中山大学软件学院 **2009** 级软件工程专业(2009 春季学期)

《电路与模拟电子技术》期末试题试卷(A)

(考试形式： 闭卷 考试时间：2 小时)

警示

《中山大学授予学士学位工作细则》第六条

考试作弊不授予学士学位

方向：_____ 姓名：_____ 学号：_____

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1. 10 pt) For the circuit of Figure 1, compute current I_1, I_2, and V_{CD}.

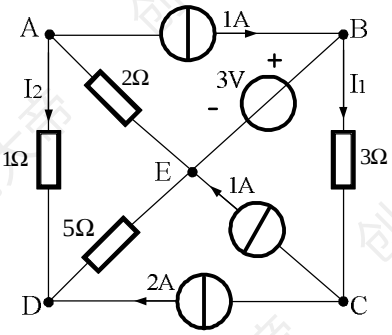

Figure 1

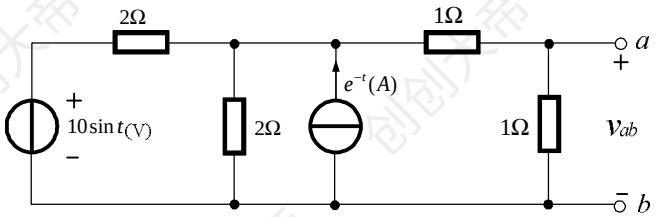

Figure 2

2. (10 pt) Use the superposition theorem to find v_{ab} in the circuit shown in Figure 2.

3. (15pt) Find the Thevenin equivalent of the network in Figure 3 viewed from v.

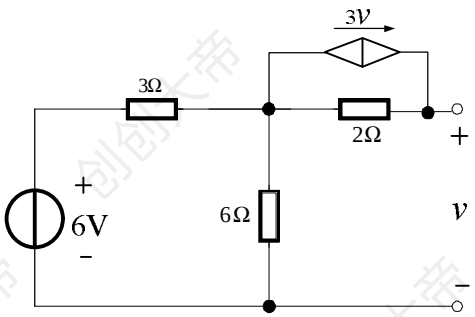

Figure 3

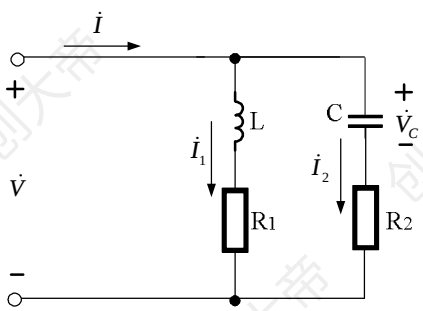

Figure 4

4. (15pt) Compute the currents $\dot{I}$、$\dot{I}_1$、$\dot{I}_2$ and $\dot{V}_C$ in Figure 4. R_1=R_2=10Ω,

L=31.8mH, C=318μF, f=50Hz, $\dot{V} = 10V$.

5. (10 pt) The circuit and input waveform of v_i =10sinωt (V) are shown in Figure 5, sketch the output waveform using the ideal model for the diode.

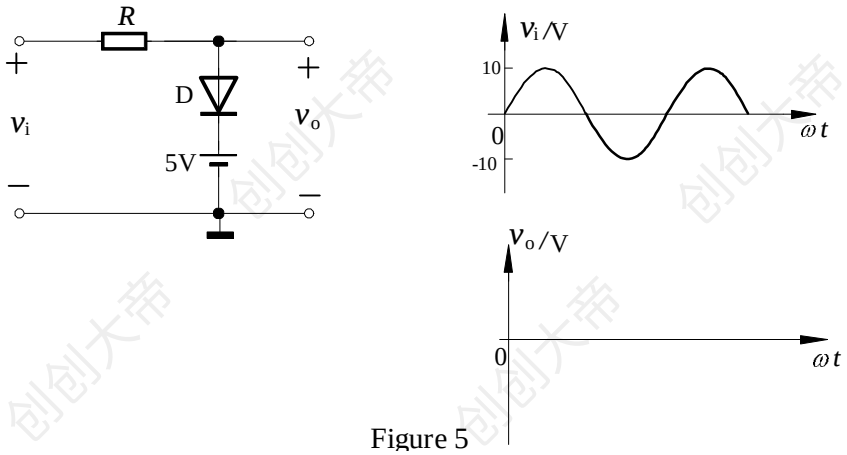

Figure 5

6. (15pt) Find Q-point and gain A_v, input resistance R_i, output resistance R_o for the circuit shown in Figure 6. Assume that the DC current through R_2 is large compared with the expected base current.

