Answers to practical exercise of lecture - 3

① the transistor is working at the cutoff region.

possible reasons:

(1). R_b is open

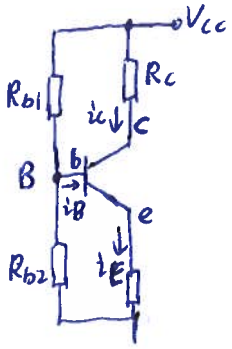
R_b is open $\Rightarrow I_B = 0 \Rightarrow I_C = 0 \Rightarrow V_{CE} = V_{CC} - I_C R_C = V_{CC}$

(2). C_{b1} is short

C_{b1} is short $\Rightarrow V_{BE} = 0 \Rightarrow I_B = 0 \Rightarrow I_C \Rightarrow 0 \Rightarrow V_{CE} = V_{CC} - I_C R_C = V_{CC}$

②

$$V_{BQ} \approx \frac{R_{b1}}{R_{b1} + R_{b2}} \cdot V_{CC}$$



$$I_{CQ} \approx I_{EQ} \approx \frac{V_{BQ} - V_{BEQ}}{R_e}$$

$$V_{CEQ} = V_{CC} - I_{CQ} R_C - I_{EQ} \cdot R_e = V_{CC} - I_{CQ} \cdot (R_e + R_C)$$

$$I_{BQ} = \frac{I_{CQ}}{\beta}$$

③

$$I_{BQ} = \frac{V_{CC} - V_{BEQ}}{500\,k\Omega} = \frac{(12 - 0.6)\,V}{500\,k\Omega} \approx 23\,\mu A$$

$I_{CQ} = \beta \cdot I_{BQ} = 80 \times 23\,\mu A = 1.84\,mA$

$V_{CEQ} = V_{CC} - I_{CQ} \cdot R_C = 4.64\,V.$ $\quad Q\,(23\,\mu A, 1.84\,mA, 4.64\,V)$

④ Due to Base and Emitter junction is reversed, the transistor is working at the cutoff region.