2-4.解：

1. a,b; a,a
2. b
3. a,b
4. a,a,b
5. b.

2-4.解：

A管：NPN.
X-c
Y-b
Z-e.

B管：PNP
X-b
Y-e
Z-c

2-7解

a). 不能.
+Vcc改为-Vcc

b). 不能
将R_B改为一端接基极另一端接Vcc

c). 不能
在基极与Vcc之间接一电阻R_B.

d). 不能
将R_B改为一端接基极，另一端接Vcc

e) 能 正常放大

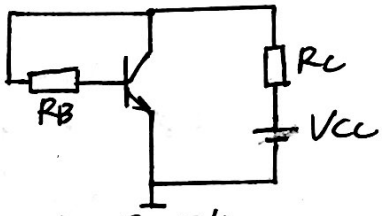
f) 能 正常放大

g) 不能
在集电极与Vcc之间加电阻R_c

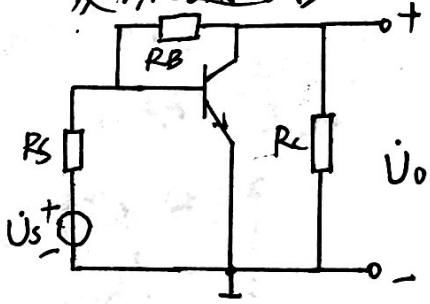
h). 不能
去掉电容C_B

2-8.解：

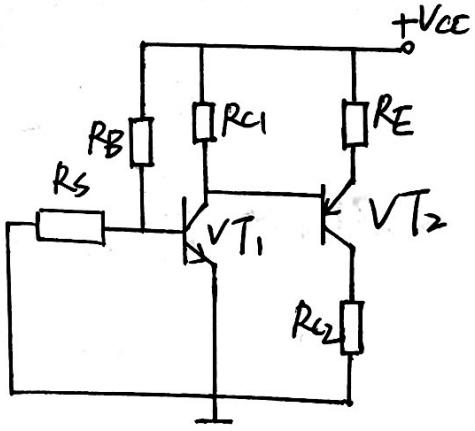
a). 直流通路



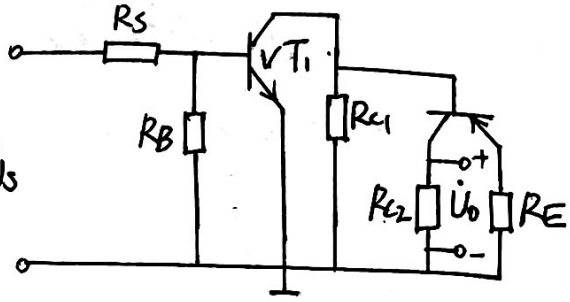
交流通路



b). 直流通路



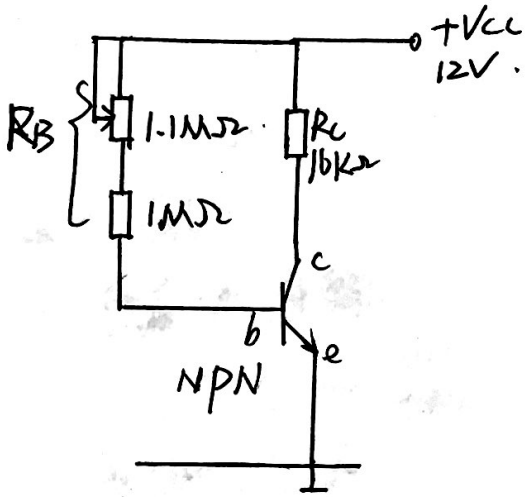
交流通路



联系方式：_____

2-14. 解：

1. 直流通路

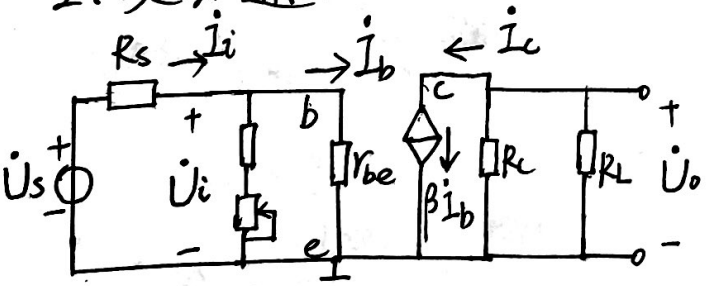


$$I_{BQ} = \frac{I_{CQ}}{\beta} = 0.01\,mA$$

$$\therefore R_B = \frac{V_{CC} - U_{BEQ}}{I_{BQ}}$$

$$= 1.13\,M\Omega$$

2. ~~交流通路~~ 微变等效电路



$$U_o = -I_c(R_c \parallel R_L)$$

$$I_c = \beta I_b$$

$$U_i = I_b \cdot r_{be}$$

$$\therefore A_u = \frac{U_o}{U_i}$$

$$= \frac{-\beta I_b (R_c \parallel R_L)}{I_b \cdot r_{be}}$$

$$= -\frac{\beta (R_c \parallel R_L)}{r_{be}}$$

$$r_{be} = r_{bb'} + r_{b'e}$$

$$= 100 + (1+\beta)\cdot\frac{26mV}{I_{EQ}}$$

