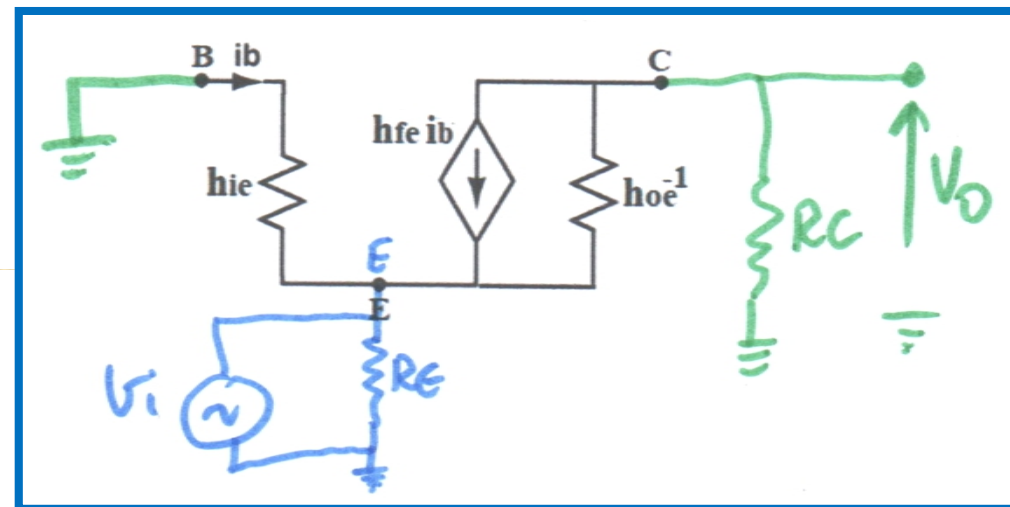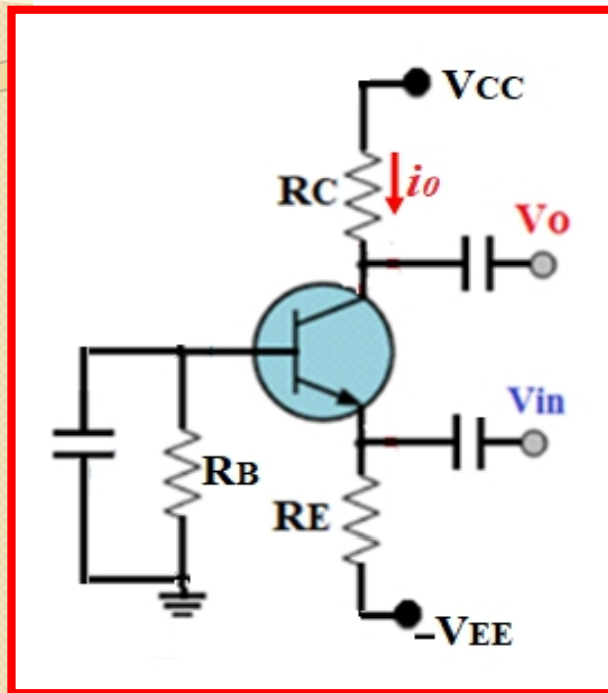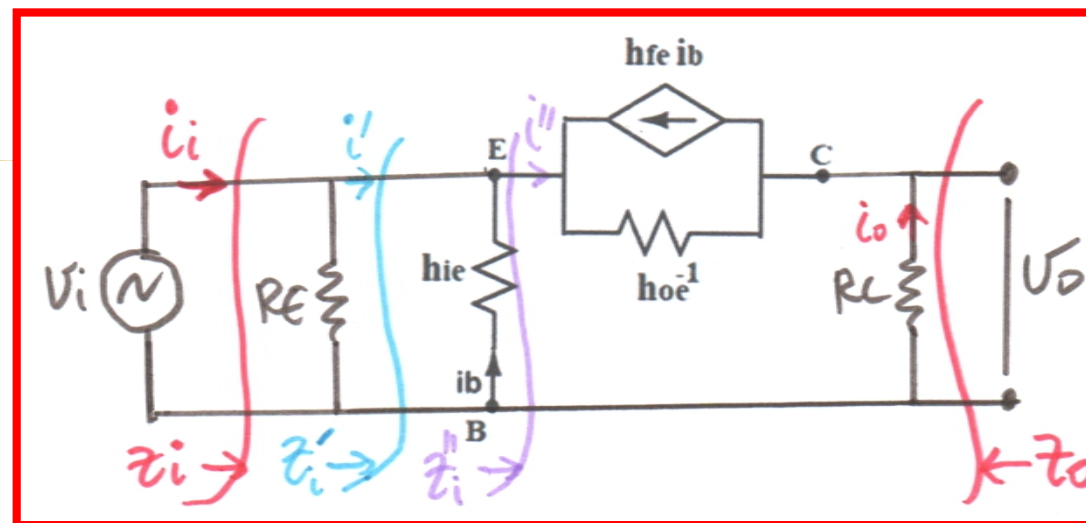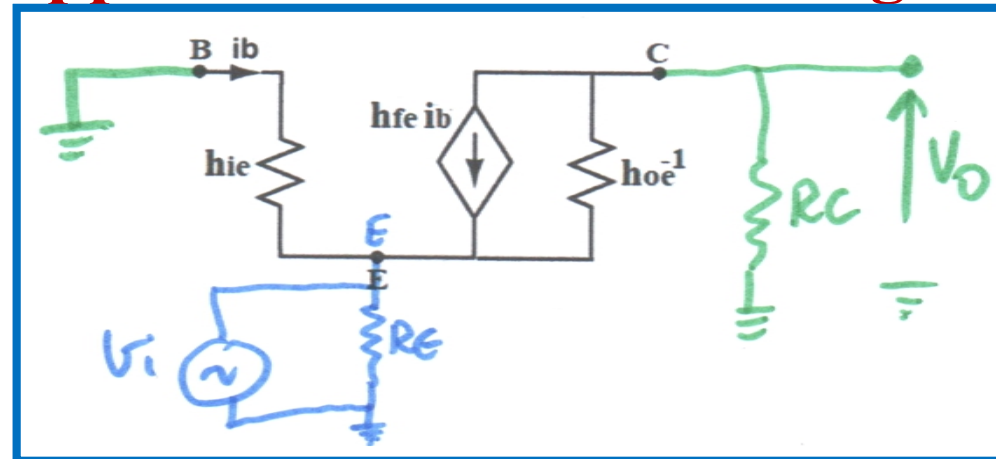# App 3: Common Base configuration

