P1 (A) NAPONSKO POJAČANJE, (B) STRUJNO POJAČANJE (SAMO KOD BJT)

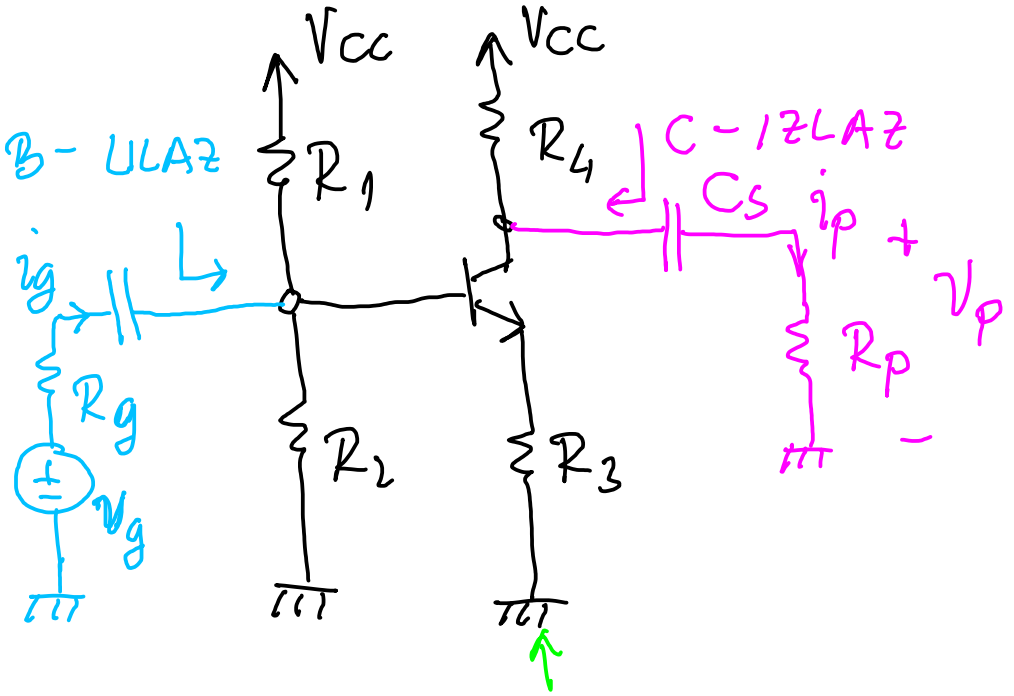
(C) ULAZNA OTPORNOST, (D) IZLAZNA OTPORNOST => "SMALL" SIGNAL

$$X_C = \frac{1}{\omega C} = \frac{1}{2\pi f \cdot C}$$

$\lim X_C = 0\ \Omega$
$C \to \infty,\ f \neq \infty, 0$ (AC LF/MF)

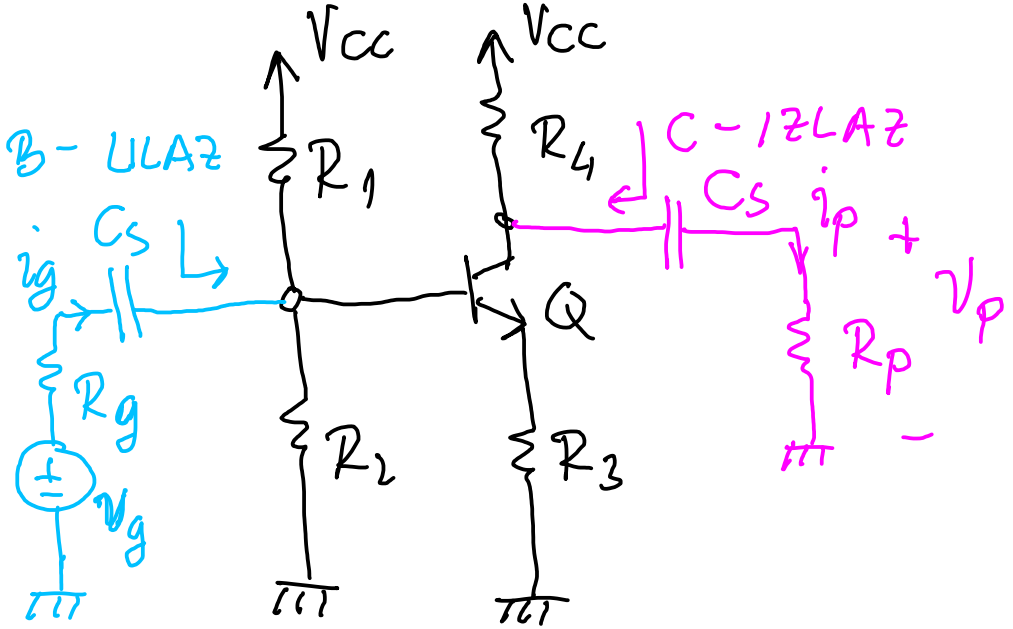
$\lim X_C = 0\ \Omega$
$f \to \infty,\ C \neq \infty$ (AC HF)

