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2-4 A: $U_X=12V$, $U_Y=11.7V$, $U_Z=6V$.

$U_X-U_Y=0.3V$ $U_X>U_Y>U_Z$

∴ X→e Y→b Z→c.

是 PNP 型

B: $U_X=-5.2V$ $U_Y=-1V$ $U_Z=-5.5V$

$U_X-U_Z=0.3V$ $U_Y>U_X>U_Z$

∴ X→b Y→c Z→e

是 NPN 型

2-7. a) 不能. 因为 VT 是 PNP 型, 由题: $U_C>U_B>U_E$ 不满足发射结正偏. 集电结反偏的条件. 应该令 V_{CC} 为负.

b) 不能. b 点对地 =0. 应使 R_B 接 b 极和 V_{CC}.

c) 不能. b 直接接 V_{CC}. 电压比 C 极大, 集电结不能反偏. 在 b 和 V_{CC} 间接接电阻.

d). 不能. b 极没有直接直流电源. 令 R_B 接 V_{CC} 和 b 极

e). 能 VT 是 NPN 型. 并在放大区工作

f) 能, 理由同上

g) 不能. C 极直接接 V_{CC}, 在 C 极和 V_{CC} 间接一电阻

h) 不能. 输入交流信号时被短路. 应去掉电容 C_B

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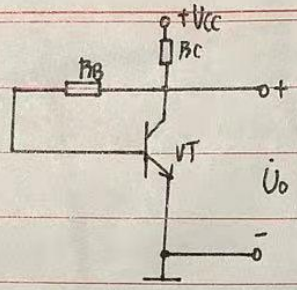
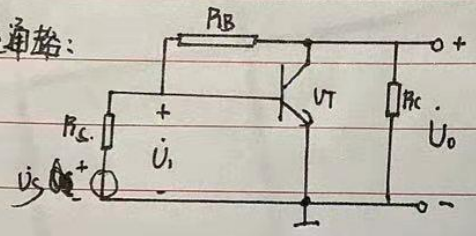
2-8

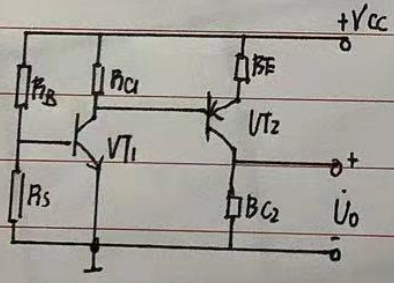
a) 直流通路



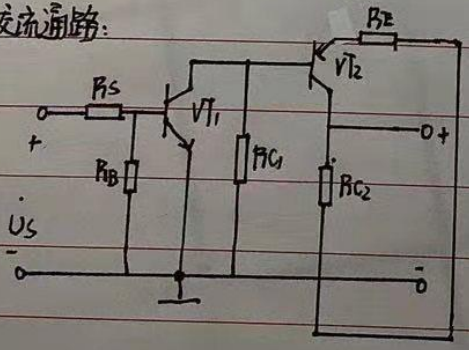
交流通路：



b) 直流通路



交流通路：



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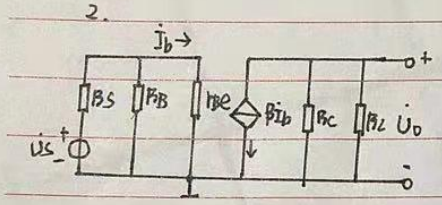
2-14. 1. $I_{BQ}=\frac{I_{CQ}}{\beta}=10\mu A$ $R_B=(V_{CC}-U_{BEQ})/I_{BQ}=1.13M\Omega$.

2.



$\dot{U}_o=-\beta\dot{I}_b(R_C/\!/R_L)$

$\dot{U}_i=\dot{I}_b r_{be}$ $r_{be}=r_{bb'}+(1+\beta)\frac{26mV}{I_{EQ}}$

$I_{EQ}=I_{CQ}+I_{BQ}\approx 0.5mA$

$A_u=\dot{U}_o/\dot{U}_i=-(R_C/\!/R_L)\beta/r_{bb'}+(1+\beta)\frac{26}{0.5}=-\frac{1}{2}$

$R_i=R_B/\!/r_{be}\approx 27/2\ k\Omega$

$A_{us}=\dot{U}_o/\dot{U}_s=\dot{U}_o/\frac{R_i+R_S}{R_i}\dot{U}_i=\frac{R_i}{R_i+R_S}A_u=-8.2$

3. $R_i=R_B/\!/r_{be}\approx 2.7k\Omega$ $R_o=R_C=16k\Omega$

2-15 1. $I_{BQ}=I_{B1}-I_{B2}=0$

$U_B=R_{B2}\cdot V_{CC}/(R_{B1}+R_{B2})=-4V$

$I_{CQ}\approx I_{EQ}=(U_B-U_{BE})/R_E\approx U_B/R_E=-2mA$

$U_{CEQ}\approx V_{CC}-I_{CQ}(R_C+R_E)=-16V+10V=-6V$

2. $U_{CEQ}=V_{CC}-I_{CQ}(R_C+R_E)=-4V$

$I_{CQ}=(V_{CC}-U_{CEQ})/(R_C+R_E)=-2.4mA$.

