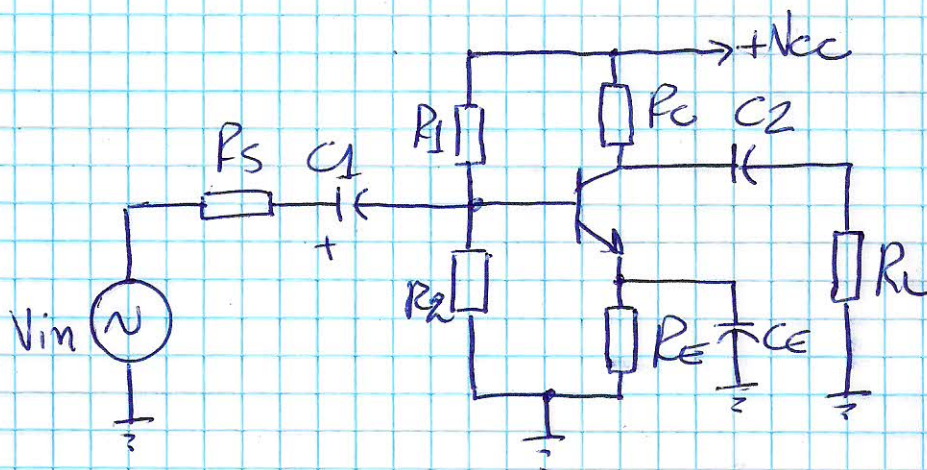


PROJETO AMPLIFICADOR COM POLARIZAÇÃO POR DIVISOR DE TENSÃO

1. TOPOLOGIA



2. DADOS

$$V_{CC} = 12V; V_{BE} = 0,7V; \beta = 100; R_L = 1K\Omega$$

$$R_S = 200\Omega; f_{min} = 30Hz$$

3. CÁLCULOS

$$V_E = 10\% \cdot V_{CC} = 0,1 \cdot 12 = 1,2V$$

$$I_E = 1mA \text{ (TÍPICO)}$$

$$R_E = \frac{1,2V}{1mA} = 1,2K\Omega$$

$$V_{CE} = 50\% \cdot V_{CC} = 0,5 \cdot 12 = 6V$$

$$V_C = V_{CE} + V_E = 6 + 1,2 = 7,2V$$

$$R_C = \frac{V_{CC} - V_C}{I_E} = \frac{12 - 7,2}{1mA} = 4K\Omega$$

$$0,01 \leq K \leq 0,1$$

(ESTÁVEL)
MELHOR

(FIRME)

$$R_2 = K \cdot \beta \cdot R_E$$

$$R_2 = 0,02 \cdot 100 \cdot 1,2K = 2,4K\Omega$$

$$R_1 = \frac{V_{CC} - V_{R2}}{V_{R2}} \cdot R_2$$

$$R_1 = \frac{12 - 1,9}{1,9} \cdot 2,4K \approx 12K\Omega$$

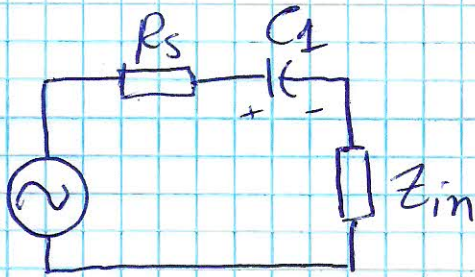
$$r_e = \frac{25mV}{I_E} = \frac{25mV}{1mA} = 25\Omega$$

$$Z_b = \beta \cdot r_e = 100 \cdot 25 = 2,5K\Omega$$

$$Z_{in} = R_1 // R_2 // Z_b \approx 1,1K\Omega$$

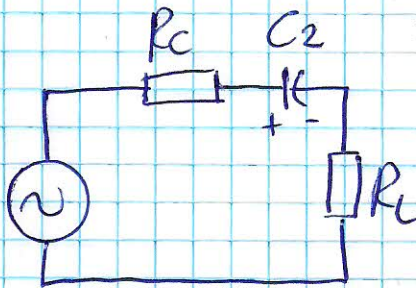
$$r_c = R_C // R_L \approx 827\Omega$$

$$A_v = - \frac{r_c}{r_e} = \frac{827}{25} \approx 33$$



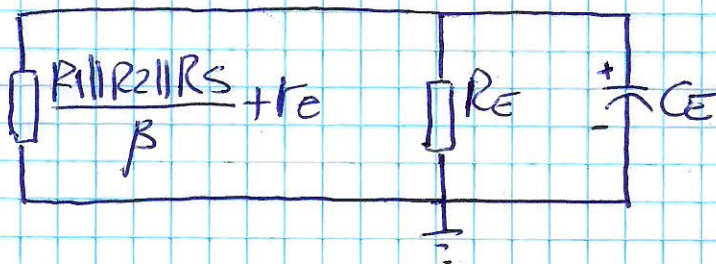
$$C_1 = \frac{1}{2\pi (R_s + Z_{in}) f_{min}}$$

$$C_1 = \frac{1}{2\pi (200 + 1,1K) \cdot 30} = 4 \mu F$$



$$C_2 = \frac{1}{2\pi (R_c + R_L) f_{min}}$$

$$C_2 = \frac{1}{2\pi (4,8K + 1K) \cdot 30} \approx 1 \mu F$$



$$C_E = \frac{1}{2\pi \cdot Z_E \cdot f_{min}} = \frac{1}{2\pi \cdot 43,2 \cdot 30} = 123 \mu F$$

$$Z_E = R_E \parallel \left(r_e + \frac{R_1 \parallel R_2 \parallel R_S}{\beta} \right)$$