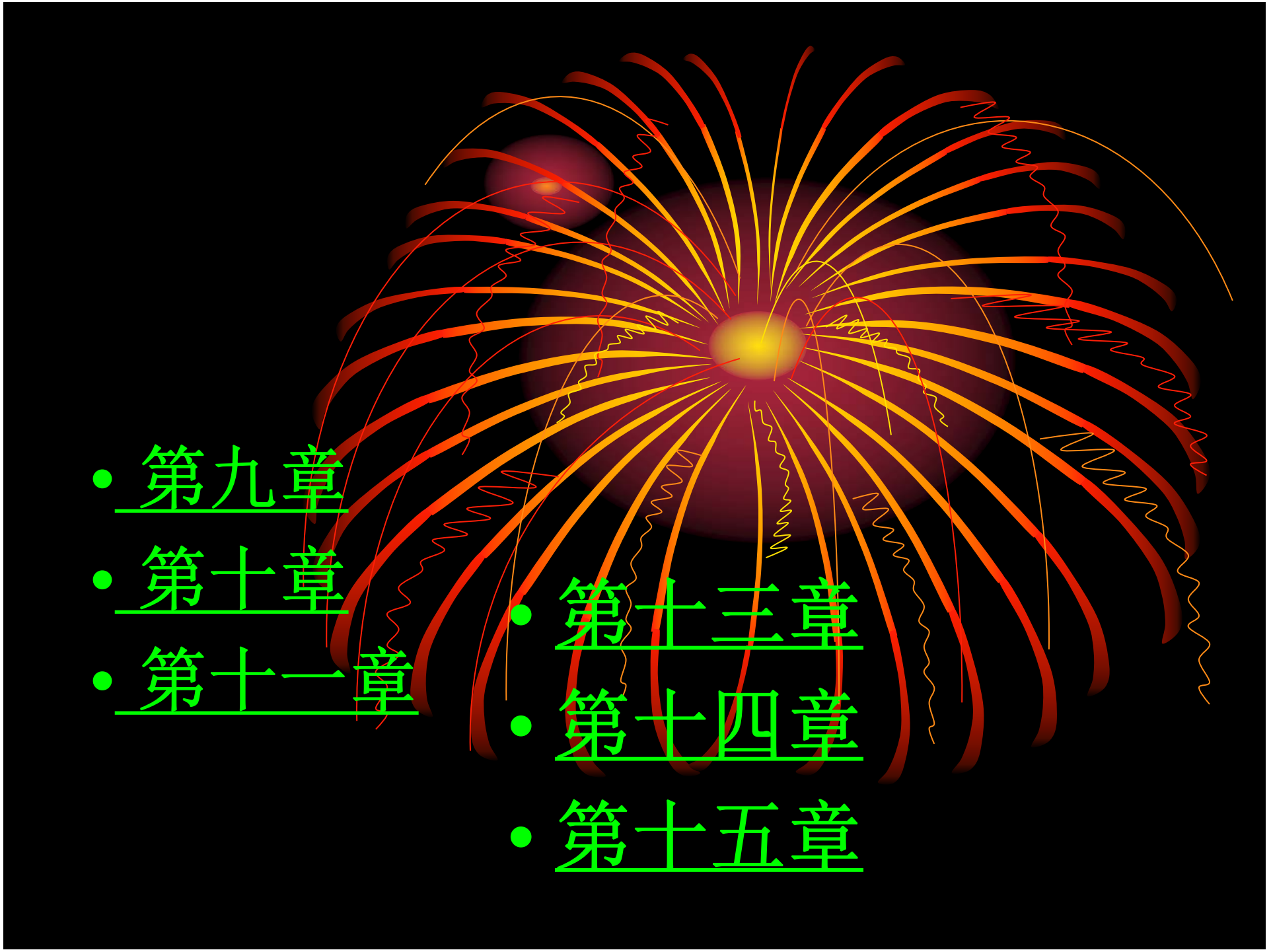
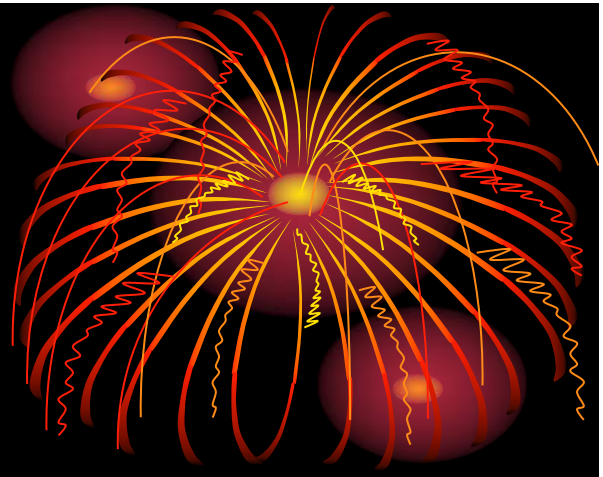
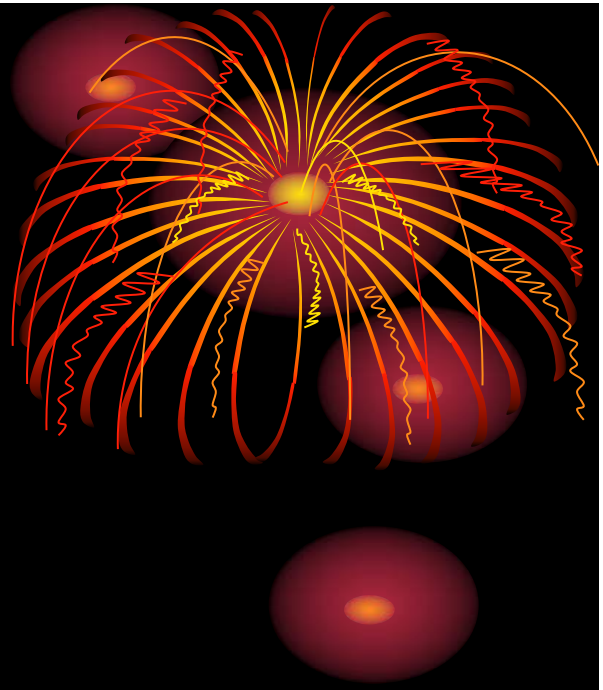


第 九 章



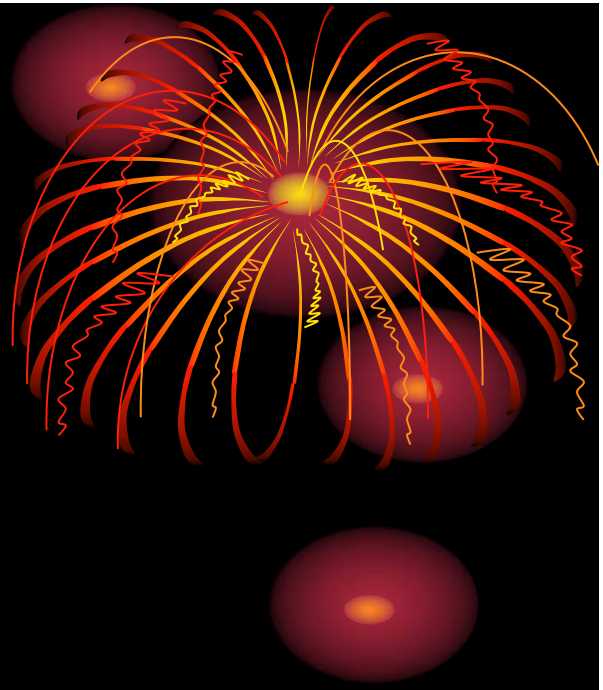
- 9－2
- 9－3
- 9－5
- 9－6
- 9－7
- 9－8
- 9－10
- 9－14
- 9－18
- 9－19

第十章

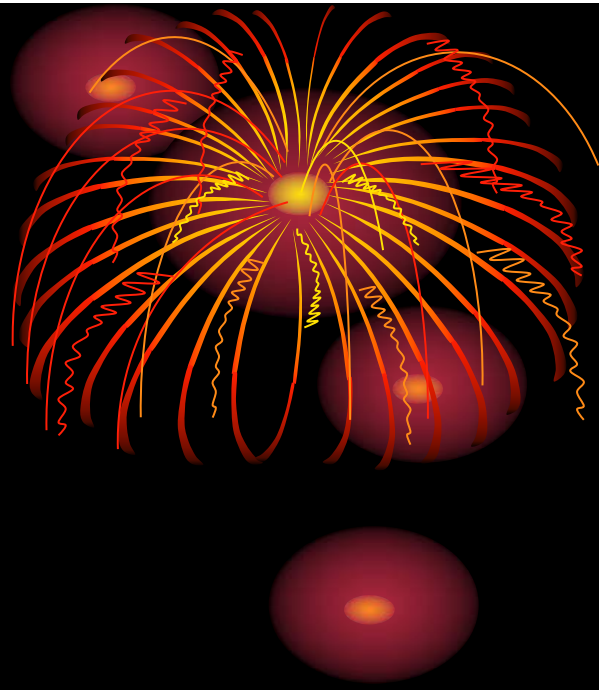


- 10－1
- 10－2
- 10－3
- 10－4
- 10－5
- 10－6
- 10－7
- 10－8
- 10－9
- 10－10
- 10－11
- 10－12

第十一章

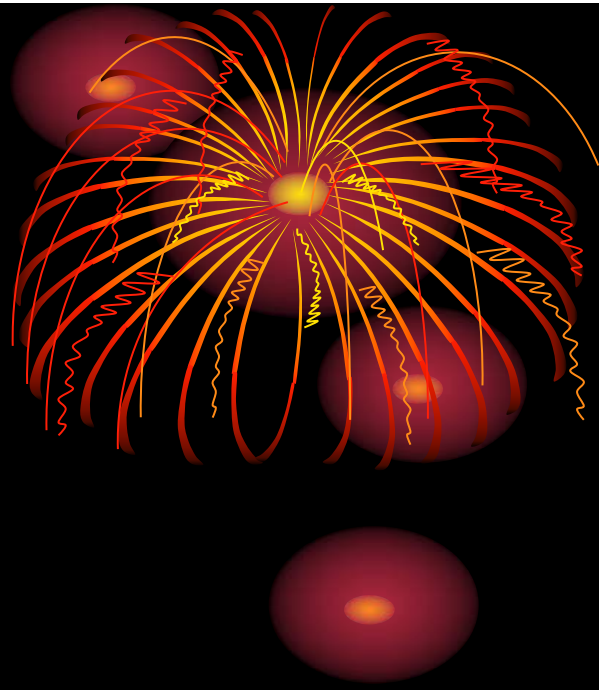


第 十三 章



- 13－1
- 13－2
- 13－3
- 13－4
- 13－5
- 13－6
- 13－7
- 13－8
- 13－9
- 13－10

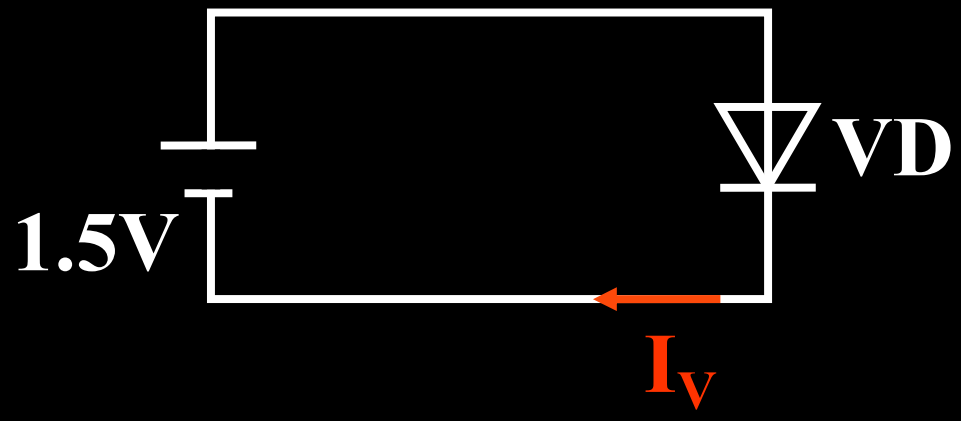
第 十四 章



- 14－1
- 14－2
- 14－3
- 14－14
- 附加题

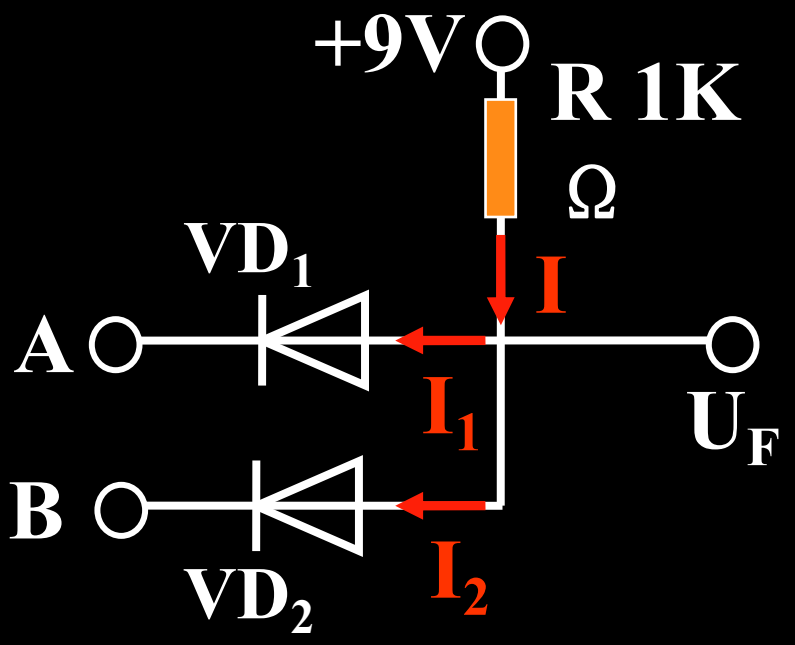
第 十五 章

9—2 若在不加限流电阻的情况下，直接将二极管接于1.5V的干电池上，会出现什么问题？



答：时间久了，电流过大会烧坏二极管。

9—3　二极管组成电路如图，二极管导通电压可忽略，试求输出电压U_F。



（3）$V_A = V_B = 3V$

9 > 3

VD_1、VD_2导通，

$U_F = U_B = 3V$

$I = （9 - 3） / 1 = 6mA$

$I_1 = I_2 = 6 / 2 = 3mA$

9—5　假设一个二极管在50℃的反向电流为10μA，则在20℃和80℃时反向电流为多大？已知温度每升高10反向电流增大一倍。

温度为20℃：

$I_R = 10 / 2^3 = 1.25\ \mu A$

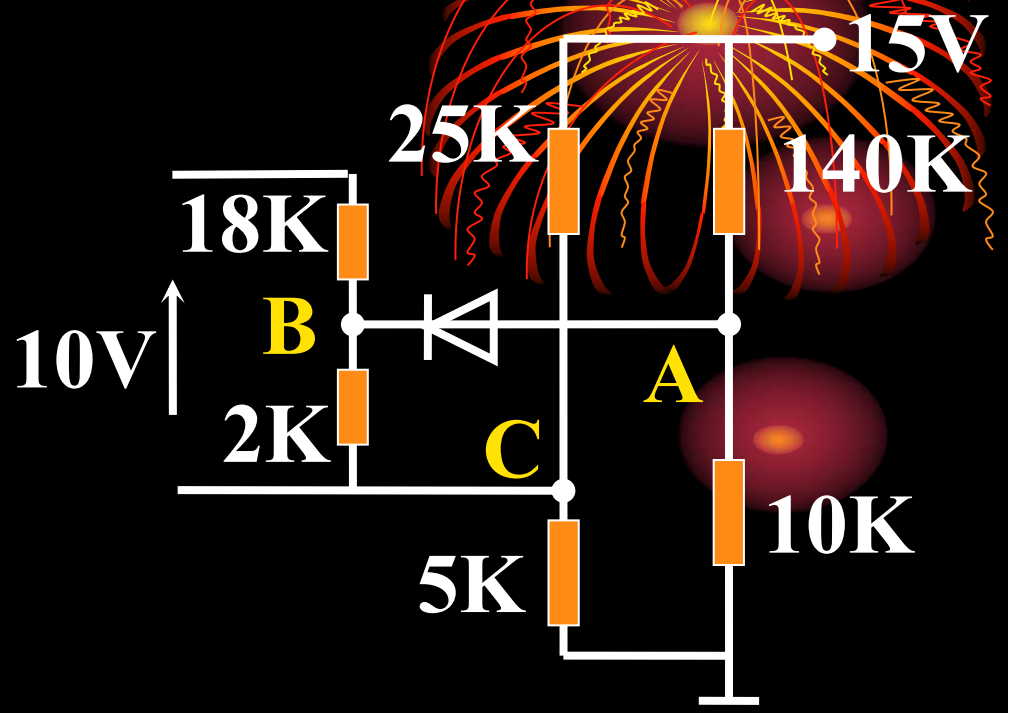
温度为80℃：

$I_R = 10 \times 2^3 = 80\ \mu A$

9—6 电路如图，试判断二极管状态。

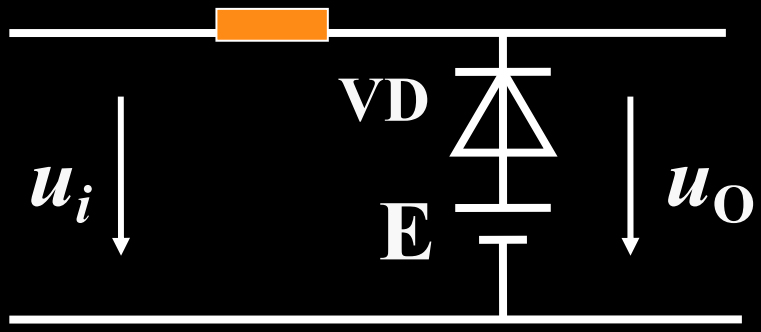
解：

假设二极管截止，



$U_B > U_A$ ， D截止

9—7 已知$u_i = 6\sin\omega t$V，E=3V，画输出波形。

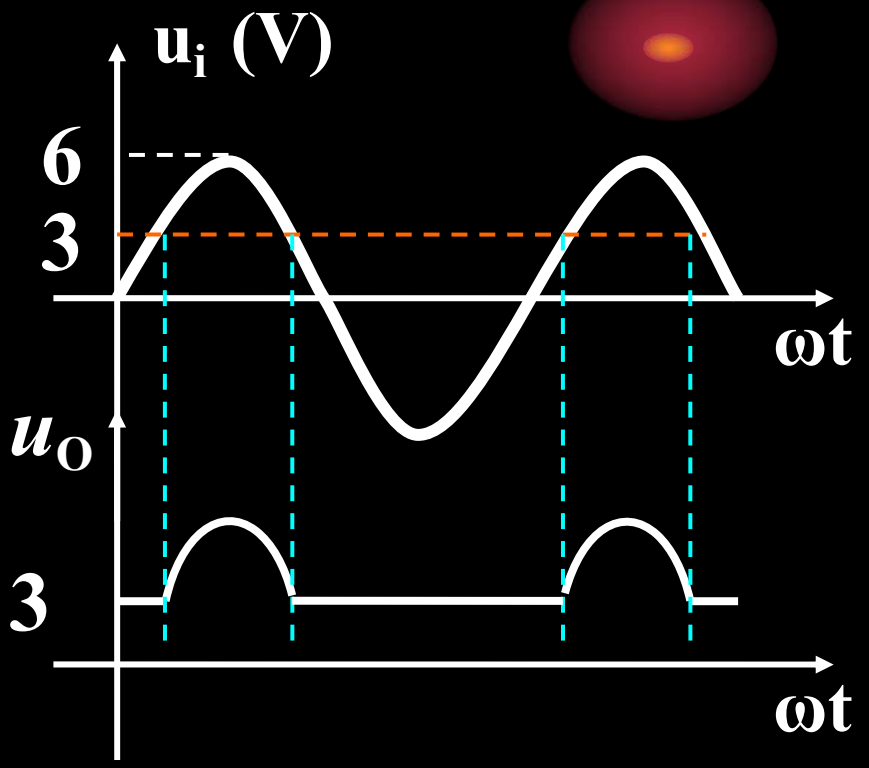


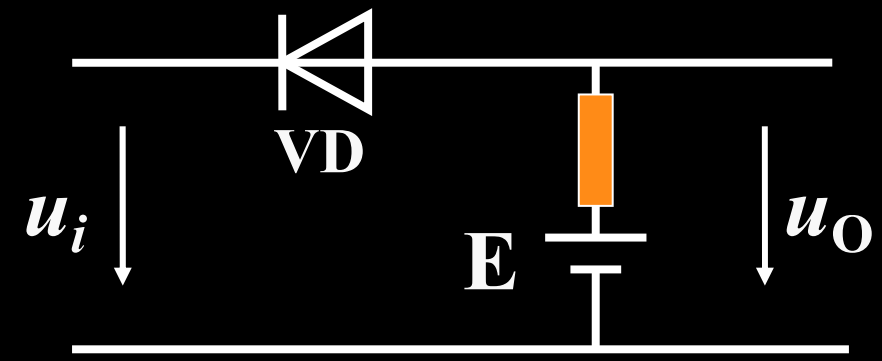
$u_i \geqslant E$ VD截止

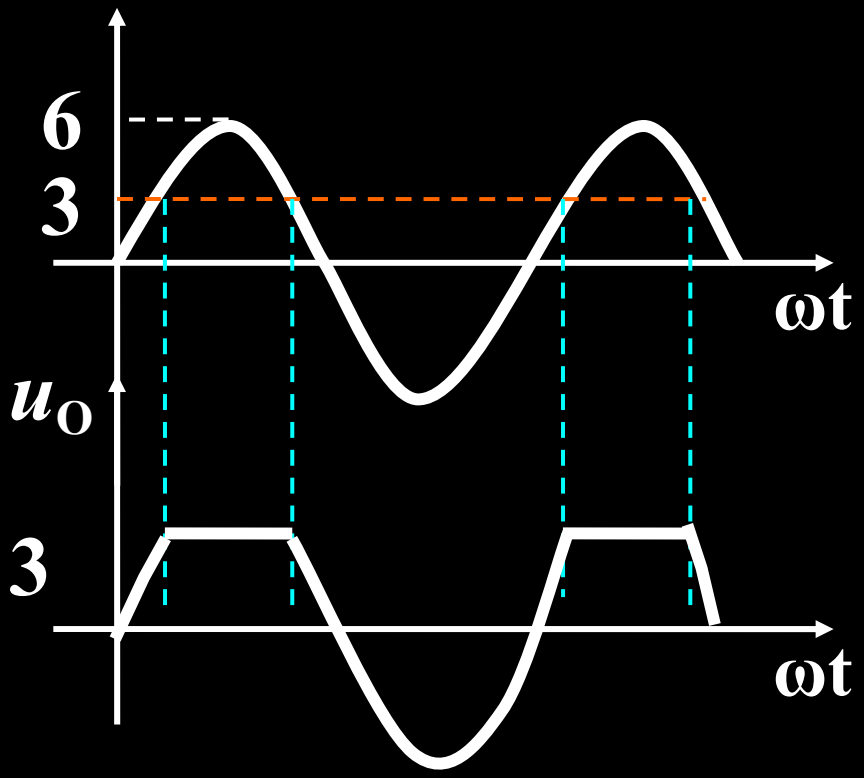
$u_o = u_i$

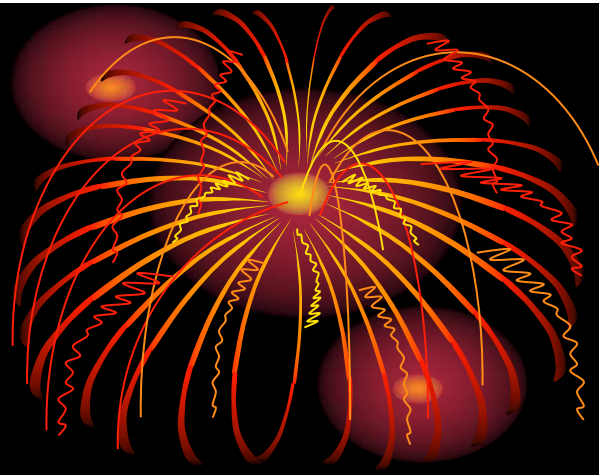
$u_i < E$ VD导通

$u_o = E$









$u_i \geqslant E$　　VD截止

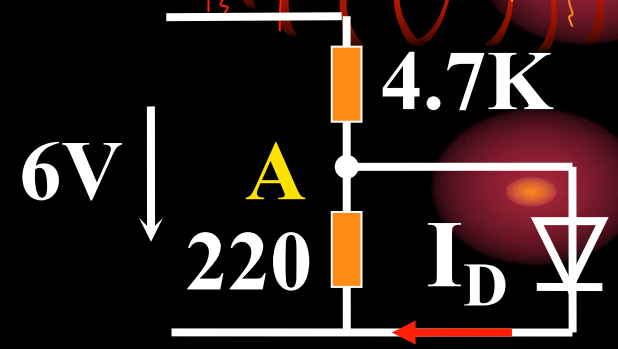
$u_o = E$

$u_i < E$　　VD导通

$u_o = u_i$

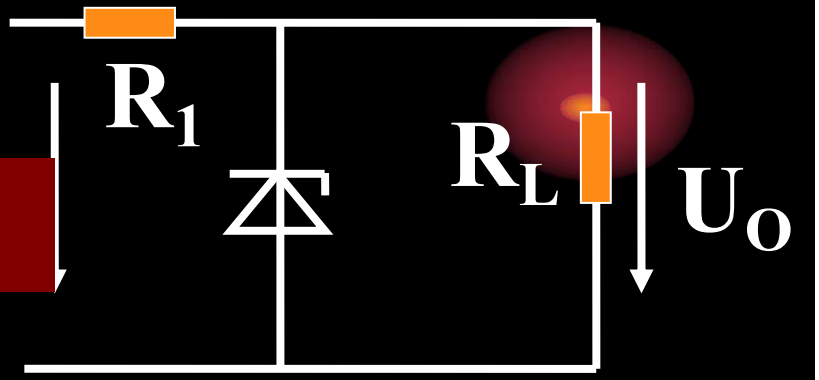
9—8 二极管为硅管，试判断其状态。若换为锗管，能否导通，求电流。

解：假设二极管截止，



硅管不能导通，锗管可以导通。

9－10　图示电路，R_1＝1KΩ，　R_L＝500Ω，稳压管U_Z＝6V,稳定电流范围I_{Zmax}＝25mA，I_{Zmin}＝5mA，试分析U_I＝10V、15V、20V，U_O的值。若U_I＝35V，负载开路会怎样？