$\lim X_C = \infty\ \Omega$
$f \to 0,\ C \neq \infty$ (DC)



E - "ZAJEDNIČKA" TAČKA

KONFIGURACIJA SA ZAJEDNIČKIM EMITOROM



Q: $V_{BE} = 0.7\,V$, $\beta = 100$, $V_A \to \infty\ V$

$$V_A \to \infty\ V \Rightarrow r_o = \frac{V_A + V_{CE}}{I_C} \to \infty\ \Omega$$

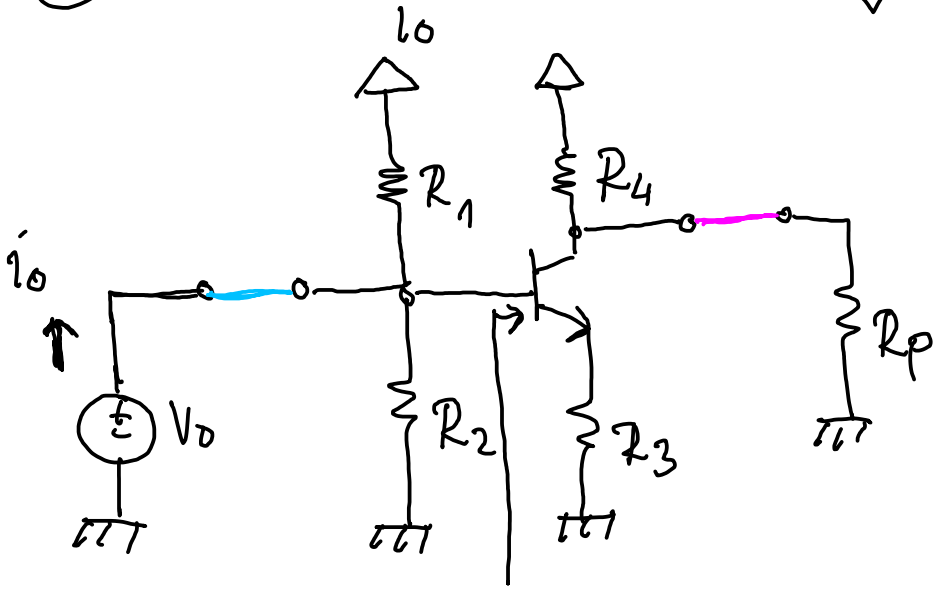
$$V_A \gg V_{CE},\ r_o \approx \frac{V_A}{I_C}$$