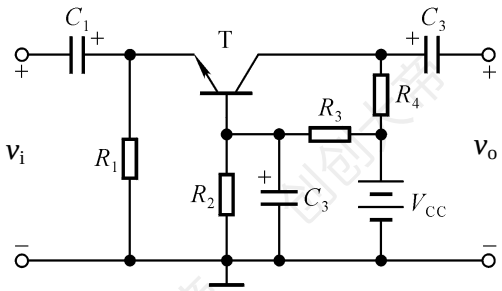

Figure 6

7. (15 pt）Determine the output voltage for the circuit of figure 7

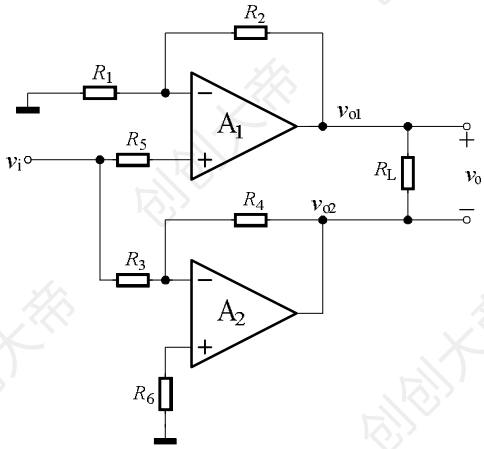

Figure 7

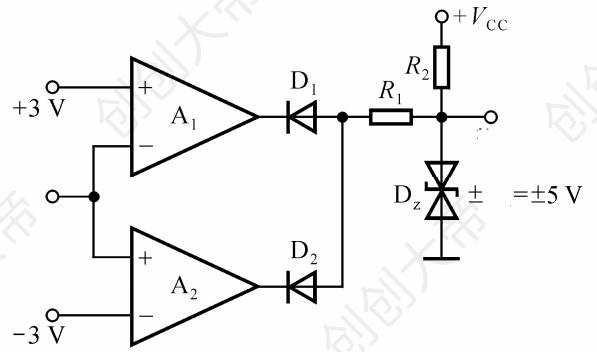

Figure 8

8. (10 pt）The circuit is shown in Figure 8. Find threshold voltages and sketch the transfer characteristics.

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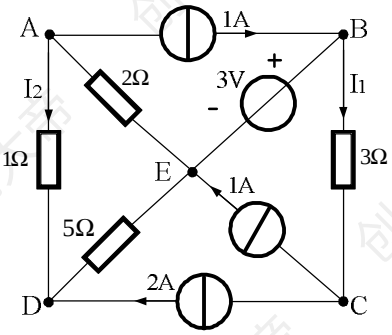
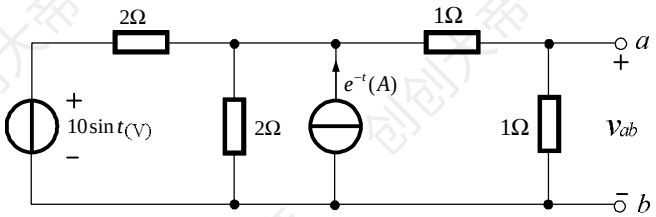


Figure 1



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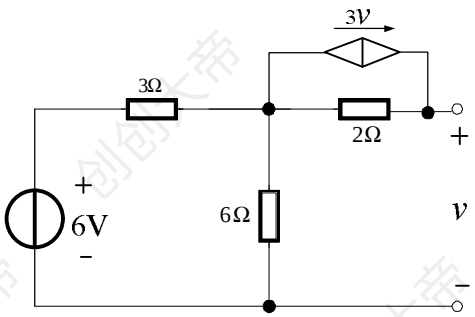
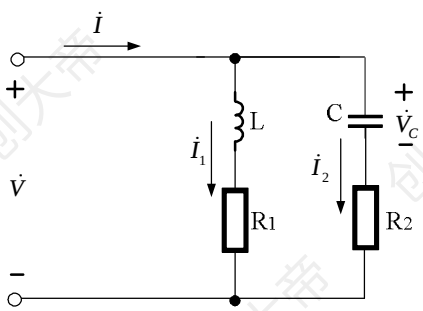


Figure 3



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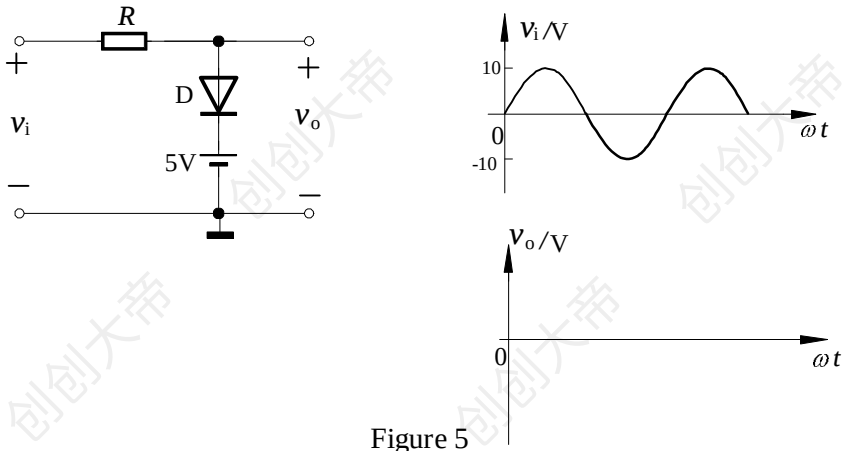
L=31.8mH, C=318μF, f=50Hz, $\dot{V} = 10V$.

5. (10 pt) The circuit and input waveform of v_i =10sinωt (V) are shown in Figure 5, sketch the output waveform using the ideal model for the diode.