U_I＝20V

稳压管反向稳压，U_O＝6V

$$I_Z=\frac{20-6}{1}-\frac{6}{0.5}=12\text{mA}$$

U_I＝35V

U_O＝6V

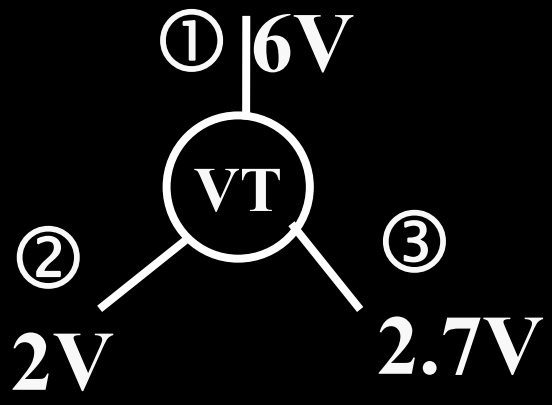
$$I_Z=\frac{35-6}{1}=29\text{mA},$$

电流超范围管子烧坏

9—14 已知三极管三个电极的对地电压，试判断它们的极性、材料、并确定三个电极。

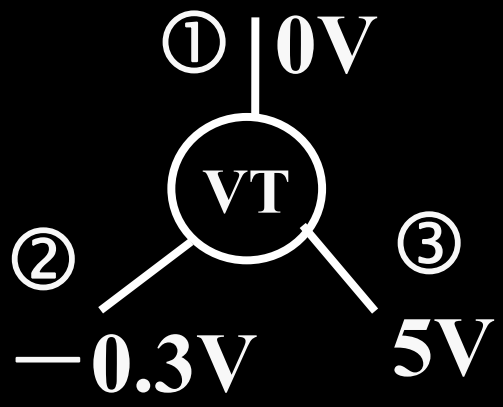
$|U_{be}|$ ≈0.3v(锗管）

$|u_{be}|$ ≈0.7v(硅管）



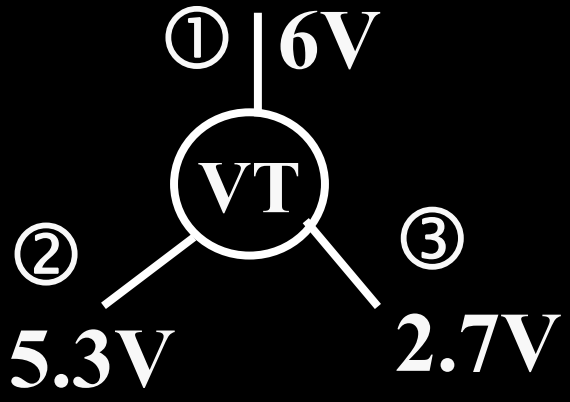
（1） 硅管 、NPN管

①集电极 ②发射极③基极



（2）锗管、NPN管

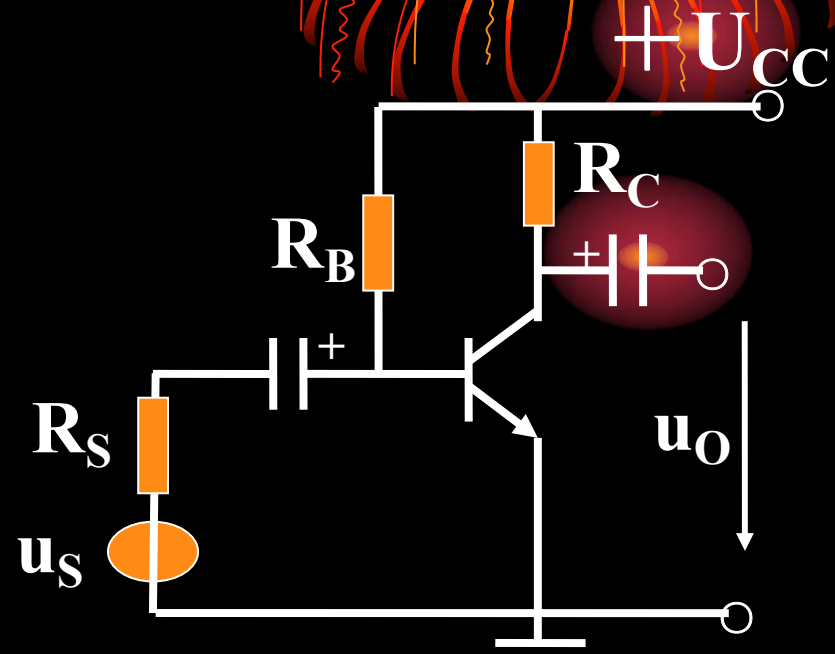
①基极②发射极③集电极



（3） 硅管 、 PNP管

①发射极②基极 ③集电极

9－18　有一只NPN晶体管接在共发射极电路中，若测得$U_{CE}\approx U_{CC}$，该管工作在什么状态？若$U_{CE}\approx 0$该管工作在什么状态？



共发射极电路如图

若$U_{CE}\approx U_{CC}$

$U_{Rc}\approx 0$，即$I_C=0$

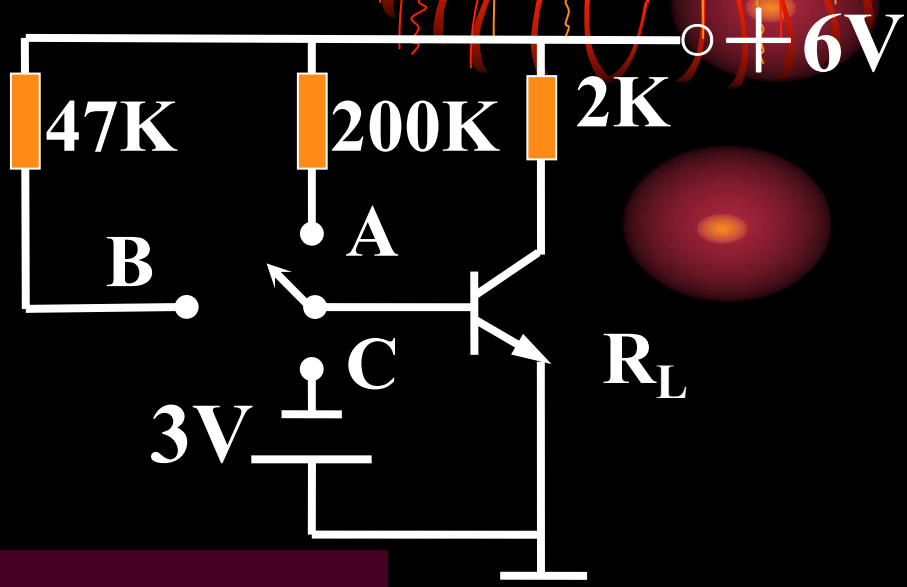
则电路处于截止状态

若$U_{CE}\approx 0$

则电路处于饱和状态

9－19 S分别接在A、B、C上时，判断晶体管状态，β＝50

若三极管正常工作可认为 $U_{BE}\approx 0.7$



接于B：$U_B > U_E$

$$I_B = \frac{6-0.7}{47} = 0.113\ \text{mA}$$

若 $I_C = \beta I_B = 56.5\text{mA}$

$U_{CE} = 6 - 56.5\times 2 = -107\text{V}$，错误

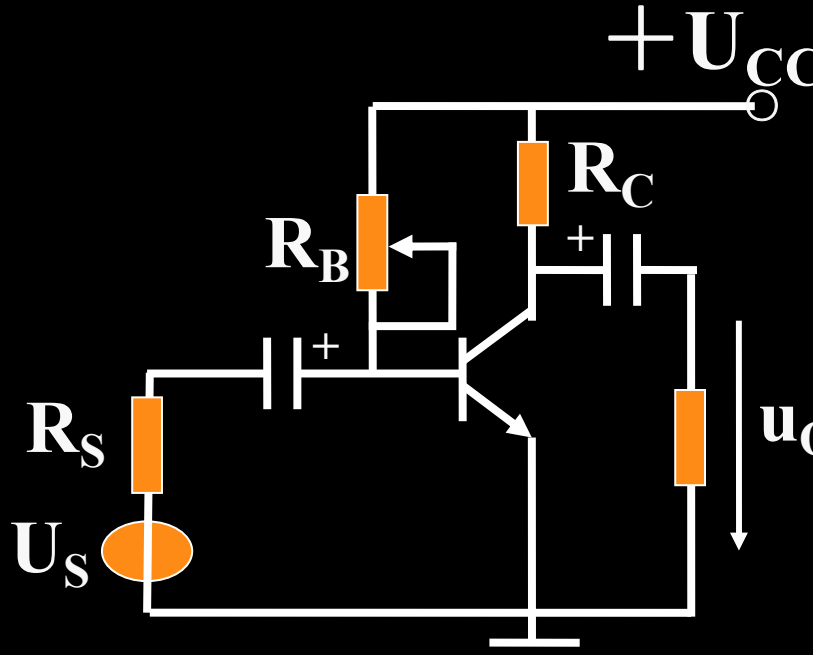
三极管为饱和状态

接于C：

$U_{BE} = -3\text{V}$

三极管为截止状态

10－1 已知U_{CC}=12V，当U_{CE}分别为7V，11.5V，0.5V时，三极管为何状态。



A. U_{CE}＝7V

集电结反偏发射结正偏

U_{CE}＝7V 放大

U_{CE}＝11.5V 截止

U_{CE}＝0.5V 饱和

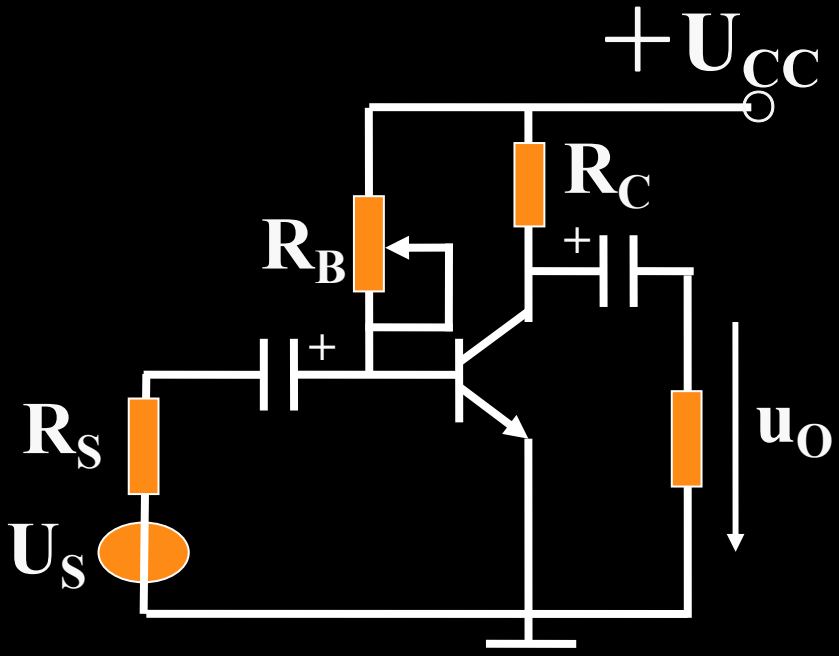
B. U_{CE}＝11.5V

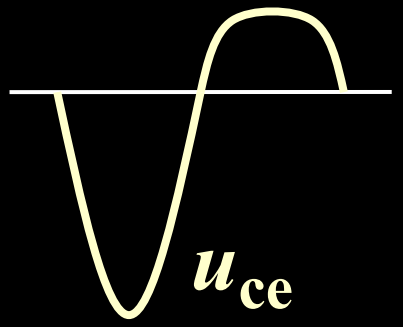
I_C很大，三极管饱和

C. U_{CE}＝0.5V

I_C很大，∴ I_B＝I_C/ β也很大

10－2 U_{CC}=12V，R_C=2.2kΩ,β=60，U_{BE}=0.6V，① U_{CE}=6V，R_B=？ ②I_C=1.5mA，R_B=？ ③若R_B=0，三极管有何影响④ 判断失真类型。

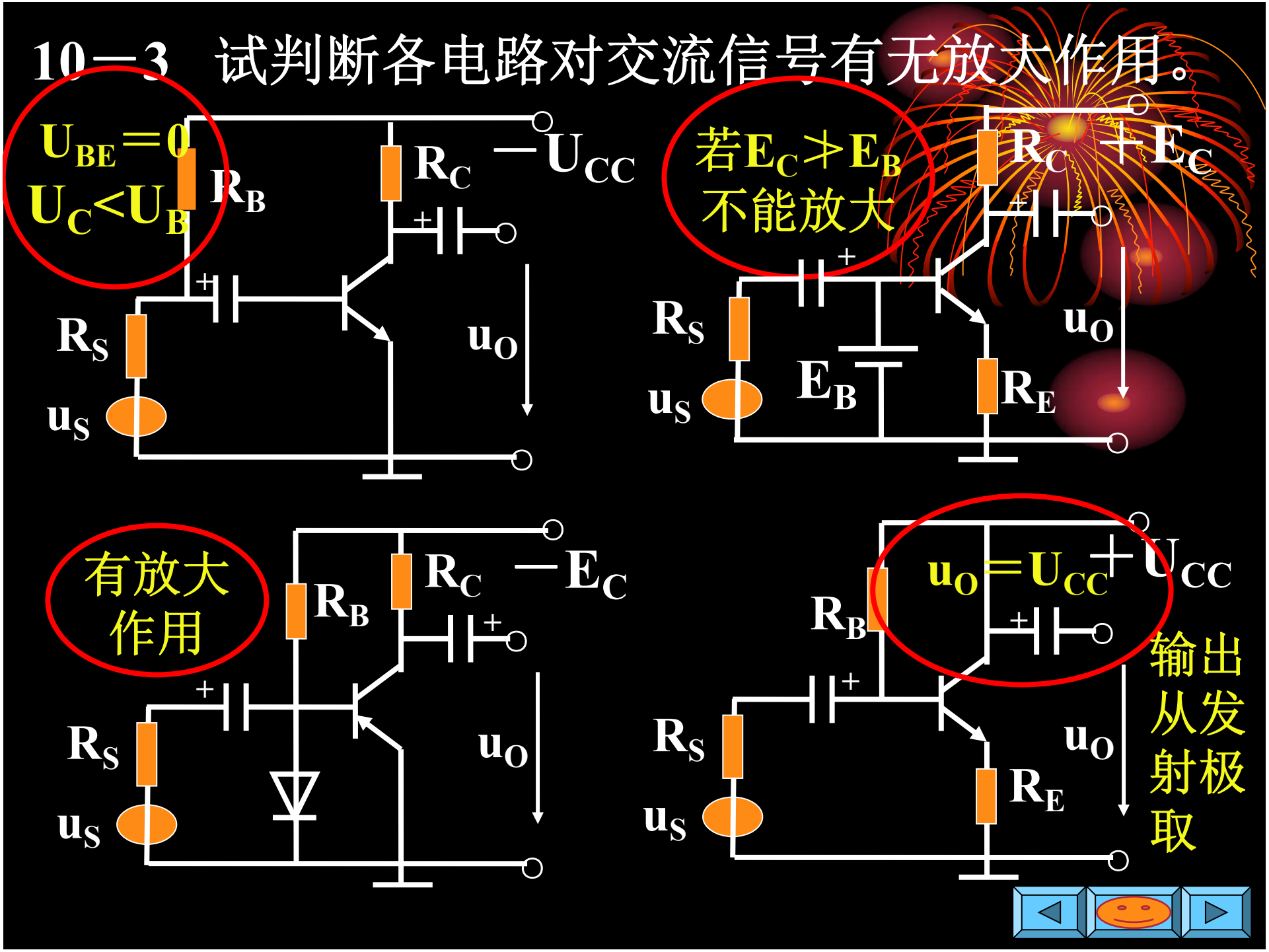




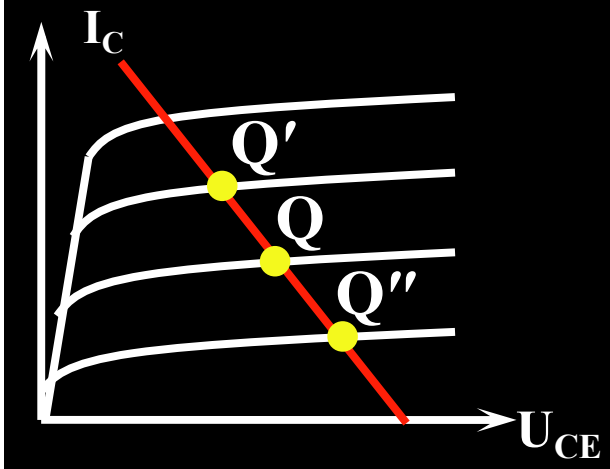
截止失真

若R_B＝0，U_{CC}直接加在B极上，使管子损坏，应再串入一个固定电阻。

10—3 试判断各电路对交流信号有无放大作用。

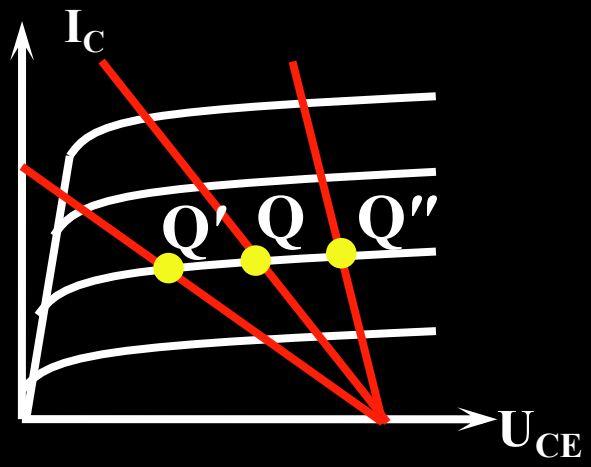


10－4　放大电路如图，若静态工作点由Q变为Q′、Q″，电路中哪些参数发生变化？



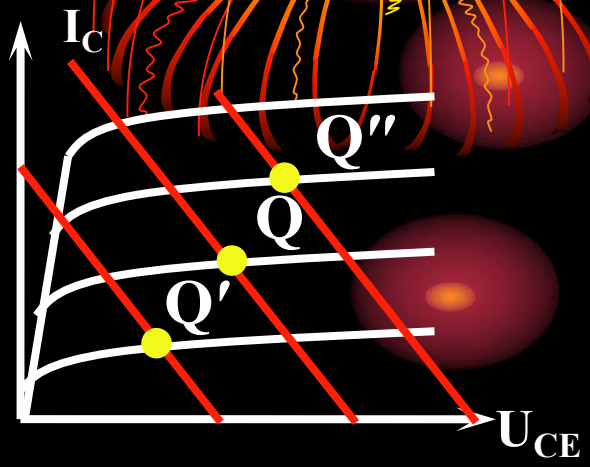
负载线斜率不变，I_B变化。

是R_B变化引起的。



负载线斜率改变，I_B不变。

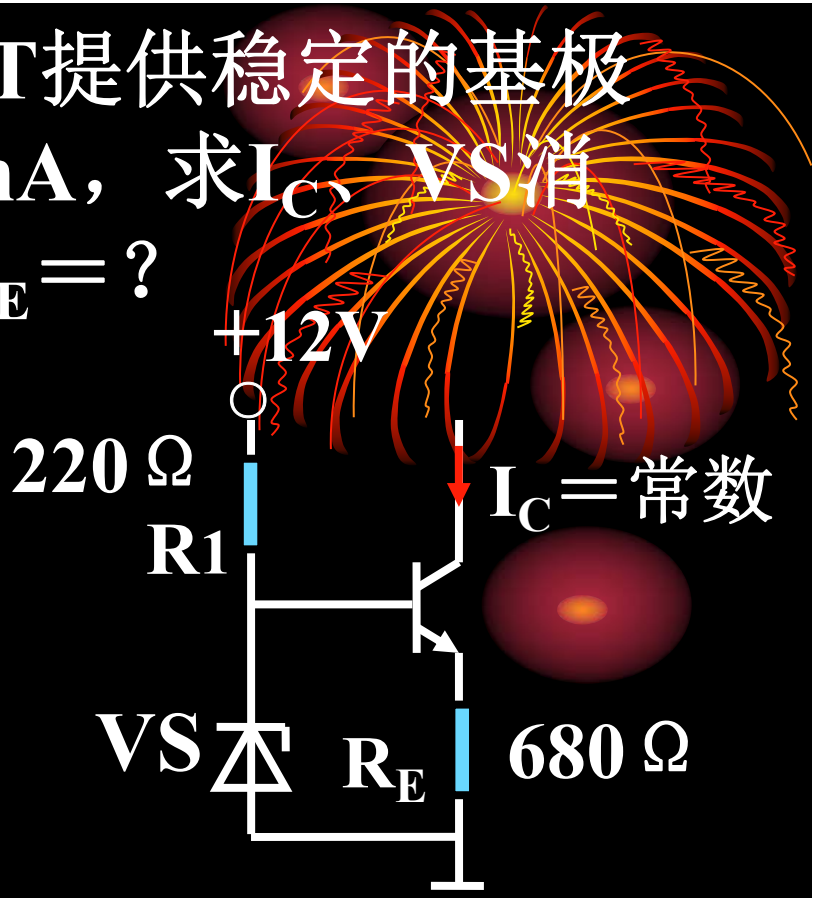
是R_C变化引起的。



负载线斜率不变，I_B变化。

是E_C变化引起的。

10－5　电路如图，用VS为VT提供稳定的基极偏压，U_Z＝ 7.5V，I_{ZM}＝50mA，求I_C、VS消耗的功率。若I_C＝2.5mA，R_E＝？



U_B=7.5V

U_E=7.5－0.7＝6.8V

I_E=6.8／680=10*m*A

$I_C \approx I_E$=10mA

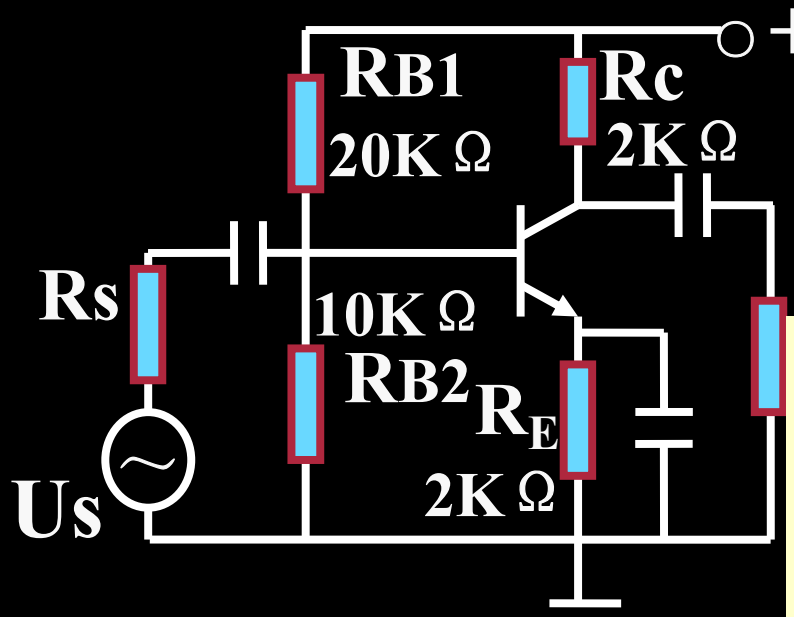
$I_Z \approx$（12－7.5）／220＝20.45mA

P_Z＝0.02045×7.5＝0.153W

若I_C＝2.5mA，

R_E＝6.8／2.5＝2.72KΩ

10－6 已知β=50,画出微变等效电路；计算Q、Au、Ri、Ro。



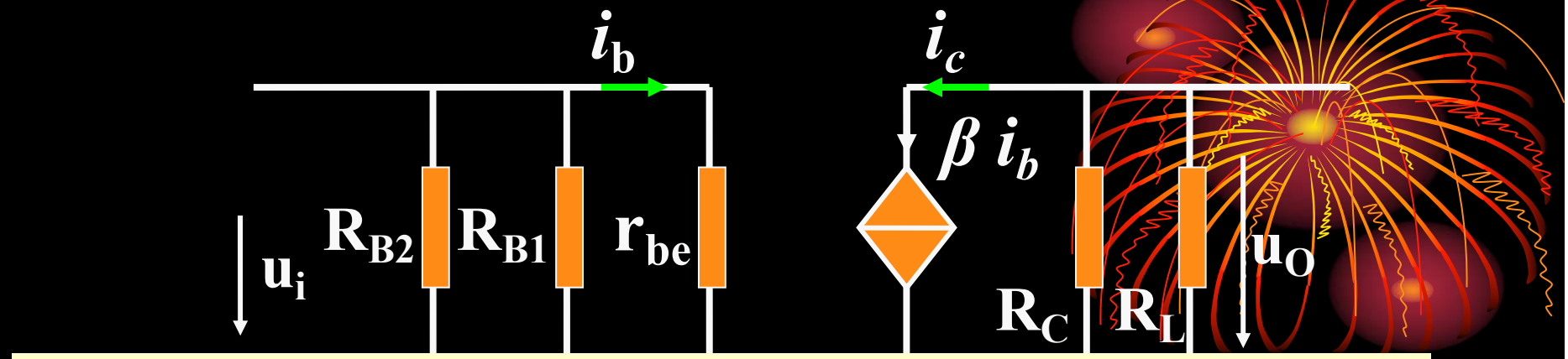
$$U_B = \frac{R_{B2}}{R_{B1}+R_{B2}} \cdot Ucc$$

$$\frac{10}{} \times 12$$

$$U_{CE} \approx Ucc - I_C(Rc+R_E)$$
$$= 12 - 1.65 \times (2+2)$$
$$= 5.4\ V$$

$$I_C \approx I_E = \frac{U_E}{R_E} = \frac{3.3}{2}$$
$$= 1.65mA$$

$$I_B = \frac{I_C}{\beta} = \frac{1.65}{50}$$
$$= 33\mu A$$

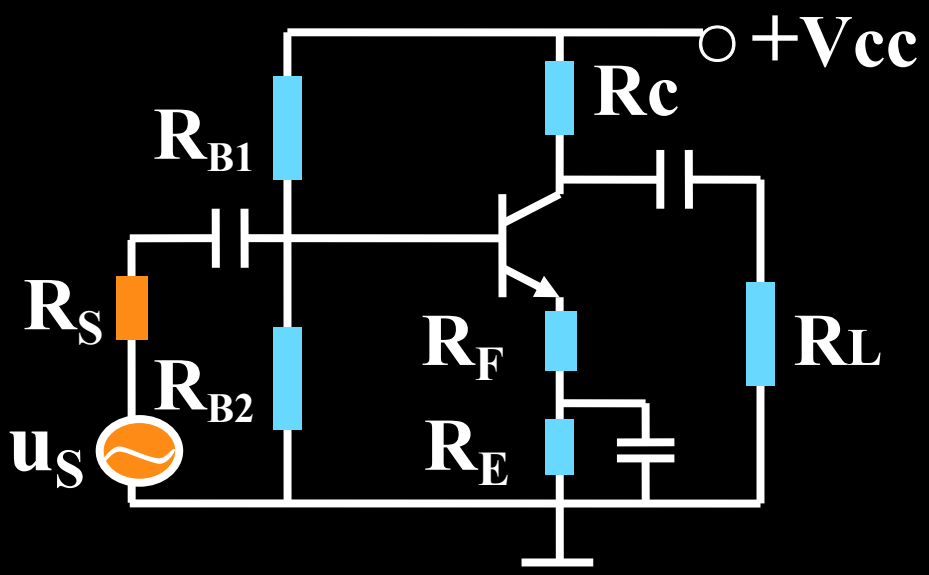


若换上一只β=30的三极管，I_C基本不变。

温度上升至50℃，V_C经调整，与原值接近。

=1KΩ

10－7 已知R_{B1}=33KΩ，R_{B2}=8.2KΩ，Rc= 10KΩ，R_F=390Ω，R_E=3KΩ，Vcc=20V，β=40，R_L=10KΩ。试计算Au、r_{be}、r_i、r_O；要使U_0＝460mV，U_I＝？若R_S＝1KΩ，U_S=?

