

实验报告

课程名称: 模电 实验名称: _____ 实验日期: _____ 年 _____ 月 _____ 日
 班级: 06011909 教学班级: _____ 学号: 1320191001 姓名: 张子轩

2-1. 1. 放大区, 发射结正偏, 集电结反偏
 饱和区. ———— 正偏 ———— 正偏

2. $\frac{10\mu A}{20\mu A} = 0.5$ b.

3. a. b.

4. a. a. b.

5. b.

2-6. 晶体管反向, 不能放大

2-4. A. $V_x > V_y > V_z$. PNP
 B. $V_y > V_x > V_z$ NPN

2-7 a. $V_c > V_b > V_e$. 不能 $+V_{cc} \rightarrow -V_{cc}$.

b. $V_b = V_e$. 不能 R_B 接至 $+V_{cc}$

c. $V_b > V_c$. 基极反偏接地.
 基极与 V_{cc} 间加 R .

d. $V_b = 0$ 应将 R_B 右端接至 V_{cc} .

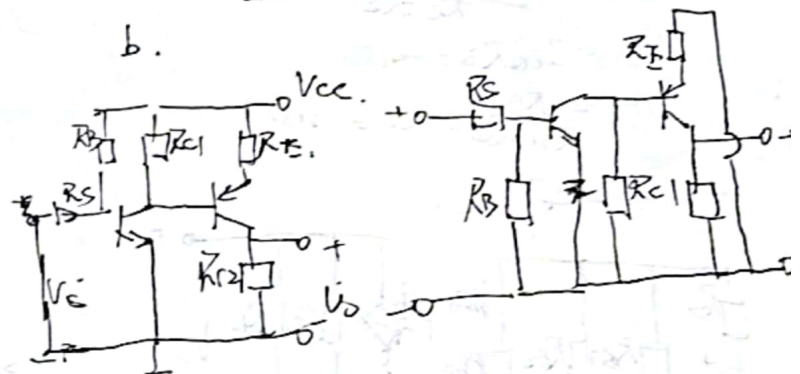
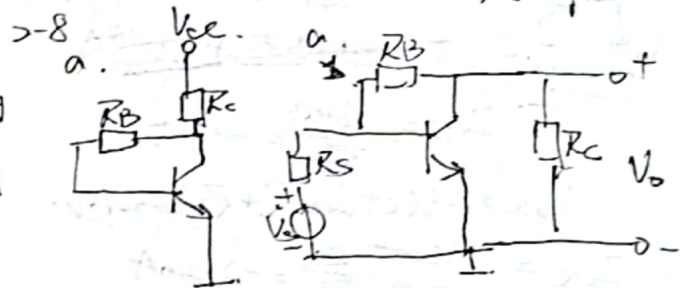
e. 可以放大.

f. 可以放大.

g. 集电基极加 R_c .

h. 可放大, 但应接反偏, 应去掉 C_A

联系方式: _____



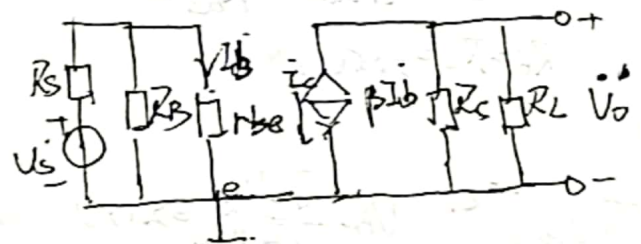
2-14

$$1. I_{EQ} = \beta I_{BQ}$$

$$\therefore I_{BQ} = \frac{0.5mA}{50} = 0.01mA$$

$$R_B = \frac{V_{CC} - V_{BE}}{I_{BQ}} = 1.2 \times 10^4 \Omega$$

2.