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6. (15pt) Find Q-point and gain A_v, input resistance R_i, output resistance R_o for the circuit shown in Figure 6. Assume that the DC current through R_2 is large compared with the expected base current.

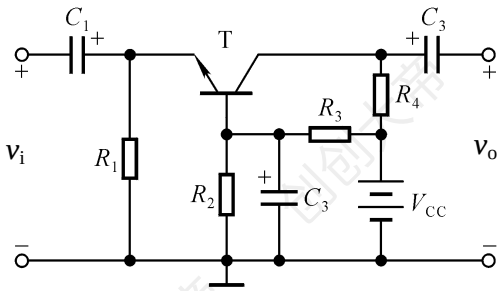


Figure 6

7. (15 pt）Determine the output voltage for the circuit of figure 7

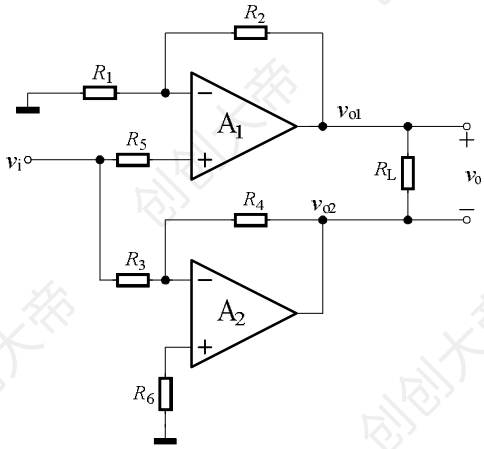


Figure 7

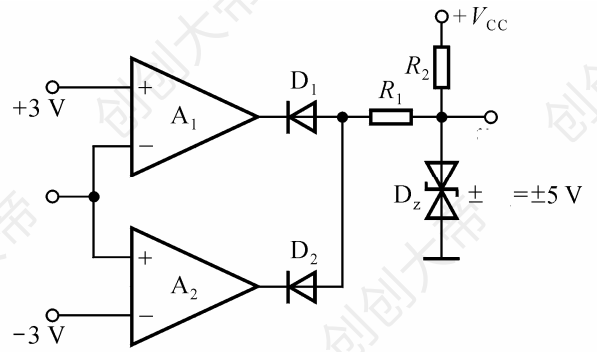


Figure 8

8. (10 pt）The circuit is shown in Figure 8. Find threshold voltages and sketch the transfer characteristics.

09“电路与模电”期末试题(A)答案

1. (10pt)

由节点 C 可得 $I_1 = 3$ A

因此 $I_{EB} = 2$ A

由节点 A 可得 $I_{EA} = I_2 + 1$

由节点 D 可得 $I_{DE} = I_2 + 2$

根据 KVL 则有

$U_{DE} + U_{EA} + U_{AD} = 0$

即 $I_2 = -1.5$ A

根据 KVL 有 $U_{CD} = U_{CB} + U_{BE} + U_{ED} = -8.5$ V

2. (10pt)

只有电压源单独作用时：

$$U'_{ab} = \frac{1}{3} \times 10 \sin t \times \frac{1}{2} = \frac{5}{3} \sin t$$

只有电流源单独作用时：

$$U''_{ab} = I \times 1 = \frac{1}{3} \times e^{-t} \times 1 = \frac{1}{3} e^{-t}$$

应用叠加定理求得：$U_{ab} = U'_{ab} + U''_{ab} = \frac{5}{3} \sin t + \frac{1}{3} e^{-t}$ （V）

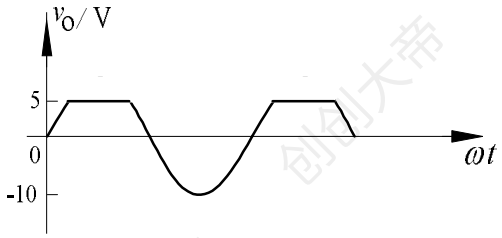
3. (15pt) -0.8V, -0.8Ω

4. (15pt) $R_L = jwL = j*2\pi fL = j*2\pi*100*31.8*10^{-3} = j10$ Ω, $R_C = 1/jwC = -j10$ Ω ,

$I_L = 10/(10+j10) = (1-j)/2$ A, $I_C = 10/(10-j10) = (1+j)/2$ A,

$I = I_L + I_C = 1$ A, $U_C = I_C * R_C = ((1+j)/2)*(-j10) = 5(1-j)$ V

5. （10pt）



6. （15pt）*Q*-point：

$$I_{BQ}=(\frac{R_2}{R_2+R_3}V_{CC}-V_{BEQ})\Big/[R_2\ /\!/\ R_3+(1+b)R_1]$$

$$\text{Or}\qquad I_{BQ}\approx(\frac{R_2}{R_2+R_3}V_{CC}-V_{BEQ})\Big/(1+b)R_1$$