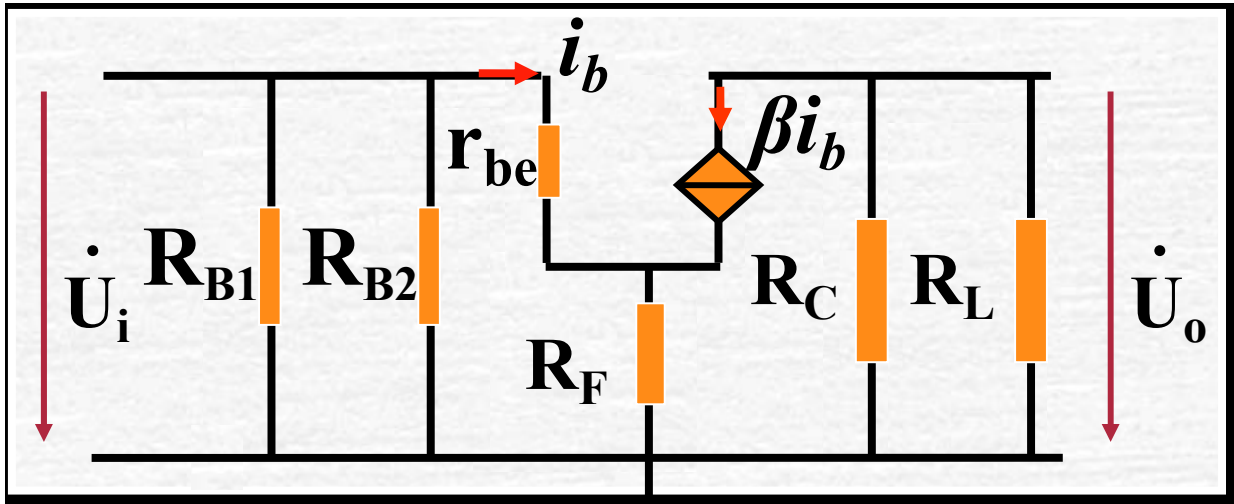


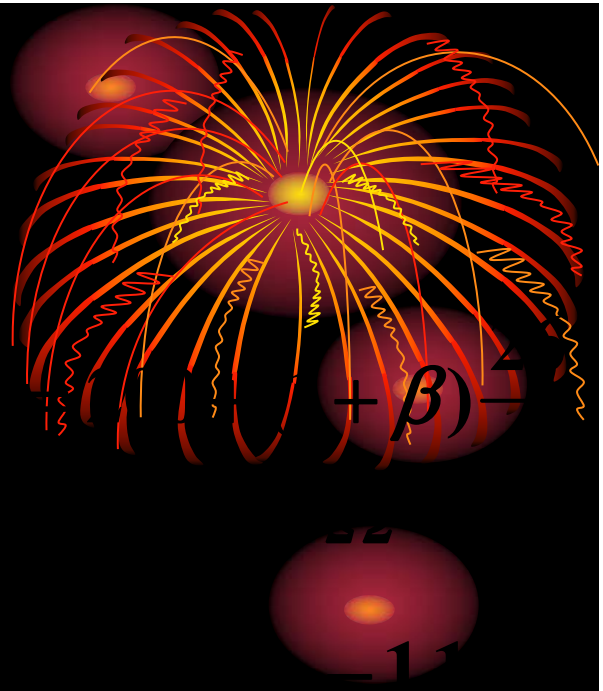
$$U_B = \frac{R_{B2}}{R_{B1}+R_{B2}} \cdot Vcc$$

$$= 3.98V$$

$$I_E = \frac{U_B}{R_F+R_E} = \frac{3.98}{3.39}$$

$$= 1.17mA$$

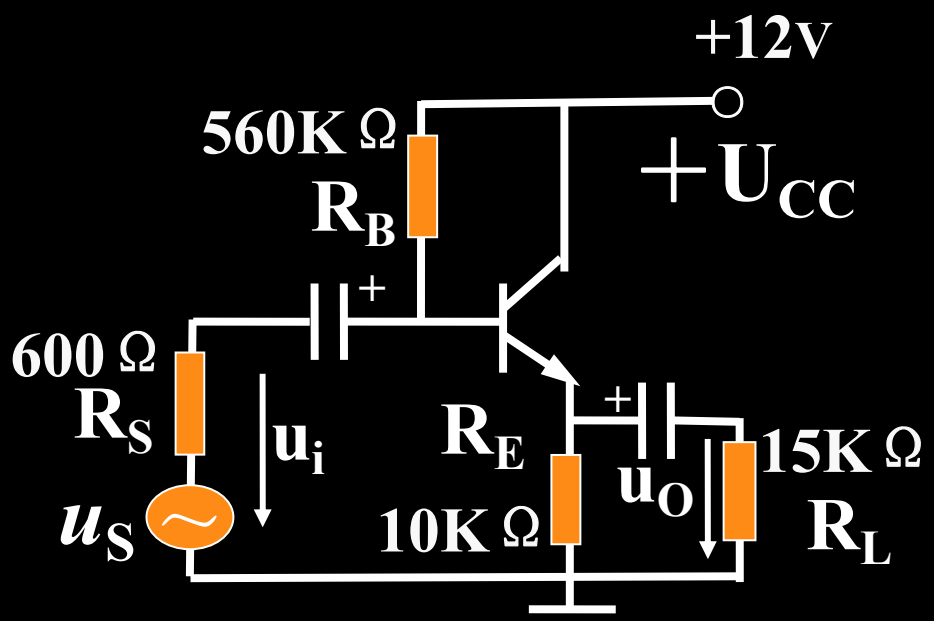




$$U_I = U_O / A_u = 39.55\text{mV}$$

$$U_S = U_O / A_{us} = 47.9\text{mV}$$

10－8 已知 $\beta=60$，求：静态工作点Q、画出微变等效电路、A_u、A_{us}、r_i、r_0。



$$r_i = R_B // [r_{be} + (1+\beta)(R_E // R_L)]$$

$$= 560 // [2.86 + (1+60)(10 // 15)]$$

$$= 222\,K\Omega$$

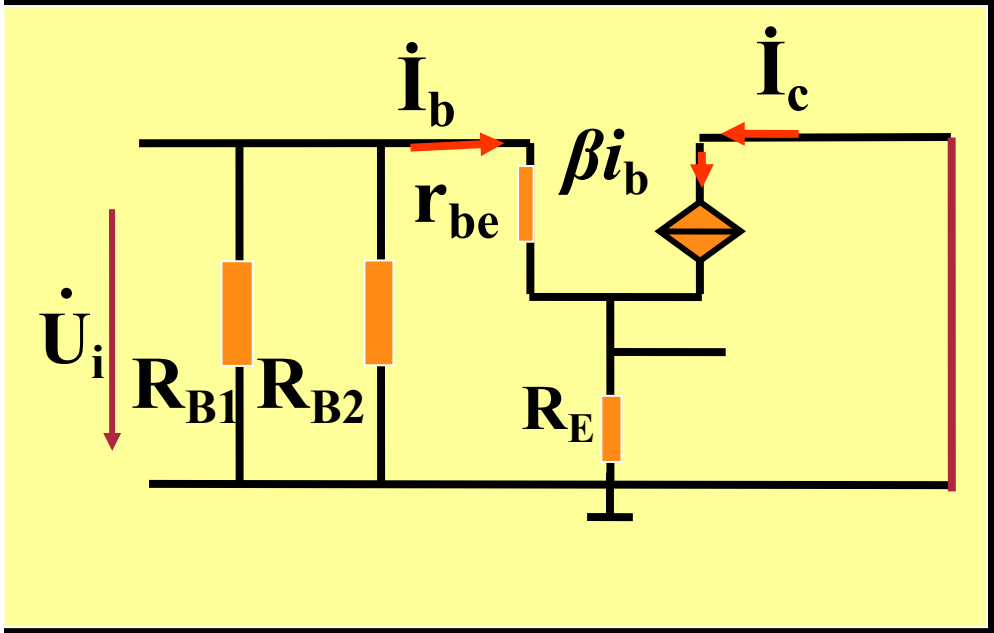
$$r_0 = R_E // \frac{r_{be} + (R_B // R_S)}{1+\beta}$$

$$= 10 // \frac{2.86 + (560 // 0.6)}{1+60} = 56.4\Omega$$

$$\dot{A}_{us} = \dot{A}_u \cdot \frac{r_i}{r_i + R_S} = 0.992 \times \frac{222}{(222+0.6)}$$

$$= 0.989$$

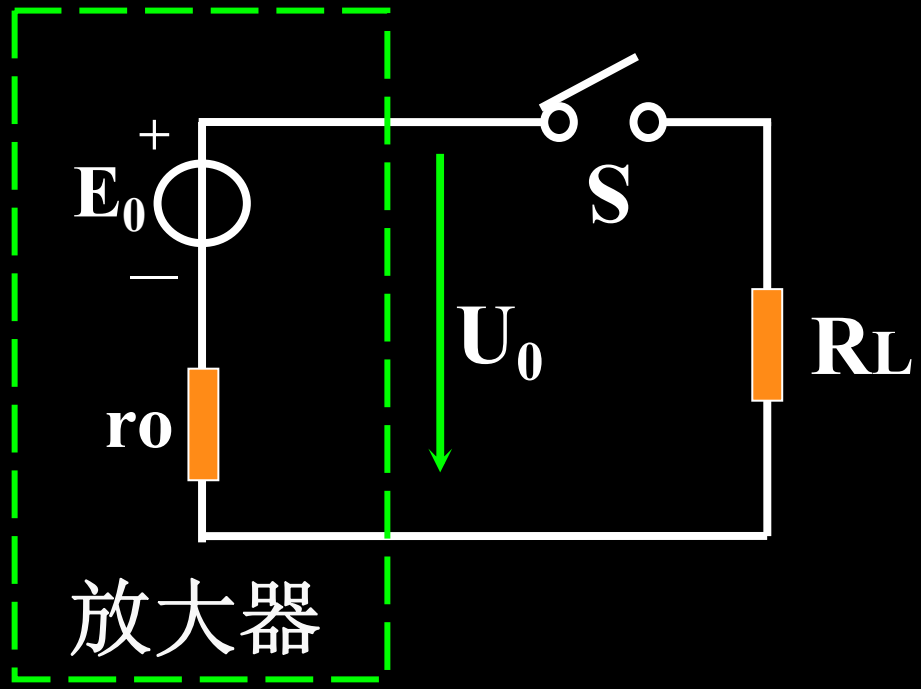
10－9 电路如图，已知 $\beta=50$，$r_{be}=1K\Omega$，画微变等效电路；求r_i、 r_O、 ，



解：

$+\beta)R$

10－10 某放大电路不带负载时，开路电压$U_0'=1.5V$，而带上5.1KΩ负载，开路电压$U_0=1V$，求输出电阻$r_o=?$



开路时

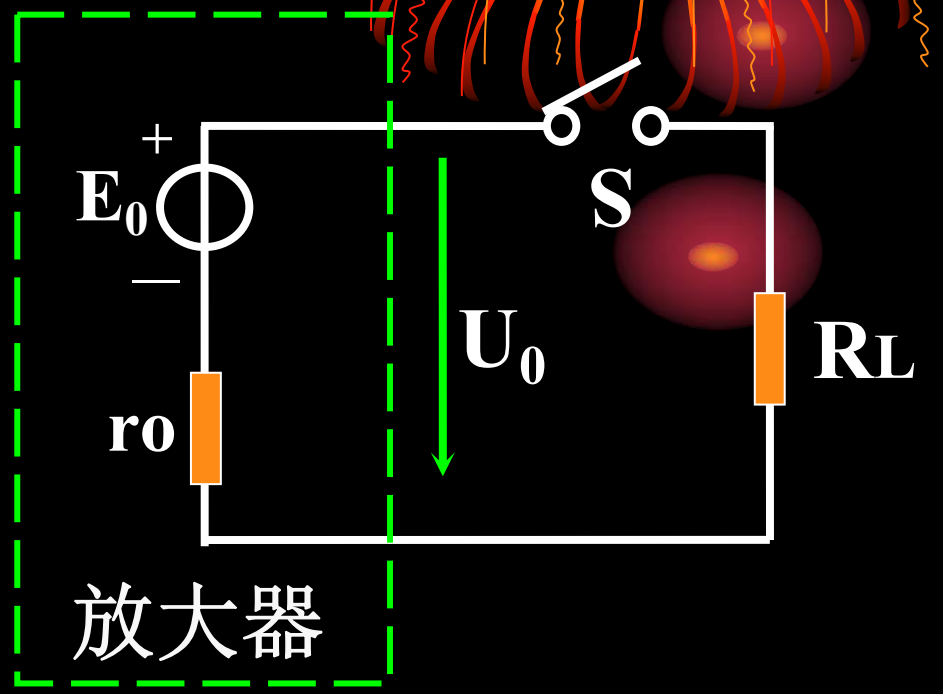
$E_0=U_0'=1.5V$

带上负载

$1.5\times5.1=r_0+5.1$

$r_0=2.55K\Omega$

10－11 某放大电路若R_L从6KΩ变为3KΩ时，输出电压U_0从3V变为2.4V，求输出电阻r_o＝？若R_L开路，求U_0＝？



R_L＝6KΩ

R_L＝3KΩ

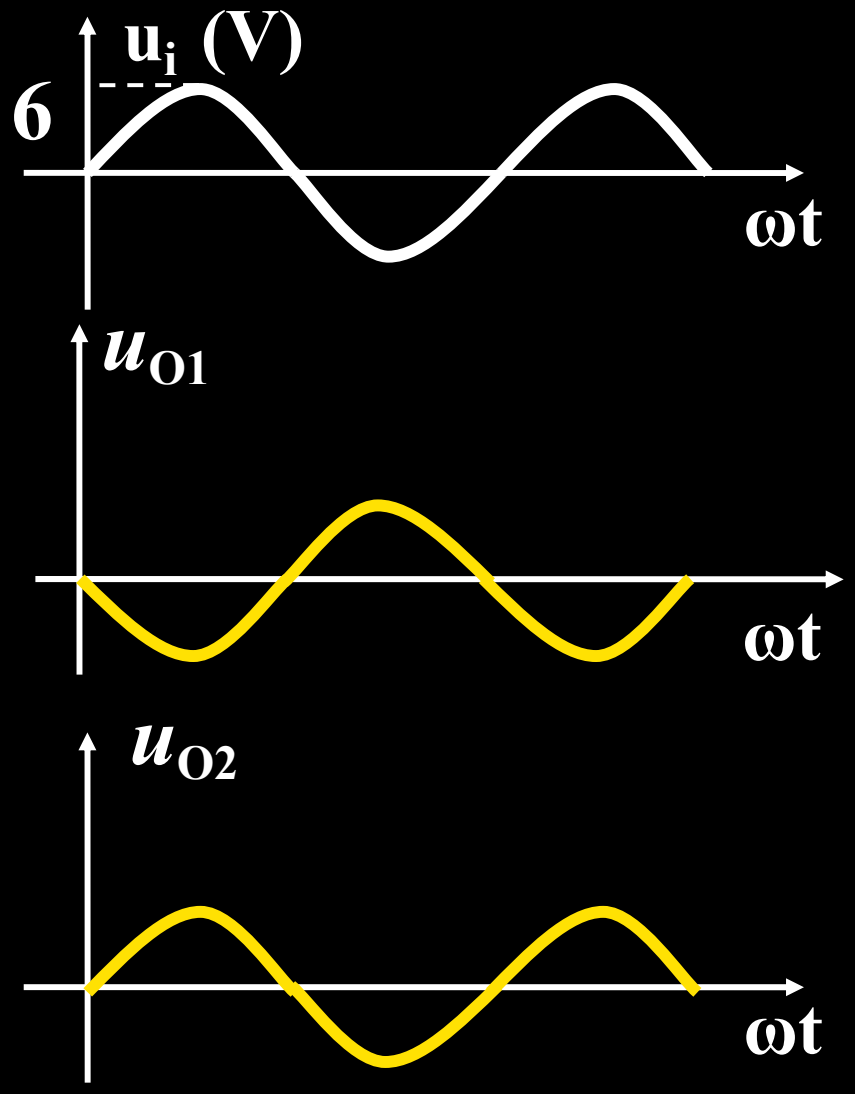
得 r_0＝2KΩ

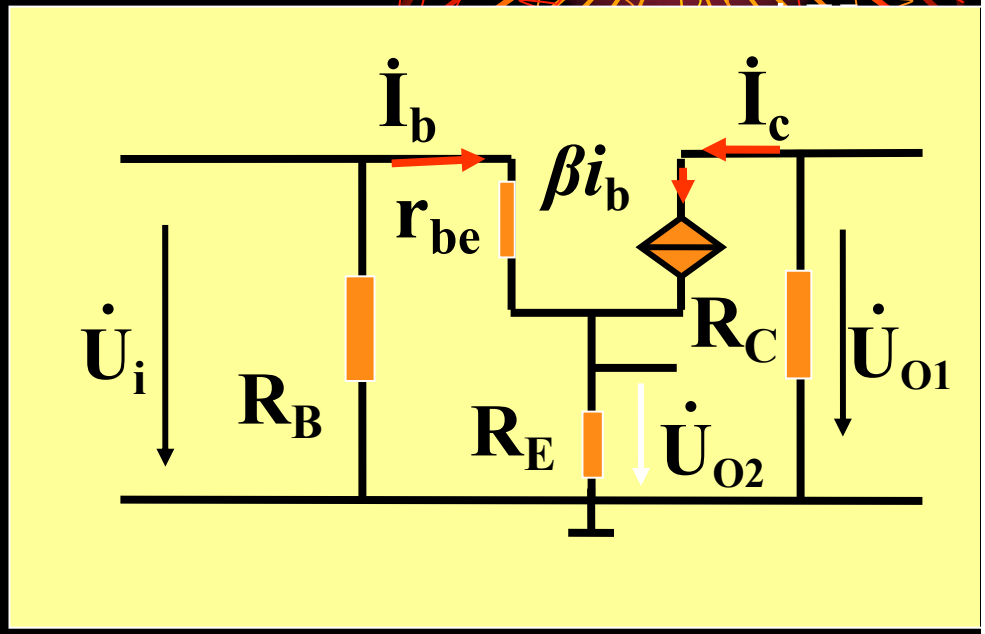
E_0＝4V

若R_L开路，

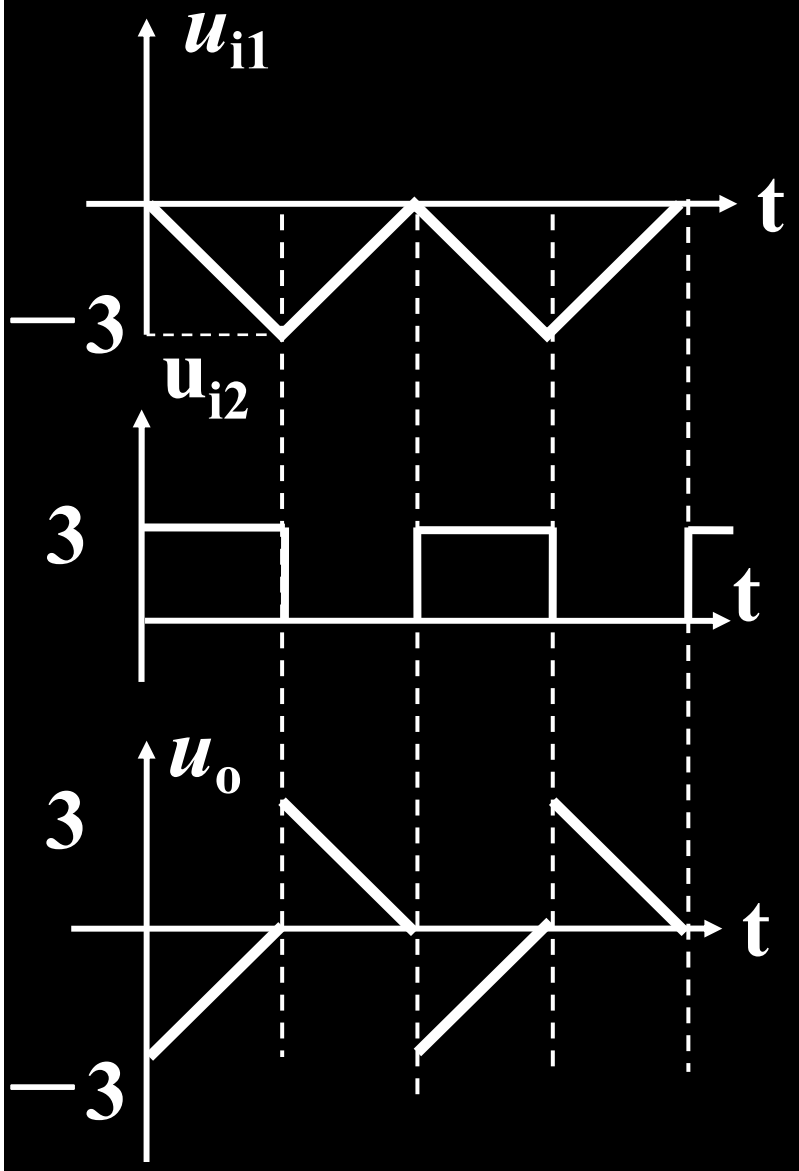
U_0＝E_0＝4V

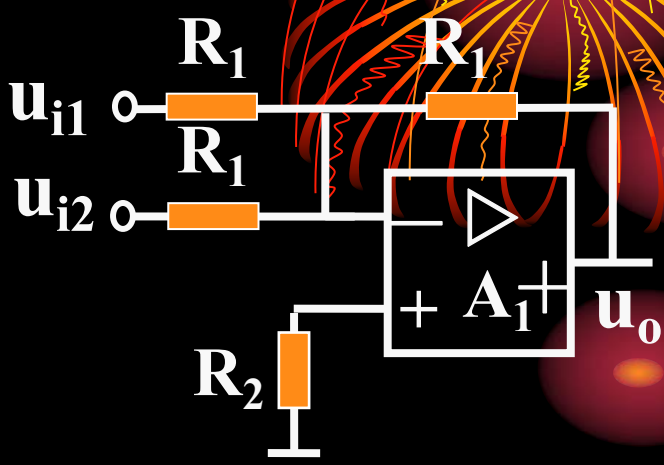
10－12 画微变等效电路；求A_{u1}、A_{u2}，当$R_C=R_E$时，输入正弦波，画输出波形。





