

1. STRÖMDELNINGSLAGEN

$$I_1 = I_0 \cdot \frac{R_3}{R_1 + R_2 + R_3} \Rightarrow \underline{I_1 = 2 \text{ A}}$$

OHMS LAG

$$U_1 = R_1 \cdot I_1 \Rightarrow \underline{U_1 = 6 \text{ V}}$$

$$P_1 = U_1 \cdot I_1 \Rightarrow \underline{P_1 = 12 \text{ W}}$$

2.

$$Z_{\text{TOT}} = j\omega L_1 + \frac{R \cdot (j\omega L_2 + \frac{1}{j\omega C})}{R + j\omega L_2 + \frac{1}{j\omega C}} = 2,92 \cdot e^{j84,1^\circ} \Omega$$

$$I = \frac{U}{Z_{\text{TOT}}} = \frac{4\sqrt{2} \cdot e^{j0}}{2,92 \cdot e^{j84,1^\circ}} = \sqrt{2} \cdot 1,37 e^{-j84,1^\circ} \text{ A}$$

$$P = U \cdot I \cdot \cos \varphi = 4 \cdot 1,37 \cdot \cos 84,1^\circ = 0,56 \text{ W}$$

$$Q = U \cdot I \cdot \sin \varphi = 4 \cdot 1,37 \cdot \sin 84,1^\circ = 5,45 \text{ VAR}$$

$$3a) \quad \frac{N_1}{N_2} = \frac{\hat{U}_1}{\hat{U}_2} = \frac{\hat{U}_1}{U_C + 2 \cdot 0,70}$$

$$\Rightarrow \frac{N_1}{N_2} = \frac{230\sqrt{2}}{15 + 1,4} \approx \underline{\underline{20}}$$

$$b) \quad U_C - R \cdot J_R - U_Z = 0 \dots (1)$$

$$P_{Z_{MAX}} = U_Z \cdot J_{Z_{MAX}} \dots (2)$$

$$(2) \Rightarrow 2,0 = 12 \cdot J_{Z_{MAX}} \Rightarrow J_{Z_{MAX}} \approx 0,17 \text{ A}$$

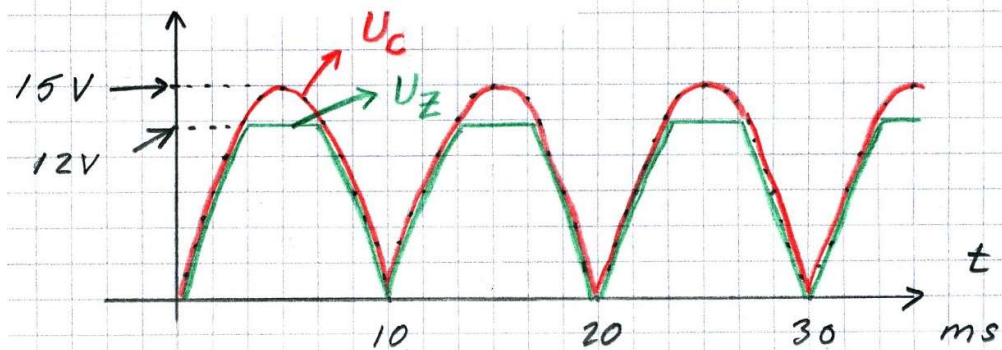
"NÄR LAST SAKNAS BLIR

J_Z MAXIMAL OCH LIKA
MED J_R .