$$I_{CQ}=b\ I_{BQ}$$

$$V_{CEQ}=V_{CC}-I_{CQ}(R_4+R_1)$$

$$A_v=\frac{b\ R_4}{r_{be}}$$

$$R_i=R_1\ /\!/\ \frac{r_{be}}{1+b}$$

$$R_o=R_4$$

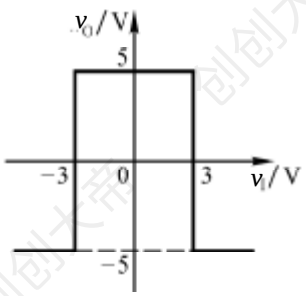
7. （15pt）$v_O=v_{O1}-v_{O2}$，

$$v_{O1}=v_I(1+\frac{R_2}{R_1})$$

$$v_{O2}=-\frac{R_4}{R_3}v_I$$

$$v_O=v_I(1+\frac{R_2}{R_1}+\frac{R_4}{R_3})$$

8. （10pt）$v_O=\pm V_Z=\pm 5\text{V}$，$\pm V_T=\pm 3\text{V}$



中山大学软件学院 **2010** 级软件工程专业(2010 春季学期)

《SE-111 电路与模拟电子技术》期末考试试卷(A)

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1.(10 pt) For the circuit of Figure 1, compute voltage V_1, V_2, and current I

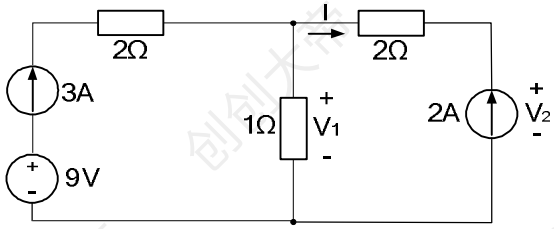


Figure 1

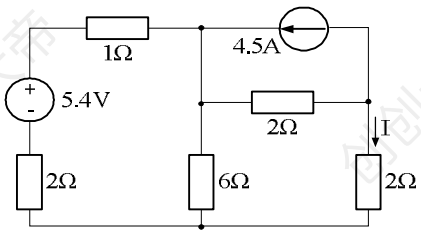


Figure 2

2.(15 pt) Use the superposition theorem to find I in the circuit shown in Figure 2.

3.(15pt) Find the Thevenin equivalent of the network in Figure 3 viewed from points a、b.

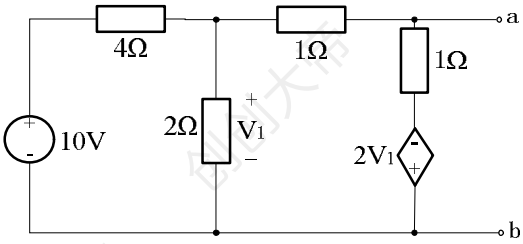


Figure 3

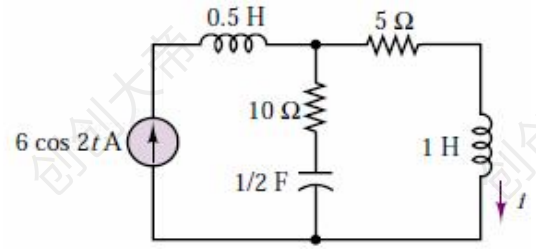


Figure 4

4.(10pt) Compute *i* in Figure 4.($arctg0.1 = 5.7^o$， $arctg0.067 = 3.8^o$)

5. (10pt)Assume diode's V_{on}=0.6(V), sketch the output waveform in Figure 5.

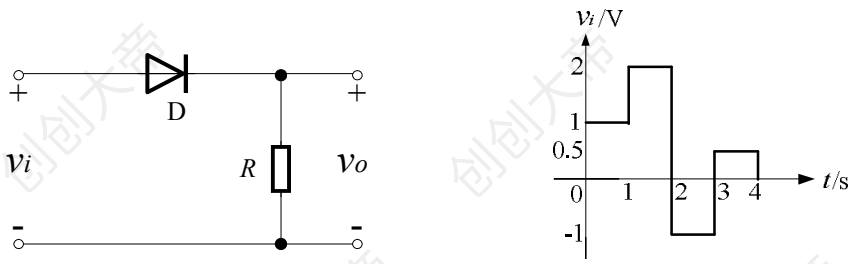


Figure 5

6. (15pt)For the C-E amplifier in Figure 6,

1) Determine the Quiescent Operation Point;

2) Draw the Small-Signal equivalent circuit, Determine the voltage gain and input resistance, output resistance.

