3.1.(a) T_1：共射，T_2：共基

(b) T_1：共射，T_2：共射

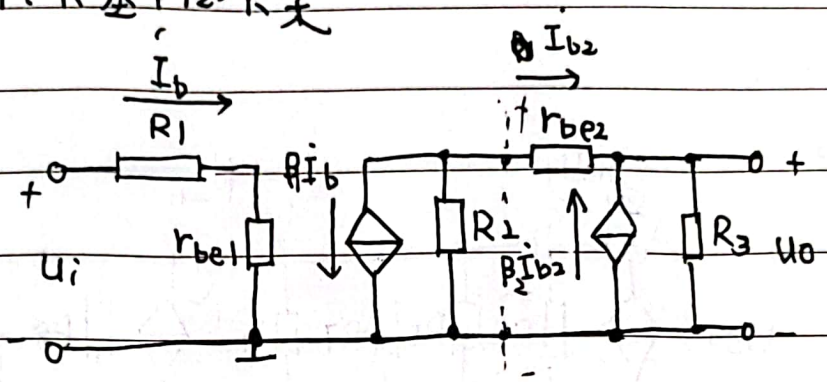
(c) T_1：共集，T_2：共射

(d) T_1：共集，T_2：共基

(e) T_1：共源，T_2：共集

(f) T_1：共基，T_2：共集

3.2.(a)

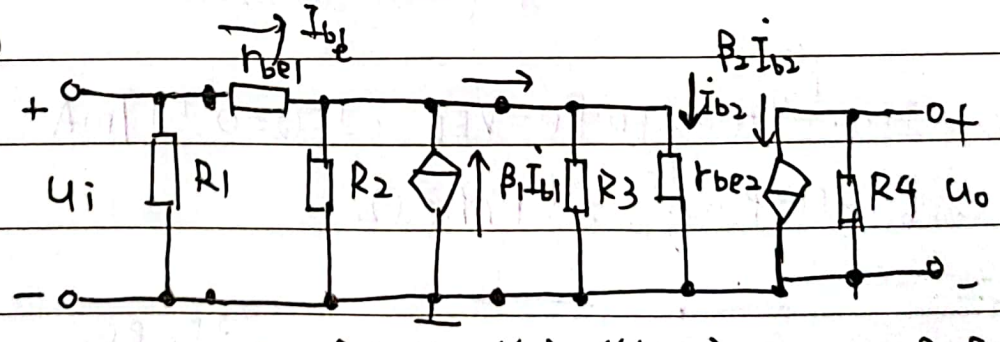


$$\dot{A}_u = -\frac{\beta_1(R_2 // r_{be2} + (1+\beta_2)R_3)}{R_1 + r_{be1}} \cdot \frac{(1+\beta_2)R_3}{r_{be2} + (1+\beta_2)R_3}$$

$$R_i = R_1 + r_{be1}$$

$$R_o = R_3 // \frac{r_{be2} + R_2}{1+\beta_2}$$

(b)

