

$$V_B = R_B I_B + V_{BE} + R_E I_E$$

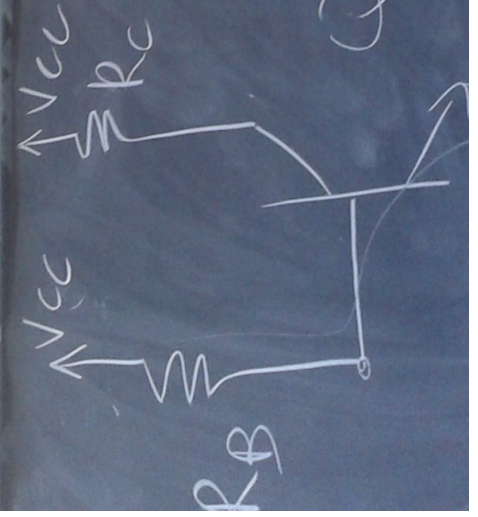
$$I_B = \frac{V_B - V_{BE}}{R_B + R_E(\beta + 1)}$$

$$V_{CE} = V_{CC} - R_C I_C - R_E I_E$$

$$V_{CE} = V_{CC} - [\beta R_C + (\beta + 1) R_E] I_B$$

$$V_B = \frac{R_{B2}}{R_{B1} + R_{B2}} V_{CC}$$

$$R_B = R_{B1} \parallel R_{B2}$$



$$I_C = \beta I_B$$

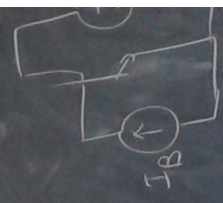
$$V_{BE} = V_{BE_{on}} \approx 0.7V$$

$$V_{CE} = V_{CC} - R_C I_C - R_E I_E$$

$$V_{CC} = R_B I_B + V_{BE} + R_E I_E$$

$$I_E = (\beta + 1) I_B = I_B + I_C$$

$$I_B = \frac{V_{CC} - V_{BE}}{R_B + (\beta + 1) R_E}$$



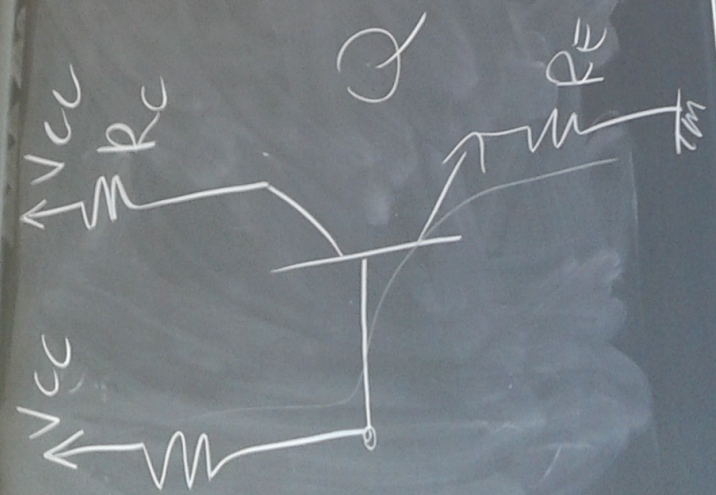
$$I_B = \frac{V_B - V_{BE}}{R_B + R_E(\beta + 1)}$$