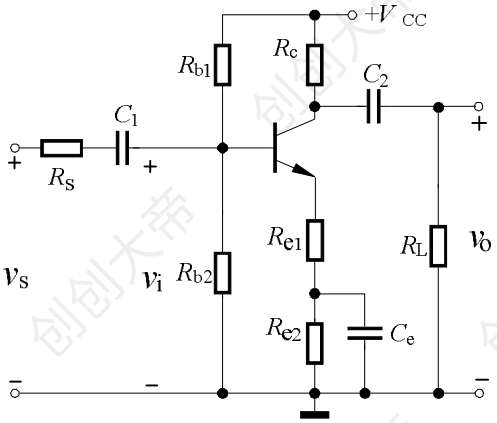


Figure 6

7. (15pt)Determine the output voltage v_O for the circuit of Figure 7

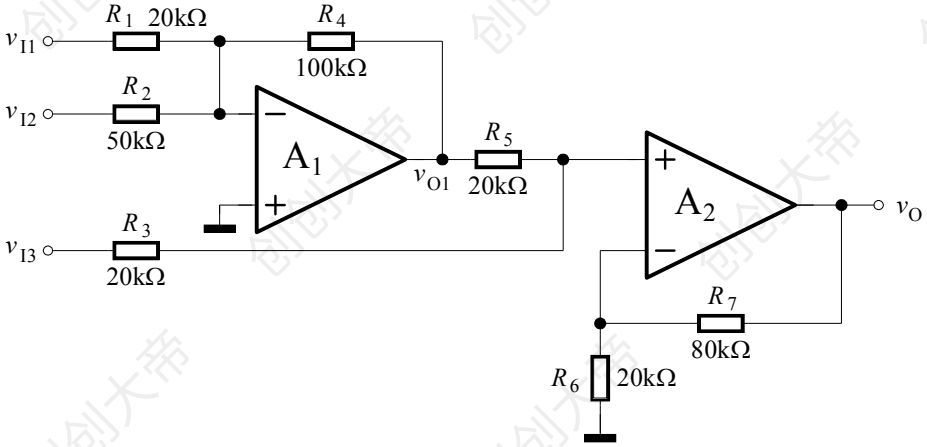


Figure 7

8. (10pt)Design a circuit to $A_f = \frac{v_o}{v_i} = 0.9$ （Require the input resistance of every signal $R_i \geqslant$ 20kΩ）

10 级“电路与模电”期末试题(A)答案

1. (10pt)

I=-2A　V_1=5V　　V_2=9V

2. (15pt)

I=-0.9A

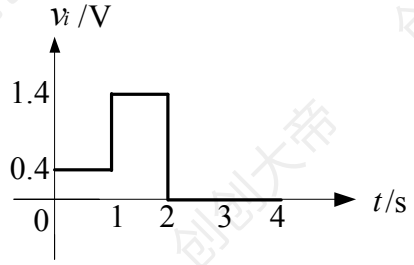
3. (15pt)

V_{eq}=-5/9V,　R_{eq}=7/18 Ω

4. (10pt)

i=4cost(2t-9.52°) A

5. (10pt)



6. (15pt)

1）$V_B \approx V_{CC}\dfrac{R_{b2}}{R_{b1}+R_{b2}}$

$I_{CQ} \approx I_{EQ} = \dfrac{V_B - V_{BEQ}}{R_{e1}+R_{e2}}$

$I_{BQ} = \dfrac{I_{EQ}}{1+\beta}$

$V_{CEQ} = V_{CC} - I_{CQ}R_c - I_{EQ}(R_{e1}+R_{e2})$

3）$r_{be} = (1+\beta)\dfrac{V_T}{I_{EQ}}$

$A_v = -\dfrac{\beta(R_C // R_L)}{r_{be}+(1+\beta)R_{e1}}$

$R_i = [r_{be} + (1+\beta)R_{e1} // R_{b1} // R_{b2}$

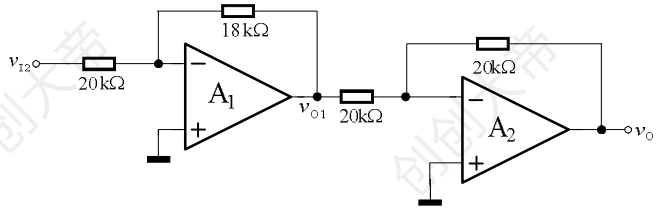
$R_o = R_c$

7. (15pt)解：　$v_{O1} = -5v_{I1} - 2v_{I2}$

$v_{+2} = \dfrac{1}{2}(v_{O1} + v_{I3})$

$v_O = \left(1+\dfrac{R_7}{R_6}\right)v_{+2} = 5\left(\dfrac{1}{2}v_{I3} - \dfrac{5}{2}v_{I1} - v_{I2}\right)$

8. (10pt)



中山大学软件学院 **2011** 级软件工程专业(2012 春季学期)

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出卷：任江涛、李宁　　审核：_____

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1. (10 pt) For the circuit of Figure 1, compute U and I.

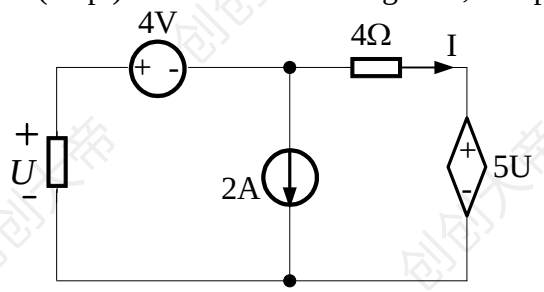


Fig.1

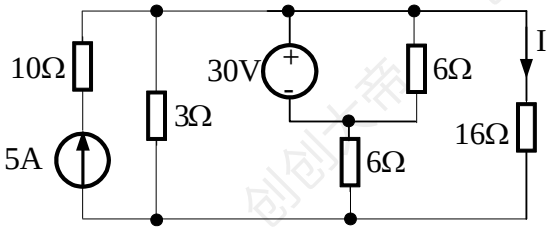


Fig.2

2. (10pt) Use the superposition theorem to find I in the circuit shown in Figure 2.

