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Elektronska vezja, 1. del
Zbirka rešenih nalog

Errata

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(http://paris.fe.uni-lj.si/lsd/skripte/skripte.htm)

Str. 20, Naloga 3.5

$R_2 = \dfrac{U_{EE} - U_{D1} - U_{D2}}{I_{E20}} = 2933\,\Omega$.

Str. 22

1) Izberemo I_{C0} in s tem določimo strmino $g_{21E} = \dfrac{q}{kT} I_{C0} = \dfrac{I_{C0}}{U_T}$.

Str. 24

8) Določimo C_{V2} iz pogoja $\omega_{C_{V2}} \le \dfrac{1}{10}\omega_{C_E}$: $C_{V2} \ge \dfrac{1}{\frac{1}{10}\omega_m (R_C \left\| \dfrac{1}{g_{22E}} + R_L \right.)}$.

Str. 24

1) Izberemo I_{C0} in s tem določimo strmino $g_{21E} = \dfrac{q}{kT} I_{C0} = \dfrac{I_{C0}}{U_T}$.

Str. 26

1) Izberemo I_{C0} in s tem določimo strmino $g_{21E} = \dfrac{q}{kT} I_{C0} = \dfrac{I_{C0}}{U_T}$.

Str. 27

7) Določimo C_{V1} iz pogoja $\omega_{C_{V1}} \le \dfrac{1}{10}\omega_m$:

8) Določimo C_{V2} iz pogoja $\omega_{C_{V2}} \le \dfrac{1}{10}\omega_m$:

$C_{V2} \ge \dfrac{1}{\frac{1}{10}\omega_m (R_C \| (1/g_{22E} + R_E) + R_L)}$ za C_{V1} kot odprte sponke pri $\omega = \omega_{CV2}$

Str. 28, Naloga 4.1

Med podatki manjka : $U_{BE0} = 0.7$ V in $\dfrac{kT}{q} = 25\,\text{mV}$

Str. 29, Naloga 4.2

Med podatki manjka : $R_G = 50\,\Omega$

Str. 30, Naloga 4.2

$g_{21E} = \dfrac{q}{kT} I_{C0} = 20$ mS

$C_E = \dfrac{1}{2\pi f_m (R_3 + R_E \left\| \dfrac{r_{11E} + R_1 \| R_2 \| R_G}{1+\beta_{AC}} \right.)} = 7.55\,\mu\text{F}$

$C_{V1} \ge \dfrac{1}{\frac{1}{10}\omega_m (R_G + R_1 \| R_2 \| r_{vh\,AC})} = \dfrac{1}{\frac{2\pi f_m}{10}(R_G + R_1 \| R_2 \| (r_{11E} + (1+\beta_{AC}) R_E))} = 844\,\text{nF}.$

Str. 41, Naloga 5.3

$$R_G + r_{BB'} + R_e \le \frac{k_E r_{B'E} \cdot 382.5\,\Omega}{k_E r_{B'E} - 382.5\,\Omega} = 423\,\Omega \quad \text{in zato} \quad R_G \le 369\,\Omega\,.$$

Str. 42, Naloga 6.1

Med podatki napaka: $\omega_0 = 10^8$ rad/s

Str. 44, Naloga 6.2

$$A_U(\omega = \omega_0) = A_0 = -\frac{|y_{21}|}{g_{22} + g_{pL}} = -1500$$

Str. 48, Naloga 6.5

$$L_1 = L_2 = \frac{1}{\omega_0 g_{pL} Q_L} = \frac{\frac{1}{Q_{ef}} - \frac{1}{Q_{0k}}}{\omega_0 (g_{22} + g_{11}^*)} = 9.7\,\mu\text{H}$$

Str. 49, Naloga 6.5

$$C_2 = \frac{1}{\omega_0^2 \cdot L_1 \cdot n_1} = 130.5\,\text{pF} \quad \text{in} \quad C_1 = \frac{n_1}{1 - n_1} C_2 = 32.6\,\text{pF}\,.$$

$$C_4 = \frac{1}{\omega_0^2 \cdot L_2 \cdot n_2} = 130.5\,\text{pF} \quad \text{in} \quad C_3 = \frac{n_2}{1 - n_2} C_4 = 32.6\,\text{pF}\,.$$

Str. 49, Naloga 6.6

Med podatki napaka: $y_{21} = g_{21} = 20$ mS

Med podatki napaka: $L_2 = 0.3\,\mu$H

Med podatki manjka : $R_L = 2\,\text{k}\Omega$

Str. 50, Naloga 6.5

$$C_{BC\ kriticni} = \frac{2G_1 G_2}{\omega_0 |y_{21}|} = \frac{2(g_{k1} + g_{11})(g_{k2} + g_{22} + G_L^*)}{\omega_0 g_{21}} = 2.04\,\text{pF}$$