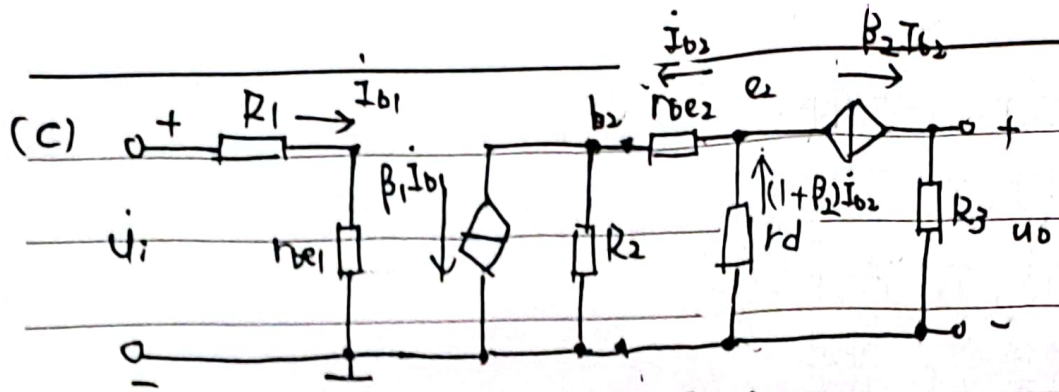


$$\dot{A}_u = \frac{(1+\beta_1)(R_2 // R_3 // r_{be2})}{r_{be1} + (1+\beta_1)(R_2 // R_3 // r_{be2})} \cdot \frac{\beta_2 R_4}{r_{be2}}$$

$$R_i = R_1 // (r_{be1} + (1+\beta_1)R_2 // R_3 // r_{be2})$$

$$R_o = R_4$$

(c)

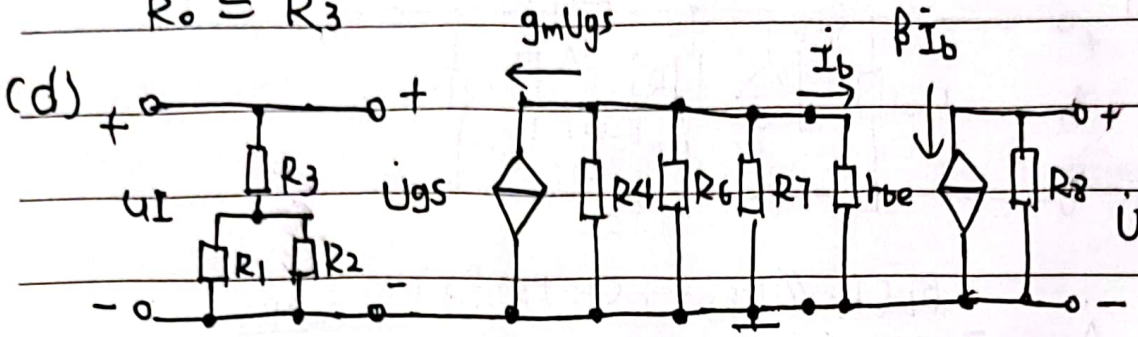


$$\dot{A}_u = -\frac{\beta_1(R_2 /\!/ r_{be2} + (1+\beta)r_d)}{R_1 + r_{be1}} \cdot \frac{\beta_2 R_3}{r_{be2} + (1+\beta_2)r_d}$$

$$R_i = R_1 + r_{be1}$$

$$R_o = R_3$$

(d)



$$\dot{A}_u = -g_m(R_4 /\!/ R_6 /\!/ R_7 /\!/ r_{be}) \cdot \left(-\frac{\beta R_8}{r_{be}}\right)$$

$$R_i = R_3 + R_1 /\!/ R_2$$

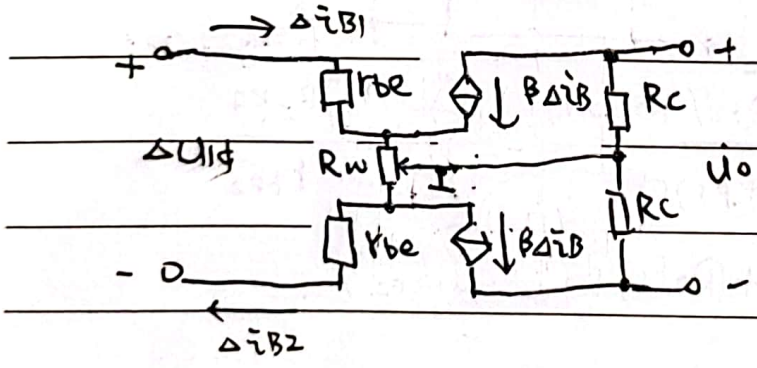
$$R_o = R_8$$

5.3

$0.7 + 50I_{EQ} + 10.2\text{k}\Omega \times$

3.5. $U_{BEQ} + I_{EQ}\cdot\frac{R_W}{2} + 2I_{EQ}\cdot R_e = V_{EE}$, $I_{EQ} = 0.517\,\text{mA}$