3. (15pt) Find the Thevenin equivalent of the network in Figure 3 viewed from a and b

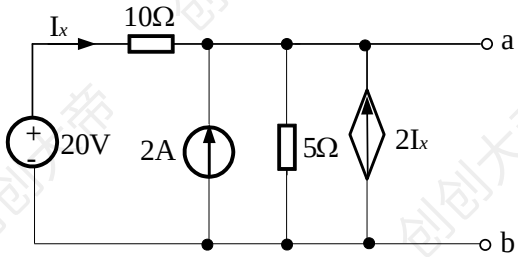


Fig.3

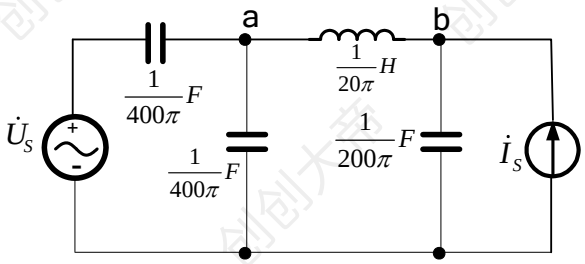


Fig.4

4.(15pt) $\dot{U}_S = 20\angle 90^o$ V， $\dot{I}_S = 10\angle 0^o$ A， f=50Hz ，Compute $\dot{U}_{ab}$ in Figure 4.

5.(10pt) Assume diode's V_{on}=0.7V, Compute V_A and I_D in Figure 5.

6. (10 pt) Shown in Figure 6, the output waveform of the circuit with input waveform of sine is tested for varying parameter. What distortion happened in each graph? How to eliminate these distortions?

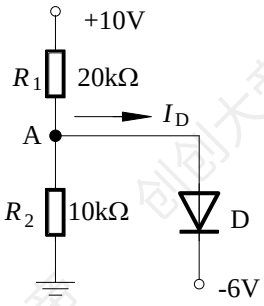


Fig.5

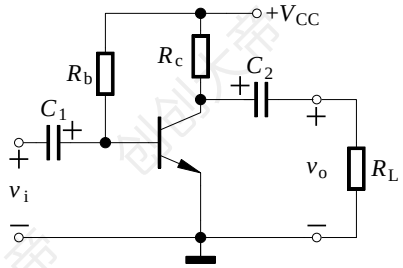


Fig.6

7. (15pt)For the CC amplifier in Figure 7,

1) Determine the Quiescent Operation Point;

2) Draw the Small-Signal equivalent circuit, Determine the voltage gain and input resistance, output resistance.

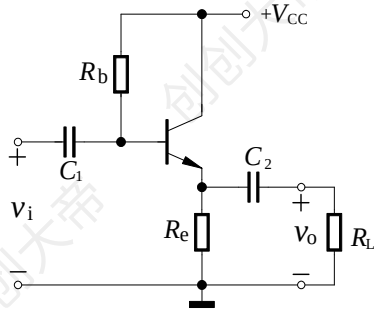


Fig.7

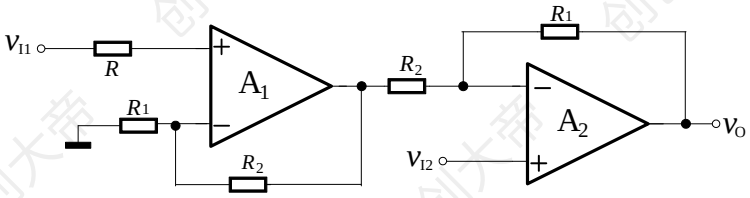


Fig.8

8. (15pt)Determine the output voltage v_O for the circuit of Figure 8.

中山大学软件学院 **2011** 级软件工程专业(2012 春季学期)

《电路与模拟电子技术》 期末试题 (A)参考答案及评分标准

1. (10 pt)

$$4+4I+5I-U=$$

$$\frac{U}{2}+2+I=0 \qquad \text{（6 pt）}$$

I=-3A , U=2 V （4 pt）

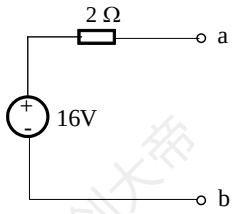
2. (10pt) 5A：$I'=\frac{5}{9}\text{A}$； （3 pt）

30V：$I''=\frac{5}{9}\text{A}$ （3 pt）

$I=\frac{10}{9}=1.11\text{A}$ （1 pt）

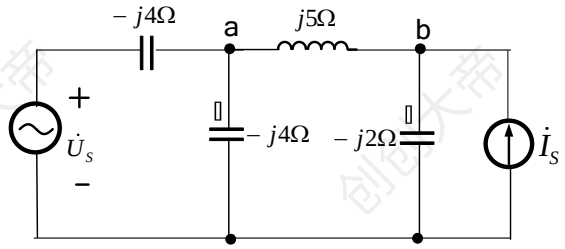
3. (15pt) $U_{OC}=16\text{V}$ （7 pt）

$R_{eq}=2\Omega$ （6 pt）



（2 pt）

4.(15pt)