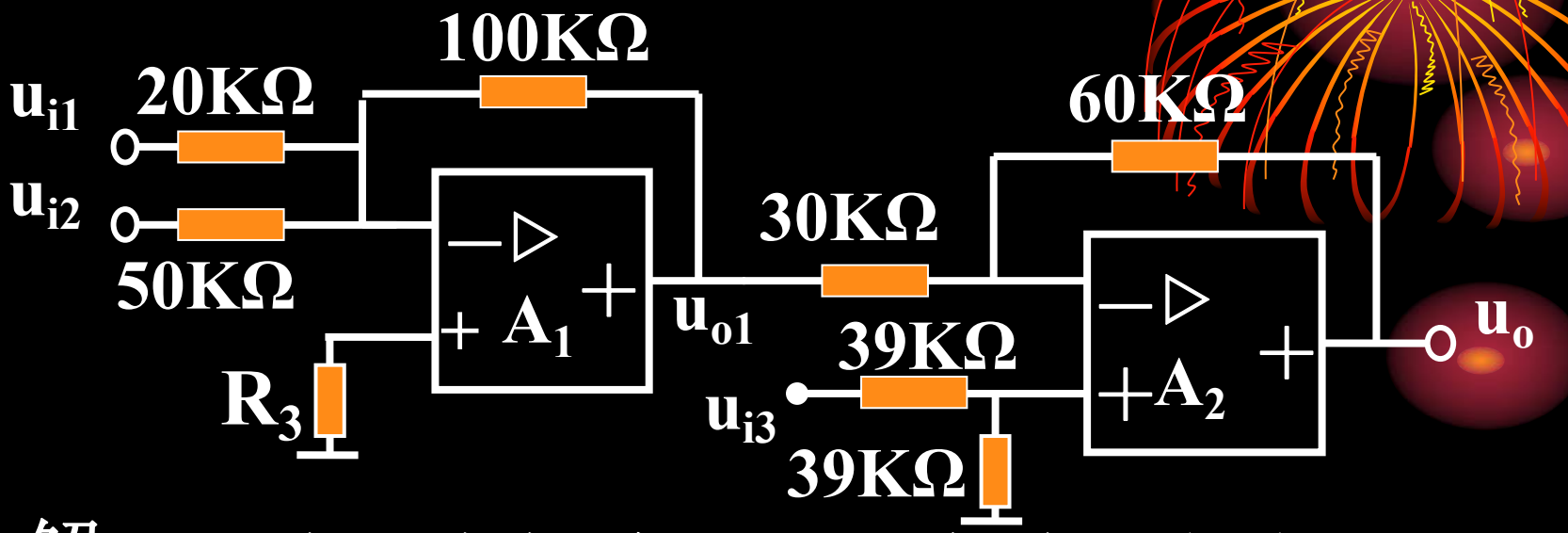
11－3　已知u_{i1}、u_{i2}输入波形，试画输出波形。





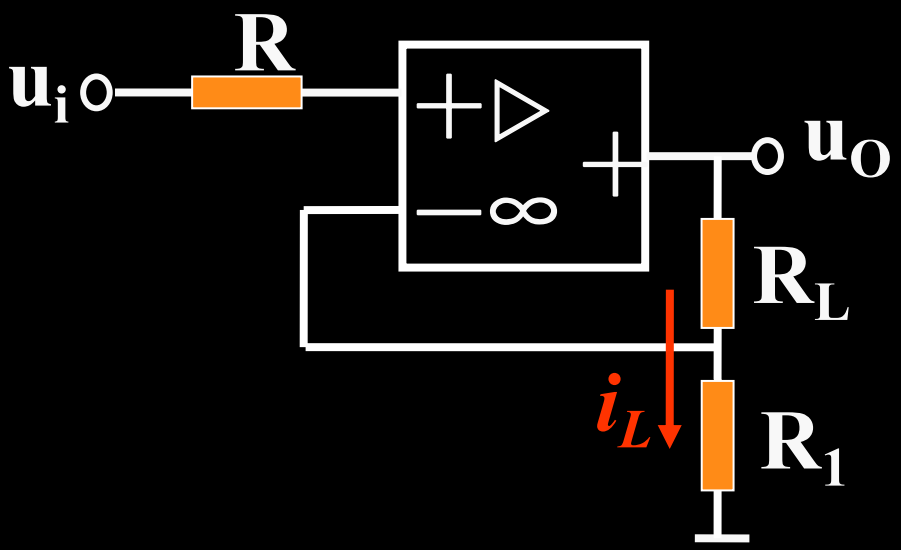
$$u_O = -(u_{i1} + u_{i2})$$

11－4　已知u_{i1}＝0.5V，u_{i2}＝－2V，　u_{i3}＝1V，运算放大器构成何电路，求u_o、R_3。



解：A_1为反向加法器；A_2为差动电路。

11－5 求i_L与u_i的关系式。

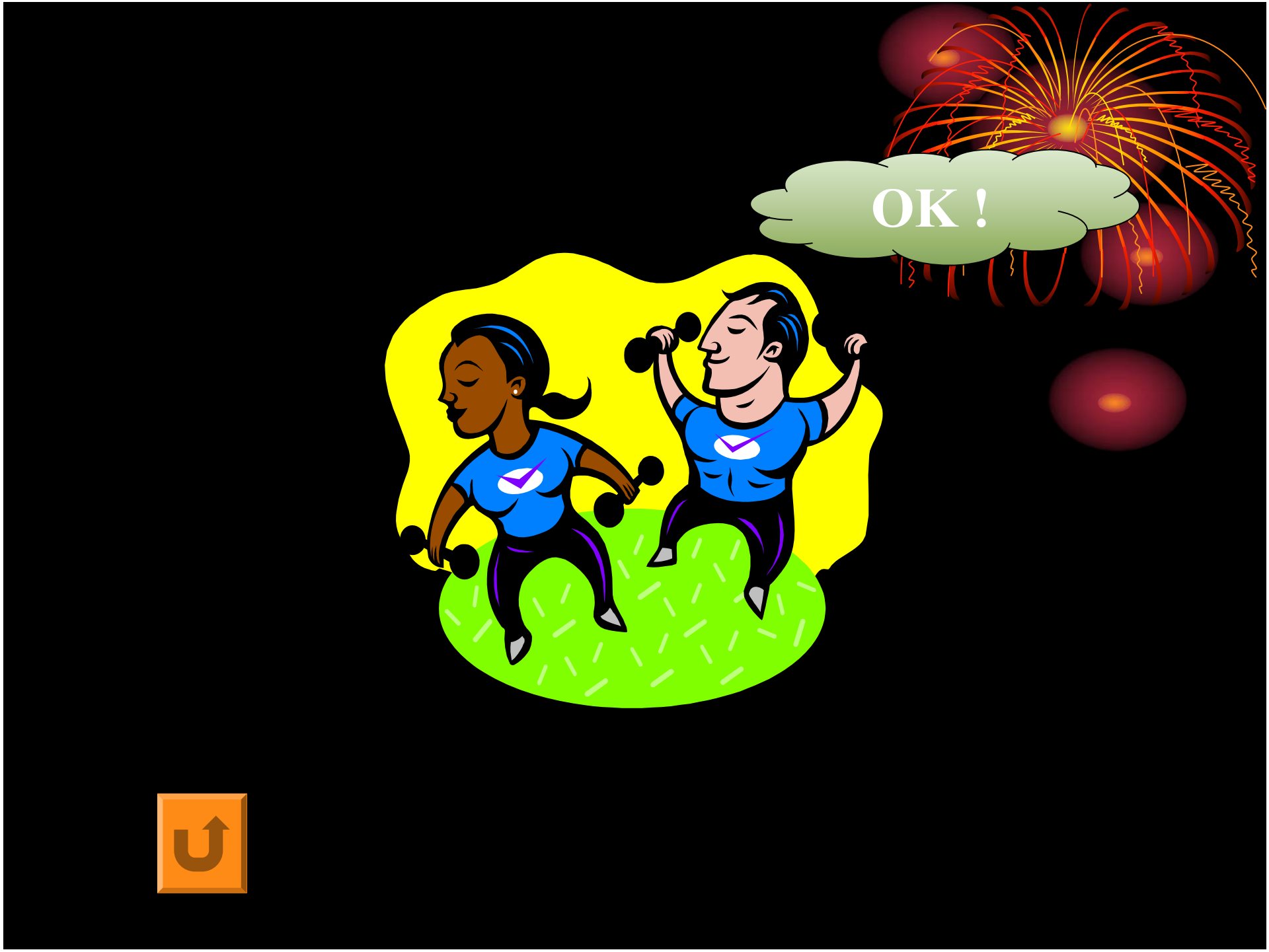


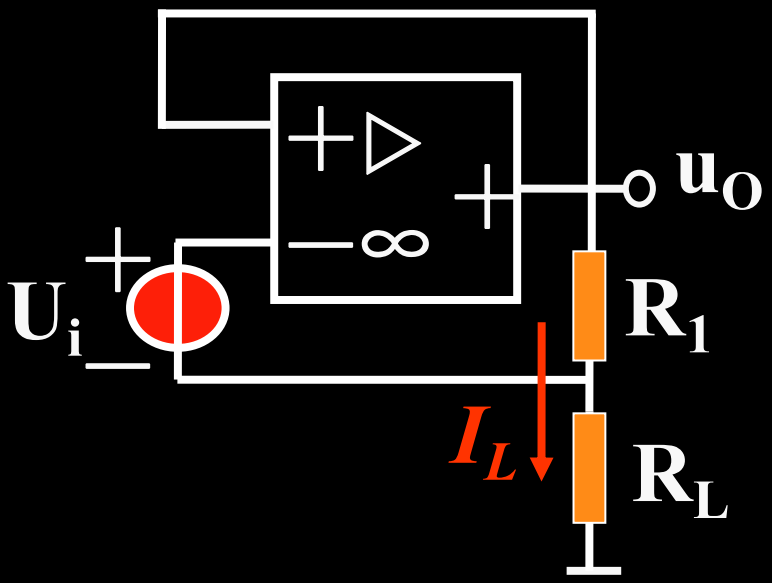
A. u_+为虚地点

B. $u_- \neq u_i$

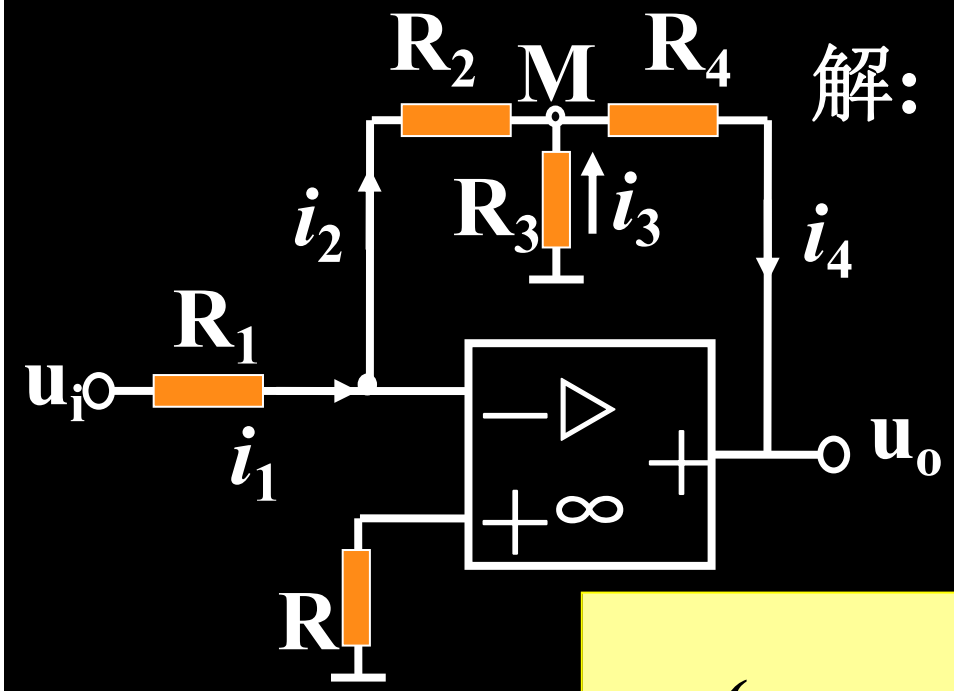
C. $i_L = u_O / (R_L + R_1)$

D. $i_- = u_- / R_1$





11－6 图示电路为T型反相比例电路，$R_2=R_3=R_4=4R_1$，试推算输出输入之间的关系。



解：$u_+ \approx u_- \approx 0$（虚地点）

$\because i_- \approx i_+ = 0$

$\therefore i_1 = i_2 = u_i / R_1$

$$= -(R_2+R_4)\frac{u_i}{R_1} - \frac{R_4 R_2}{R_3}\cdot\frac{u_i}{R_1}$$

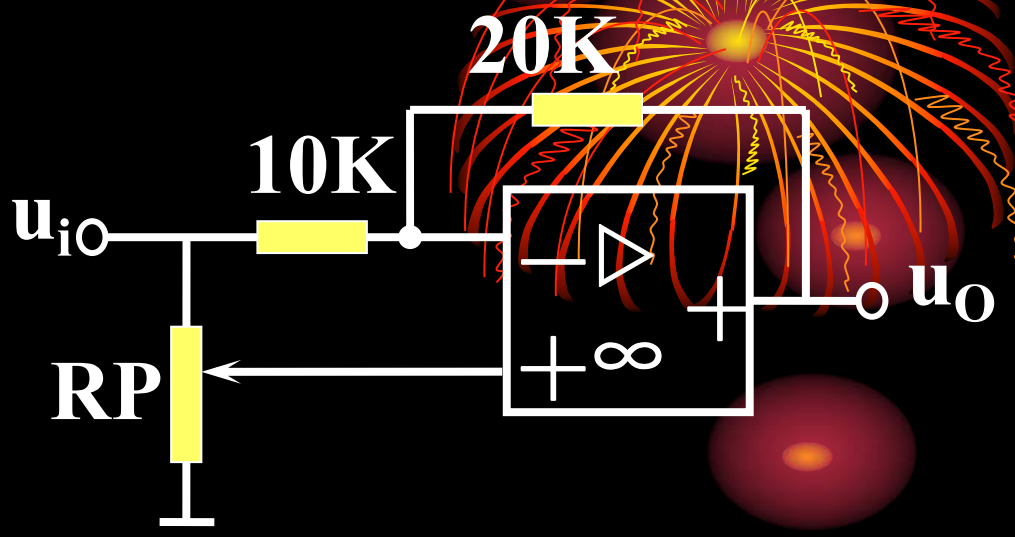
$$\frac{u_0}{u_i} = -\frac{R_2+R_4}{R_1}\left(1+\frac{R_2 /\!/ R_4}{R_3}\right) = -12$$

11－7 理想运放如图，试求A_u可调范围。

解：

滑动头在最下端

电路为反相比例电路



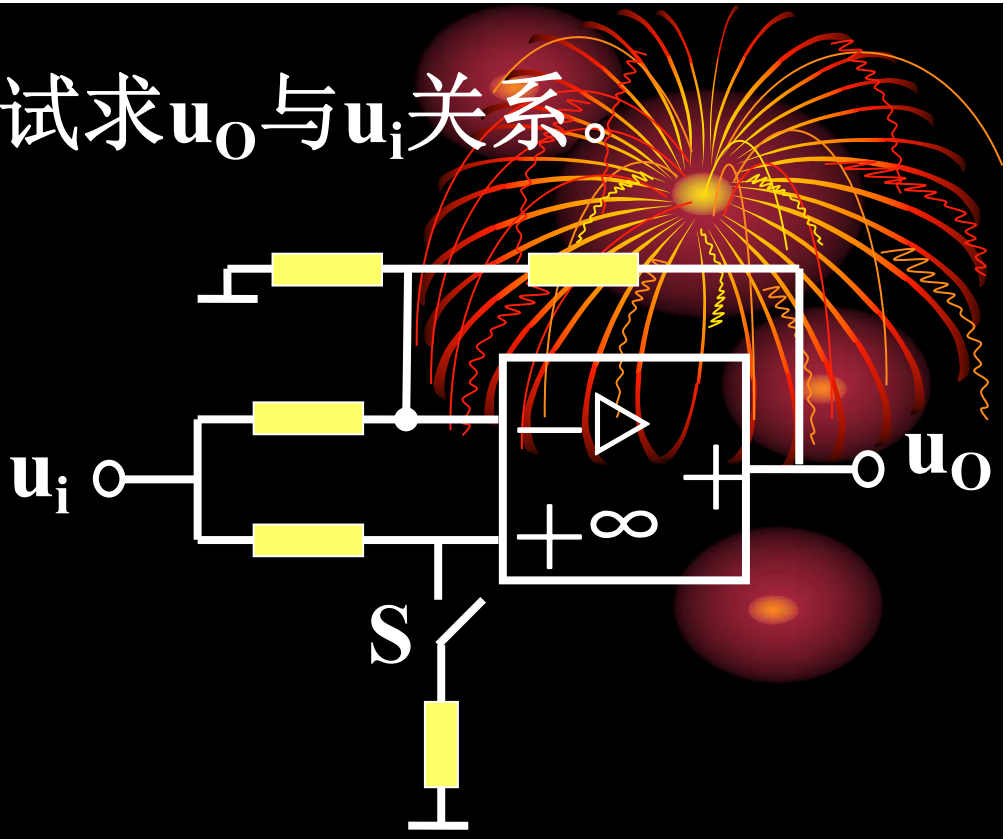
滑动头在最上端，电路为差动电路

Au可调范围－2~ 1

11－8 理想运放如图，试求u_O与u_i关系。

解：

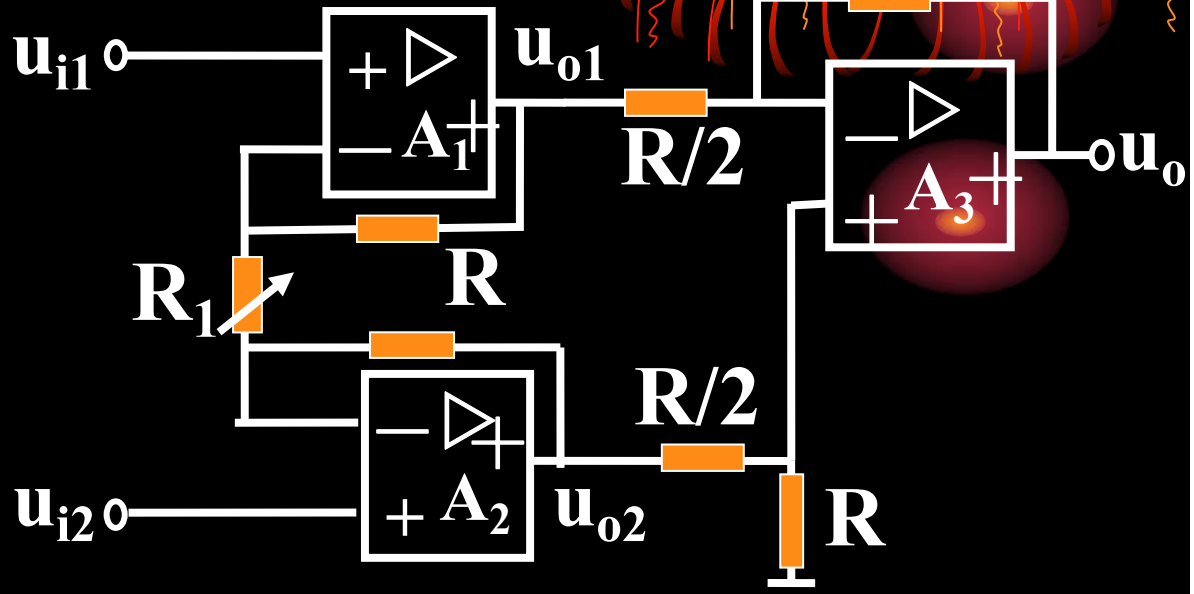
S打开，为差动电路



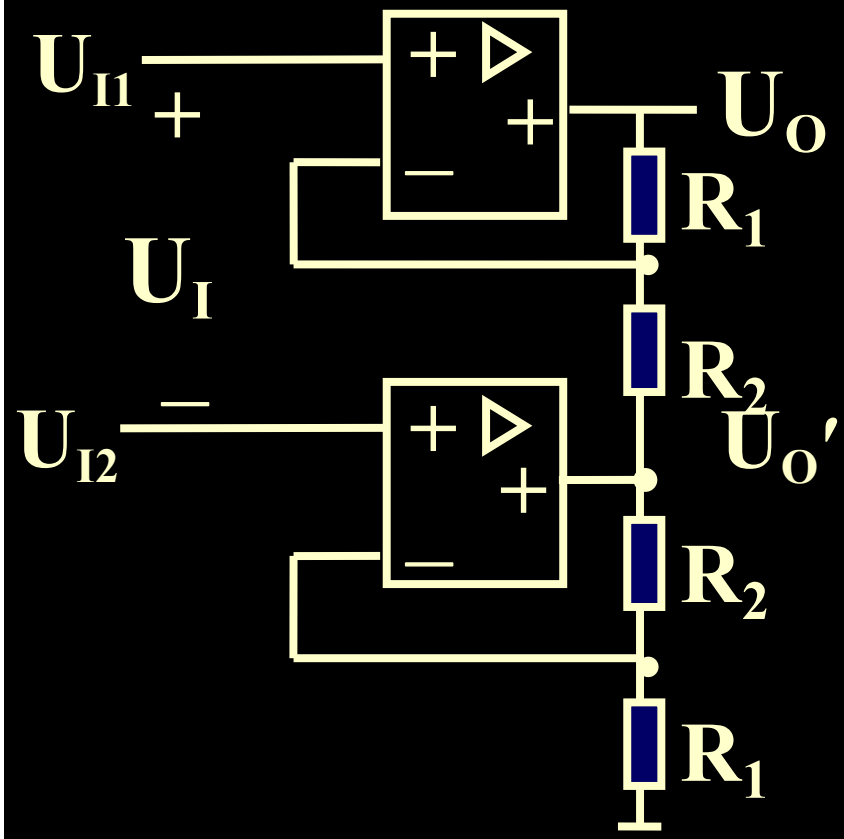
S闭合，仍为差动电路

11－9 理想运放如图，试求证

$$u_{R1}=u_{i1}-u_{i2}$$

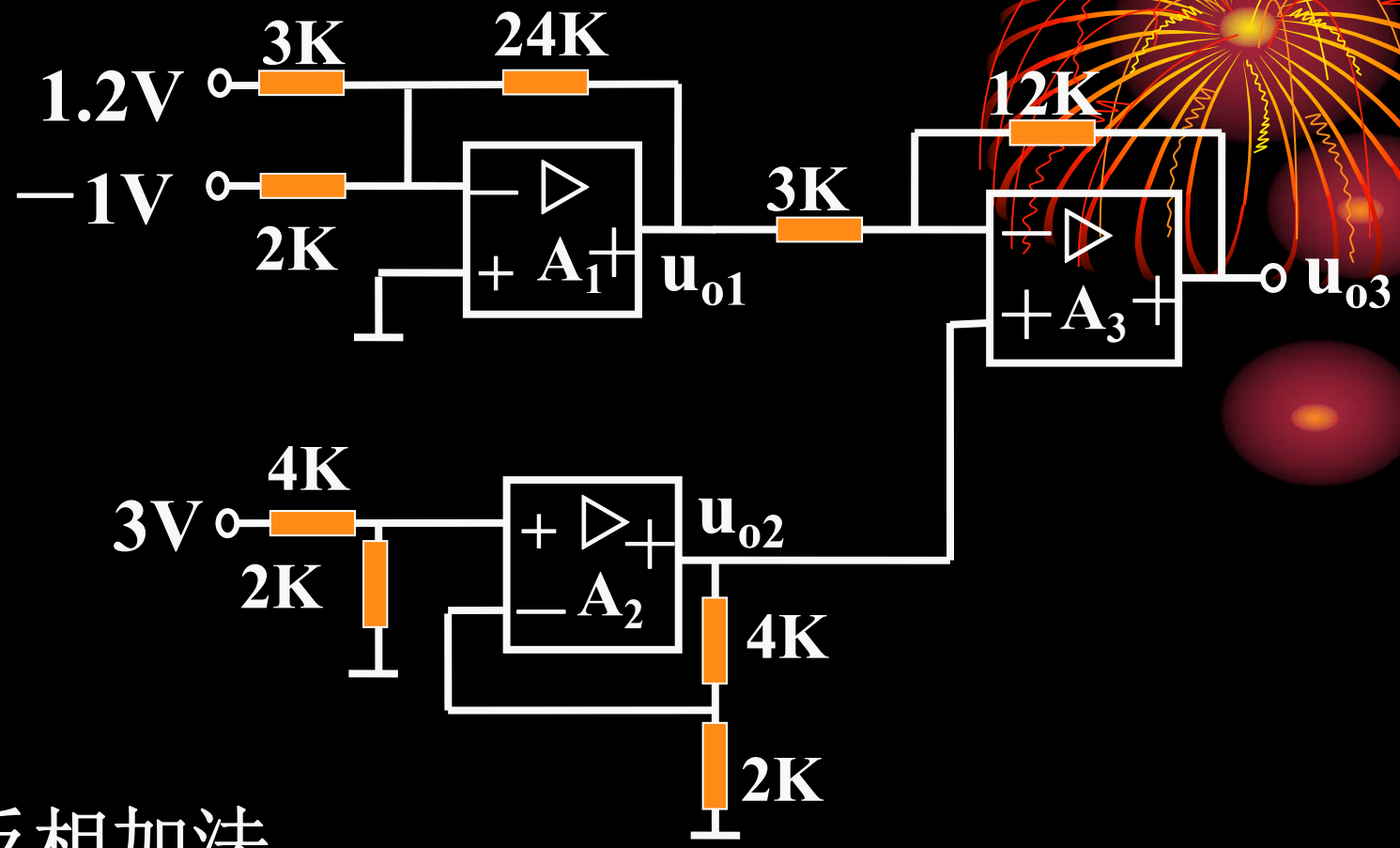


11－10 理想运放如图，试求u_O。



$$U_I = U_{I1} - U_{I2}$$

11－11　如图，求u_{01}、u_{02}、u_{03}的值。

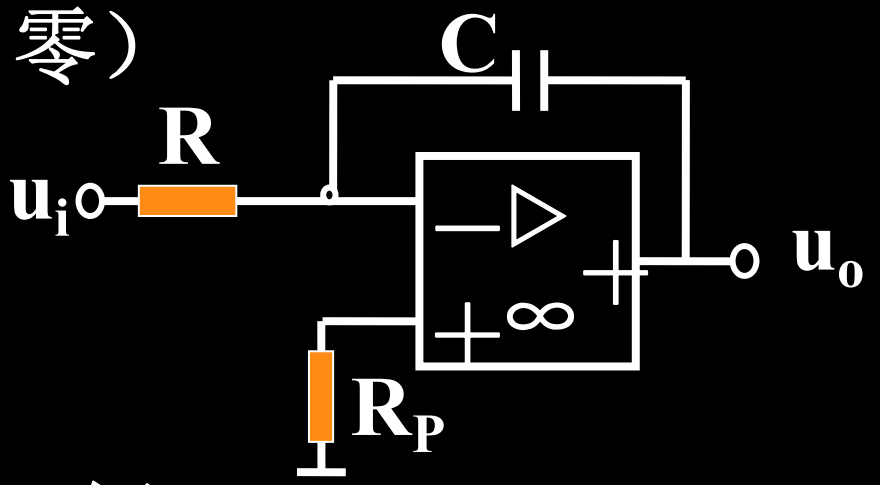


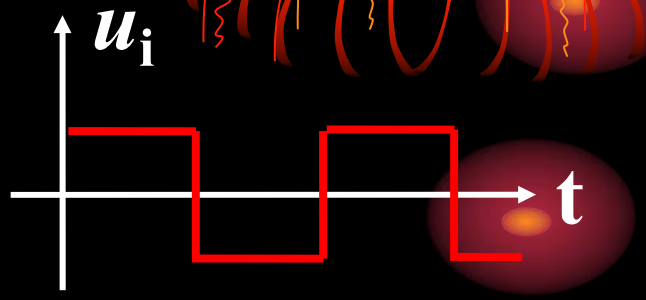
A_1：反相加法

A_2：同相比例

A_3：差动输入

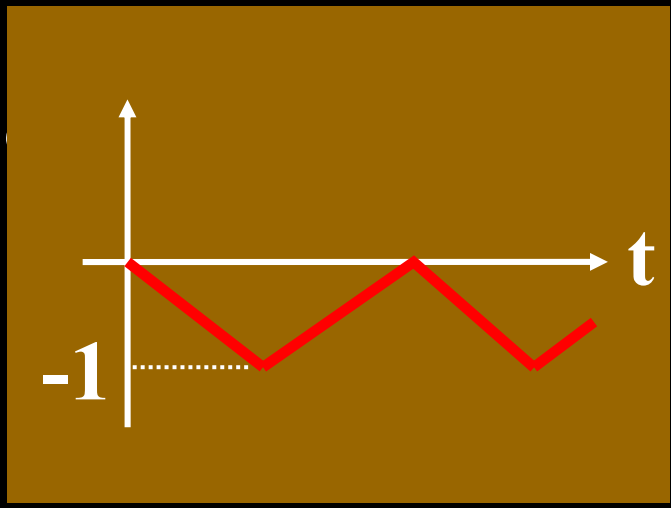
11－12电路如图，输入信号波形如图，C＝1μF，R＝50KΩ，求输出波形。（电容初始能量为零）





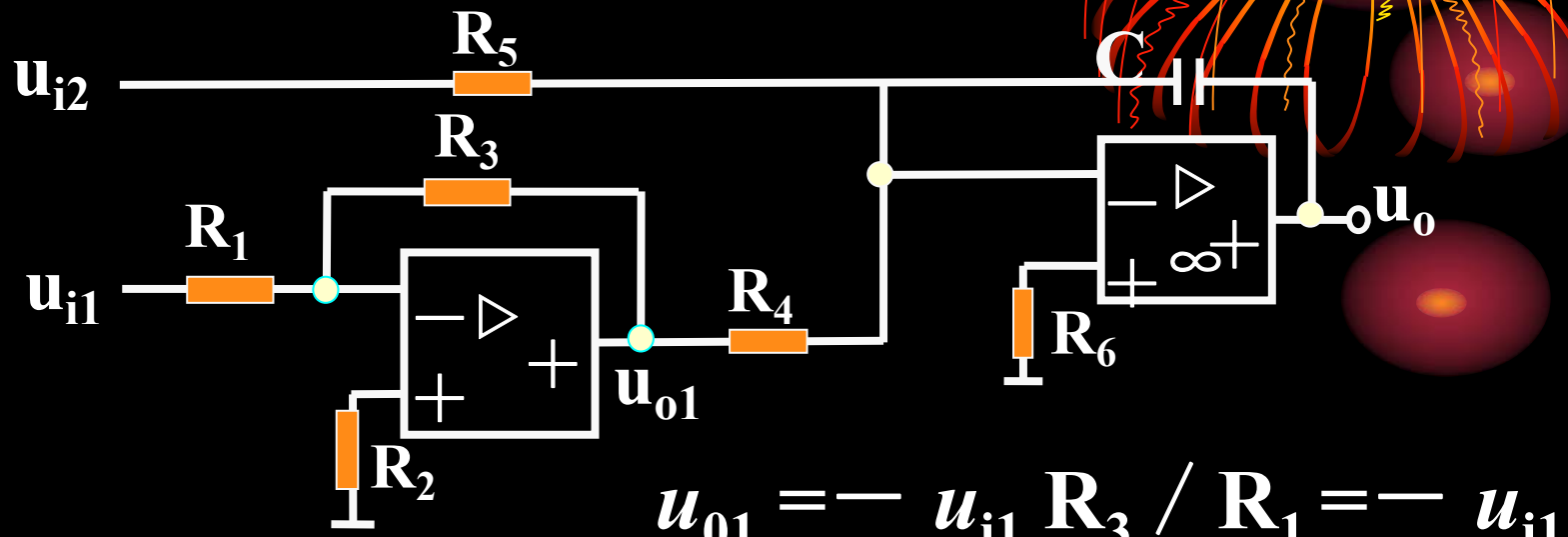
解：

$RC=50\times10^{3}\times1\times10^{-}$



$t=10mS$　　$u_0=-000\ t=-1V$

11－13 电路如图，已知$R_1=R_3=R_4=R_5=R$，试证明



$$u_{01}=-u_{i1}R_3/R_1=-u_{i1}$$

u_{i2}单独作用

$$u_0=\frac{1}{RC}\int(u_{i1}-u_{i2})dt$$

$R_4=R_5=R$

11－14 设$u_{i1}=u_{i2}=0$时，$u_C=0$，若将$u_{i1}=-10V$加入0.2S后，再将$u_{i2}=15V$加入，经多长时间u_O能达到－6V.