$$r_{be} = r_{bb'} + (1+\beta)\frac{U_T}{I_{EQ}} = 5179.3\,\Omega$$

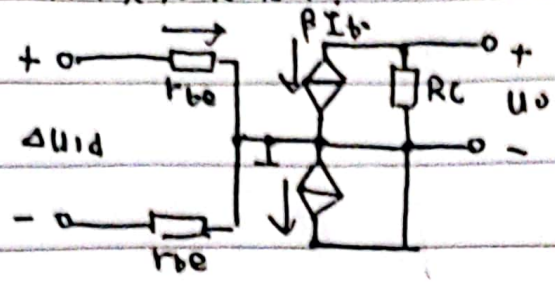


$$A_{cl} = -\frac{\beta R_C}{r_{be} + (1+\beta)\cdot\frac{R_W}{2}} = -97.76$$

$$R_i = 2r_{be} + (1+\beta)R_W = 20.46\,\text{k}\Omega$$

3.6. $u_{ic}=15mV$，$u_{id}=10mV$

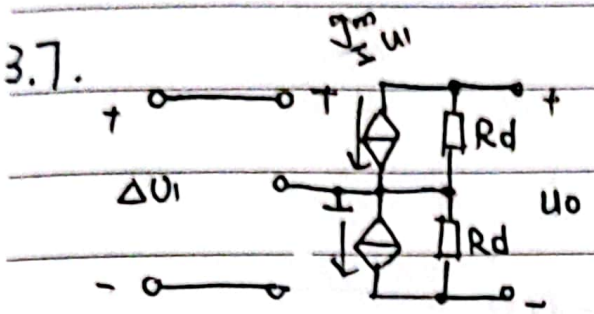
共模无负载



$$A_u = -\frac{\beta R_c}{2r_{be}} = \frac{u_o}{u_{id}}$$

$u_o = -1750mV$

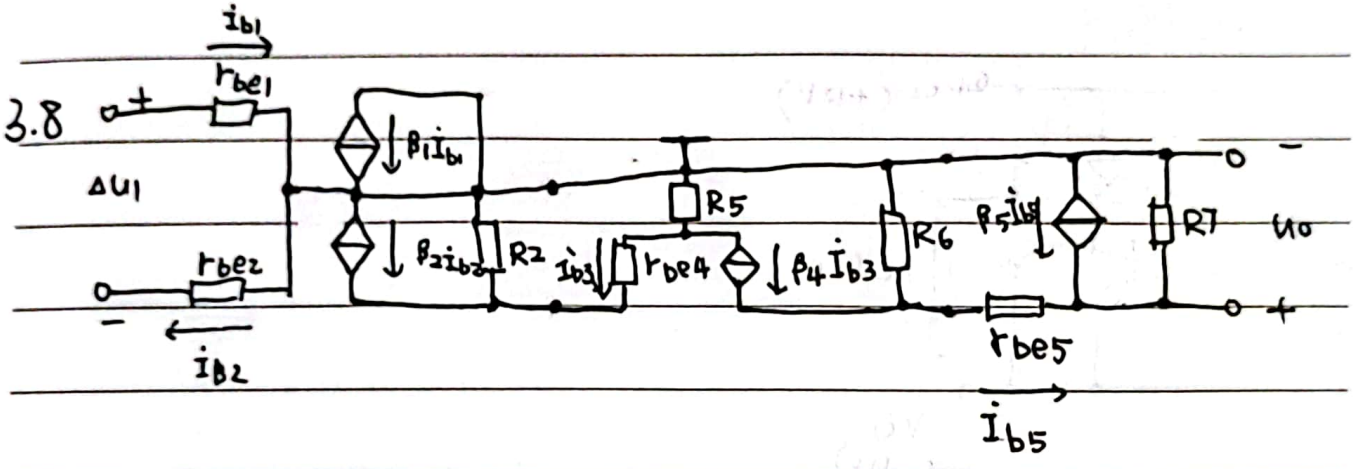
3.7.