由静态工作点分析：

$$I_{EQ} = \frac{1+\beta}{\beta} I_{CQ}$$

$$= (0.01\,mA) \times (1+\beta)$$

$$\therefore r_{be} = 2700\,\Omega$$

$$R_c \parallel R_L = \frac{16}{16+10} \approx 6.15k\Omega$$

$$\therefore A_u \approx -113.9$$

~~$A_{us} = \frac{r_{be}+R_s}{r_{be}} \cdot A_u$~~

输电阻 R_i：

$$R_i = R_B \parallel r_{be}$$

$$\approx 2.7k\Omega$$

$$\therefore A_{us} = \frac{R_i}{R_s + R_i} A_u \approx -83.1$$

3. 由2题

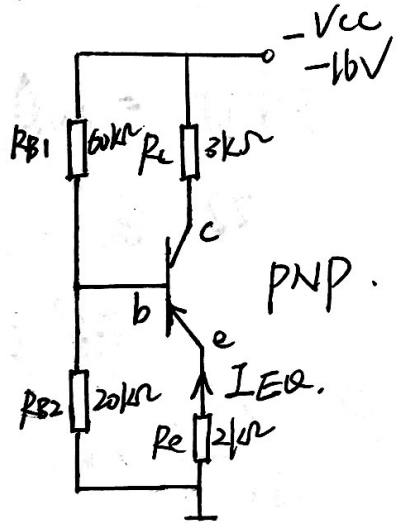
$R_i \approx 2.7k\Omega$

$R_o = R_c$

$= 16k\Omega$

2-15 解：

1. 求直流通路



$U_{BQ} \approx \frac{-V_{CC}}{R_{B1}+R_{B2}} \cdot R_{B2}$

$= -4V.$

$\therefore I_{EQ} \approx \frac{-U_{BQ}+U_{BEQ}}{1.65 \cdot R_e}$

$= 1.65mA.$

$\therefore I_{BQ} = \frac{I_{EQ}}{1+\beta}$

$= 0.027mA$

$\therefore I_{CQ} \approx 1.65mA.$

$\therefore U_{CEQ} = -V_{CC} + I_{CQ}(R_c + R_e)$

$\approx -7V.$

2. $I_{CQ} = \frac{V_{CC}+U_{CEQ}}{R_c+R_e}$

$= 2.4mA$

$\therefore I_{EQ} \approx 2.4mA.$

$U_{BQ} = -I_{EQ} \cdot R_e$

$= -4.8V.$

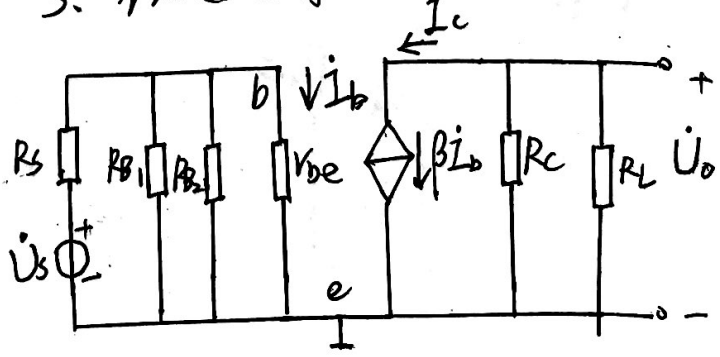
~~$\therefore U_{BQ} = -5.1V.$~~