（4 pt）

$\dot{U}_{ab}=150\angle 90^o\text{V}$ （11 pt）

5.(10pt)

$$V_{\text{A}}=(-6+0.7)\text{V}=-5.3\text{V} \qquad \text{（5 pt）}$$

$$I_{\text{D}}=\frac{10-V_{\text{A}}}{R_1}+\frac{0-V_{\text{A}}}{R_2}\approx 1.3\text{mA} \qquad \text{（5 pt）}$$

6. (10 pt) (a) saturation distortion; $R_b\uparrow$ （5 pt）

(b) cutoff distortion; $R_b\downarrow$ （5 pt）

7. (15pt)

1) $I_B = \dfrac{V_{CC} - V_{BE}}{R_b + (1+\beta)R_e}$， $I_E \approx I_C = \beta I_B$， $V_{CE} = V_{CC} - I_E R_e$ （5 pt）

2）Draw the Small-Signal equivalent circuit （2 pt）

$r_{be} \approx (1+\beta)\dfrac{26mV}{I_E}$， $A_v = \dfrac{v_o}{v_i} = \dfrac{(1+\beta)(R_e // R_L)}{r_{be} + (1+\beta)(R_e // R_L)}$ （4 pt）

$R_i = R_b // [r_{be} + (1+\beta)(R_e // R_L)$ （2 pt）

$R_o = R_e // \dfrac{r_{be}}{(1+\beta)}$ （2 pt）

8. (15pt) $v_{O1} = (1+\dfrac{R_2}{R_1})v_{I1}$ （6 pt）

$\dfrac{v_{O1} - v_{I2}}{R_2} = \dfrac{v_{I2} - v_O}{R_1}$ （6 pt）

$v_O = (1+\dfrac{R_1}{R_2})(v_{I2} - v_{I1})$ （3 pt）

10 级“电路与模电”期末试题(A)答案

1. (10pt)

I=-2A　V_1=5V　　V_2=9V

2. (15pt)

I=-0.9A

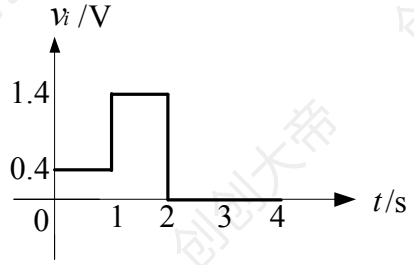
3. (15pt)

V_{eq}=-5/9V,　R_{eq}=7/18 Ω

4. (10pt)

i=4cost(2t-9.52°) A

5. (10pt)



6. (15pt)

1）$V_B \approx V_{CC}\dfrac{R_{b2}}{R_{b1}+R_{b2}}$

$I_{CQ} \approx I_{EQ} = \dfrac{V_B - V_{BEQ}}{R_{e1}+R_{e2}}$

$I_{BQ} = \dfrac{I_{EQ}}{1+\beta}$

$V_{CEQ} = V_{CC} - I_{CQ}R_c - I_{EQ}(R_{e1}+R_{e2})$

3）$r_{be} = (1+\beta)\dfrac{V_T}{I_{EQ}}$

$A_v = -\dfrac{\beta(R_C // R_L)}{r_{be}+(1+\beta)R_{e1}}$

$R_i = [r_{be} + (1+\beta)R_{e1} // R_{b1} // R_{b2}$

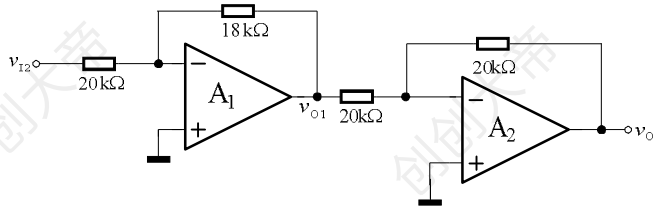
$R_o = R_c$

7. (15pt)解：　$v_{O1} = -5v_{I1} - 2v_{I2}$

$v_{+2} = \dfrac{1}{2}(v_{O1} + v_{I3})$

$v_O = \left(1+\dfrac{R_7}{R_6}\right)v_{+2} = 5\left(\dfrac{1}{2}v_{I3} - \dfrac{5}{2}v_{I1} - v_{I2}\right)$

8. (10pt)



中山大学软件学院 **2010** 级软件工程专业(2010 春季学期)

《SE-111 电路与模拟电子技术》期末考试试卷(A)

(考试形式： 闭卷 考试时间：2 小时)

警示

《中山大学授予学士学位工作细则》第六条

考试作弊不授予学士学位

方向：_____ 姓名：_____ 学号：_____

注意：答案一定要写在答卷中，写在本试题卷中不给分。本试卷要和答卷一起交回。

1.(10 pt) For the circuit of Figure 1, compute voltage V_1, V_2, and current I

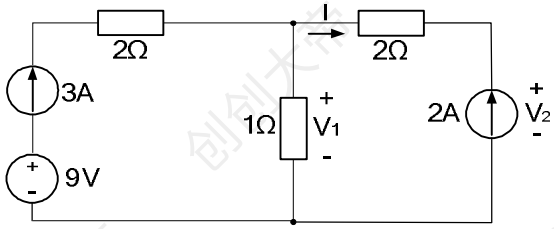


Figure 1

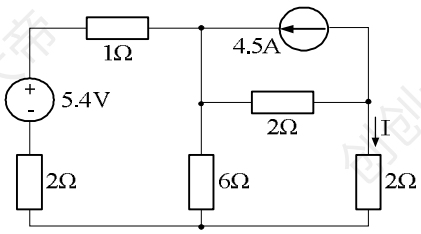


Figure 2

2.(15 pt) Use the superposition theorem to find I in the circuit shown in Figure 2.