$U_{B2}=U_B=I_{CQ}R_E=-4.8V$

$I_{B1}\approx I_{B2}=U_{B2}/R_{B2}=-0.24mA$

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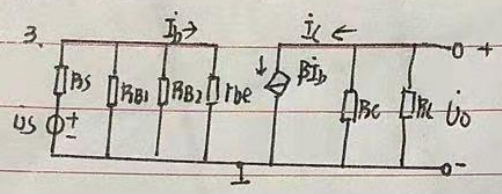
$U_{B1} \approx V_{CC} - U_{B2} = -11.2V$

$R_{B1} = U_{B1} / I_{B1} \approx 4k\Omega$

3.



$r_{be} = r_{bb}' + (1+\beta)\frac{26mV}{I_{EQ}} \approx 1.3k\Omega$

$R_i = R_{B1} // R_{B2} // r_{be} \approx 1.2k\Omega$

$A_{US} = \dot{U}_o/\dot{U}_S = \frac{R_i}{R_i+R_S}\frac{\dot{U}_o}{\dot{U}_i} = \frac{R_i}{R_i+R_S}\cdot\frac{\beta(R_C//R_L)}{r_{be}} = -57$

$R_o = R_C = 3k\Omega$

2-17 $R_E = 0$ 时

$U_B = (R_{B2}\cdot V_{CC})/(R_{B1}+R_{B1}) = 2.12V$

$I_{EQ} = (U_B - U_{BEQ})/(R_E + R_{E1}) = 1.42mA$

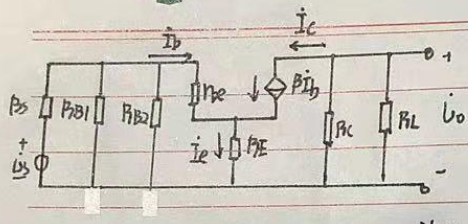
图同上题3.

$r_{be} = r_{bb}' + (1+\beta)\frac{26mV}{I_{EQ}} = 1.87k\Omega$ $A_u = \frac{\dot{U}_o}{\dot{U}_i} = \frac{-\beta(R_C//R_L)}{r_{be}} = -180.$

$R_i = R_{B1} // R_{B2} // r_{be} \approx 1.6k\Omega$

$R_o = R_C = 8.2k\Omega$

$R_E = 200\Omega$ 时. $I_{EQ} = \frac{U_B - U_{BEQ}}{R_E + R_{E1}} = 1.18mA$



$$r_{be} = r_{bb'} + (1+\beta)\frac{26mV}{I_{EQ}} = 2.33k\Omega$$

$$A_u = \frac{\dot{U}_o}{\dot{U}_i} = \frac{-\beta(R_C /\!/ R_L)}{r_{be}+(1+\beta)R_E} = -15.7$$

$$R_o = R_C = 8.2k\Omega$$

$$R_i = R_{B1} /\!/ R_{B2} /\!/ [r_{be} + (1+\beta)R_E] = 6.3k\Omega$$

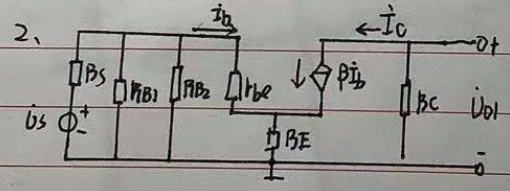
∴ $R_E = 0 \rightarrow R_E = 200$ 时，$|A_u|$ 下降，R_i 增大。

2-解. 1. $U_B \approx \frac{R_{B2}V_{CC}}{R_{B1}+R_{B2}} = 4.3V$

$$I_{CQ} \approx I_{EQ} = (U_B - 0.7)/R_E = 1.8mA$$

$$U_{CEQ} \approx V_{CC} - I_{CQ}(R_C + R_E) = 2.8V.$$

2、



$$r_{be} = r_{bb'} + (1+\beta)\frac{26mV}{I_{EQ}} = 1.2k\Omega$$

$$R_i = \dot{U}_i/\dot{I}_i = R_{B1} /\!/ R_{B2} /\!/ [r_{be} + (1+\beta)R_E] = 8.2k\Omega$$

$$A_{u1} = \frac{\dot{U}_{o1}}{\dot{U}_S} = \frac{R_i}{R_i+R_S} \cdot \frac{-\beta R_C}{r_{be}+(1+\beta)R_E} = -0.783.$$

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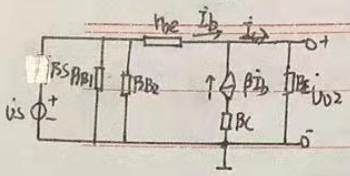


$$A_{u2}=\frac{\dot{U}_{o2}}{\dot{U}_s}=\frac{R_i}{R_i+R_S}\cdot\frac{(1+\beta)R_E}{r_{be}+(1+\beta)R_E}=0.796$$