~~$\therefore R_{B1} \equiv$~~

$U_{BQ} \approx \frac{-V_{CC}}{R_{B1}+R_{B2}} \cdot R_{B2}$

$\therefore R_{B1} \approx 47.8k\Omega$

3. 微变等效电路



联系方式：_____

作 业 纸

课程名称：_____

班级：　　教学班级：　　姓名：　　学号：　　第　页

$U_o = -I_c(R_C // R_L)$

$I_c = \beta I_b$

$r_{be} = r_{bb'} + (1+\beta)\frac{26mV}{I_{EQ}}$

$U_i = I_b \cdot r_{be}$

$R_i = R_{B1} // R_{B2} // r_{be}$

$R_o = R_C // R_L = 3K\Omega$

$\therefore A_{us} = \frac{R_i}{R_s + R_i} \cdot \frac{U_o}{U_i}$

≈ -55

2-16. 解：

1. $A_u = \frac{-\beta(R_C // R_L)}{r_{be}}$

$\approx \frac{(R_C // R_L) \cdot I_{EQ}}{26mV}$

$R_i = R_{B1} // R_{B2} // r_{be}$

$\therefore \beta$ 增大，A_u 基本不变

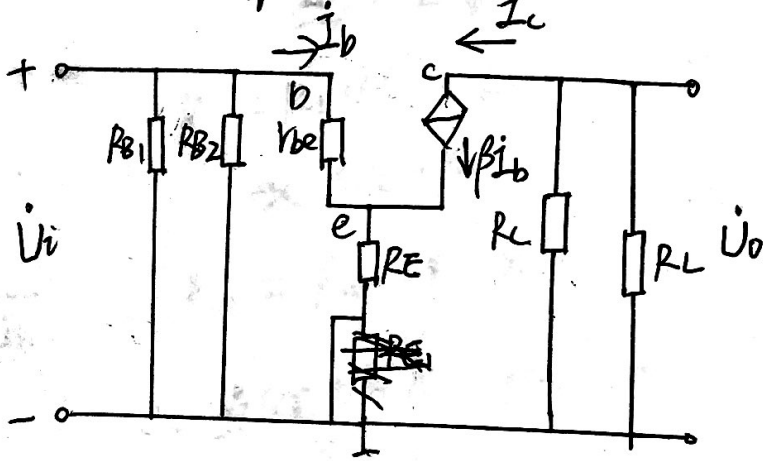
但 R_i 会因 r_{be} 增大而增大

2. 若 R_E 增大，则 I_{EQ} 相应减小

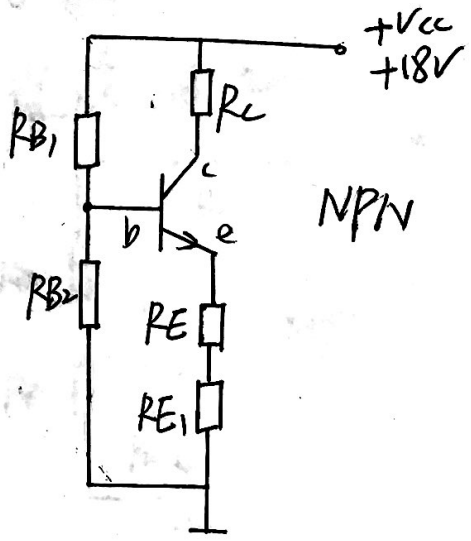
A_u 随之减小且 r_{be} 增大

$\therefore R_i$ 增大

2-17. 解：微变等效电路：



直流通路



联系方式：_____

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

$$= 2.12V$$

① 当 $R_E = 0$

$$I_E = \frac{U_B - U_{BEQ}}{R_E + R_{E1}}$$

$$= 1.42mA$$

$$\therefore r_{be} = r_{bb'} + (1+\beta)\frac{26mV}{I_E}$$

