

2010 Elektronikai alapismeretek SZÉTV első forduló megoldás

11Egyszerű, rövid feladatok

1.) $R_b = R_3 + R_1 \times R_2 = 2 \text{ k}\Omega$

2.) $(C_1 + C_2) \cdot u = C_1 \cdot U_1$
 $U = U_1 \cdot \frac{C_1}{C_1 + C_2} = \underline{10 \text{ V}}$

3.) $U = N \cdot \frac{\Delta \Phi}{\Delta t} = \underline{400 \text{ V}}$

4.) $U = I \cdot \sqrt{R^2 + (X_c - X_L)^2} = 10 \text{ V}$
 $I_L = \frac{U}{X_L} = \underline{10 \text{ mA}}$

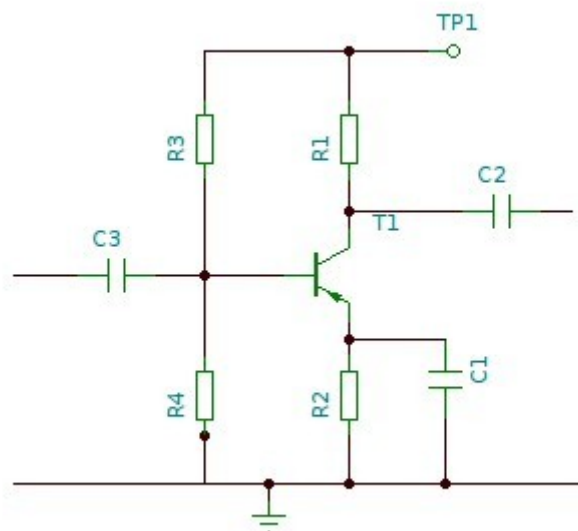
5.) $Z = \frac{1}{\sqrt{\frac{1}{R^2} + \frac{1}{X_C^2}}} = \underline{12 \text{ k}\Omega}$

6.) $Q = \sqrt{G^2 - P^2} = \underline{900 \text{ var}}$

7.) $r_d = \frac{\Delta U}{\Delta I} = \underline{7,5 \Omega}$

8.) $h_{11B} = \frac{h_{11E}}{h_{21E}} = \underline{23,8 \Omega}$

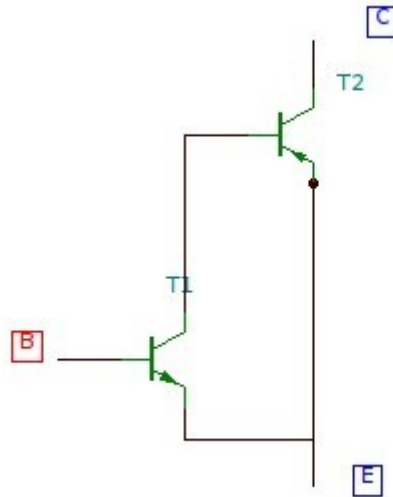
9.)



$$10.) \quad A_I = \frac{A_u * R_{be}}{R_t} = -100$$

$$A_P = A_I * A_U = \underline{\underline{5000}}$$

11.)



$$12.) \quad R_{ki} = R_{ki0} * \frac{A_{uv}}{A_{u0}} = \underline{\underline{25 \text{ m}\Omega}}$$

$$1. \text{ a. } R_{be} = R_1 + R_2 + R_3 = \underline{\underline{22 \text{ k}\Omega}}$$

$$U_{be} = U_g * \frac{R_{be}}{R_g} + R_g = \underline{\underline{11 \text{ V}}}$$

$$I = \frac{U_{be}}{R_{be}} = \underline{\underline{0,5 \text{ A}}}$$

$$\text{b. } U_R = U_{be} * \frac{R_3}{R_{be}} = \underline{\underline{8 \text{ V}}}$$

$$\text{c. } U_1 C_1 = U_2 C_2 = U_3 C_3 = U_{R3} C_e$$

$$U_{ki} = U_3 = U_{R3} * \frac{C_e}{C_3} = \underline{\underline{4 \text{ V}}}$$

$$C_e = C_1 \times C_2 \times C_3 = 7,5 \text{ nF}$$

$$Q_{c3} = U_3 * C_3 = \underline{\underline{60 \text{ nC}}}$$

$$\text{d. } R = R_3$$

$$C = 7,5 \text{ nF}$$

$$T = R * C = 120 \mu\text{s}$$

$$2.a. \quad Z = \sqrt{R^2 + (X_L - X_C)^2} = \underline{1,5 \text{ k}\Omega}$$

$$I = \frac{U}{Z} = \underline{0,5 \text{ mA}}$$

$$b. \quad U_{ki} = I \cdot X_C = \underline{1,2 \text{ V}}$$

$$c. \quad X_C = \frac{1}{2\pi fC} \quad C = \underline{66 \text{ nF}}$$

$$X_L = 2\pi fL \quad L = \underline{238 \text{ mH}}$$

$$d. \quad f_0 = \frac{1}{2\pi fL} \quad L_x = \underline{384 \text{ mH}}$$

$$3.a. \quad R_{be} = R_{B1} \times R_{B2} \times h_{11E} = \underline{3 \text{ k}\Omega}$$

$$R_{ki} = R_C \times \frac{1}{h_{22E}} = \underline{2,83 \text{ k}\Omega}$$

$$b. \quad A_U = \frac{U_{ki}}{U_{be}} = \frac{-h_{21} \cdot R_{ki} \cdot R_t}{h_{11E}} = \underline{-81,3}$$

$$A_i = -A_u \cdot \frac{R_{be}}{R_t} = \underline{49,1}$$

$$c. \quad U_g \cdot \frac{R_{be}}{R_{be} + R_g} = \underline{8,57 \text{ mV}}$$

$$U_{ki} = A_u \cdot U_{be} = \underline{697 \text{ mV}}$$

$$4.a. \quad A_u = -\frac{R_2}{R_1}$$

$$R_2 = -A_u \cdot R_1 = \underline{500 \text{ k}\Omega}$$

$$R_3 = R_2 = \underline{500 \text{ k}\Omega}$$

$$b. \quad U_{be} = \frac{U_{ki}}{A_u} = 0,26 \text{ V}$$

$$U_{eff} = \frac{U_{be}}{\sqrt{2}} = \underline{0,18 \text{ V}}$$

$$c. \quad f_{a1} = \frac{1}{2\pi R_1 \cdot C_1} = \underline{15,9 \text{ Hz}}$$

$$f_{a2} = \frac{1}{2\pi R_t \cdot C_2} = \underline{1,59 \text{ Hz}}$$

$$f_a = f_{a1} = \underline{1,59 \text{ Hz}}$$

$$d. \quad f_f = f_0 \cdot \frac{A_{U0}}{A_{Uv}} = \underline{4 \text{ kHz}}$$