$$(1) \Rightarrow 15 - R \cdot 0,17 - 12 = 0$$

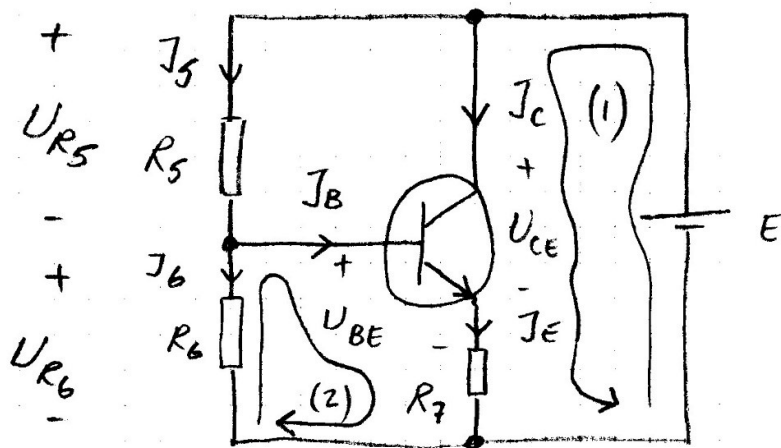
$$\Rightarrow \underline{\underline{R = 18 \Omega}} \quad (R_{MIN})$$

c) TIDSDIAGRAM FÖR U_C OCH U_Z
DÅ GLÄTTNINGSKONDENSATORN
GÅTT SÖNDER.



$$\omega = 100\pi \text{ RAD/S} \quad \omega = \frac{2\pi}{T} \Rightarrow T = 20 \text{ ms}$$

4a) LÖKSTRÖMSSCHEMA FÖR GC-STEGET :



$$+E - U_{CE} - R_7 J_E = 0 \dots (1)$$

$$+U_{R6} - U_{BE} - R_7 J_E = 0 \dots (2)$$

$$J_E = J_B + J_C \quad J_B = \frac{J_C}{h_{FE}} \rightarrow J_B = 8,3 \mu A$$

$$\rightarrow J_E = 8,3 \cdot 10^{-6} + 5,0 \cdot 10^{-3} \approx 5,01 \text{ mA}$$

$$(1) \rightarrow +10 - 5,0 - R_7 \cdot 0,00501 = 0$$

$$\rightarrow \underline{R_7 \approx 1,0 \text{ k}\Omega}$$

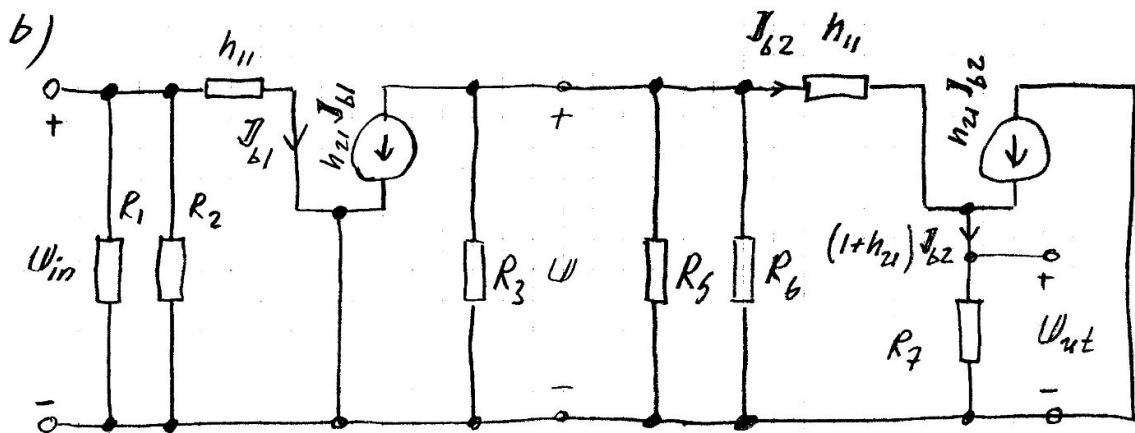
$$(2) \rightarrow U_{R6} - 0,70 - 5,0 = 0$$

$$\rightarrow U_{R6} = 5,7 \text{ V}$$

$$J_6 = \frac{U_{R6}}{R_6} \rightarrow J_6 = 570 \mu A$$

$$J_5 = J_6 + J_8 \rightarrow J_5 = 578 \mu A$$

$$R_5 = \frac{U_{R5}}{J_5} = \frac{E - U_{R6}}{J_5} \rightarrow \underline{\underline{R_5 = 7,4 \text{ k}\Omega}}$$