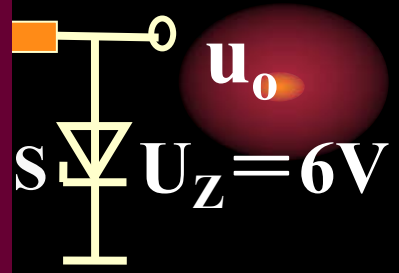
$u_{O1}<-2V$时，

$u_O=-6V$，

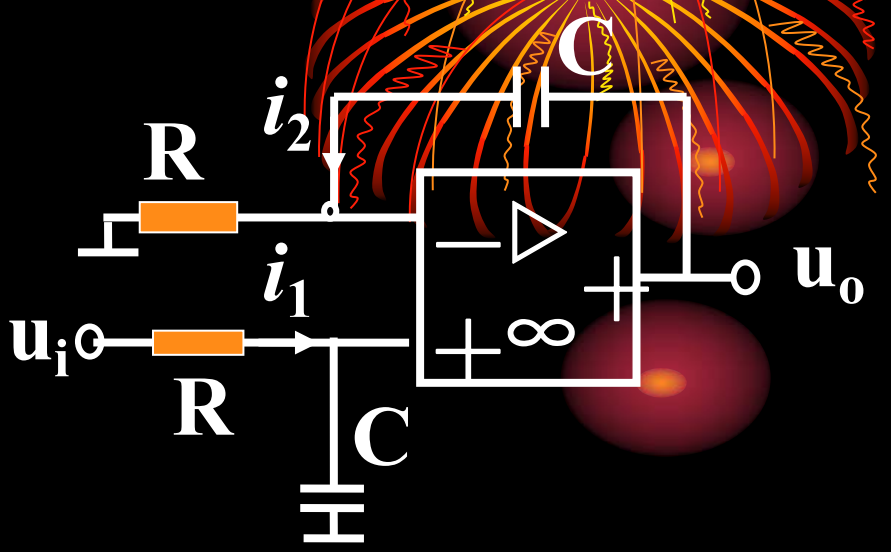
$$-2=-\int_0^t -10dt-\int_0^{0.2} -10dt-\int_{0.2}^{0.2+t} 15dt$$

$$=10t-15t+2$$

$t=0.8S$



11－15 试推导理想运放输出u_o与输入u_i的关系。



$$u_+ = u_-$$

11－16 下列情况下，应引入何种组态的负反馈？

1.使放大电路的输出电阻降低，输入电阻降低。

电压并联负反馈

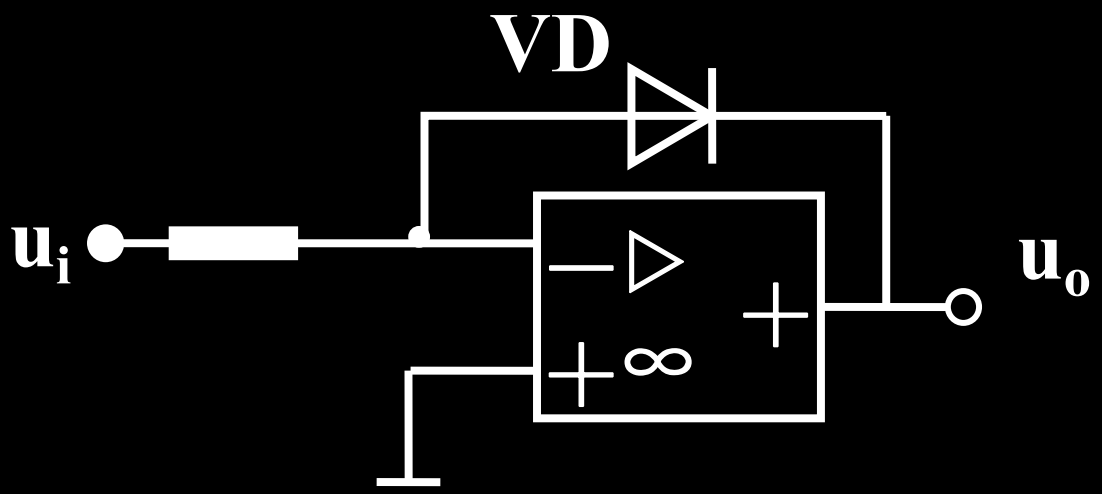
2.使放大电路的输入电阻提高，输出电压稳定。

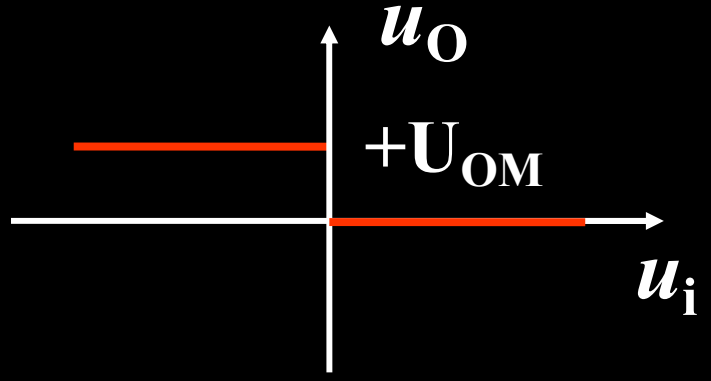
电压串联负反馈

3.使放大电路吸收信号源的电流小，带负载能力强。

电压串联负反馈

11－19　试画出电路的电压传输特性。





$u_i > 0$　VD导通

$u_O = u_- = 0$

$u_i < 0$　VD截止

$u_O = +U_{OM}$

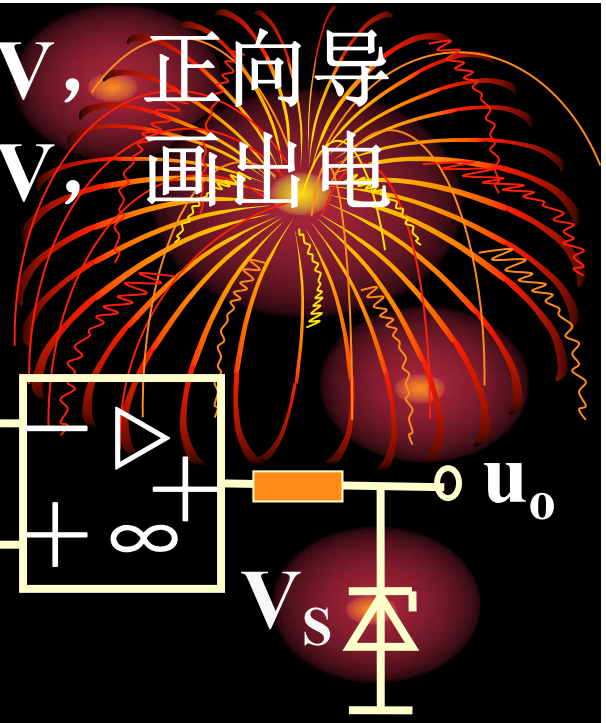
11－20　已知U_{OM}＝±12V，U_Z＝6V，正向导通电压0.7V，u_i=12sin ω t，U_R＝3V，画出电压传输特性曲线和u_O波形。

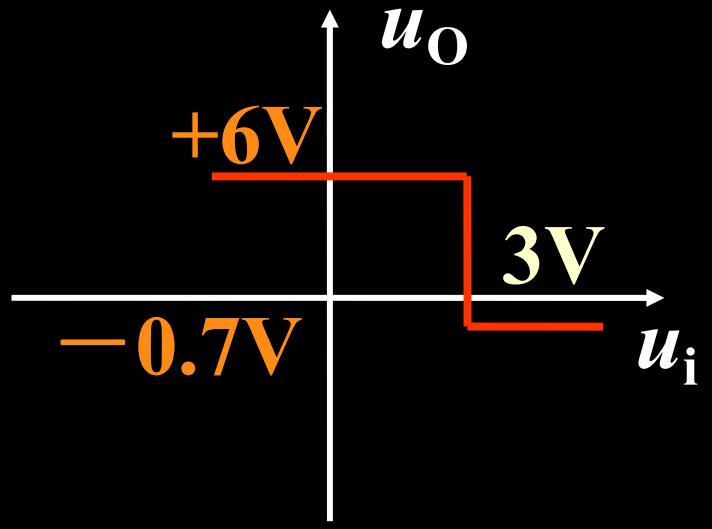
u_i＜3　正饱和

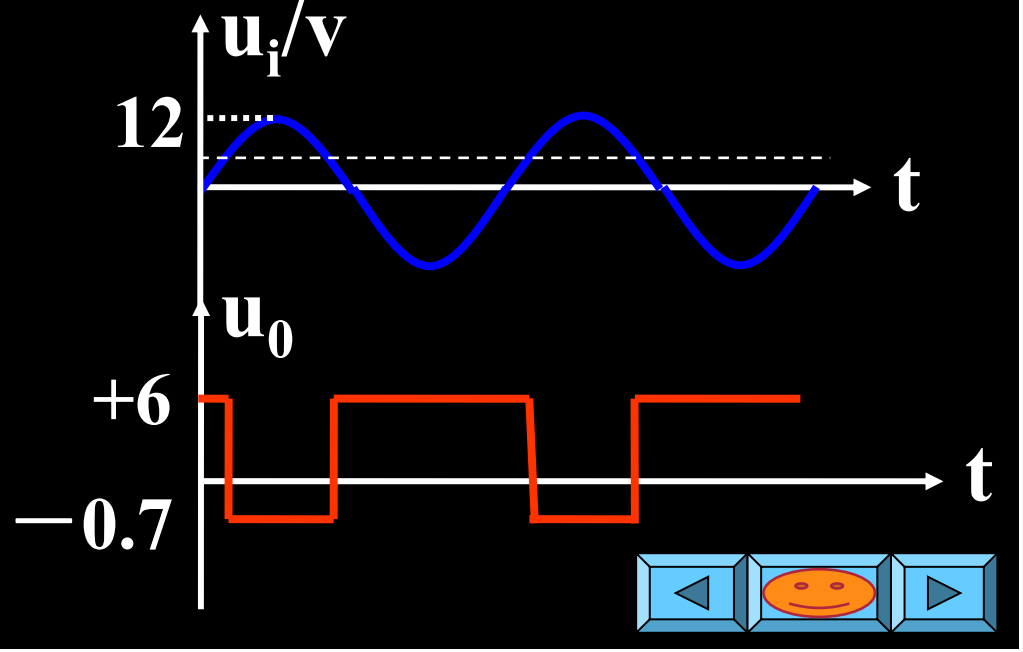
VS稳压，u_O＝6V

u_i＞3　负饱和

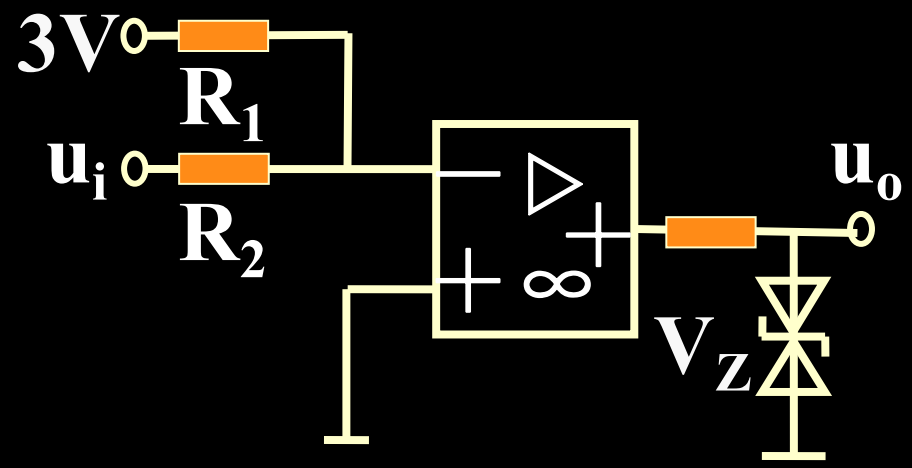
VS导通，u_O=－0.7V







11－21 电路如图所示，已知$U_Z=\pm 6V$，画出电压传输特性曲线。



$u_+=0$，

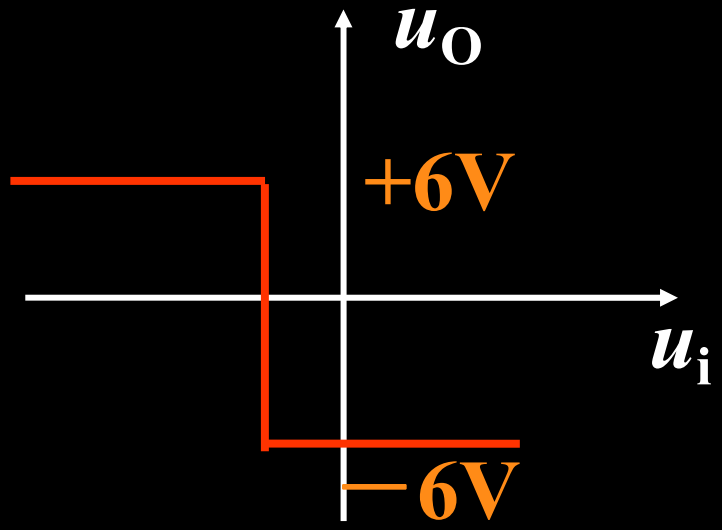
$u_+=u_-$　　$u_O=0$

$u_-<0$　正饱和

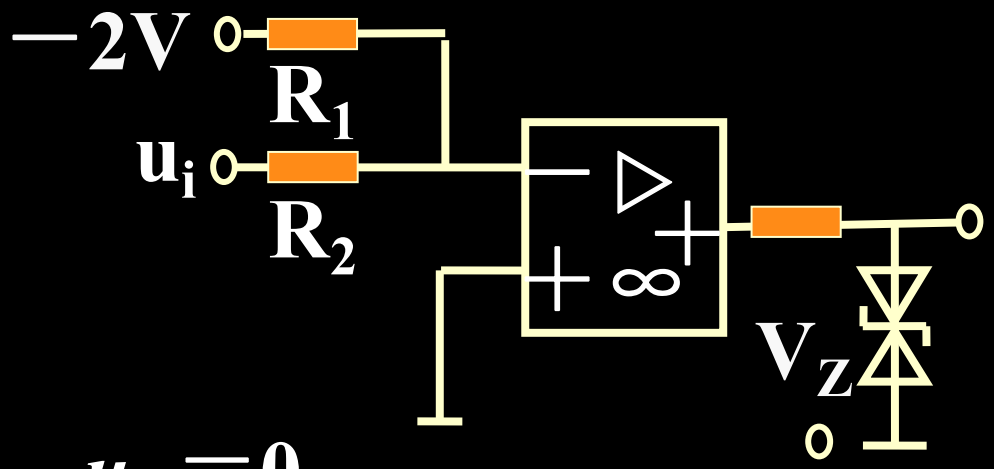
$u_O=+U_Z$

$u_->0$　负饱和

$u_O=-U_Z$



$u_-=0$，　$U_T=-3R_2/R_1$



$u_+ = 0$,

$u_+ = u_-$　　$u_O = 0$

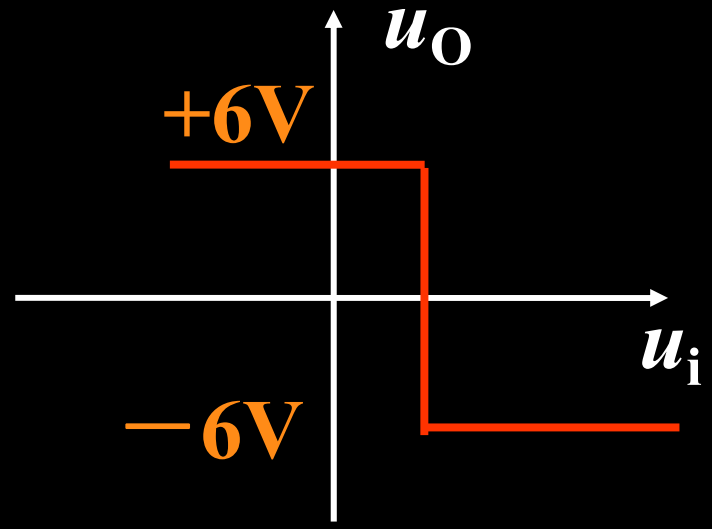
$u_- < 0$　正饱和

$u_O = +U_Z$

$u_- > 0$　负饱和

$u_O = -U_Z$

$u_- = 0$,　$U_T = 2R_2/R_1 V$



13－1　晶体管的放大区、截止区和饱和区各有什么特点？

- 截止区

$I_B \approx 0$，$I_C \approx 0$，$U_{BE} \leqslant 0$ 发射结反偏，集电结反偏。

- 放大区

$I_C = \beta I_B$　　发射结正偏，集电结反偏。

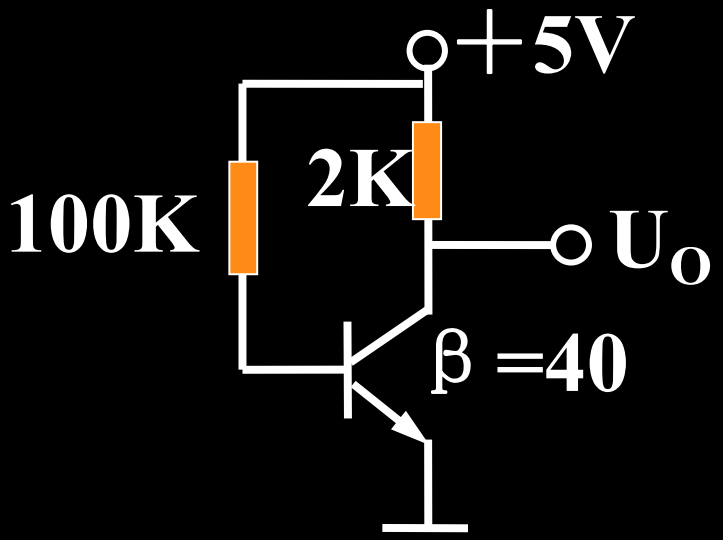
$I_{BS} > I_B > 0$

- 饱和区

$U_{CE} \leqslant U_{BE}$ ，发射结、集电结正偏。

$I_B > I_{BS}$

13－2 判断三极管的工作状态。

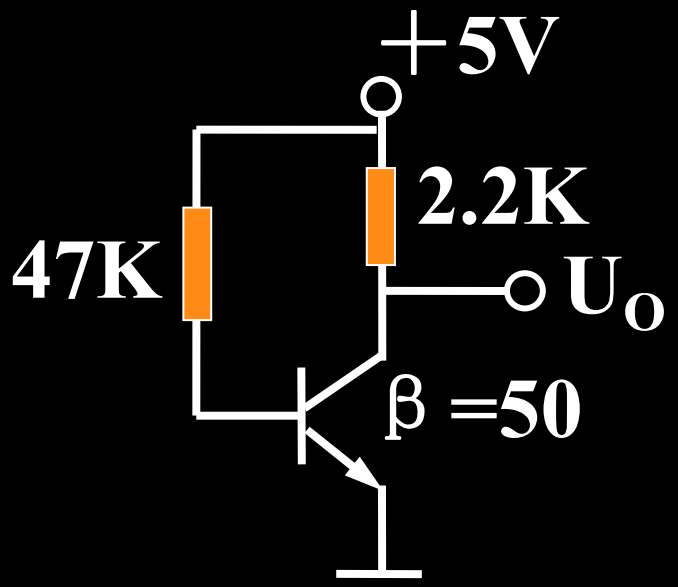


解：

$$I_B = (5-U_{BE})/R_B$$
$$= (5-0.7)/100$$
$$= 0.043mA$$

$$I_{BS} = E_C / \beta R_C$$
$$= 5 / 40 \times 2$$
$$= 0.0625mA$$

$I_B < I_{BS}$，T 处于放大状态



解：

$I_B = (5-U_{BE})/R_B$

$= (5-0.7)/47$

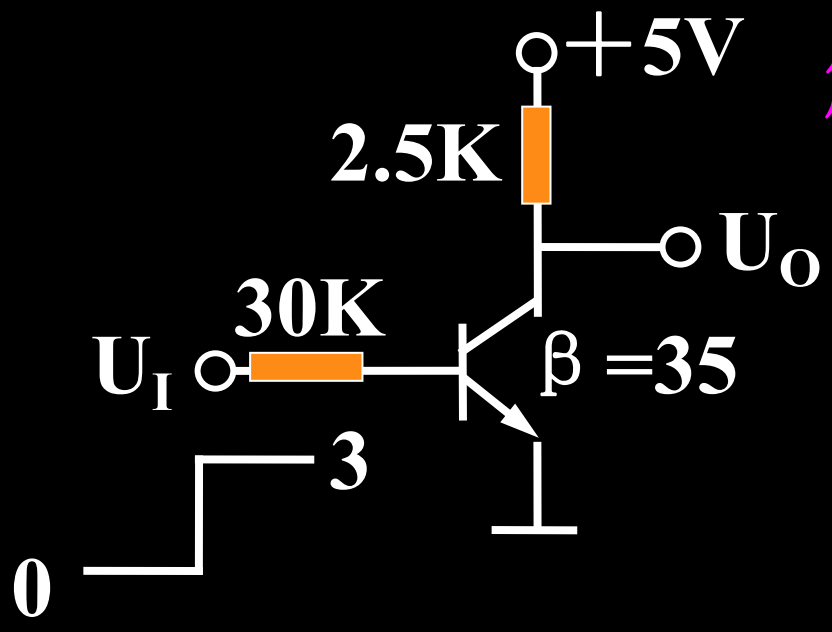
$= 0.1mA$

$I_{BS} = E_C / \beta R_C$

$= 5 / 50 \times 2.2$

$= 0.045mA$

$I_B > I_{BS}$， T 处于饱和状态



解：

$U_I = 0$

$I_B = 0$　　$I_C = 0$

T处于截止状态

$U_I = 3V$

$I_B = (U_I - U_{BE})/R_B$

$= (3 - 0.7)/30$

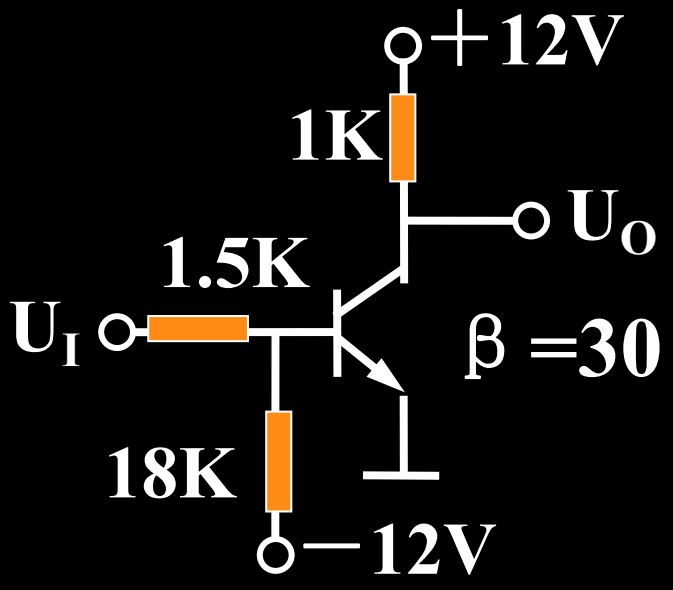
$= 0.077mA$

$I_{BS} = E_C / \beta R_C$

$= 5 / 35 \times 2.5$

$= 0.057mA$

$I_B > I_{BS}$，T 处于饱和状态



解：U_I=0，相当于接地

U_{BE}<0

$I_B \approx 0$　　$I_C \approx 0$

T处于截止状态

U_I=3V，

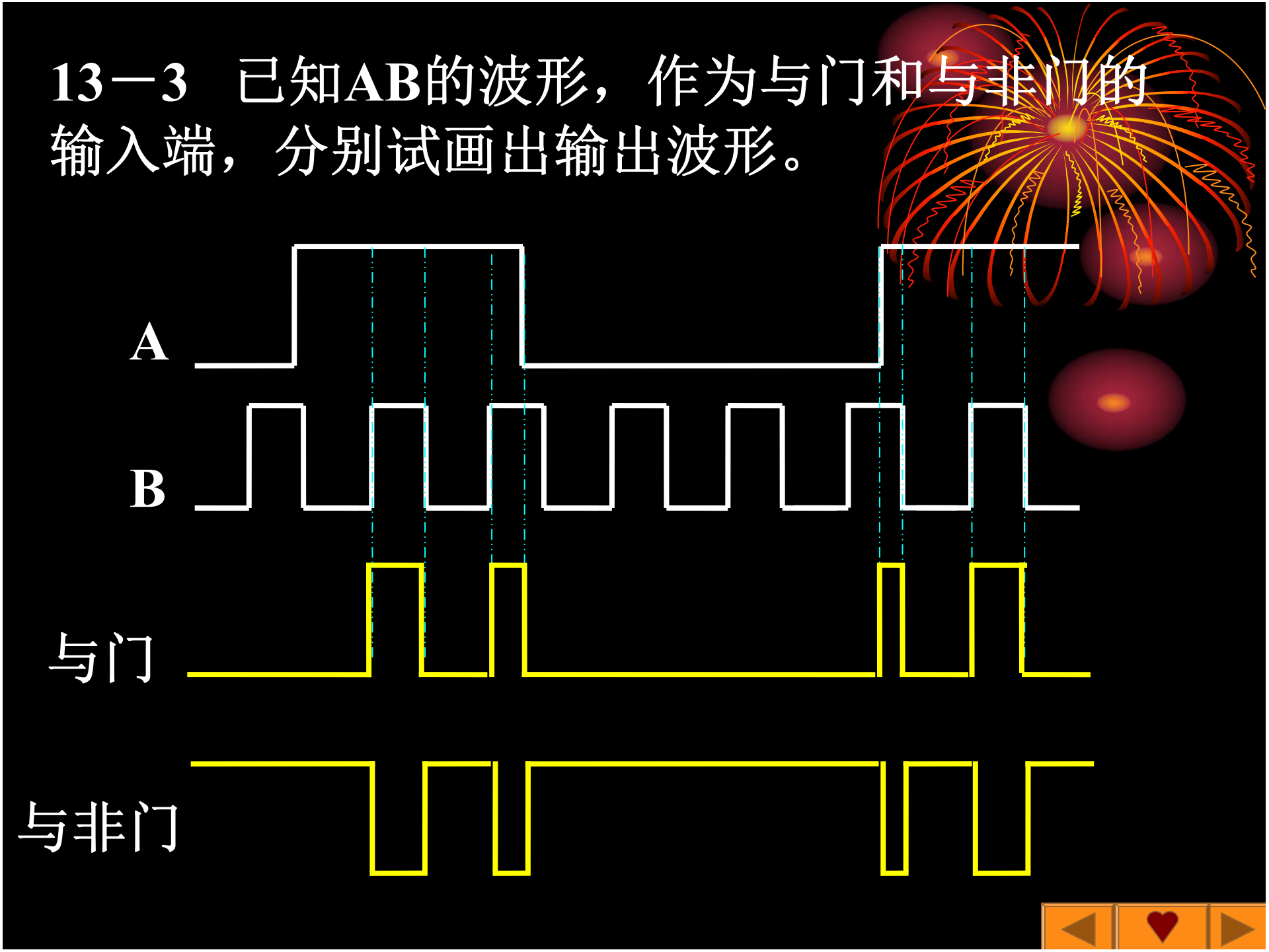
$I_B = I_1 - I_2$

$= 1.53 - 0.705 = 0.828mA$

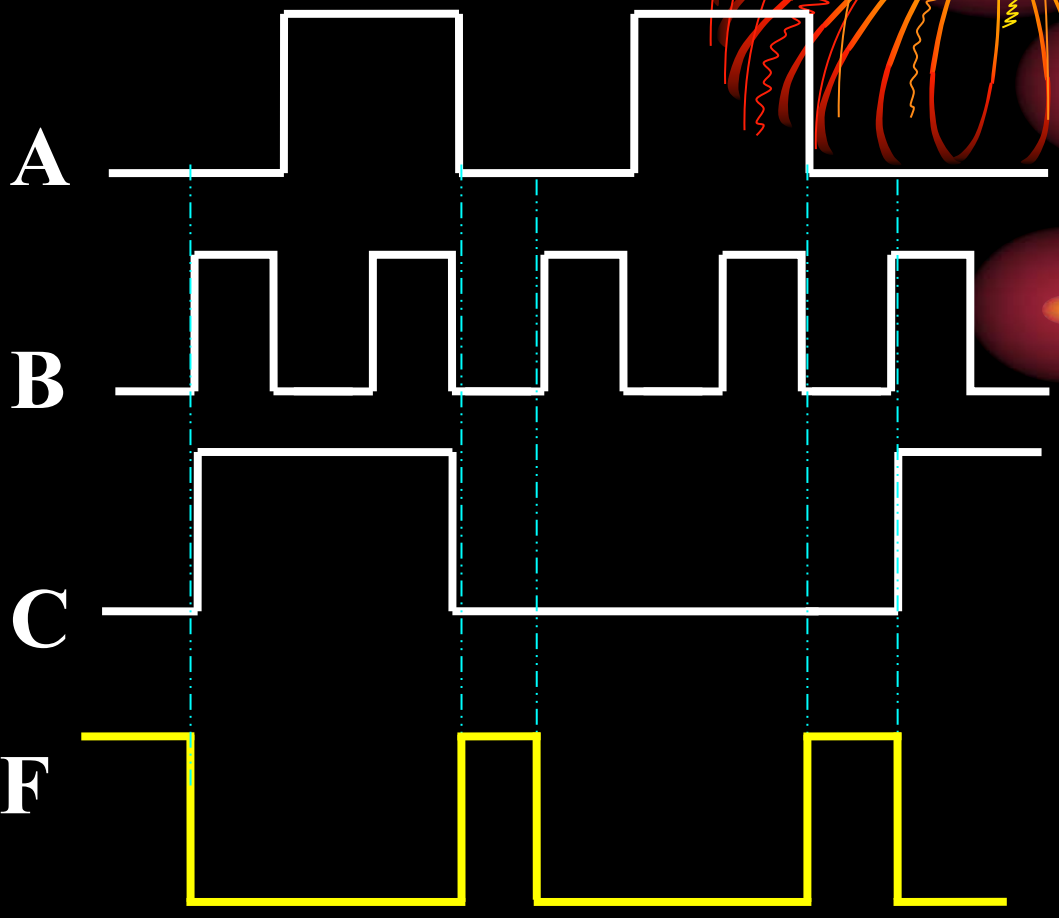
$I_{BS} = 12 / \beta R_C = 12 / 30 \times 1 = 0.4mA$

