2-1. ① a、b、a、a

② b

③ a、b

④ a、a、b

⑤ b

2-4 A: $U_X - U_Y = 0.3$ 则Z为C极

∵ C电压小 ∴ 为PNP型

且X为e极 Y为b极

B: $U_Y - U_Z = 0.3V$ ∴ Y为C极

∴ 为NPN型

且 X为b极 Z为e极

2-7 a) PNP 极不满足发射正偏集电极反偏. Vcc应接负电压

b) b极电压为0 应将 R_B 接至 Vcc

c) b极与Vcc相连 集电极正偏. 应在Vcc与b极间加一电阻

d) b极无电流. 应将 R_B 接至Vcc

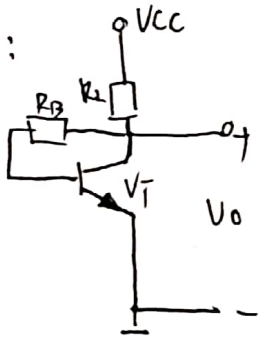
e) 可以正常放大

f) 可以正常放大

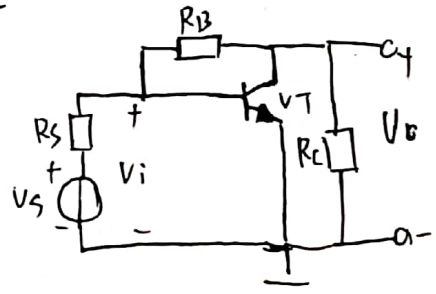
g) 信号不能取出. 应将Vcc与C_2间加一电阻

h) 交流通路中输入信号被短路 应将 C_B 去掉

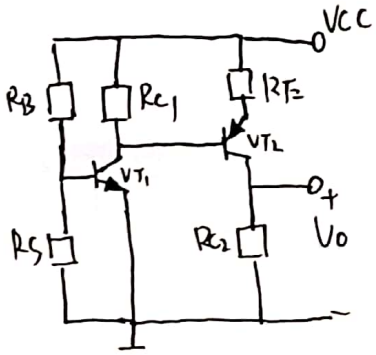
2-8 a) 直流:



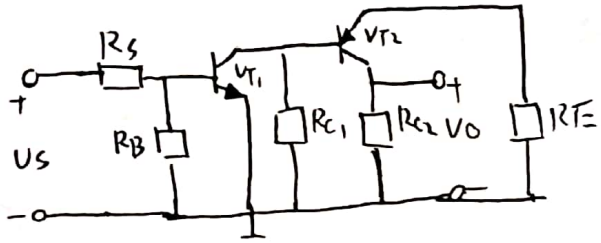
交流



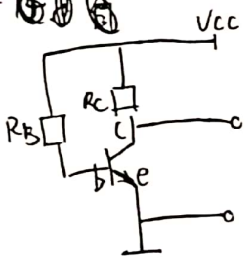
b) 直流

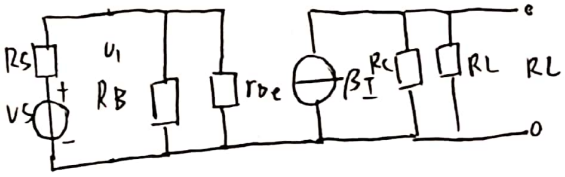


c) 交流



2-14





(1) $I_{BQ} = \frac{I_{CQ}}{\beta} = 10\mu A$

$R_B = \frac{V_{CC} - V_{BEQ}}{I_{BQ}} = 1.13M\Omega$

(2) $\dot{V}_i = I_b r_{be}$ $\quad r_{be} = 300 + (1+50)\frac{26}{0.5} = 2952\Omega$

$V_o = -\frac{R_C R_L}{R_C + R_L}\beta I_b$

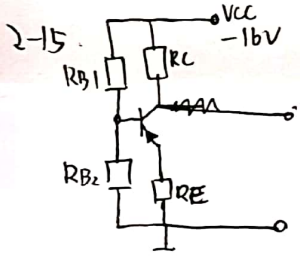
$A_V = \frac{V_o}{V_I} = \frac{-\beta \frac{R_C R_L}{R_C + R_L}}{r_{bb'} + (1+\beta)\frac{26}{0.5}} = -112$

$A_{VS} = \frac{V_o}{V_S} = \frac{V_o}{V_i}\frac{V_i}{V_S} = \frac{R_B // r_{be}}{R_B + R_S} \cdot A_V = -83$

(3) $R_i = \frac{R_B r_{be}}{R_B + r_{be}} = 27k\Omega$ $\quad R_B // r_{be}$

$R_o = R_C = 16k\Omega$

2-15.