$$\approx 1.95 K\Omega.$$

$$A_u = \frac{U_o}{U_i} = \frac{-\beta I_b (R_C // R_L)}{I_b r_{be} + (1+\beta) R_E \cdot I_b}$$

$$= -\frac{\beta (R_C // R_L)}{r_{be} + (1+\beta) R_E}$$

$$\approx .181$$

$$R_i = R_1 // R_2 // [r_{be} + (1+\beta) R_E]$$

$$\approx 1.59 K\Omega.$$

$$R_o = R_C = 8.2K\Omega$$

② 当 $R_E = 200\Omega$

$$I_E = \frac{U_B - U_{BEQ}}{R_E + R_{E1}}$$

$$\approx 1.18 mA$$

$$\therefore r_{be} = r_{bb'} + (1+\beta)\frac{26mV}{I_E}$$

$$\approx 23.0 K\Omega.$$

$$\therefore A_u = -\frac{\beta (R_C // R_L)}{r_{be} + (1+\beta) R_E}$$

$$\approx -29.5$$

$$R_i = R_1 // R_2 // [r_{be} + (1+\beta) R_E]$$

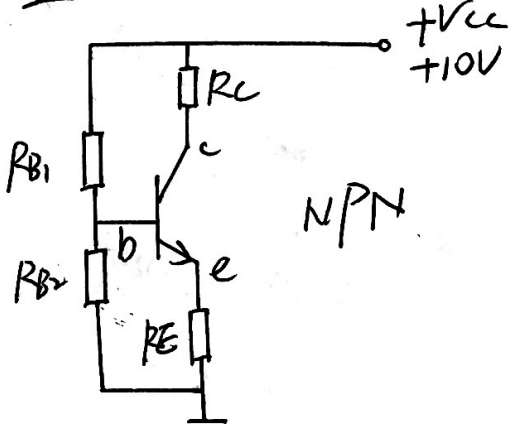
$$\approx 5.2 K\Omega.$$

$$R_o = R_C = 8.2K\Omega$$

∴ 当 R_E 增大, $|A_u|$ 减小, R_i 增大

2-18. 解:

1. 直流通路:



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

$\approx 4.3V$.

$$I_{EQ} = \frac{U_B - U_{BEQ}}{R_E}$$

$= 1.8mA$

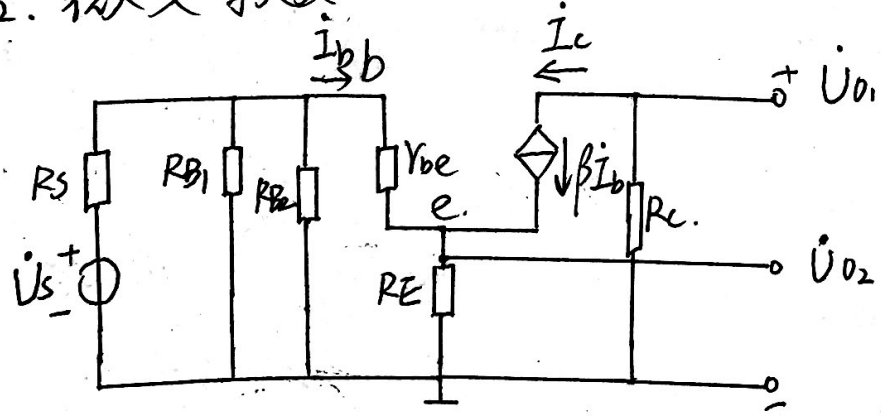
$\approx I_{CQ}$.

$\therefore U_{CEQ}$

$= V_{CC} - I_{CQ}(R_C+R_E)$

$= 2.8V$.