Str. 50, Naloga 6.7

$g_{11E} = 0.5$ mS

Str. 51, Naloga 6.7

$$G_L = g_{22}(1 + m_2) = 38.4\,\mu\text{S}$$

$$A_{MUG} = \frac{P_L}{P_{vh\,\max}} = \frac{g_{21}^2}{4 g_{11} g_{22}} \cdot \frac{16 m_2}{(1 + m_1)^2 (1 + m_2)^2} = \frac{g_{21}^2}{g_{11} g_{22}} \cdot \frac{4m}{(1 + m)^4} = 4179.7$$

Str. 52, Naloga 6.8

$$P_L = \frac{1}{2} \frac{g_{21}^2 U_1^2 n^2}{(g_{22} + g_k + n^2 G_L)^2} \cdot G_L = \frac{1}{2} \frac{I_1^2}{(g_{11} + G_G)^2} \cdot \frac{g_{21}^2}{(g_{22} + g_k + n^2 G_L)^2} \cdot n^2 G_L$$

$$m_2 = \frac{G_L^*}{g_{22} + g_k} = \frac{n^2 G_L}{g_{22} + g_k} = 0.6$$

$$A_{MUG} = \frac{P_L}{P_{vh\,\max}} = \frac{g_{21}^2}{g_{11}(g_{22} + g_k)} \cdot \frac{4 m_2}{(1 + m_1)^2 (1 + m_2)^2} = 3125$$

Str. 54, Naloga 7.1

$R_{vhT_1\,DC} = r_{11E} + (\beta+1)R_E = 103.5\,\mathrm{k\Omega}$

Str. 58, Naloga 8.1

$U_{CE0} = +U_{BE0}+U_{CC}- R_{C0}\,I_{C0} = +U_{BE0}+U_{CC}- R_{C0}\,I_{RE0}\,/\,2 =$ +7.6 V.

Str. 59, Naloga 8.1

$R_{vh\,s} = r_{11E} + (\beta_{AC}+1)2R_E =$ 4.59 MΩ

Str. 60, Naloga 8.2

$A_{sp} = -0.0445$

Str. 61, Naloga 8.2

$CMRR = \left|\frac{A_d}{A_{sp}}\right| = 5353$ oziroma *CMRR* = 74.6 dB.

Str. 62, Naloga 8.4

Med podatki manjka : β = 100

Str. 67, Naloga 8.9

$CMRR = \frac{A_d}{A_{sp}} = 10^{\frac{68\,\mathrm{dB}}{20\,\mathrm{dB}}} = 2511.9$

Str. 72, Naloga 8.13

$A_{U1} = -g_{21E}\,(R_{C1}\|(R_{vh2}/2)) \cong -69.5.$

$A_U = A_{U1}A_{U2}A_{U3} \cong$ 4358.

Str. 76, Naloga 9.2

Prvi O.O. v narisanem vezju mora imeti (–) in (+) vhodni sponki zamenjani.

Str. 79, Naloga 9.4

$$I_B^- = \frac{u_{izh}}{R} - (\frac{R}{R_s^-}+1)\cdot\frac{U_{off}}{R} = \frac{u_{izh}}{R}\left[1-(\frac{1}{R_s^-}+\frac{1}{R})\cdot\frac{RU_{off}}{u_{izh}}\right] = \frac{u_{izh}}{R}\left[1-\delta\right]$$

Str. 80, Naloga 9.5

$$u^+ = u_s + \frac{u_d}{2} = u_s(1-\frac{1}{2\cdot CMRR}) - \frac{U_{off}}{2} + \frac{u_d'}{2} = u_s - \frac{U_{off}}{2} = -R_3 i^+$$

Str. 81, Naloga 9.5

$u_{izh} \cong \frac{R_1+R_2}{R_1}U_{off} + R_2 I_{off} = \pm 303\,\mathrm{mV} \pm 20\,\mathrm{mV}$

Str. 81, Naloga 9.5

Med podatki napaka: $I_{off} = -100$ nA

Str. 93, Naloga 10.2

$R_{izh\,\beta} \le \frac{R_{izh}}{1+A_{U\,0\,\min}} = 0.0015\,\Omega$

Str. 99, Naloga 10.6

ki se z naraščajočo A_0 giblje od vrednosti -0.0095 proti -0.01, kamor limitira, ko gre ojačenje $A_0 \to \infty$.

Str. 127, Naloga 12.7

$$u_{izh2}(t) = U^+ + u_c(t) = U^+ - \frac{1}{R_1 C}\int (u_{izh1}(t) - U^+)dt\,.$$

$$U_{ZTP} - U_{STP} = U^+ - \frac{1}{R_1 C}\int_{t_0}^{t_0+t_r} (-U_{sat} - U^+)dt = U^+ - \frac{1}{R_1 C}(-U_{sat} - U^+)t_r\,,$$

$$t_r = -R_1 C \frac{U_{ZTP} - U_{STP} - U^+}{-U_{sat} - U^+} = 457.4\,\mu\text{s}\,.$$

$$t_f = -R_1 C \frac{U_{STP} - U_{ZTP} - U^+}{+U_{sat} - U^+} = 116.4\,\mu\text{s}\,.$$

$$T = t_r + t_f = 573.8\,\mu\text{s}\,.$$