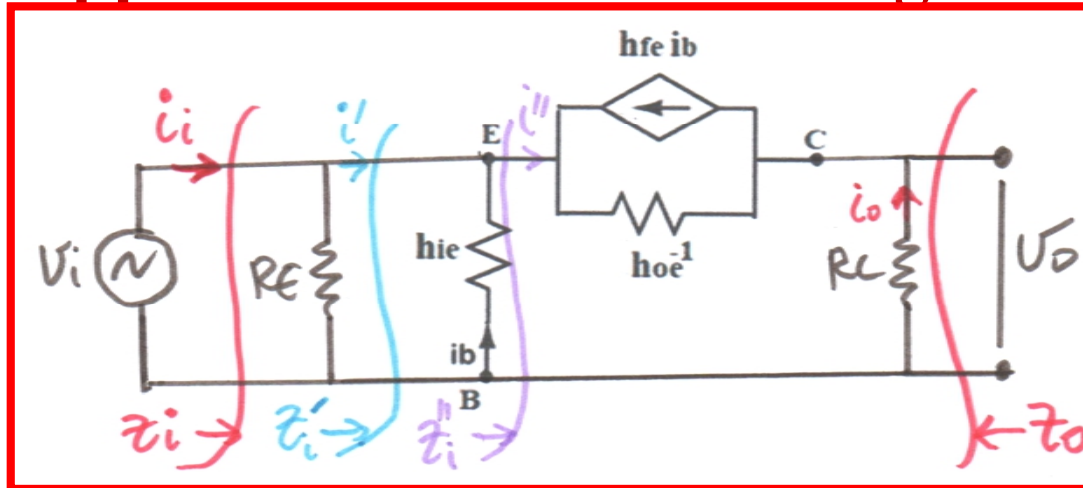# App 3: Common Base configuration

App 3: Common Base configuration

App 3: Common Base configuration

$$z_i = \frac{v_i}{i_i} \,?$$

$$z_i = R_E \, // \, hie \, // \, z_i''$$

$$z_i'' = \frac{v_i}{i''}$$

$$v_i = h\bar{o}e^{\hat{}} (i' + h_{fe} \, i_b) + R_C \, i''$$

$$v_i = (h\bar{o}e^{\hat{}} + R_C) \, i'' + h\bar{o}e^{\hat{}} h_{fe} \, i_b \dots \text{①}$$