2. 微变等效电路



$$A_{UU1} = \frac{U_{O1}}{U_i} = \frac{-I_c R_c}{I_b \cdot r_{be} + (1+\beta) I_b \cdot R_E}$$

$$r_{be} = r_{bb'} + (1+\beta)\frac{26mV}{I_{EQ}}$$

$\approx 1.18K\Omega$

$$\therefore A_{UU2} = \frac{-\beta R_c}{r_{be} + (1+\beta) R_E}$$

≈ -0.97.

$$A_{UU2} = \frac{U_O}{U_i}$$

$$= \frac{(1+\beta) R_E I_b}{I_b r_{be} + (1+\beta) I_b R_E}$$

$$= \frac{(1+\beta) R_E}{r_{be} + (1+\beta) R_E}$$

$= 0.99$.

$$R_i = \frac{U_i}{I_i}$$

$= R_{B1} // R_{B2} // [r_{be} + (1+\beta) R_E]$

$= 8.2K\Omega$.

$$\therefore A_{U1} = \frac{R_i}{R_i + R_S} A_{UU1}$$

≈ -0.779.

$$A_{U2} = \frac{R_i}{R_i + R_S} A_{UU2}$$

≈ 0.78.

联系方式:_____

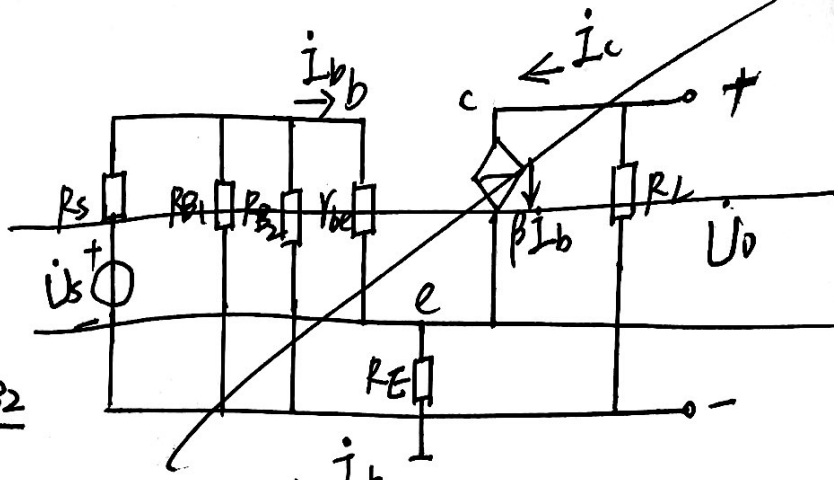
3. 由2题:

$R_i = 8.2K\Omega$.

$R_{O1} = R_c = 2K\Omega$.

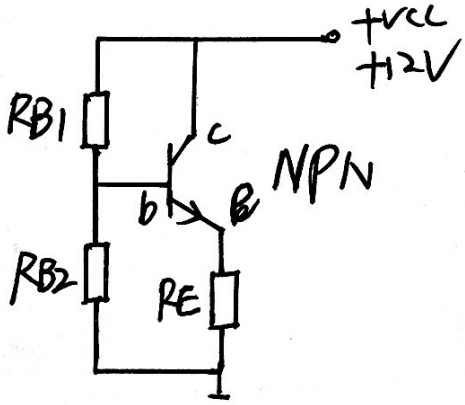
$R_{O2} = R_E // \frac{r_{be} + R_S // R_{B1} // R_{B2}}{1+\beta}$

$\approx 33\Omega$



2-19. 解:

1. 求直流通路



$U_B \approx \frac{R_{B2}}{R_{B1}+R_{B2}} \cdot V_{cc}$

$= 4.9V$.

