

九十二學年度台灣大學電資學院電機系電子學(一)第二次小考

- 一、The transistor in the circuit shown in Fig. 1(a) is biased to operate in the active mode. Assuming that β is very large, find the collector bias current I_C . Replace the transistor with the small-signal equivalent circuit model of Fig. 1(b) (remember to replace the dc power supply with a short circuit). Analyze the resulting amplifier equivalent circuit to show that

$$\frac{v_{o1}}{v_i} = \frac{R_E}{R_E + r_e} \quad \frac{v_{o2}}{v_i} = \frac{-\alpha R_C}{R_E + r_e}$$

Find the values of these voltage gains ($\alpha \cong 1$)

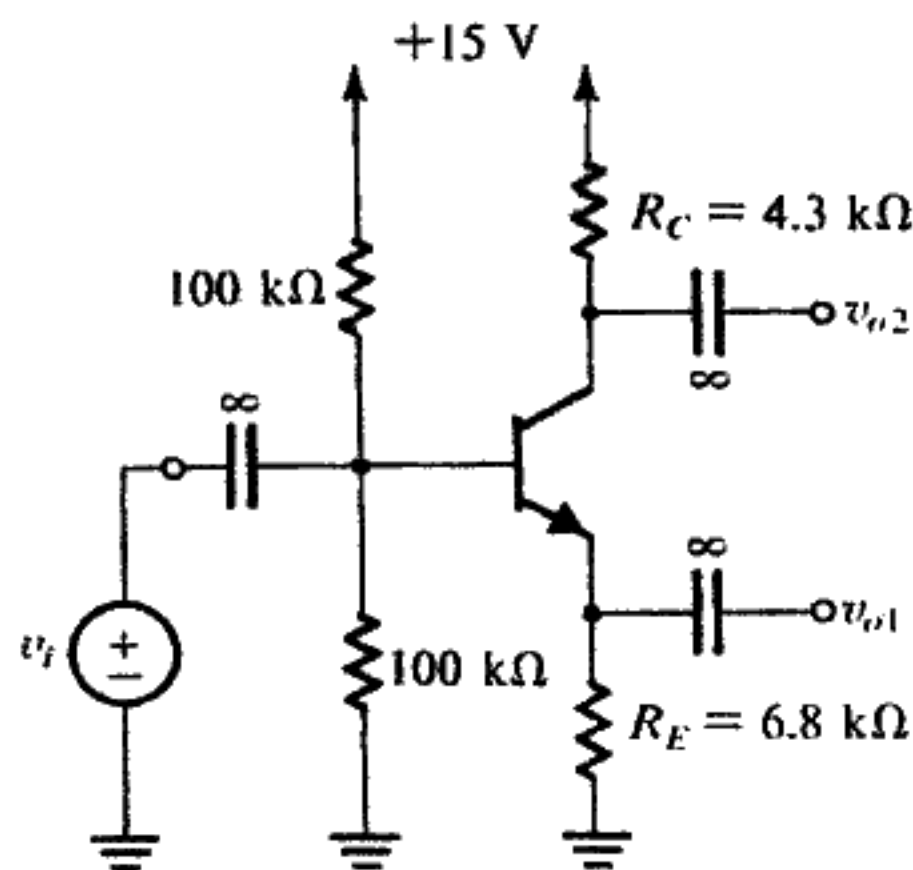


Fig. 1(a)

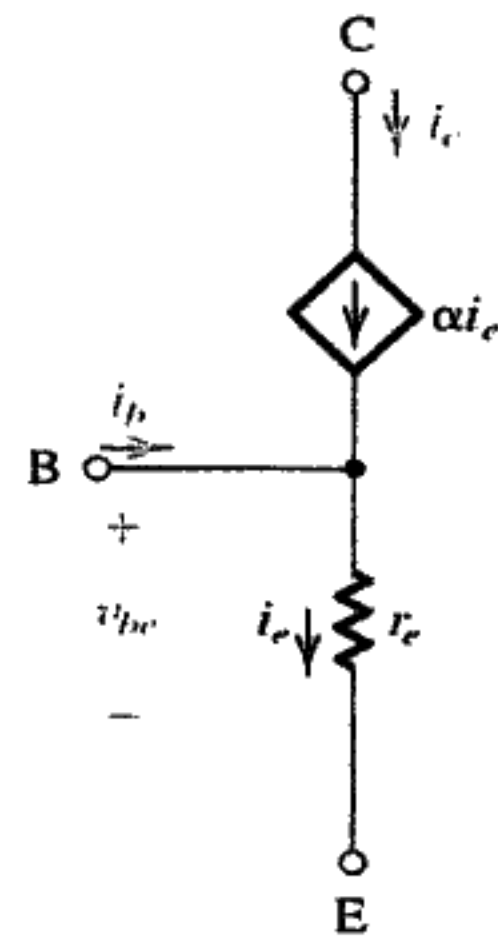


Fig. 1(b)