3. $R_i=R_{B1}//R_{B2}//[r_{be}+(1+\beta)R_E]=8.2k\Omega$

$R_{o1}=R_C=2k\Omega$

$R_{o2}=R_E//\dfrac{r_{be}+R_S//R_{B1}//R_{B2}}{1+\beta}$

$=45\Omega$

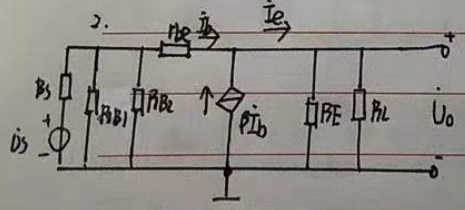
2-19 1. $U_B=\dfrac{U_{B2}\cdot V_{CC}}{R_{B1}+R_{B2}}=5V$

$I_{EQ}=\dfrac{U_B-0.7}{R_E}=2.15mA$

$I_{CQ}=\dfrac{\beta}{1+\beta}I_{EQ}=2.1mA$

$U_{CEQ}=V_{CC}-I_{EQ}\cdot R_E=7.7V$

2.



$r_{be}=r_{bb'}+(1+\beta)\dfrac{26mV}{I_{EQ}}=1.32k\Omega$.

$A_u=\dfrac{\dot{U}_o}{\dot{U}_i}=\dfrac{(1+\beta)(R_E//R_L)}{r_{be}+(1+\beta)(R_E//R_L)}=0.987$

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

$=21.8k\Omega$

$R_o=R_E//\dfrac{r_{be}+R_S//R_{B1}//R_{B2}}{1+\beta}=22.4\Omega$

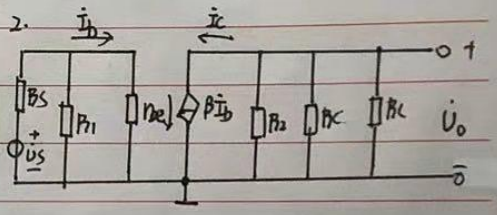
2-24. 1. $I_{BC}=\dfrac{V_{CC}-U_{CEQ}}{R_C}=I_{EQ}$

$=(1+\beta)I_{BQ}$

$I_{BQ}=\dfrac{V_{CC}-U_{CEQ}}{(1+\beta)R_C}=0.026mA$

$R_{i1}=R_{i2}=\dfrac{U_{CEQ}-U_{BEQ}}{I_{BQ}}\cdot\dfrac{1}{2}=63k\Omega$.

2.



$r_{be}=r_{bb'}+(1+\beta)\dfrac{26mV}{I_{EQ}}=1.3k\Omega$

$A_u=\dot{U}_o/\dot{U}_i$

$=\dfrac{-\beta\dot{I}_b(R_2//R_C//R_L)}{\dot{I}_b r_{be}}=-149$

$R_i=R_1//r_{be}\approx 1.3k\Omega$

$A_{us}=\dfrac{\dot{U}_o}{\dot{U}_s}=\dfrac{R_i}{R_i+R_S}A_u=-83$

3. $R_i=R_1//r_{be}\approx 1.3k\Omega$

$R_o=R_2//R_C\approx 7.3k\Omega$

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2-25 1. $I_{BQ} = \frac{I_{CQ}}{\beta} = 0.01\,mA$

$I_{EQ} = I_{BQ} + I_{CQ} \approx 1mA$

$U_{BQ} \approx 5U_{BEQ} = 3.5V$

$R_E = \frac{U_{BQ} - U_{BEQ}}{I_{EQ}} = 2.8k\Omega$

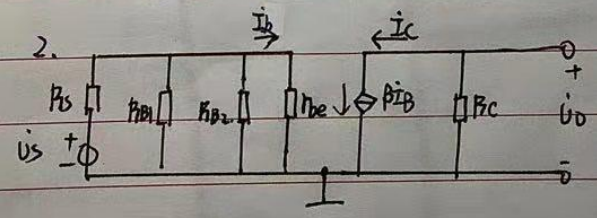
$R_C = \frac{V_{CC} - U_{CEQ} - (U_{BQ} - U_{BEQ})}{I_{CQ}} = 5.2k\Omega$

$I_1 = 10, I_{BQ} = 0.1mA \gg I_{BQ}$

$\begin{cases} R_{B1} + R_{B2} \approx \frac{V_{CC}}{I_1} = 120k\Omega \\ \frac{R_{B1}V_{CC}}{R_{B1}+R_{B2}} = 3.5V \end{cases}$

$\therefore R_{B1} \approx 35k\Omega \quad R_{B2} \approx 85k\Omega$

2.



$A_u = \frac{\dot{U}_O}{\dot{U}_i} = \frac{-\dot{I}_c R_C}{\dot{I}_b r_{be}} = \frac{-\beta R_C}{r_{be}} = -182$

$R_i = R_{B1} // R_{B2} // r_{be} = 2.4k\Omega$

$R_o = R_C = 5.2k\Omega$