$I_{EQ} = \frac{U_B - U_{BEQ}}{R_E}$

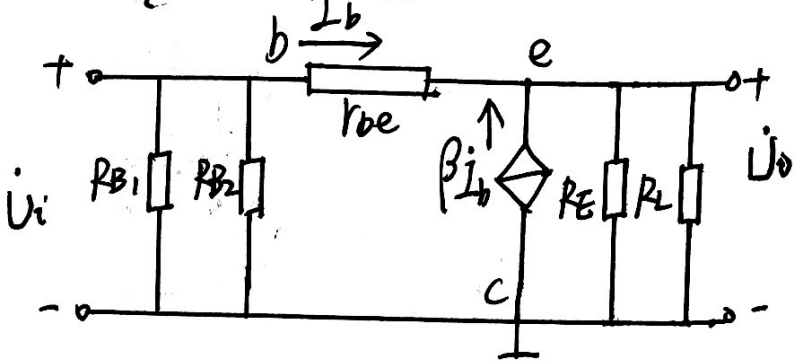
$\approx 2.1mA$

$\approx I_{CQ}$.

$U_{EQ} = V_{cc} - I_{CQ}R_E$

$= 7.8V$.

2. 动态等效电路



$r_{be} = r_{bb'} + (1+\beta)\frac{26mV}{I_{EQ}}$

$= 1.35K\Omega$

$A_u = \frac{\dot{U}_o}{\dot{U}_i} = \frac{I_E(R_E // R_L)}{I_b r_{be} + I_E(R_E // R_L)}$

$= \frac{(1+\beta)(R_E // R_L)}{r_{be} + (1+\beta)(R_E // R_L)}$

≈ 0.99

$R_i = R_{B1} // R_{B2} // [r_{be} + (R_E // R_L)(1+\beta)]$

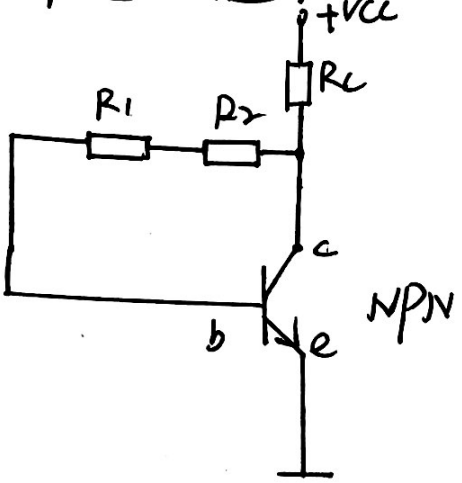
$\approx 21.4K\Omega$.

$R_o = R_E // \frac{r_{be} + R_{B1} // R_{B2} // R_S}{1+\beta}$

$\approx 23\Omega$.

2-24. 解：

1. 求直流通路



$$I_B = \frac{U_{CEQ} - U_{BEQ}}{R_1 + R_2}$$

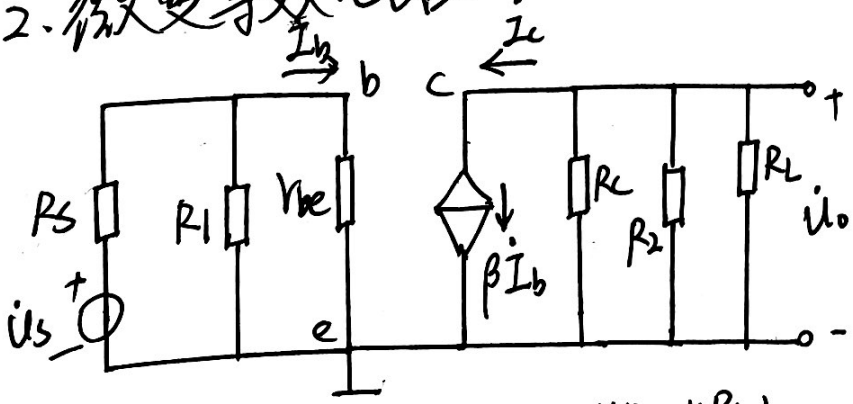
$R_1 = R_2$

$I_C = \beta I_B$

$\therefore$ $U_{CEQ} = V_{CC} - R_C I_C$

$\therefore$ $R_1 = R_2 \approx 62K\Omega$

2. 微变等效电路



$$A_{uu} = \frac{\dot{U}_o}{\dot{U}_i} = \frac{-I_c (R_C // R_2 // R_L)}{I_b \cdot r_{be}}$$

$I_C = \beta I_b$

$r_{be} = r_{bb'} + (1+\beta)\frac{26mV}{I_{EQ}}$

$I_{EQ} \approx I_{CQ} = 1.33mA$

$\therefore r_{be} = 1.3K\Omega$.