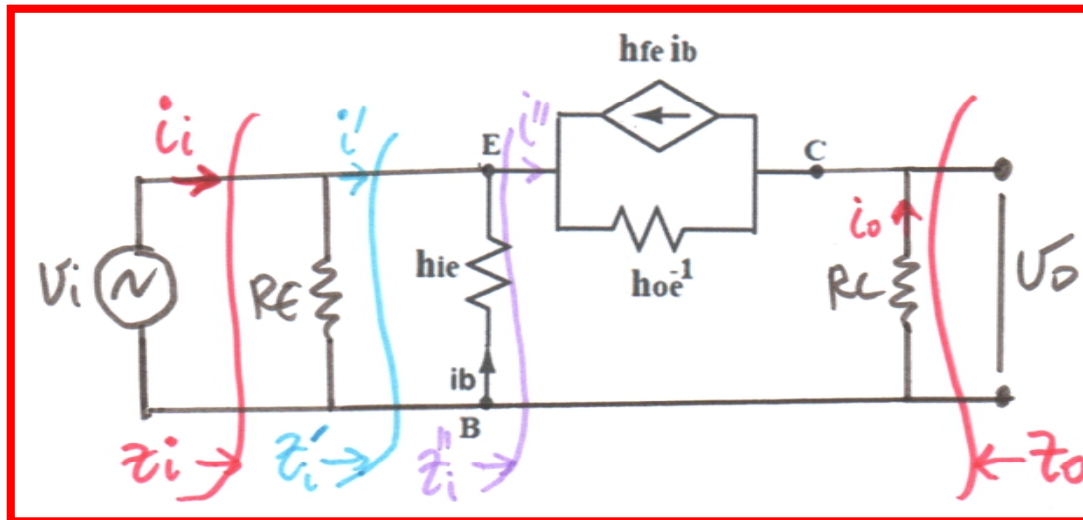# App 3: Common Base configuration
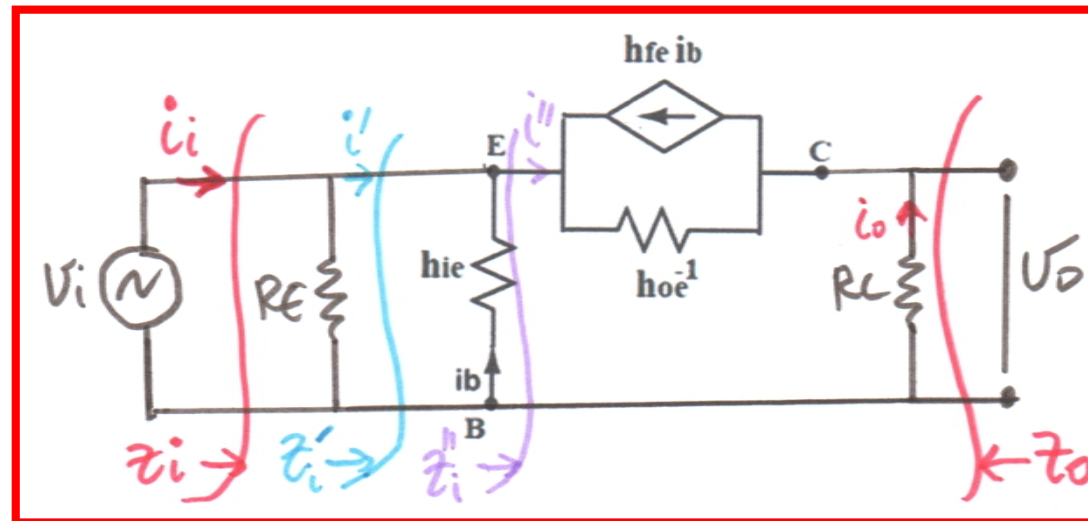
i_b?