$$r_{be} = r_{bb'} + (1 + \beta) r_{be} = 2700\Omega$$

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

$$A_{us} = \frac{V_o}{V_s} = \frac{R_s}{R_s + R_i} A_u = -83$$

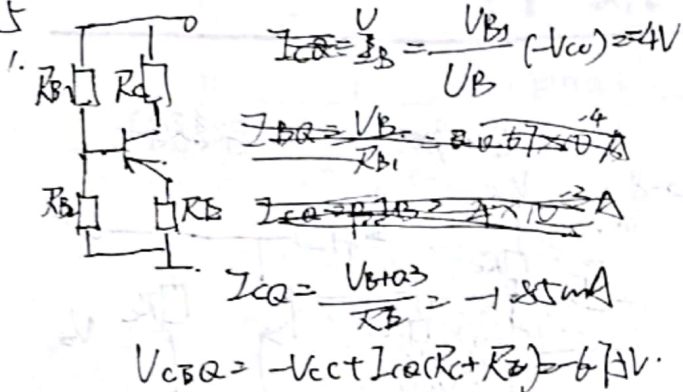
指导教师签字: _____



$$3. R_i = R_B // r_{be} = 2.7k\Omega$$

$$R_o = R_C = 16k\Omega$$

2-15



$$I_{CQ} = I_B = \frac{V_{B1} - V_{BE}}{R_{B1} + R_{B2}} = 4\mu A$$

$$I_{BQ} = \frac{V_{B1} - V_{BE}}{R_{B1} + R_{B2}} = 4\mu A$$

$$I_{CQ} = \beta I_{BQ} = 0.4mA$$

$$I_{CQ} = \frac{V_{CC} - V_{CEQ}}{R_C} = 1.8mA$$

$$V_{CEQ} = -V_{CC} + I_{CQ}(R_C + R_E) = 6.7V$$

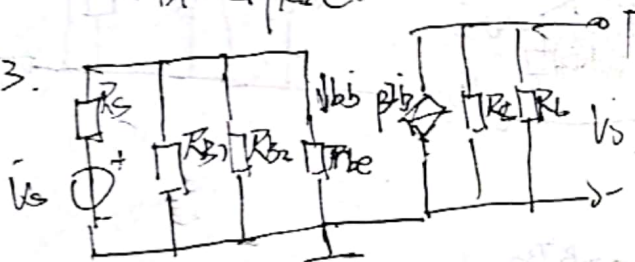
$$2. I_{CQ} = \frac{-V_{CC} - V_{BEQ}}{R_C + R_E} = -2.4mA$$

$$V_B = I_{CQ}R_E = -4.8V$$

$$V_B = \frac{R_{B2}}{R_{B1} + R_{B2}}(-V_{CC}) = -4.8V$$

$$\therefore R_{B1} = 27k\Omega$$

3.



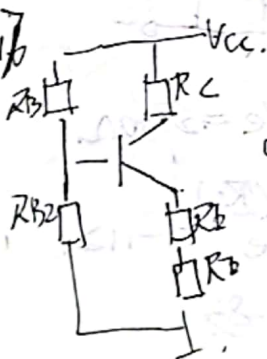
$$r_{be} = r_{bb'} + (1 + \beta) \frac{26mV}{I_{BQ}} = 1.3k\Omega$$

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

$$A_{us2} = \frac{V_o}{V_s} = -\frac{R_i}{R_s + R_i} \frac{\beta(R_o // R_L)}{r_{be}} = -5$$

$$\therefore R_o = R_C = 2k\Omega$$

2-16



$$V_{B2} = \frac{R_{B2} V_{CC}}{R_{B1} + R_{B2}} = 2.1V$$

$$\phi. R_E = 0$$

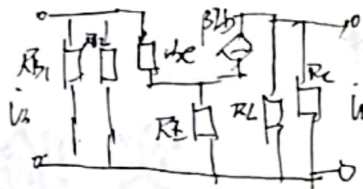
$$I_E = \frac{V_{B2} - V_{BE}}{R_{B1} + R_{B2}} = 1.4 \times 10^{-3} A$$