- 二、The BJT in the circuit of Fig. 2 has $\beta = 100$

- Find the dc collector current and the dc voltage at the collector.
- Replacing the transistor by its T model, draw the small-signal equivalent circuit of the amplifier. Analyze the resulting circuit to determine the voltage gain v_o / v_i

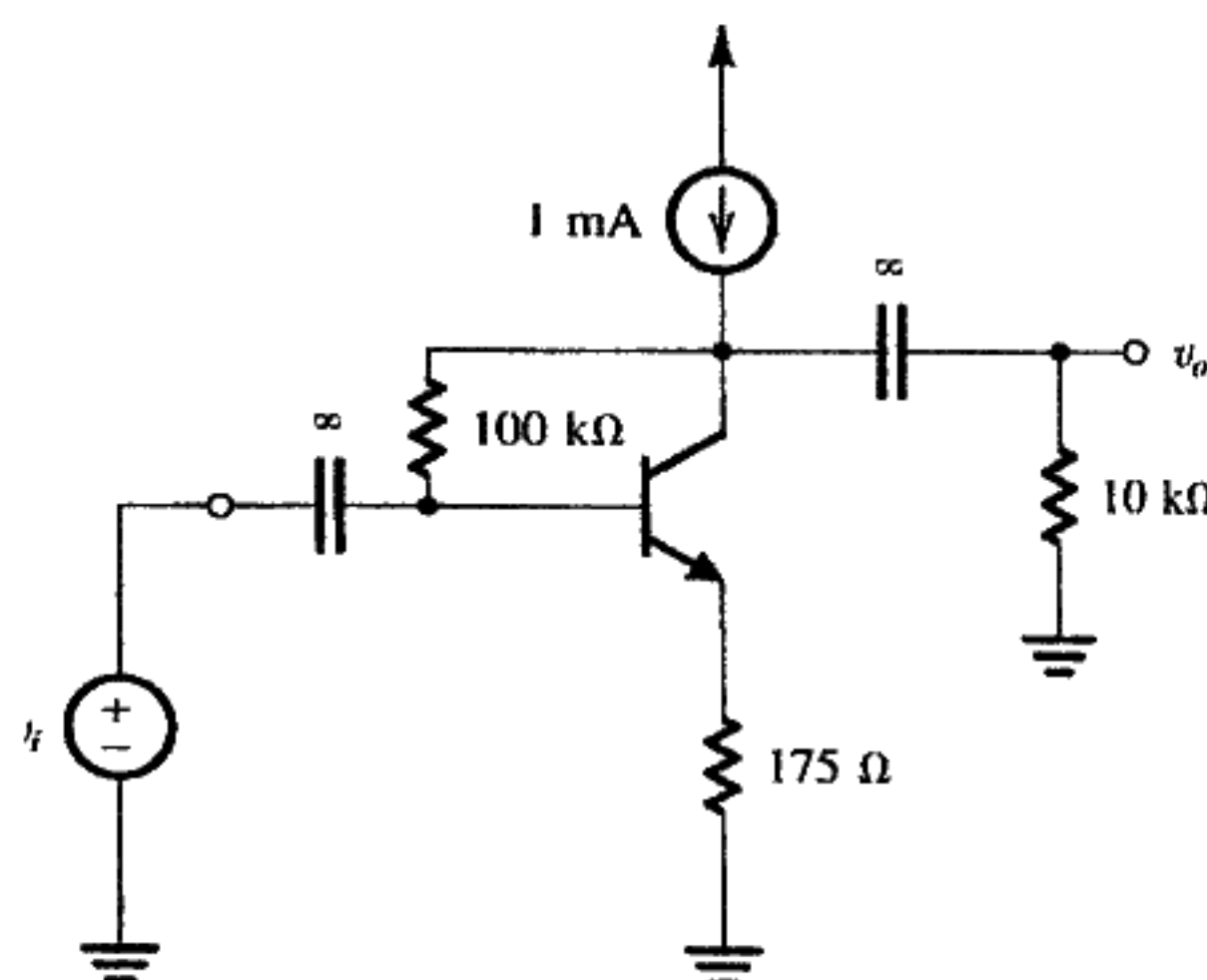


Fig. 2