$$v_i = -h_{ie}\, i_b \Rightarrow i_b = -\frac{v_i}{h_{ie}} \quad \dots \text{②}$$
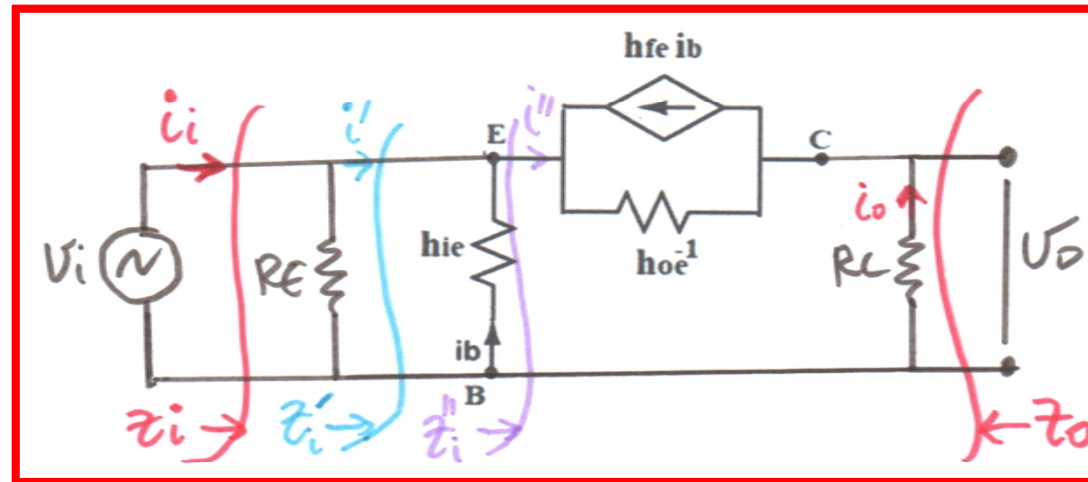
② in ① :

App 3: Common Base configuration

$$V_i \left[1 + \frac{h_{oe}^{-1} h_{fe}}{h_{ie}} \right] = \left(h_{oe}^{-1} + R_C \right) i''$$

$$Z_i'' = \frac{V_i}{i''} = \frac{h_{oe}^{-1} + R_C}{1 + \frac{h_{oe}^{-1} h_{fe}}{h_{ie}}}$$

App 3: Common Base configuration

$$z_i'' = \frac{v_i}{i''} = \frac{h_{oe}^{-1} + RC}{1 + \frac{h_{oe}^{-1} hfe}{hie}}$$