$I_B > I_{BS}$，T 处于饱和状态，

13－3　已知AB的波形，作为与门和与非门的输入端，分别试画出输出波形。

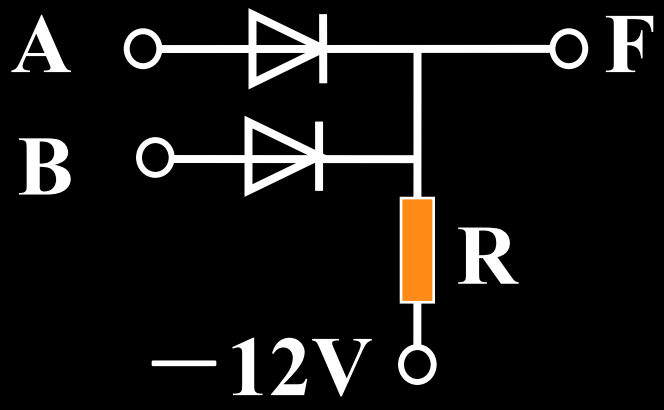


13－4　已知或非门三个输入端ABC的波形，试画出输出波形。

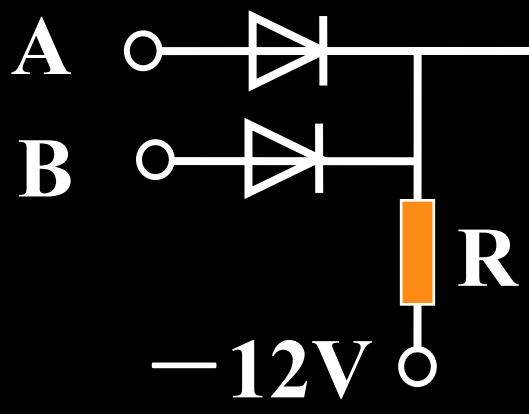


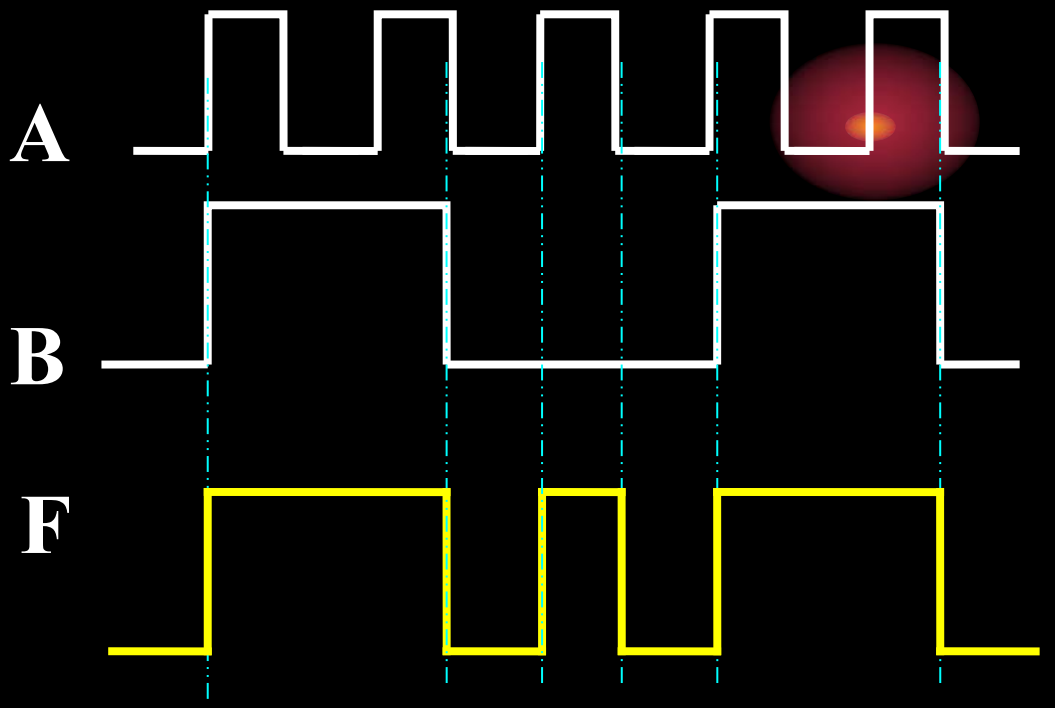
有1出0，
全0出1

13－5 某逻辑电路如图，若按正逻辑，该逻辑函数为 A 。



13－6　已知两个输入端AB的波形，试画出输出波形。

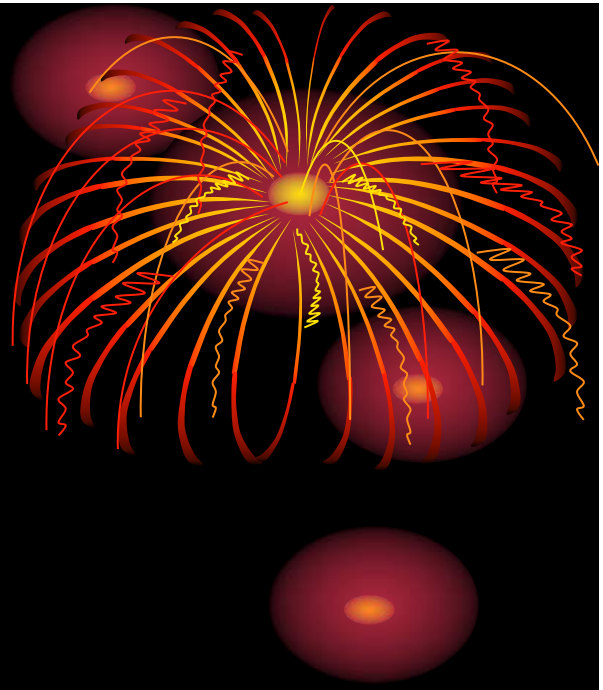




电路为或门电路。

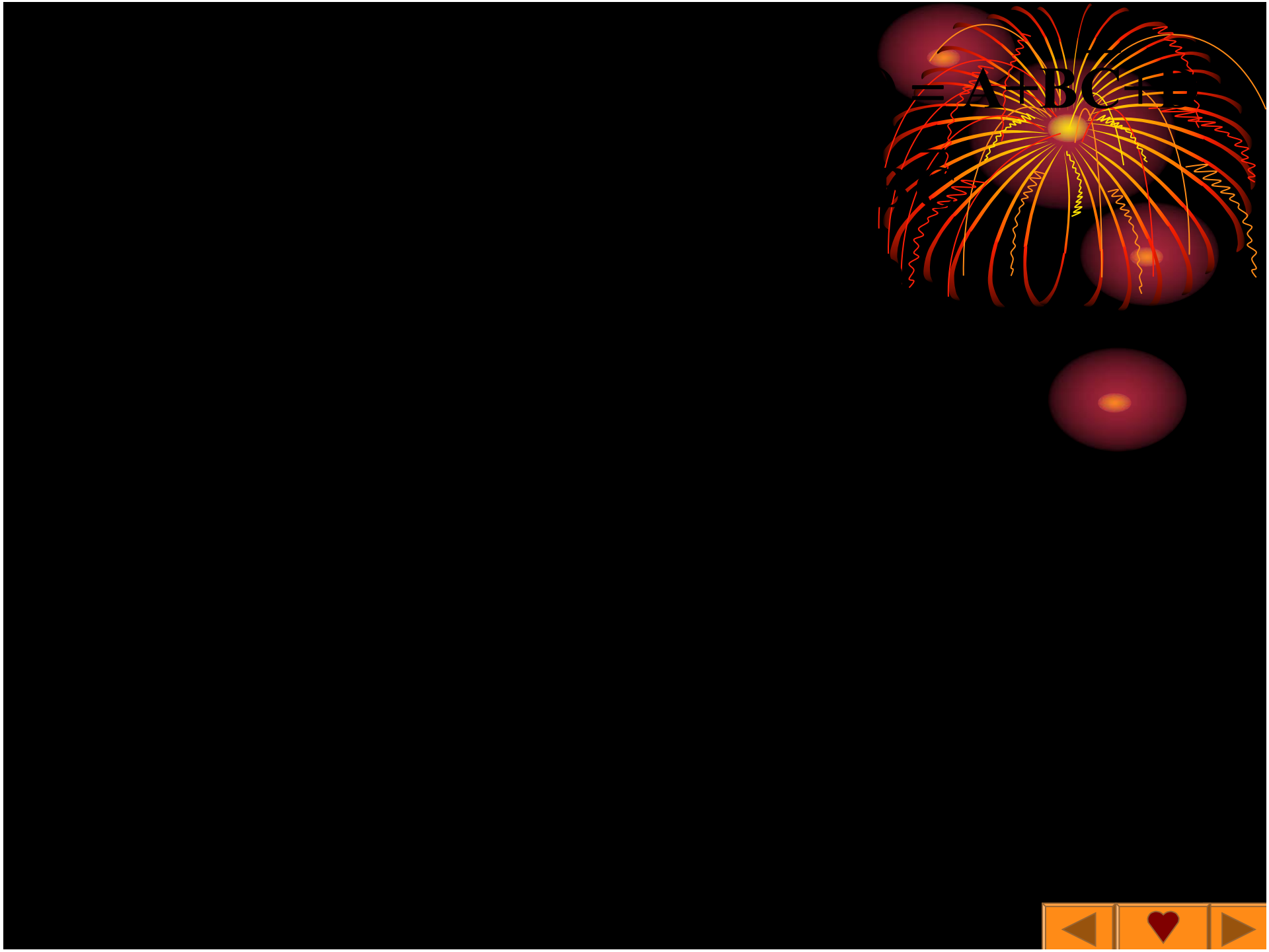
有1出1，全0出0

13－8 证明

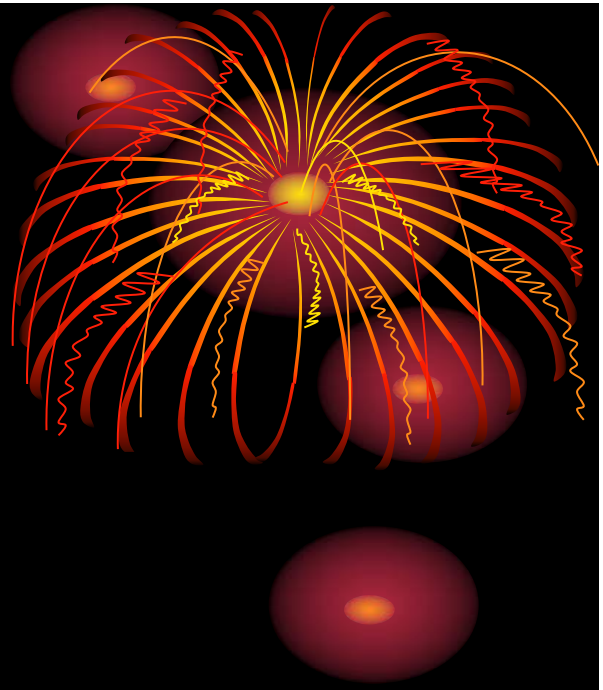


13－9 证明

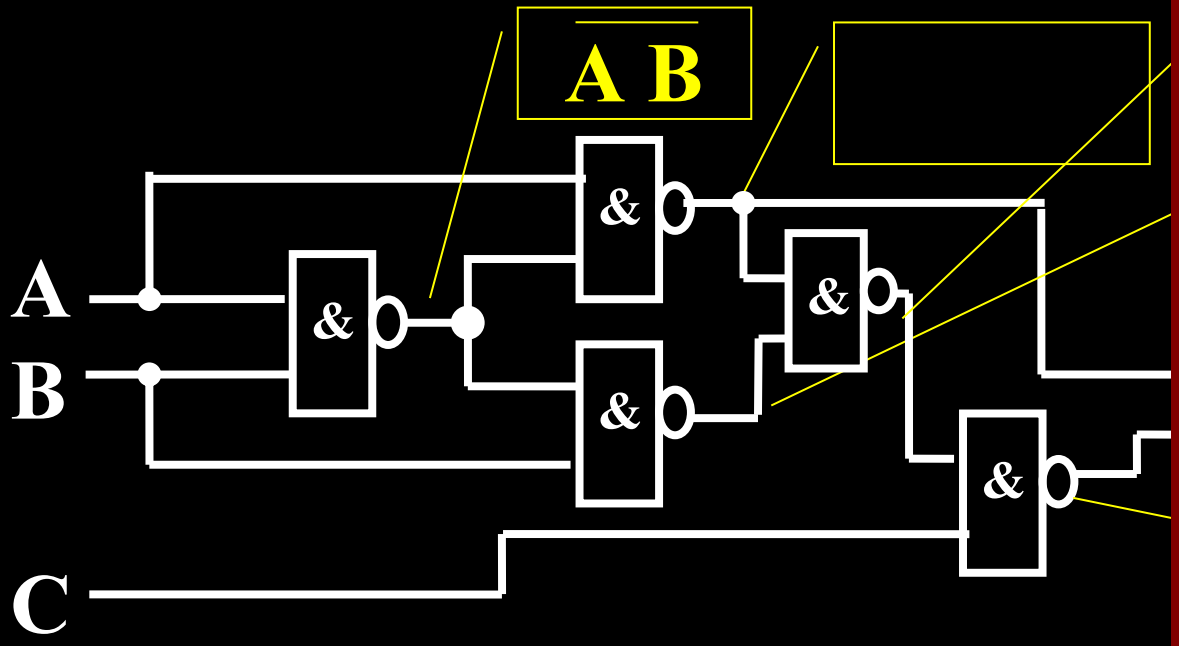
右式



13－10 化简

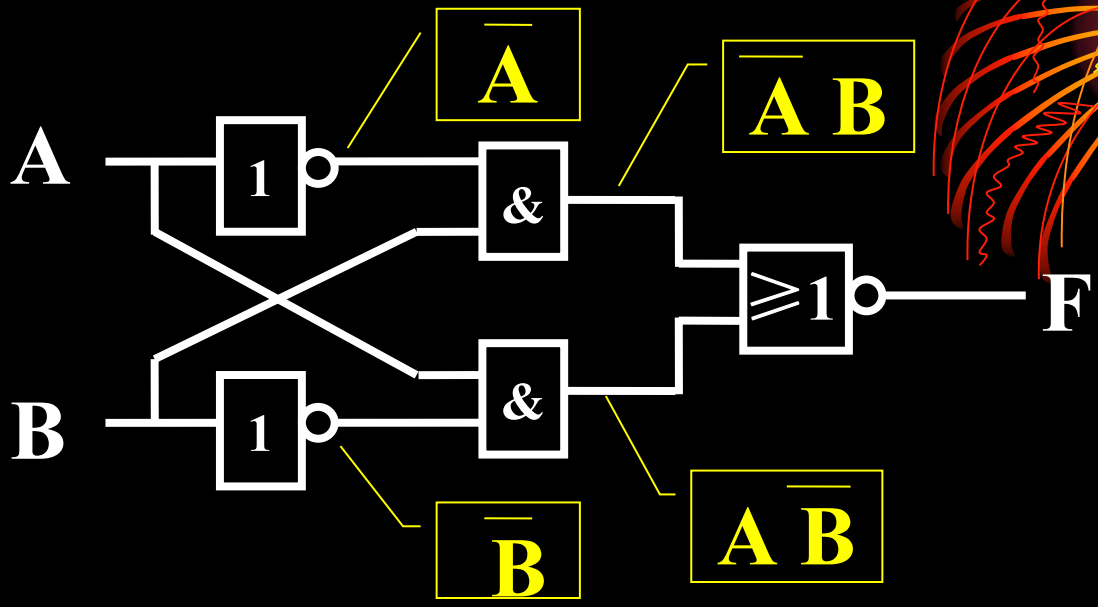


14－1　分析电路的逻辑功能。



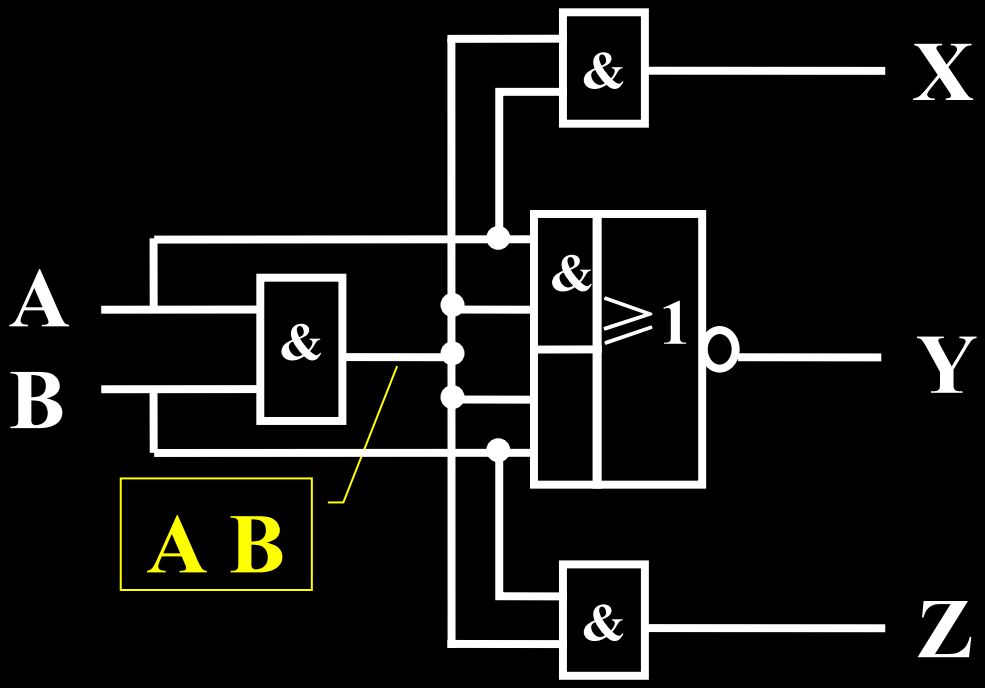
A	B	C	F
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	1
1	0	1	1
1	1	0	0
1	1	1	0

14－2(a)　分析图示电路的逻辑功能



此电路是同或门电路

14－2(b)　分析图示电路的逻辑功能

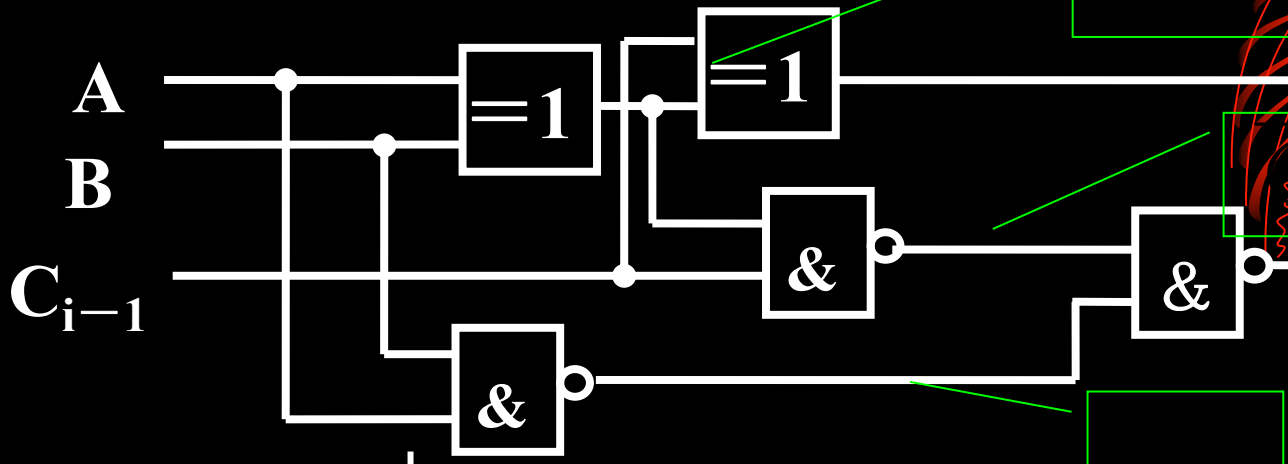


实现与逻辑

实现与非逻辑

实现与逻辑

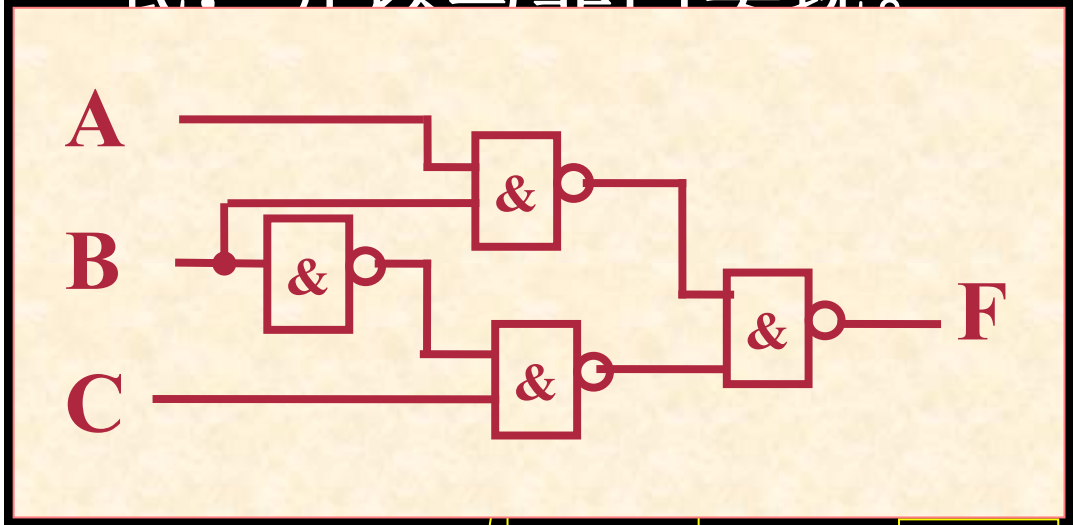
14－3　分析电路的逻辑功能。



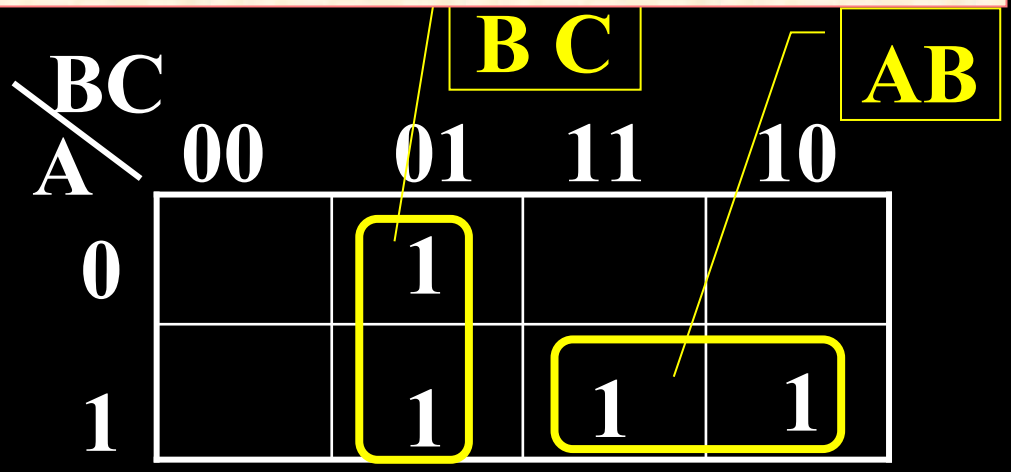
A	B	C_{i-1}	S_i	C_i
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1

