = -100$$

$$A\beta := \frac{Aoz}{1 + T} \quad A\beta = -8.333$$

$$R_{vh} := R1 + \frac{R2}{1 + A12} \quad R_{vh} = 1.09 \cdot 10^3$$

## 3. Izračunajte pasovno širino in fazno varnost!



$$R1 := 10000 \quad R2 := 90000 \quad fp1 := 10 \quad fp2 := 10^6 \quad A0 := 10^5 \quad C := 10^{-12} \cdot 100$$

$$T0 := A0 \cdot \frac{R1}{R1 + R2} \quad T0 = 1 \cdot 10^4 \quad fp1 \cdot T0 = 1 \cdot 10^5 \quad R12 := \text{Par}(R1, R2)$$

$$R12 = 9 \cdot 10^3$$

$$f_{px} := \frac{1}{2 \cdot \pi \cdot C \cdot R12} \quad f_{px} = 1.768 \cdot 10^5 \quad f_{zg} := T0 \cdot fp1 \quad B := f_{zg} \quad B = 1 \cdot 10^5$$

$$\Phi_m := 180 - \frac{180}{\pi} \cdot \left( \text{atan} \left( \frac{f_{zg}}{fp1} \right) + \text{atan} \left( \frac{f_{zg}}{f_{px}} \right) + \text{atan} \left( \frac{f_{zg}}{fp2} \right) \right) \quad \Phi_m = 54.808$$