$$z_i = RE \parallel hie \parallel z_i''$$

If $h_{oe}^{-1} = \infty$

$$z_i'' = \frac{hie}{hfe} \quad <<$$

$$z_i' = RE \parallel hie \parallel z_i'' \quad <<$$

App 3: Common Base configuration
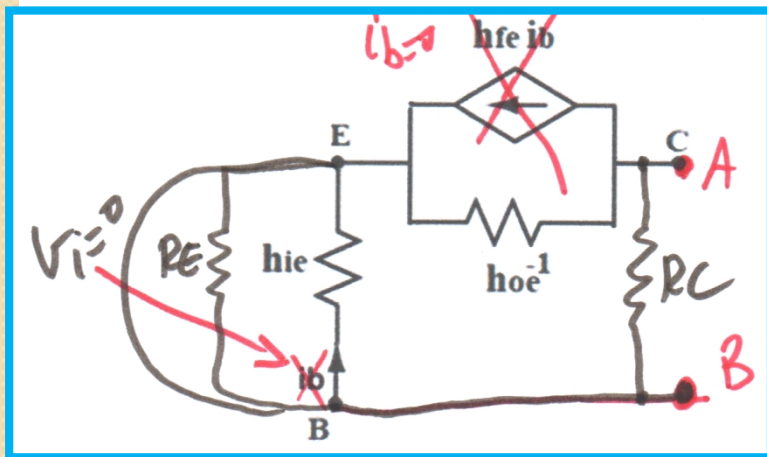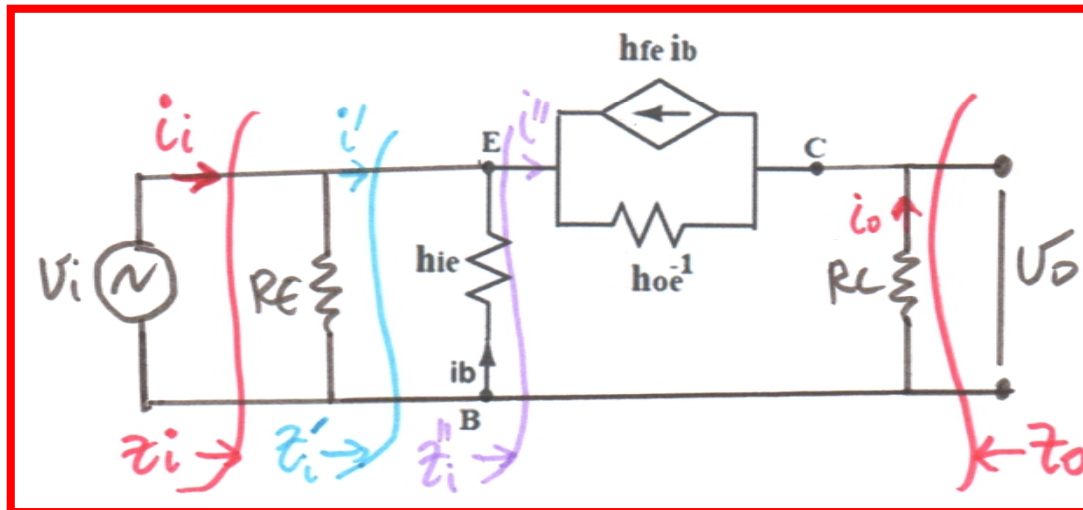
$$z_O|_{v_i=0} \; ??$$

$$z_O = hoe^{-1} // RC$$

$$z_O : Medium$$

App 3: Common Base configuration
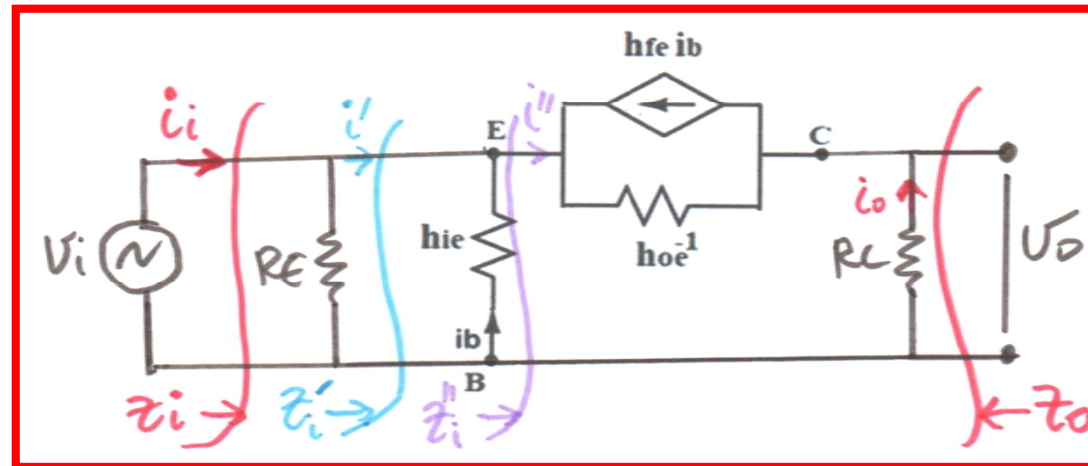
$$A_V = \frac{V_o}{V_i} \, ?$$

$$V_i = h_{oe}^{-1}(i'' + h_{fe} i_b) + V_o \cdots \textcircled{1}$$

$$i'' = \frac{V_o}{R_C} \cdots \textcircled{2} \qquad i_b = -\frac{V_i}{h_{ie}} \cdots \textcircled{3}$$