(1) $V_B \approx \frac{R_{B2}}{R_{B1} + R_{B2}} \cdot V_{CC} = -4V$

$I_{CQ} \approx I_{EQ} \approx \frac{U_B}{R_E} = \frac{-4V}{2k\Omega} = -2mA$

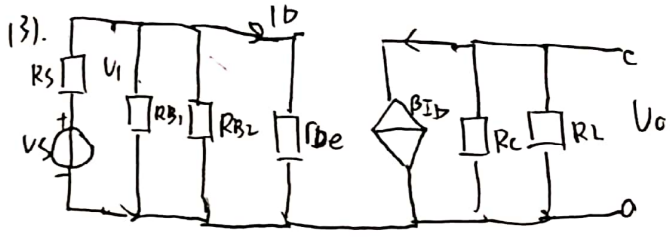
$I_{BQ} \approx \frac{I_{CQ}}{\beta} = -33.3\mu A$

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

$I_{CQ} = -2.4mA$ $\quad \therefore V_B \approx -4.8V$

$\therefore R_{B1} = \frac{R_{B2} V_{CC}}{V_B} - R_{B2} = 46.7k\Omega$

(3).



$r_{be} = (1+\beta)\frac{26}{2} = 793\Omega$

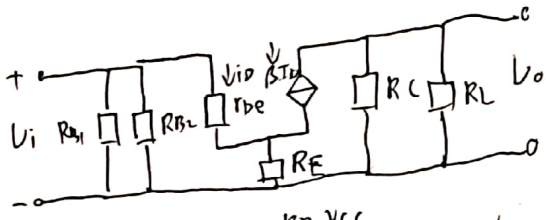
$A_V = \frac{V_o}{V_i} = \frac{-\beta R_L'}{r_{be}} = \frac{-60 \times 2}{0.793} = -151$

$A_{VS} = \frac{V_i}{V_S} A_V = -60.5$

$R_i = \frac{V_i}{I_i} = R_{B1} // R_{B2} // r_{be} = 753\Omega$

$R_o = R_C = 3k\Omega$

2-17



$R_E=0$ 时 $V_B=\frac{R_{B2}V_{CC}}{R_{B1}+R_{B2}}=2.12V$

$I_{EQ}=\frac{V_B-0.7}{R_E+R_{E1}}=1.42mA$

$r_{BE}=r_{bb'}+(1+\beta)\frac{26}{1.42}=1.217k\Omega$

$R_L'=\frac{8.2\times 6.2}{8.2+6.2}=3.53k\Omega$

$A_V=\frac{-\beta R_L'}{r_{be}+(1+\beta)R_E}=-174$

$R_i=\frac{V_i}{I_i}=R_{B1}\|R_{B2}\|r_{be}=1.63k\Omega$

$R_o=R_C=8.2k\Omega$

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

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

$R_o\approx R_C$

$\beta=200$

$V_B=2.12V$ $I_E=1.1mA$

$r_{BE}=1.4441k\Omega$

$R_L'=3.53k\Omega$

$A_V=-155$

$R_i=R_{B1}\|R_{B2}\|(r_{be}+(1+\beta)R_E)=5.4k\Omega$

$R_o=R_C=8.2k\Omega$

引入 R_E 会使 A_V 下降，R_i 上升

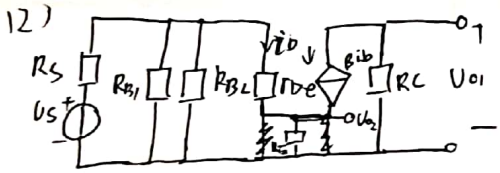
2-18

1) $V_B=\frac{15}{35}\cdot V_{CC}=4.29V$

$I_{EQ}=\frac{V_B-0.7}{R_E}=1.795mA\simeq I_{CQ}$

$V_{CEQ}=V_{CC}-I_{CQ}(R_C+R_E)=1.025V$

2)



$r_{be}=r_{bb'}+(1+\beta)\frac{26}{1.795}=1.184k\Omega$

$A_{V1}=\frac{-\beta R_C}{r_{be}+(1+\beta)R_E}=-0.974$

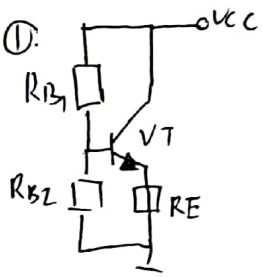
$A_{V2}=\frac{(1+\beta)R_E}{r_{be}+(1+\beta)R_E}=0.99$