$$r_{be} = r_{bb'} + (1 + \beta) \frac{26mV}{I_E} = 1.51k\Omega$$

$$R_i = \frac{V_i}{I_i} = 1.6k\Omega$$

$$A_{us} = \frac{V_o}{V_i} = 174$$

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



$$1. I_E = \frac{V_{B2} - V_{BE}}{R_{B1} + R_{B2}} = 1.18 \times 10^{-3} A$$

$$r_{be} = r_{bb'} + (1 + \beta) \frac{26mV}{I_E} = 1.4k\Omega$$

$$A_{us} = \frac{V_o}{V_i} = -15.5$$

$$R_i = \frac{V_i}{I_i} = 6.3k\Omega$$

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

2-18



$$1. V_{B2} = \frac{R_{B2} V_{CC}}{R_{B1} + R_{B2}} = 4.3V$$

$$I_{CQ} = I_{BQ} = \frac{V_{B2} - V_{BE}}{R_{B1} + R_{B2}} = 1.8mA$$

$$V_{CEQ} = V_{CC} - I_{CQ}(R_C + R_E) = 0$$



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

$$R_i = \frac{V_i}{I_i} = 8.2k\Omega$$

$$A_{us1} = \frac{V_{o1}}{V_s} = -0.79$$

$$A_{us2} = \frac{V_{o2}}{V_s} = 0.79$$

$$3. R_{o2} = R_C // \frac{r_{be} + R_s // R_{B1} // R_{B2}}{1 + \beta} = 3$$



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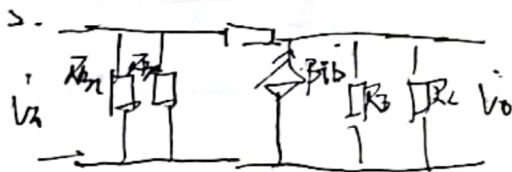
2-19

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

$$I_{BQ} = \frac{V_{BE} - 0.7V}{R_E} = 2.15mA$$

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

$$V_{CEQ} = V_{CC} - I_{CQ} R_E = 2.7V$$

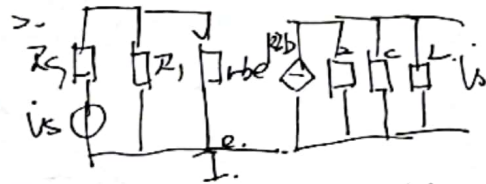


$$r_{be} = r_{bb'} + (1+\beta) \frac{26mV}{I_{BQ}} = 1.35k\Omega$$

$$A_u = \frac{V_o}{V_i} = \frac{-\beta R'_E}{r_{be} + (1+\beta) R'_E} = -0.987$$

$$R_i = R_{B1} // R_{B2} // [r_{be} + (1+\beta) R'_E] = 1.8k\Omega$$

$$R_o = R_C = 2k\Omega$$



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

$$A_u = \frac{V_o}{V_i} = -149$$

$$A_{us} = \frac{V_o}{V_s} = \frac{r_{be} / R_1}{R_1 / R_2 + r_{be} / R_1} A_u = -83$$

2-25

$$V_{BE} = \frac{R_{B1} V_{CC}}{R_{B1} + R_{B2}} = 3.5V$$

$$V_{BEQ} = \frac{V_{BE} - 0.7V}{1} = 0$$

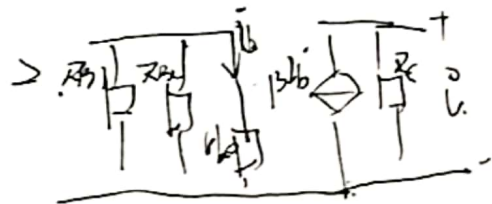
$$I_{BQ} = \frac{V_{BEQ} - V_{BEQ}}{R_E} = 1mA$$

$$R_E = 8k\Omega$$

$$R_C = \frac{V_{CC} - (V_{BEQ} - V_{BEQ}) - V_{CEQ}}{I_{CQ}} = 25.2k\Omega$$

$$R_{B1} = 35k\Omega$$

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

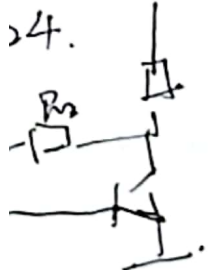


$$A_u = \frac{R_C}{r_{be}} = -193$$

$$R_i = 2.4k\Omega$$

$$R_o = R_C = 5.2k\Omega$$

2-4



$$I_{RC} = I_{BQ} + I_{CQ}$$

$$\frac{V_{CC} - V_{CEQ}}{R_C} = I_{BQ} + I_{CQ}$$

$$I_{BQ} = \frac{V_{CEQ} - V_{BEQ}}{R_E}$$

$$R_E = R_C = 6k\Omega$$

系方式: _____

指导教师签字: _____