$$\textcircled{2} \; and \; \textcircled{3} \; in \; \textcircled{1}$$

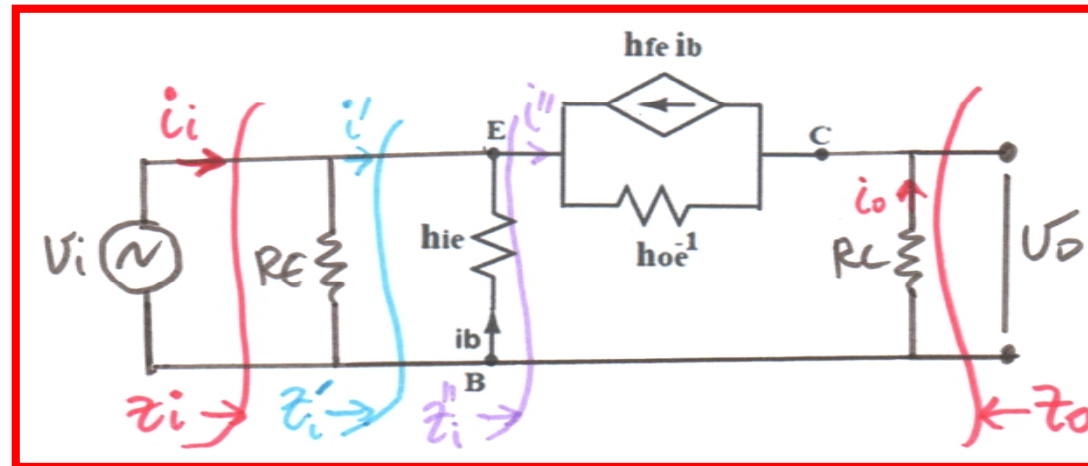$$A_V = \frac{V_o}{V_i} = \frac{1 + \dfrac{h_{fe} \, h_{oe}^{-1}}{h_{ie}}}{1 + \dfrac{h_{oe}^{-1}}{R_C}}$$

App 3: Common Base configuration
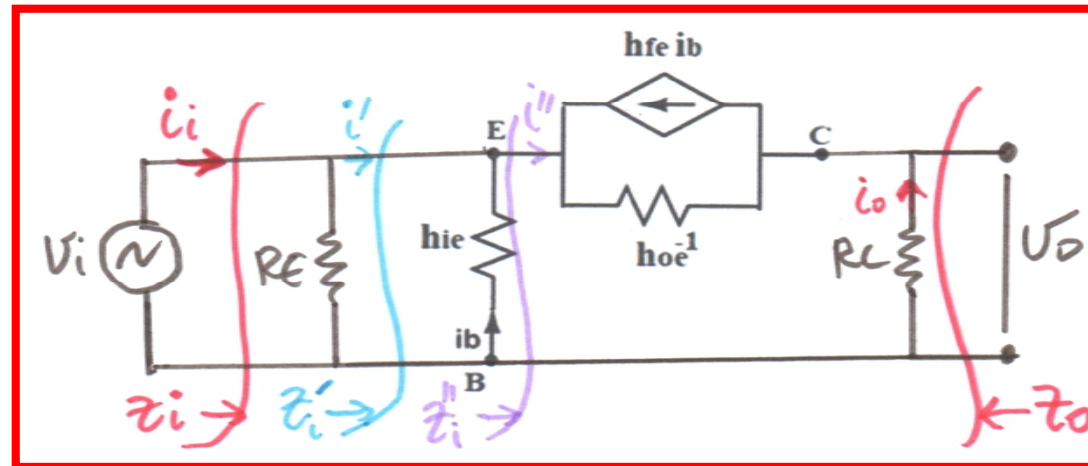
$$AV_{NL} = \frac{V_0}{V_i} = \frac{1 + \dfrac{hfe\, h\overline{oe}^1}{hie}}{1 + \dfrac{hoe^1}{Rc}}$$

$$h\overline{oe}^1 = \infty$$

$$AV_{NL} = \frac{Rc\, hfe}{hie}$$

$$AV_{NL} \nearrow$$

App 3: Common Base configuration

$$Ai = -\frac{z_i}{Rc} Av_{NL}$$

$Ai < 0$ and
$|Ai| < 1$

App 3: Common Base configuration

Config.	C-E (bypass.R_E)	C-E (unbypass. R_E)	C-B	C-C
Zi	Medium	High	Low	High
Zo	M	M	M	L
AV_{NL}	H (<0)	M(<0)	H(>0)	L(≈1)
Ai	H (>0)	H(>0)	L(≈-1)	H (<0)

End of presentation