$$V_{CE} = V_{CC} - R_C I_C - R_E I_E$$

$$V_{CE} = V_{CC} - [R_C + (\beta + 1)R_E] I_B$$

$$V_B = \frac{R_{B2}}{R_{B1} + R_{B2}} V_{CC}$$

$$R_B = R_{B1} // R_{B2}$$



$$I_C = \beta I_B$$

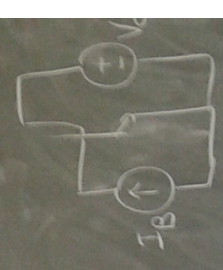
$$V_{BE} = V_{BE_{on}} \approx 0.7V$$

$$V_{CE} = V_{CC} - R_C I_C - R_E I_E$$

$$V_{CC} = R_B I_B + V_{BE} + R_E I_E$$

$$I_E = (\beta + 1) I_B = I_B + I_C$$

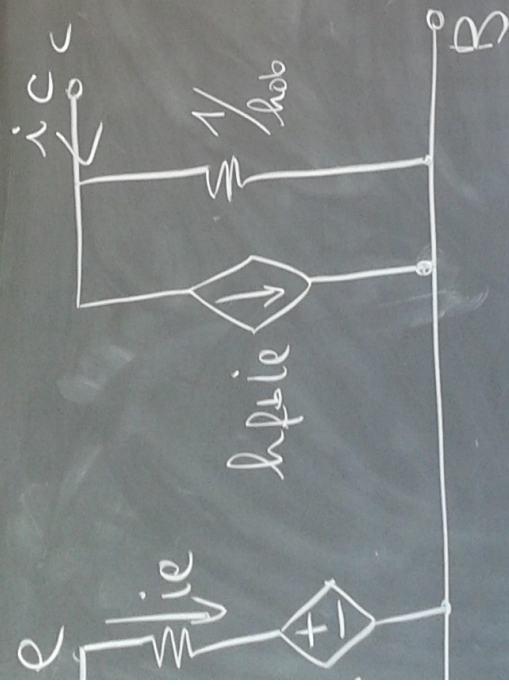
$$I_B = \frac{V_{CC} - V_{BE}}{R_B + (\beta + 1)R_E}$$



(max)

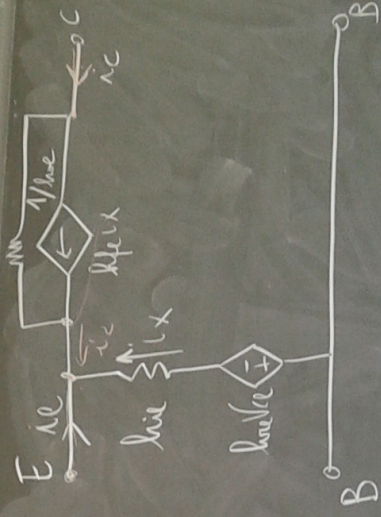
$$V_{cb} = h_{ie} i_c - \frac{h_{re}}{h_{oe}} (1+h_{fe}) i_c + \frac{1}{h_{oe}} (h_{fe}+1) i_c$$

$$V_{cb} = \left[h_{ie} + \frac{1}{h_{oe}} (h_{fe}+1) (1-h_{re}) \right] i_c \Rightarrow h_{ob} = \frac{h_{oe}}{h_{oe} h_{fe} + (h_{fe}+1)}$$



$$h_{ob} = \frac{i_c}{V_{cb}} \Big|_{i_e=0A}$$

$$h_{OB} = \frac{h_{OE}}{h_{IE} h_{OE} + (h_{FE}+1)(1-h_{RE})}$$



$$o_b = \frac{i_c}{U_{cb}}$$

$$c = -i_x$$

$$i_e = 0 \text{ A}$$

$$U_{cb} = -h_{ie} i_x - h_{re} U_{ce} + \frac{1}{h_{oe}} (i_c - h_{fe} i_x)$$

$$U_{ce} = \frac{1}{h_{oe}} (i_c - h_{fe} i_x)$$

$$U_{cb} = h_{ie} i_c - \frac{h_{re}}{h_{oe}} (1 + h_{fe}) i_c + \frac{1}{h_{oe}} (h_{fe} + 1) i_c$$

$$U_{cb} = \left[h_{ie} + \frac{1}{h_{oe}} (h_{fe} + 1) (1 - h_{re}) \right] i_c \Rightarrow h_{ob} = \frac{h_{oe}}{h_{ie} h_{oe} + (h_{fe} + 1)}$$



$$h_{ob} = \frac{h_{oe}}{h_{ie} h_{oe} + (h_{fe} + 1) (1 - h_{re})}$$