3.(15pt) Find the Thevenin equivalent of the network in Figure 3 viewed from points a、b.

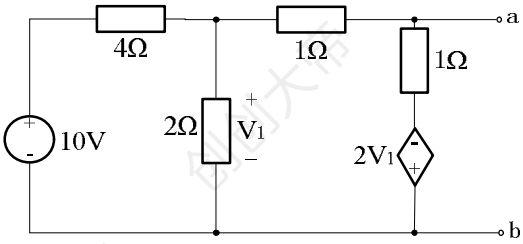


Figure 3

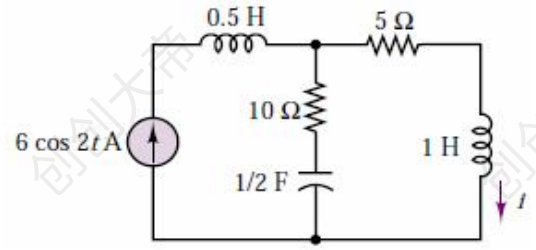


Figure 4

4.(10pt) Compute *i* in Figure 4.($arctg0.1 = 5.7^o$， $arctg0.067 = 3.8^o$)

5. (10pt)Assume diode's V_{on}=0.6(V), sketch the output waveform in Figure 5.

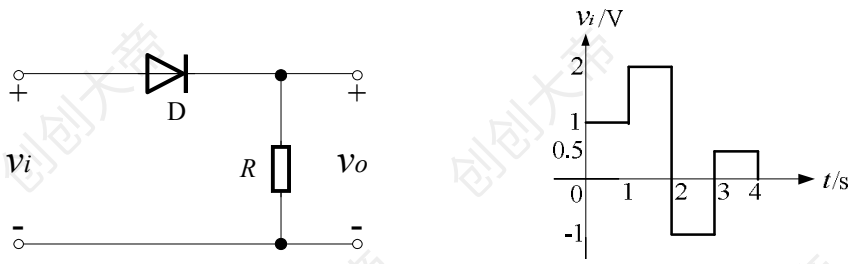


Figure 5

6. (15pt)For the C-E amplifier in Figure 6,

1) Determine the Quiescent Operation Point;

2) Draw the Small-Signal equivalent circuit, Determine the voltage gain and input resistance, output resistance.

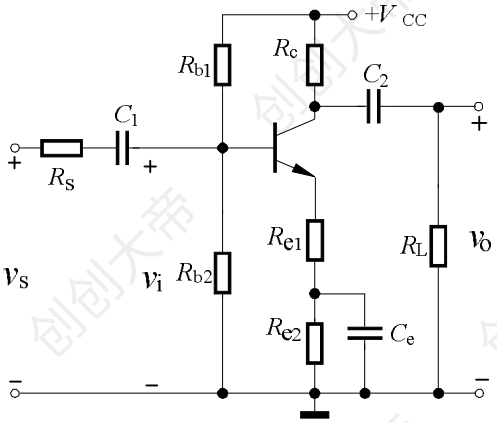


Figure 6

7. (15pt)Determine the output voltage v_O for the circuit of Figure 7

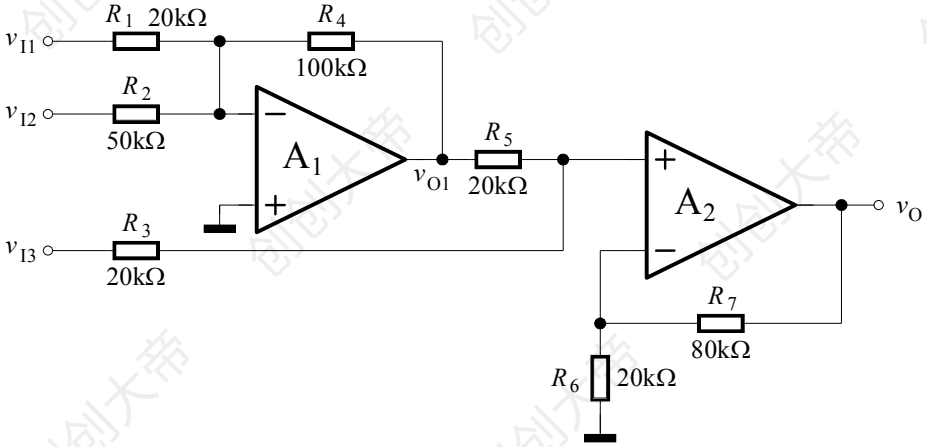


Figure 7

8. (10pt)Design a circuit to $A_f = \frac{v_o}{v_i} = 0.9$ （Require the input resistance of every signal $R_i \geqslant$ 20kΩ）