$A_{uu} = \frac{-\beta (R_C // R_2 // R_L)}{r_{be}}$

≈ -148

$R_i = r_{be} // R_1$

$\approx 1.3K\Omega$

$R_o = R_2 // R_C$

~~$\approx 7.3K\Omega$~~.

$\approx 7.24K\Omega$.

$A_{US} = \frac{R_i}{R_i + R_S} \cdot A_{uu}$

≈ -83.

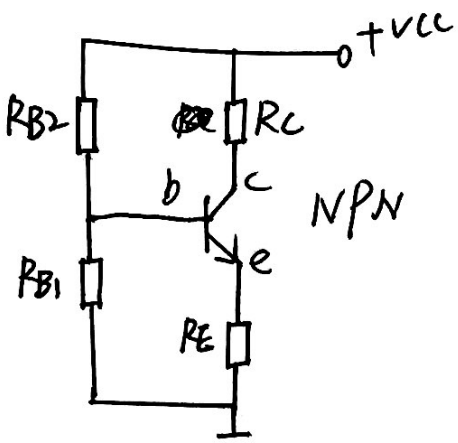
3、由2题.

$R_i \approx 1.3K\Omega$

$R_o \approx 7.24K\Omega$.

2-25、解：

1、直流通路



$$U_B \approx \frac{R_{B1} V_{cc}}{R_{B1}+R_{B2}} = 3.5V$$

$$I_E = \frac{U_B - U_{BEQ}}{R_E}$$

$$\approx I_{CQ} = 1mA$$

$$\therefore R_E = 2.8K\Omega$$

$$U_{CEQ} = V_{CC} - I_{CQ}(R_c + R_E)$$

$$= 4V$$

$$\therefore R_C = 5.2K\Omega$$

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

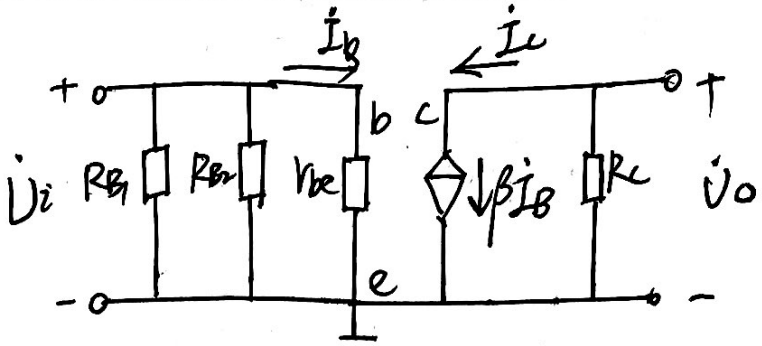
$$= 10\mu A$$

$$I_B(R_{B1}+R_{B2}) \approx V_{CC}$$

$$\therefore R_{B1} = 35K\Omega$$

$$R_{B2} = 85K\Omega$$

2、微变等效电路



$$A_u = \frac{\dot{U}_o}{\dot{U}_i} = \frac{-I_c R_c}{I_b \cdot r_{be}}$$

$$= -\frac{\beta I_b R_c}{I_b r_{be}} = -\frac{\beta R_c}{r_{be}}$$

$$r_{be} = r_{bb'} + \varnothing(1+\beta)\frac{26mV}{I_{EQ}}$$

$$\approx 2.7K\Omega$$

$$\therefore A_u \approx -193$$

$$R_i = R_{B1} // R_{B2} // r_{be}$$

$$\approx 2.4K\Omega$$

$$R_o = R_c = 5.2K\Omega.$$