3) $R_i=R_{B1}\|R_{B2}\|r_{be}+(1+\beta)R_E=8.01k\Omega$

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

$R_{o2}=R_E=2k\Omega$

2-19 ①



$V_B=\frac{R_{B2}}{R_{B1}+R_{B2}}V_{CC}\simeq 5V$

$I_{EQ}=\frac{V_B-0.7}{R_E}=2.15mA$

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

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

②

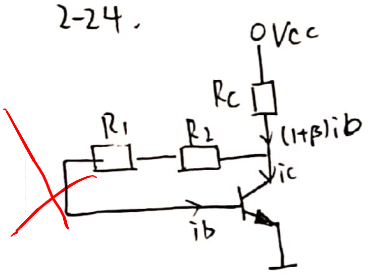
$r_{be}=r_{bb'}+(1+\beta)\frac{26}{2.1}=1.35k\Omega$

$A_V=\frac{(1+\beta)R_L'}{r_{be}+(1+\beta)R_L'}=0.987$

$R_i=R_{B1}\|R_{B2}\|[r_{be}+(1+\beta)R_L']=21.8k\Omega$

$R_o=R_E\|\frac{r_{be}+R_{B1}\|R_{B2}\|R_S}{1+\beta}=23\Omega$

2-24.

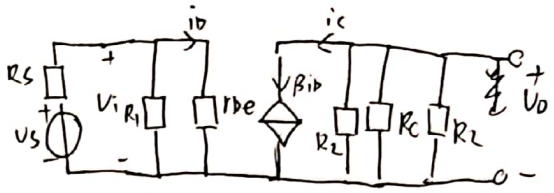


1. $(1+\beta)ib = \frac{Vcc-UCE}{Rc} = 0.976mA$

$\therefore ib = 0.019mA = \frac{VCEQ-VBEQ}{2R_1}$

$\therefore R_1 = R_2 = 86.8k\Omega$

微变等效



(2) $I_{EQ} = \beta I_b = 0.969mA$

$r_{be} = 300 + (1+\beta)\frac{26}{I_{EQ}} = 1.668k\Omega$

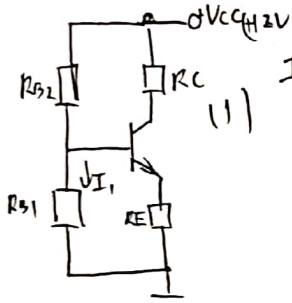
$A_U = \frac{-R_c\beta R_L'}{r_{be}} = -117$

$A_{US} = \frac{U_o}{U_S} = \frac{U_o}{U_i}\frac{U_i}{U_S} = A_U\frac{r_{be}\|R_1}{r_{be}\|R_1+R_S} = -72.63$

(3) $R_i = r_{be}\|R_1 = 1.637k\Omega$

$R_o = R_c\|R_2 = 7.49k\Omega$

2-25



(1) $I_{CQ} \approx \frac{Vcc-UCEQ}{Rc+RE}$ ①

$I_{BQ} = 0.01mA$ $I_{EQ} \approx 1mA$

$I_1 \approx 0.1mA$ $U_{BQ} \approx 3.5V$

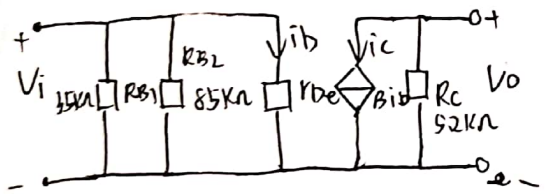
$\therefore R_{B2} = \frac{Vcc-UBQ}{I_{B2}} = \frac{8.5}{0.1mA} = 85k\Omega$

$R_{B1} = \frac{UB}{I_1} = \frac{3.5}{0.1} = 35k\Omega$

$V_E = U_B - U_{BEQ} = 2.8V$ $R_E = \frac{U_E}{I_{EQ}} = 2.8k\Omega$

$\therefore$ 由① $R_c = 5.2k\Omega$

(2) 微变



$A_U = \frac{-\beta R_c}{r_{be}} = -193$

$R_i = R_{B1}\|R_{B2}\|r_{be} = 2.43k\Omega$

$R_o = R_c = 5.2k\Omega$