此电路是全加器

14－4 已知输入输出波形，试写出逻辑表达式，并以与非门实现。

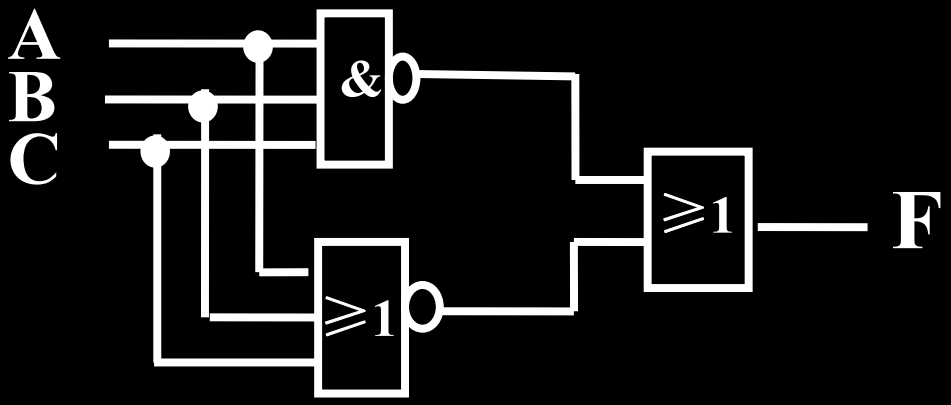


A	B	C	F
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

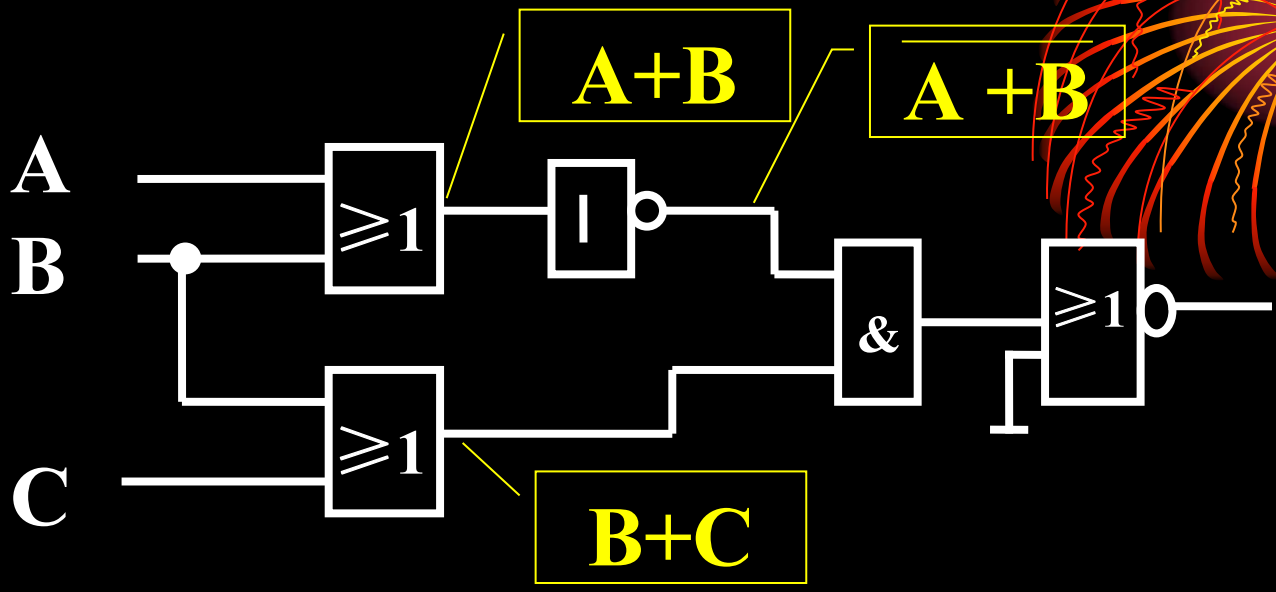


14－5 设计一个具有三输入一输出的逻辑电路，当三输入全为1或0时，输出为1，否则为0。

A	B	C	F
0	0	0	1
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	1

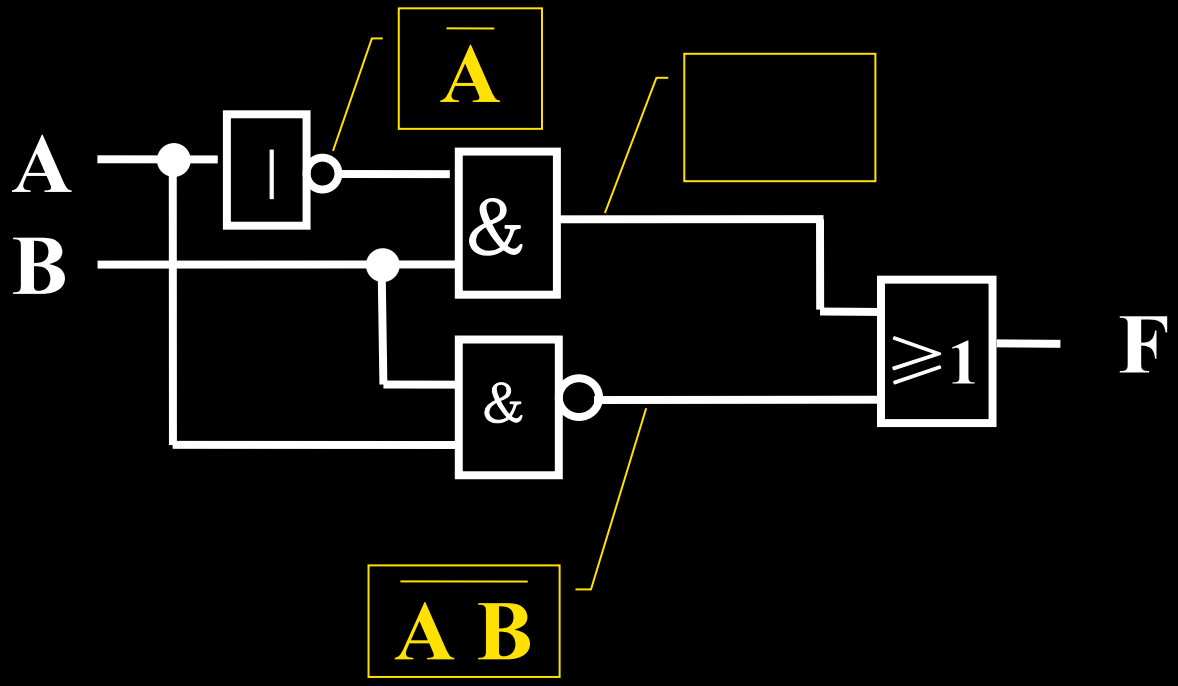


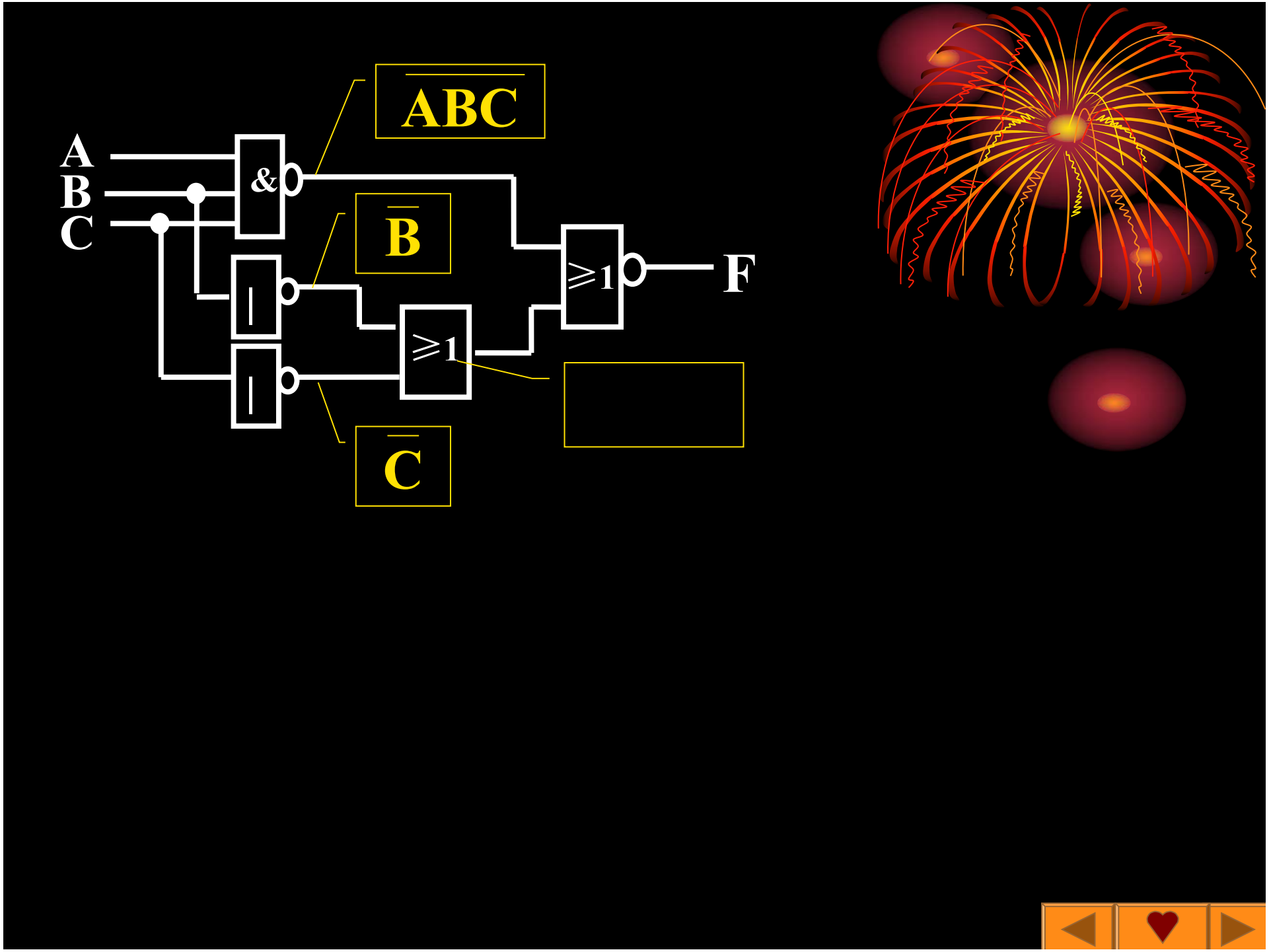
1. 分析图示电路的逻辑功能



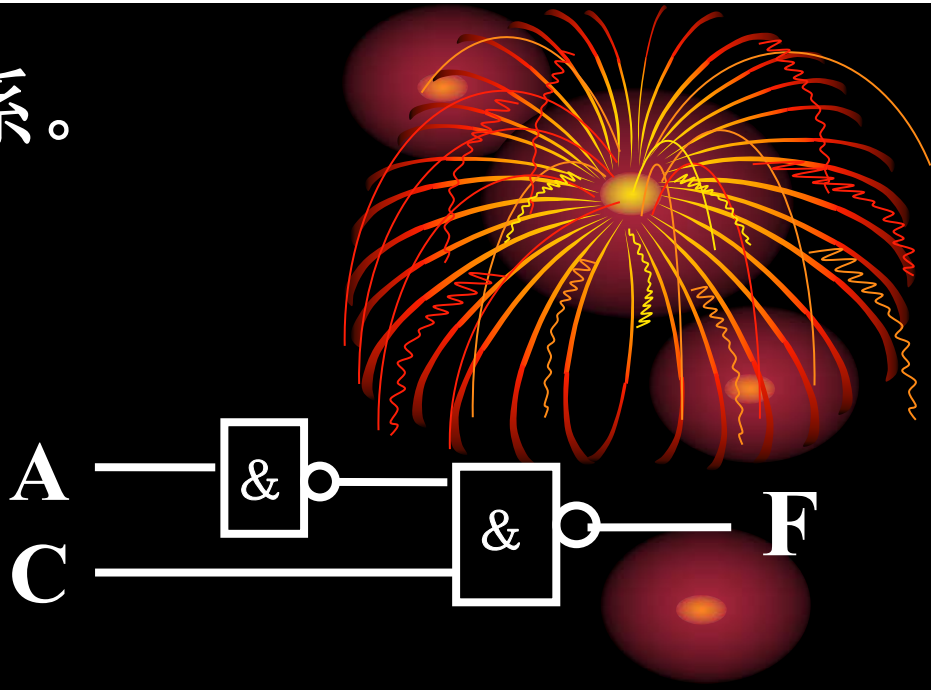
F仅在ABC＝001时输出为零

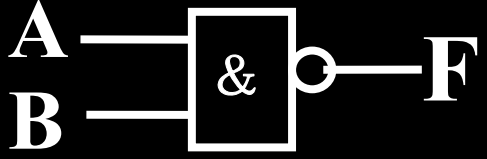
2. 分析电路的逻辑功能。

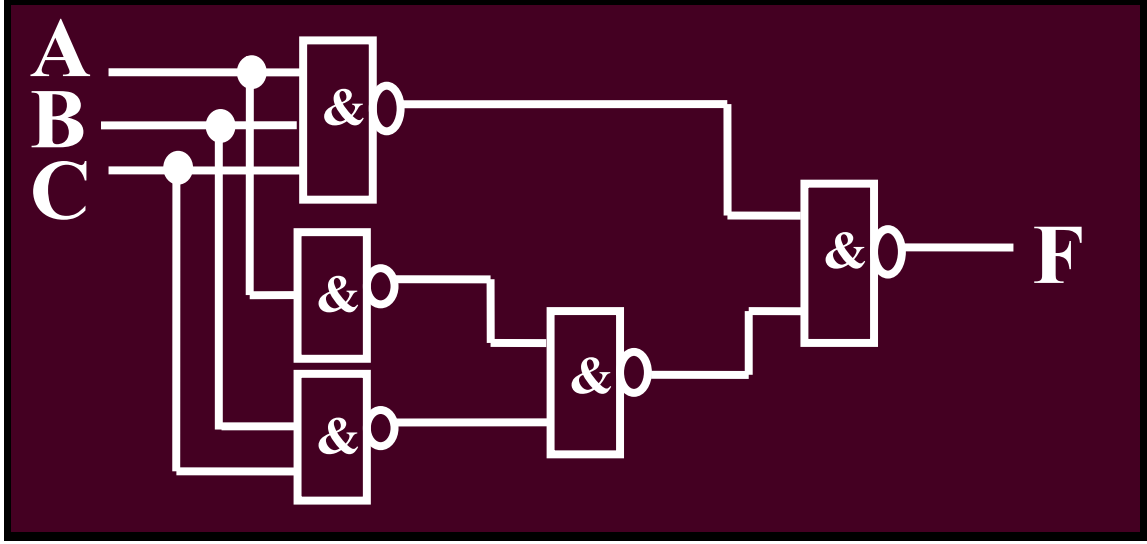




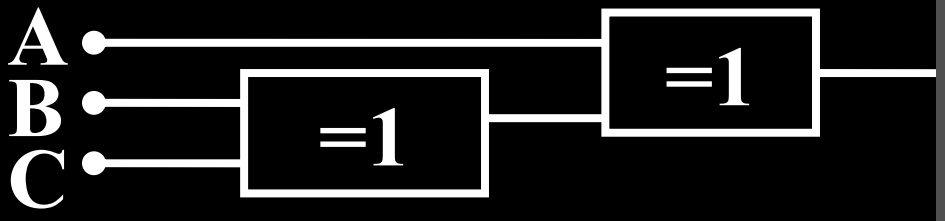
3. 用于非门实现逻辑关系。







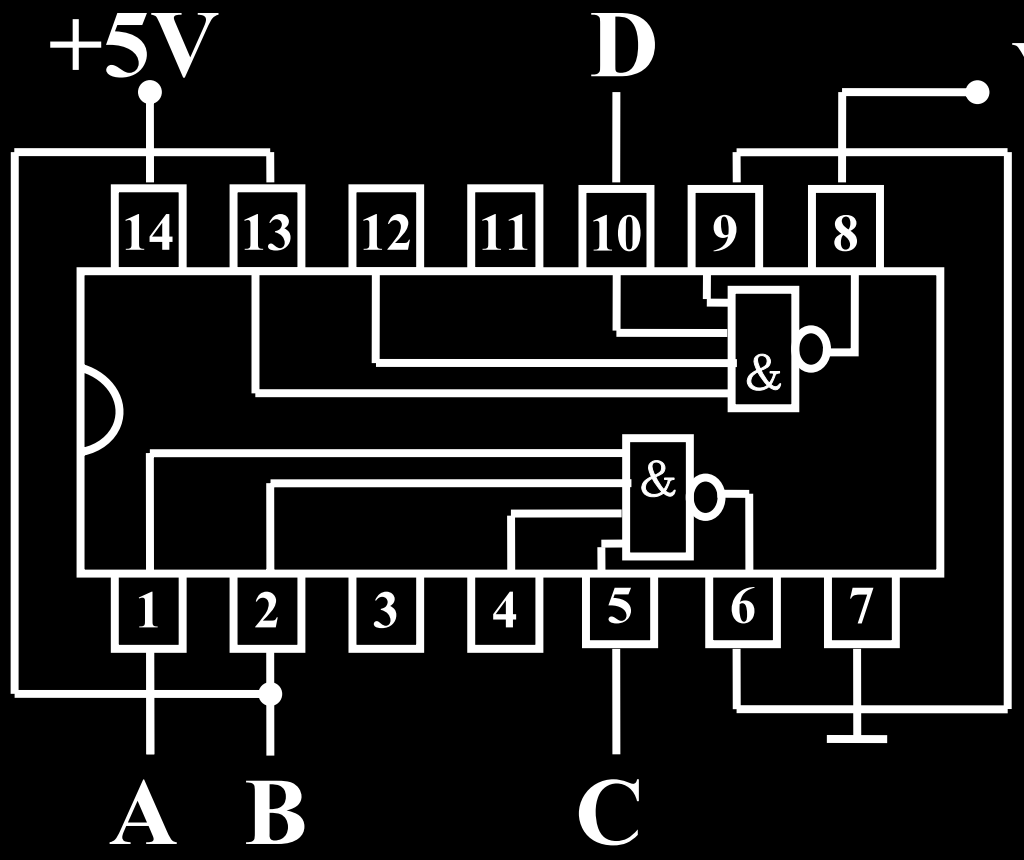
4. 电路如图，试分析其逻



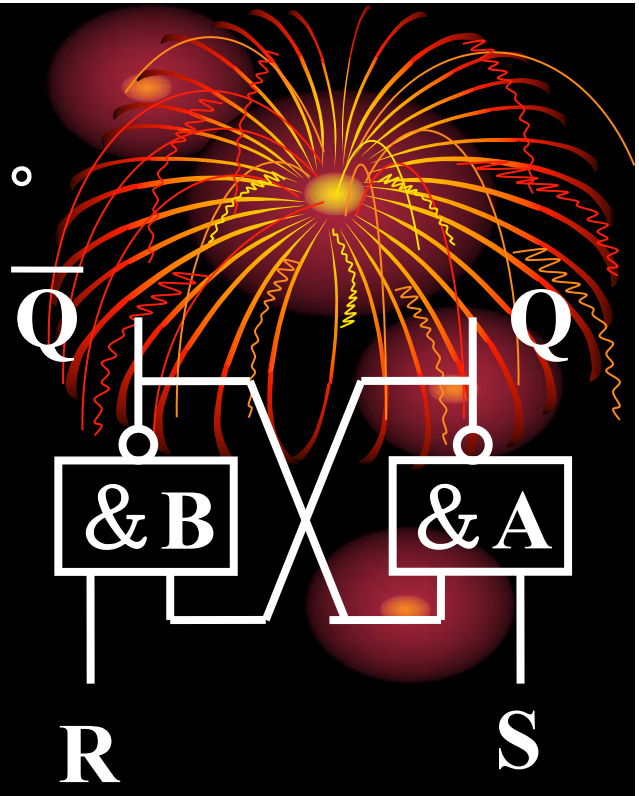
A	B	C	F
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