$C_S \to \infty\ F$

$$r_\pi = V_T / I_B$$

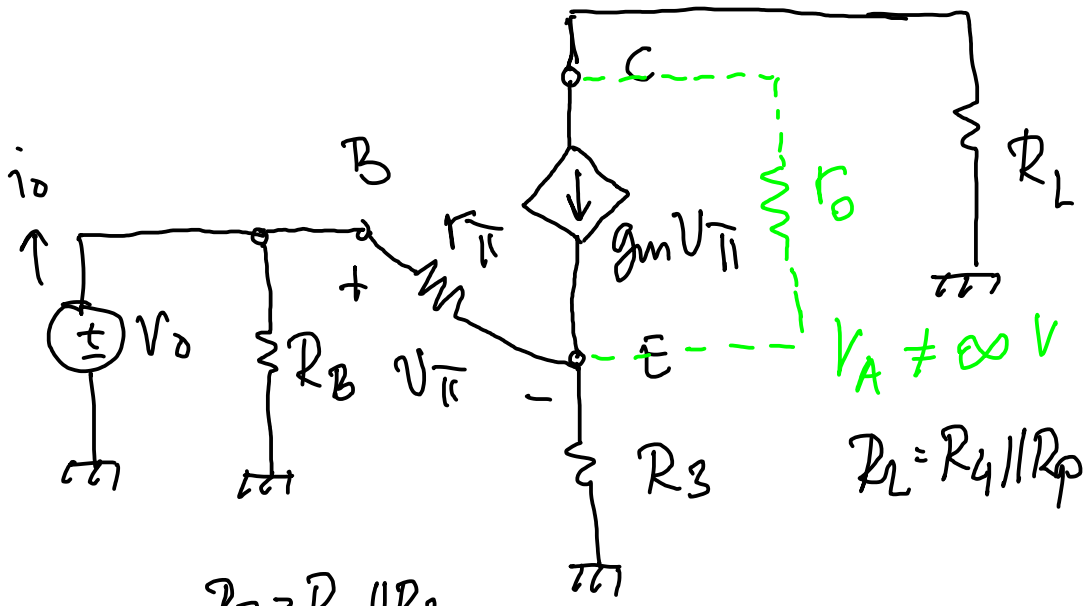
$$g_m = \beta / r_\pi = I_C / V_T$$

(c) $R_{UL} = \dfrac{V_0}{i_0}$ ("SS") ⏚ – "VIRTUELNA" MASA

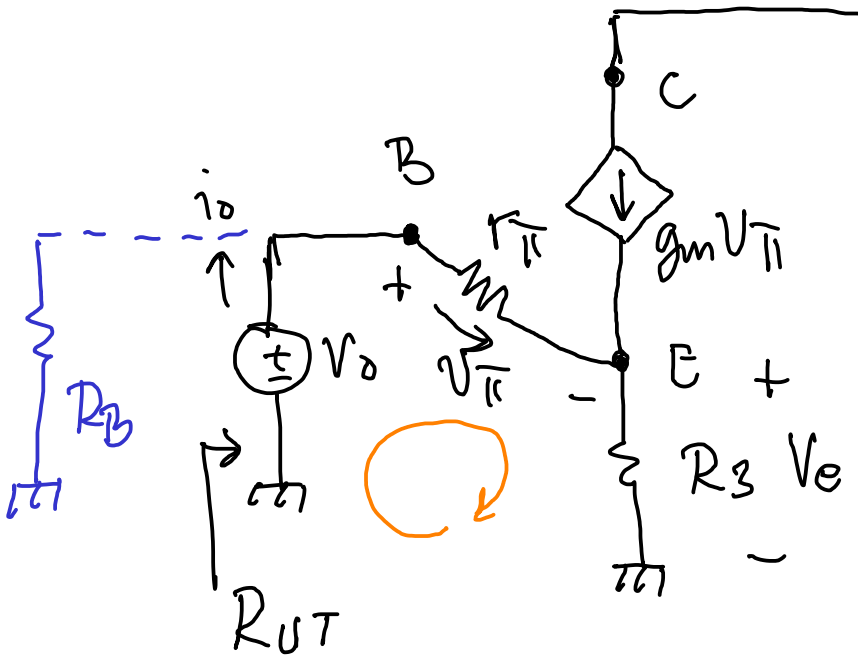


$R_{UT} = r_\pi + (1+\beta) R_3$

≡



$R_B = R_1 \| R_2$



$R_{UL} = R_{UT} \parallel R_B$

$R_{UT} \triangleq \frac{V_0}{i_0}$

(E) $\frac{V_e}{R_3} - g_m V_\pi - \frac{V_\pi}{r_\pi} = 0$

(B) $-i_0 + \frac{V_\pi}{r_\pi} = 0$

(C) $g_m V_\pi + \frac{V_C}{R_L} = 0$

(KJ) $V_0 = V_\pi + V_e \Rightarrow V_\pi = V_0 - V_e$

(E) $V_e G_3 - (V_0 - V_e)\left(g_m + \frac{1}{r_\pi}\right) = 0$ $\Rightarrow$ TREBA ELIMINISATI V_e

(B) $-i_0 + (V_0 - V_e) \cdot g_\pi = 0$

(C) $g_m (V_0 - V_e) + V_C \cdot G_L = 0$ $\Rightarrow$ NE POTREBNA ZA $\frac{V_0}{i_0}$!

(E) $v_e G_3 - (v_0 - v_e)\left(g_m + \frac{1}{r_\pi}\right) = 0$ $\quad * g_m \cdot r_\pi = \beta$

(B) $-i_0 + (v_0 - v_e) \cdot g_\pi = 0 \Rightarrow v_e = v_0 - i_0 r_\pi$

$v_e \left(G_3 + (1+\beta) g_\pi \right) = v_0 (1+\beta) g_\pi$

$(v_0 - i_0 r_\pi)\left(G_3 + (1+\beta) g_\pi \right) = v_0 (1+\beta) g_\pi$

$v_0 \left(G_3 + \cancel{(1+\beta) g_\pi} - \cancel{(1+\beta) g_\pi} \right) = i_0 r_\pi \left(G_3 + (1+\beta) g_\pi \right)$

$$R_{UT} = \frac{v_0}{i_0} = \frac{r_\pi \left(G_3 + (1+\beta) g_\pi \right)}{G_3} = r_\pi \left(1 + (1+\beta) \frac{R_3}{r_\pi} \right)$$

$$\boxed{R_{UT} = r_\pi + (1+\beta) R_3}$$

OVAJ REZULTAT KORISTIMO ZA ANALIZU VIŠESTEPENIH POJAČAVAČA!

$$R_{UE} = R_B \parallel R_{UT} = R_1 \parallel R_2 \parallel R_{UT} = R_1 \parallel R_2 \parallel \left(r_\pi + (1+\beta) R_3 \right)$$