$$c) \quad F = \frac{U_{ut}}{U_{in}} = \frac{U_{ut} \cdot U}{U \cdot U_{in}} \dots (3)$$

$$U_{ut} = R_7 (1 + h_{21}) J_{b2} \Rightarrow U_{ut} \approx 6,0 \cdot 10^5 J_{b2} \dots (4)$$

$$U = h_{11} J_{b2} + R_7 (1 + h_{21}) J_{b2} \rightarrow U \approx 6,0 \cdot 10^5 J_{b2} \dots (5)$$

$$U = -h_{21} J_{b1} \cdot R \quad \text{DÄR} \quad \frac{1}{R} = \frac{1}{R_3} + \frac{1}{R_5} + \frac{1}{R_6} + \frac{1}{h_{11} + R_7(1+h_{21})}$$

$$\Rightarrow U \approx -2,5 \cdot 10^5 J_{b1} \dots (6)$$

$$U_{in} = h_{11} J_{b1} \Rightarrow U_{in} = 3,0 \cdot 10^3 J_{b1}$$

INS 1 (3) \rightarrow

$$F = \frac{6,0 \cdot 10^5 \beta_{b2} \cdot (-2,5 \cdot 10^5 \beta_{b1})}{6,0 \cdot 10^5 \beta_{b2} \cdot 3,0 \cdot 10^3 \beta_{b1}}$$

$$\Rightarrow F \approx -83 \quad \Rightarrow \quad F = |F| \approx 83 \text{ GGR}$$

$$Z_{in} = R_1 \parallel R_2 \parallel h_{11} \quad \rightarrow \quad Z_{in} = 2,1 \text{ k}\Omega$$

$$Z_{ut} = R_7 \parallel \frac{h_{11} + (R_6 \parallel R_5 \parallel R_3)}{1 + h_{21}} \quad \rightarrow$$

$$\underline{Z_{ut} = 5,7 \Omega}$$

5a)

$$U_1 = U_{in} \cdot \frac{R_1}{R_1 + j\omega L} \Rightarrow$$

$$U_1 = 5,2\sqrt{2} e^{j0^\circ} \cdot \frac{100}{100 + j240} = 2,0\sqrt{2} \cdot e^{-j67,4^\circ} \text{ V}$$

$$\Rightarrow \underline{u_1(t) = 2,0\sqrt{2} \cdot \sin(150000t - 67,4^\circ) \text{ V}}$$

5b)

$$U_2 = U_1 \cdot \frac{R_2 + R_3}{R_3} \Rightarrow U_2 = 6,0\sqrt{2} \cdot e^{-j67,4^\circ} \text{ V}$$

$$\Rightarrow \underline{u_2(t) = 6,0\sqrt{2} \cdot \sin(150000t - 67,4^\circ) \text{ V}}$$

5c)

$$U_{out} = U_2 \cdot \frac{R_4}{R_4 + \frac{1}{j\omega C}} \Rightarrow$$

$$U_{out} \approx 6,0\sqrt{2} \cdot e^{-j67,4^\circ} \cdot \frac{100 \cdot 10^3}{100 \cdot 10^3 - j100 \cdot 10^3} =$$

$$= 6,0 \cdot e^{-j22,4^\circ} \text{ V}$$

$$\Rightarrow \underline{u_{out} = 6,0 \sin(150000t - 22,4^\circ) \text{ V}}$$

6.

FÖRE CP								EFTER CP			
Q_A	Q_B	Q_C	J_A	K_A	J_B	K_B	J_C	K_C	Q_A^+	Q_B^+	Q_C^+
0	0	0	0	-	1	-	0	-	0	1	0
0	0	1	0	-	0	-	-	1	0	0	0
0	1	0	1	-	-	1	-	-	1	0	1
0	1	1	1	-	-	0	-	1	1	1	0
1	0	0	-	1	1	-	1	-	0	1	1
1	0	1	-	0	0	-	-	1	1	0	0
1	1	0	-	1	-	1	-	-	0	0	1
1	1	1	-	0	-	0	-	1	1	1	0