$$\dot{A}_u = -\frac{g_m}{2}\cdot 2R_d = -g_m R_d = -200$$

$R_i = \infty$

3.8



$$A_{u1} = -\frac{\beta_2(R_2 // r_{be4} + (1+\beta_4)R_5)}{r_{be1}+r_{be2}}$$

$R_i = r_{be1}+r_{be2}$

$R_o = R_7 // \frac{R_6 + r_{be5}}{1+\beta_5}$

$$A_{u2} = -\frac{\beta_4(R_6 // r_{be5} + (1+\beta_5)R_7)}{r_{be4}+(1+\beta_4)R_5}$$

$$A_{u3} = \frac{(1+\beta_5)R_7}{r_{be5}+(1+\beta_5)R_7}$$

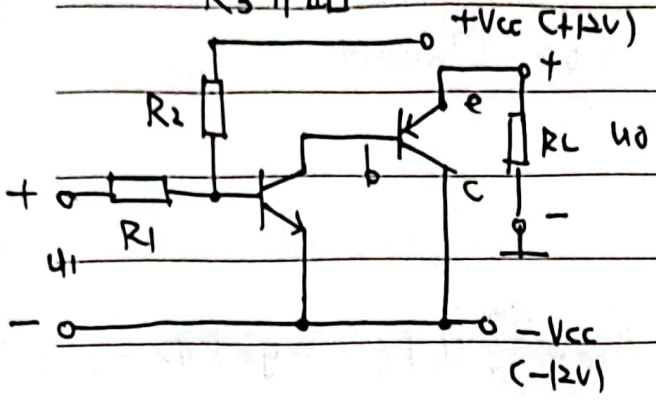
$$A_u = \frac{\beta_2(R_2 // r_{be4}+(1+\beta_4)R_5)\,\beta_4(R_6 // r_{be5}+(1+\beta_5)R_7)(1+\beta_5)R_7}{(r_{be1}+r_{be2})(r_{be4}+(1+\beta_4)R_5)(r_{be5}+(1+\beta_5)R_7)}$$

3.9、(1) 互补输出级，$U_{omax}=\frac{1}{\sqrt{2}}(V_{CC}-U_{CES})=7.778V$

$U_{imax}=\left|\frac{U_{omax}}{A_u}\right|=0.0778V$

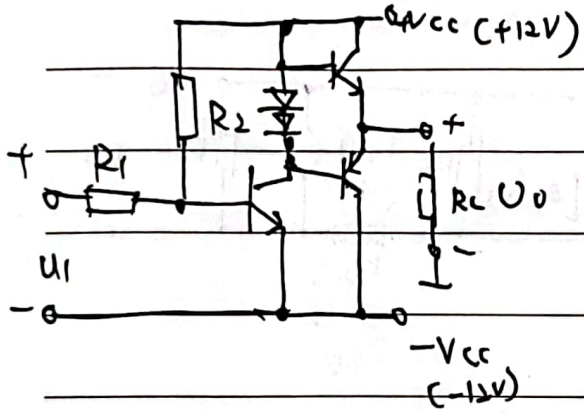
(2) $U_o=|U_i\cdot A_u|=1V$

R_3开路：



$U_o=-V_{CC}+|U_{CES3}|=-11V$

R_3短路



$1V<1.2V$. $\therefore U_o=V_{CC}-U_{BE2}=11.3V$

3.10 (1) ①

(2) ③

(3) ⑦

(4) ②

(5) ⑥

(6) ⑤ (7) ④