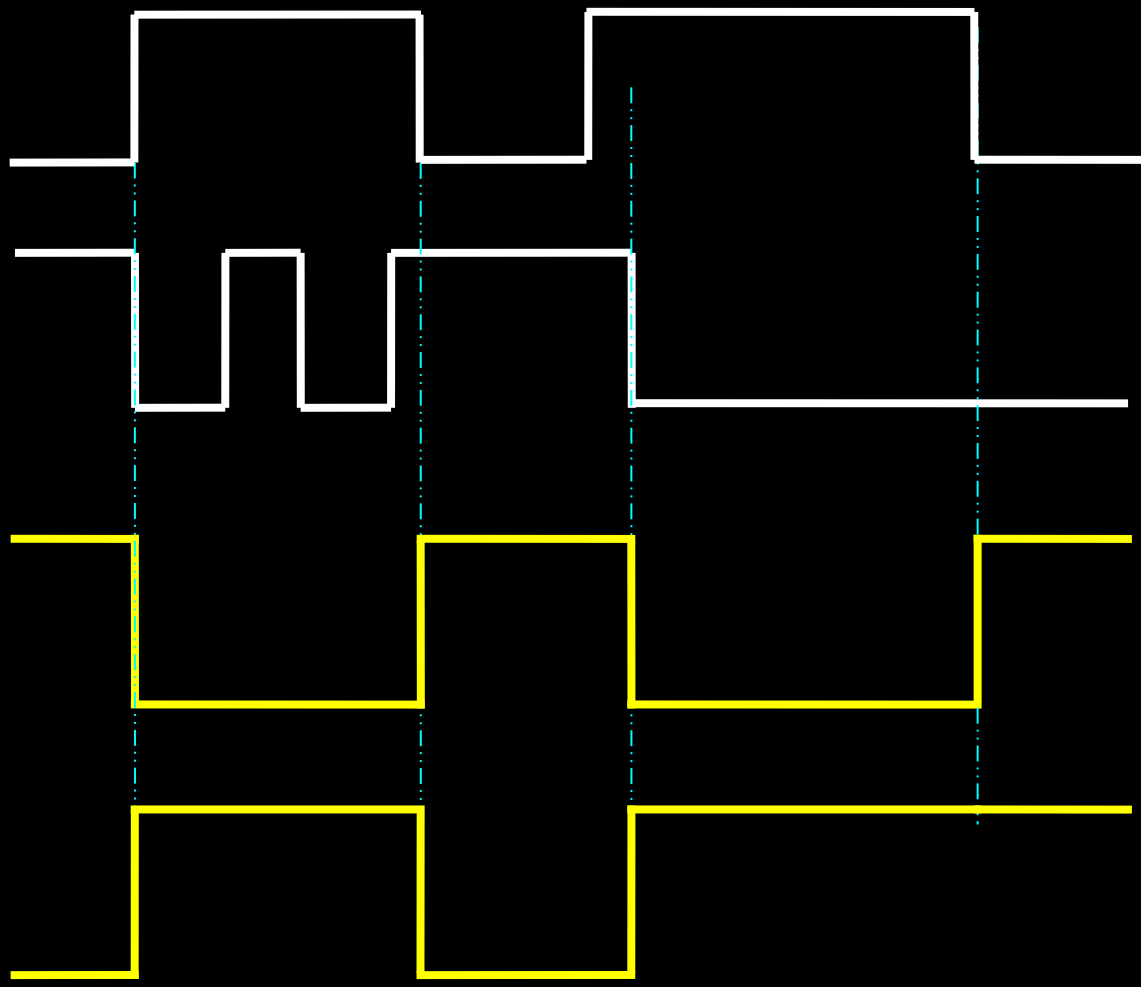
当A、B、C中有奇数个“1”时，输出为1。该电路是一个判“奇”电路。

5. 74LS20是双4输入与非门，现电路连接如图，试写出最简与或式。

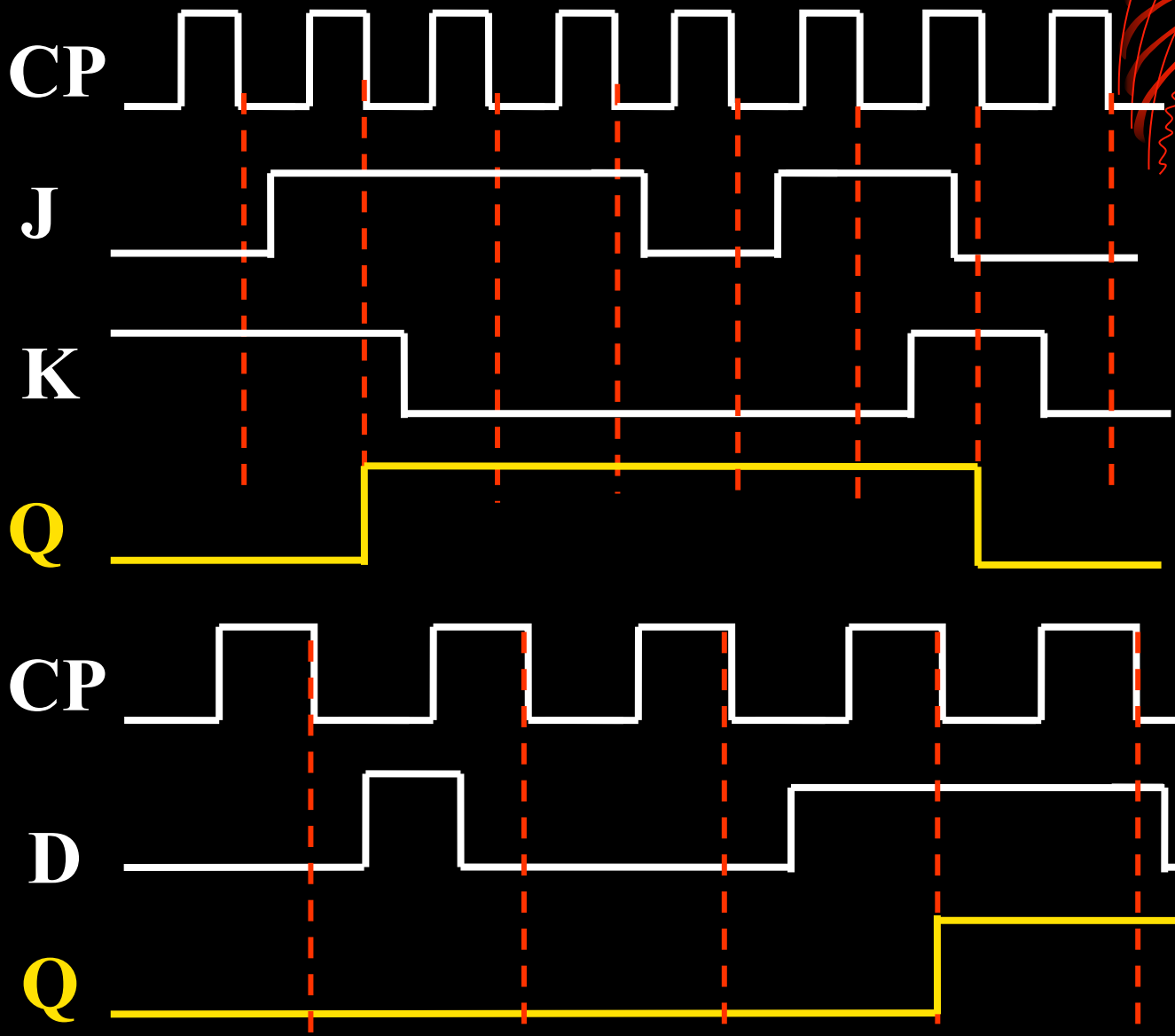


15－1 根据输入波形画Q、$\overline{Q}$波形。

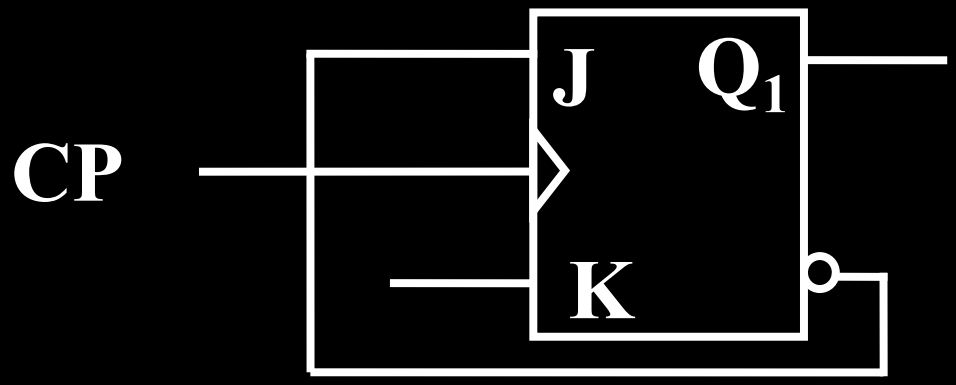


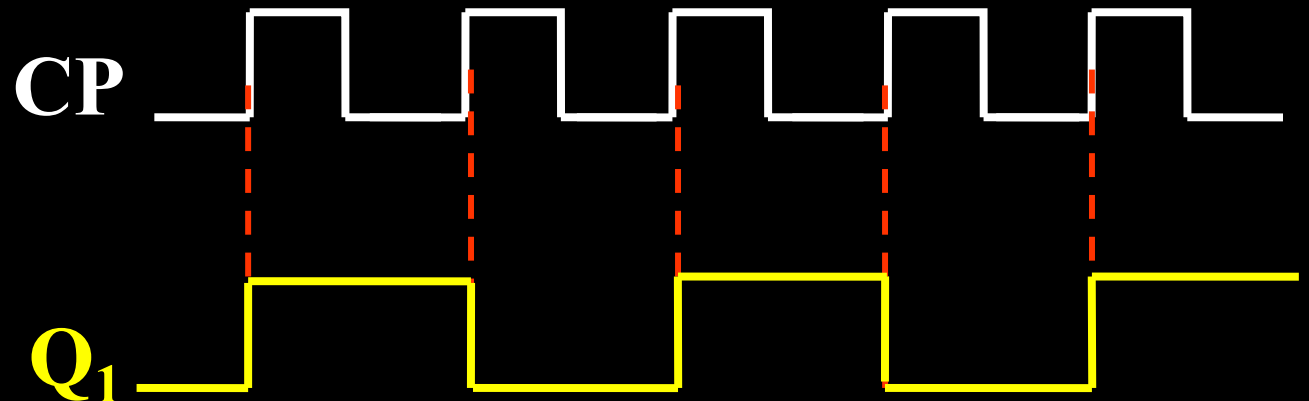


15－2 根据输入波形画Q波形。

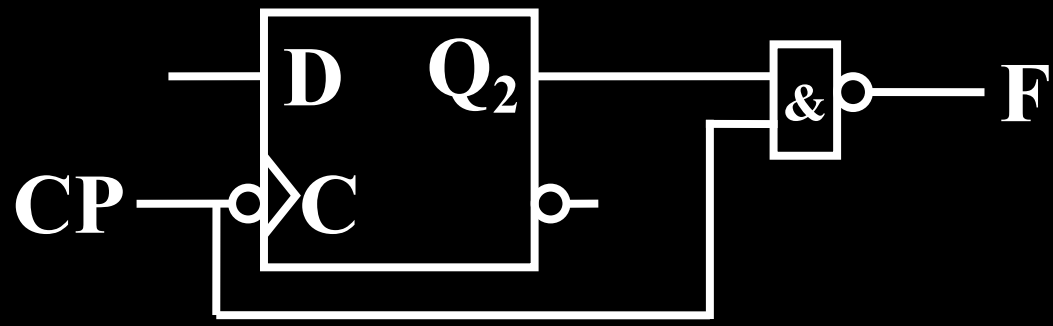


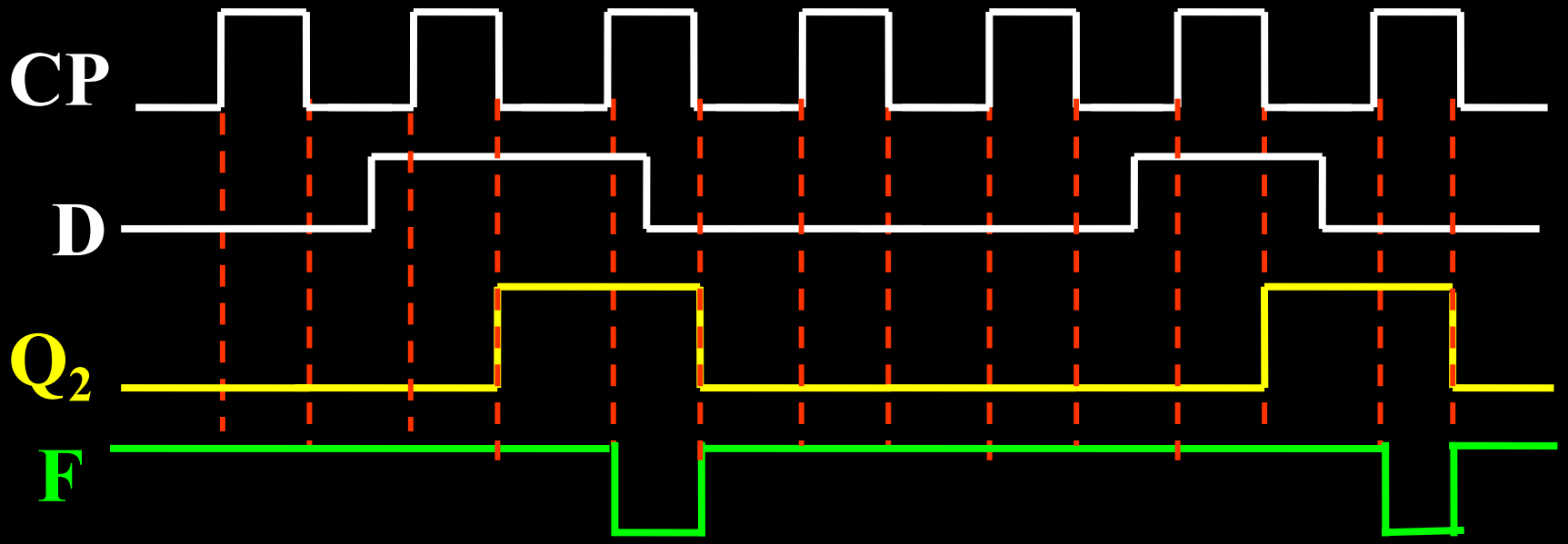
15－3(a) 已知各触发器的初态均为0，CP波形如图，试画出Q_1波形。



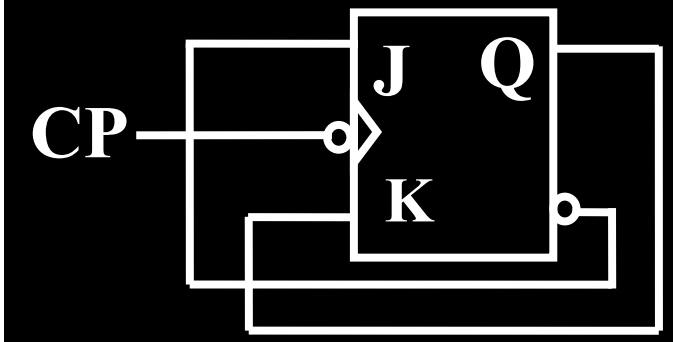


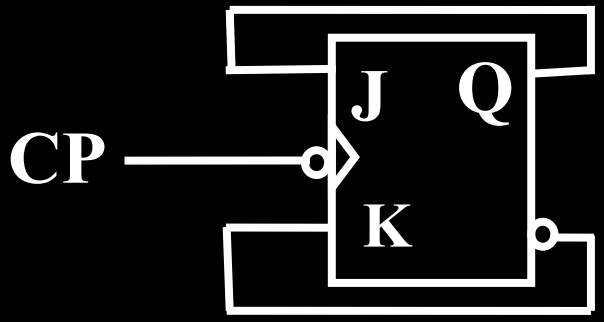
15－3(b) 已知各触发器的初态均为0，CP波形如图，试画出F波形。

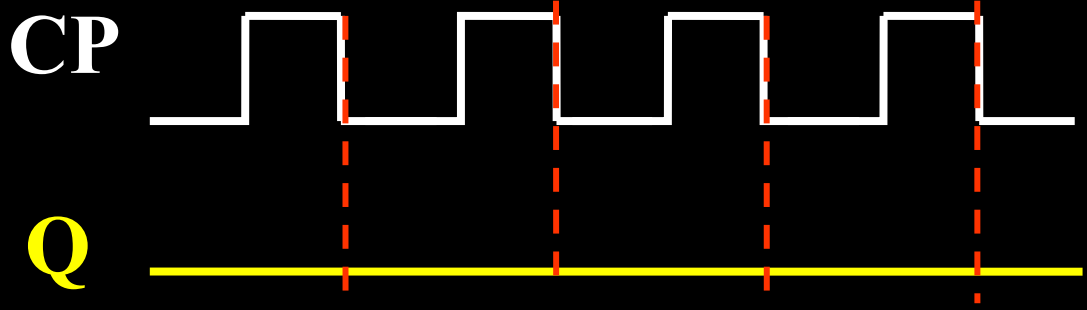


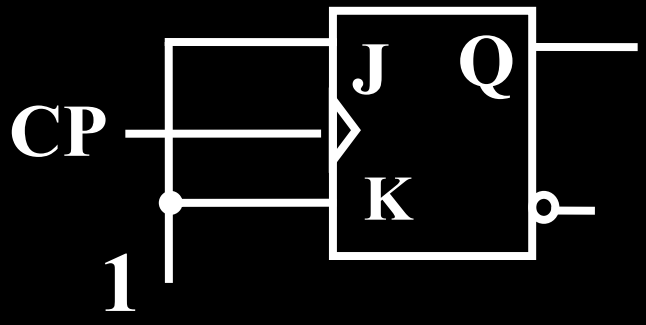


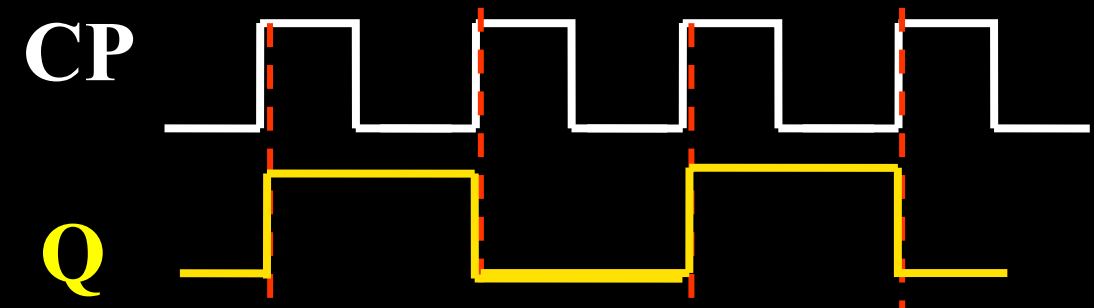
15－4 已知各触发器的初态均为0，CP 波形如图，试画出Q波形。

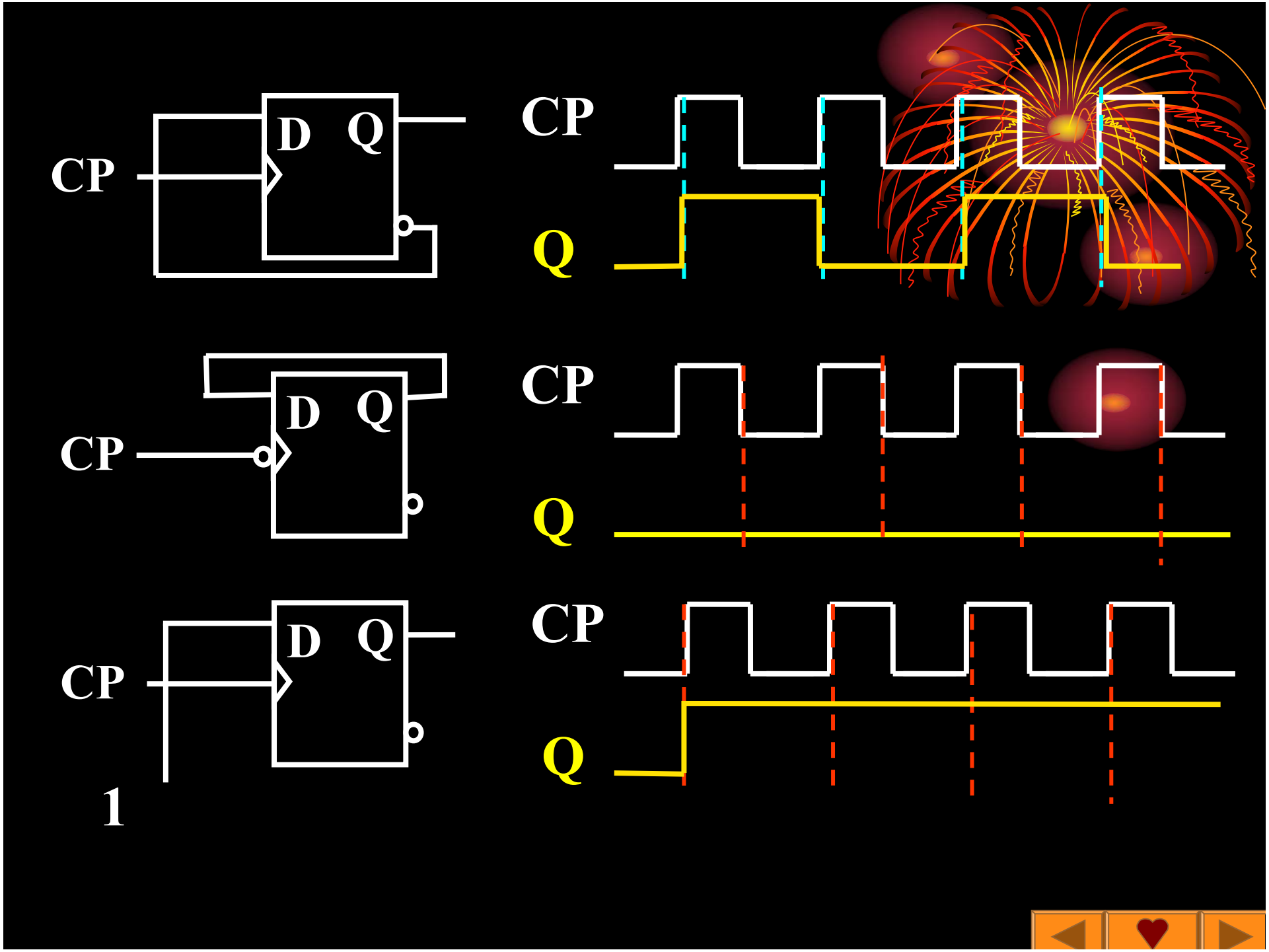




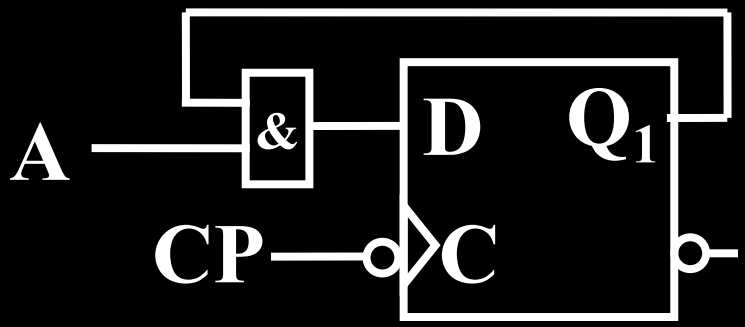


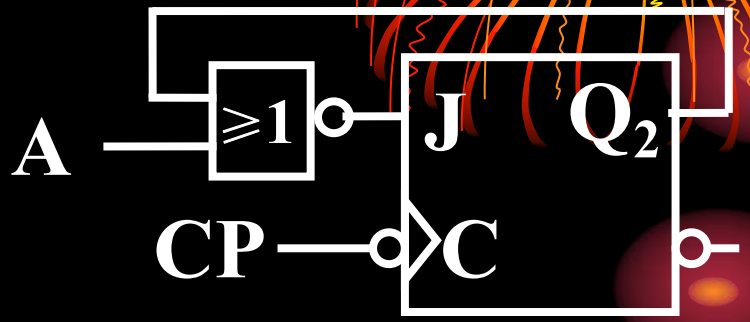


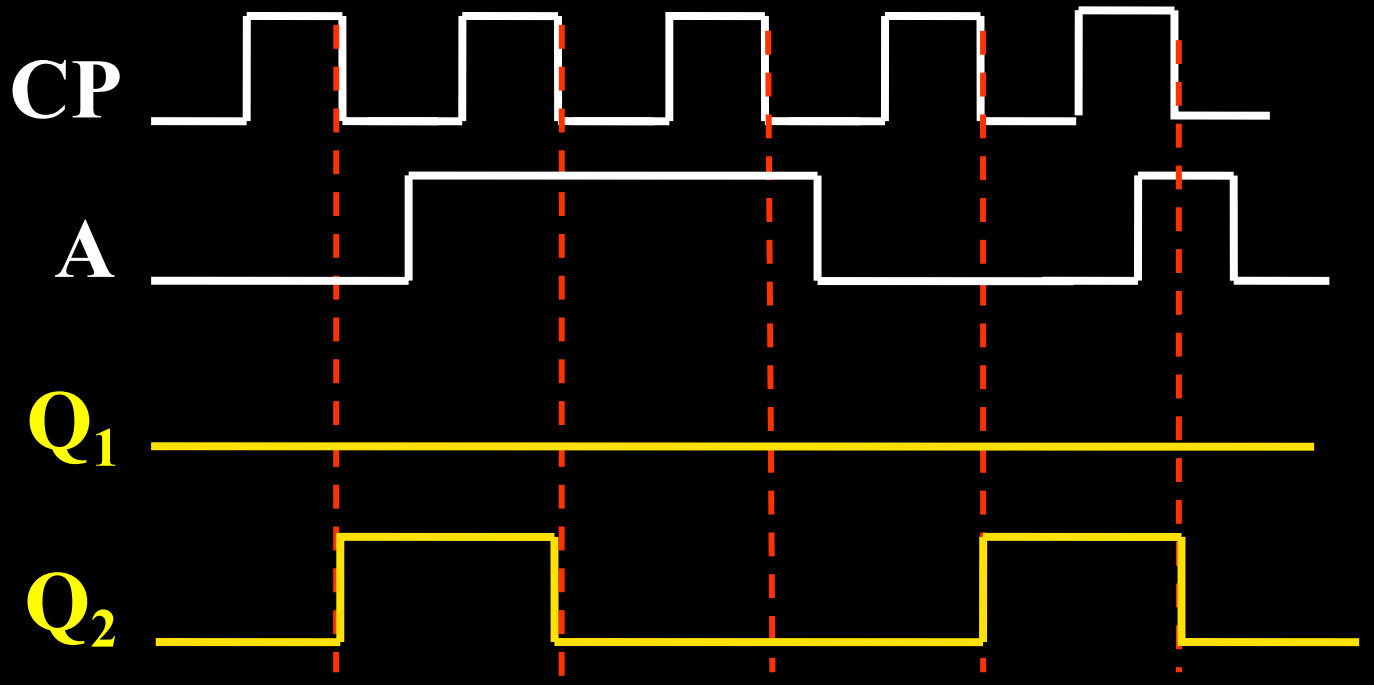




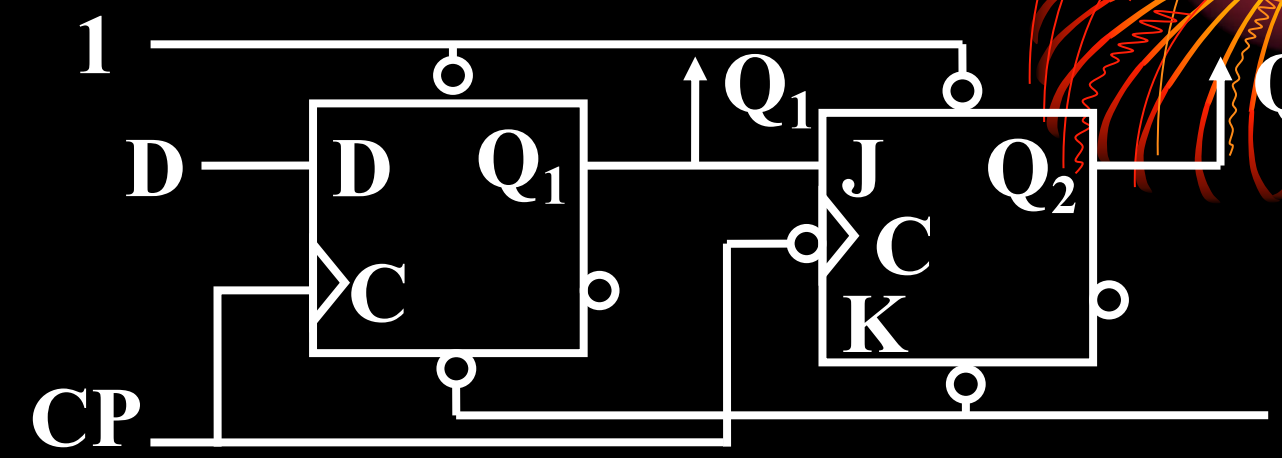
15－5 已知各触发器的初态均为0，CP、A波形如图，试画出Q波形。

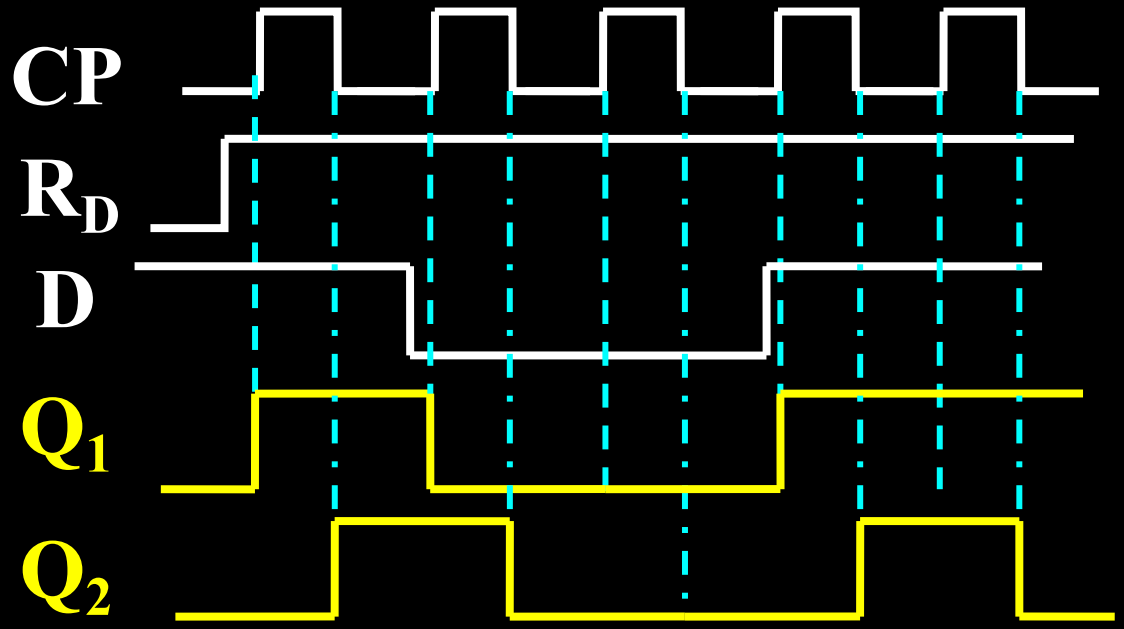






15－6 已知D、R_D 波形如图，试画出Q_1、Q_2 波形。





状态表

CP	Q_3	Q_2	Q_1	J_3	K_3	J_2	K_2	J_1	K_1
0	1	1	1	0	0	0	0	1	1
1	1	1	0	0	0	1	1	1	1
2	1	0	1	0	0	0	0	1	1
3	1	0	0	1	1	1	1	1	1
4	0	1	1	0	0	0	0	1	1
5	0	1	0	0	0	1	1	1	1
6	0	0	1	0	0	0	0	1	1
7	0	0	0	1	1	1	1	1	1
8	1	1	1						

图示电路为同步计数器

$J_1 = K_1 = 1$

$J_2 = K_0 = \overline{Q}_1$

$J_3 = K_3 = \overline{Q}_1\,\overline{Q}_2$

电路为八进制减法计数器

• 状态表

CP	Q_3	Q_2	Q_1	$J_3=Q_2Q_1$ $K_3=1$		$J_2=K_2=Q_1$		$J_1=\overline{Q_3}$ $K_1=1$	
0	0	0	0	0	1	0	0	1	1
1	0	0	1	0	1	1	1	1	1
2	0	1	0	0	1	0	0	1	1
3	0	1	1	1	1	1	1	1	1
4	1	0	0	0	1	0	0	0	1
5	0	0	0						

图示电路为同步计数器

$J_1=\overline{Q_3}$　　$K_1=1$

$J_2=K_2=Q_1$

$J_3=Q_1Q_2$　　$K_3=1$

电路为同步五进制加法计数器

• 状态表

CP	Q_3	Q_2	Q_1	J_3	K_3	J_2	K_2	J_1	K_1
0	0	0	0	0	0	0	1	1	1
1	0	0	1	0	0	1	1	1	1
2	0	1	0	0	1	0	0	1	1
3	0	1	1	1	1	1	1	1	1
4	1	0	0	0	0	0	1	1	1
5	1	0	1	0	0	1	1	1	1
6	1	1	0	0	1	0	1	0	1
7	0	0	0						

图示电路为同步计数器

$J_1 = \overline{Q_2 Q_3}$　$K_1 = 1$

$J_2 = Q_1$　$K_2 = \overline{\overline{Q_1}\,\overline{Q_3}}$

$J_3 = Q_1 Q_2$　$K_3 = Q_2$

电路为同步七进制加法计数器

15－12　分析逻辑功能。（图略）

$J_1=\overline{Q_2}\,\overline{Q_3}$　$K_1=Q_3$　$J_2=Q_1$　$K_2=\overline{Q_1}$

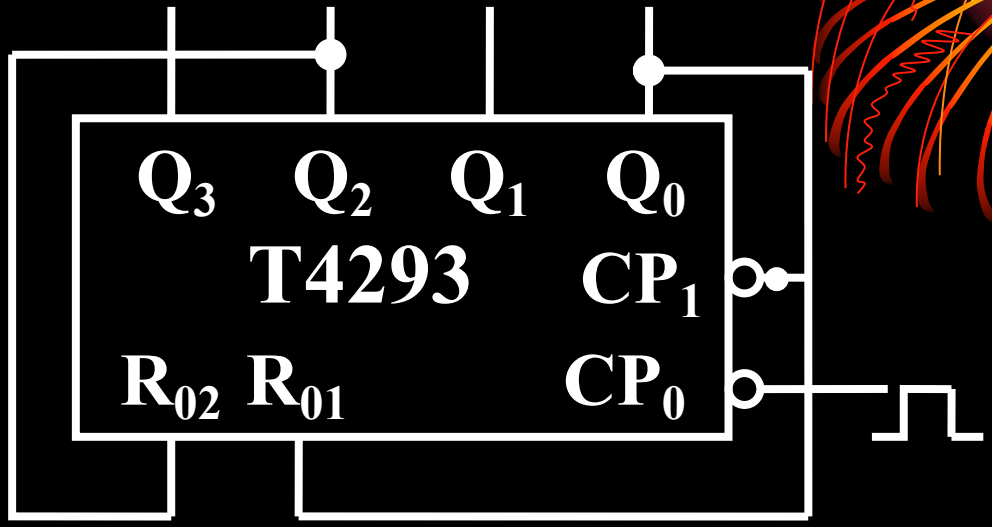
$J_3=Q_2$　$K_3=\overline{Q_2}$　图示电路为同步计数器

状态表

CP	Q_3	Q_2	Q_1	J_3	K_3	J_2	K_2	J_1	K_1
0	0	0	0	0	1	0	1	1	0
1	0	0	1	0	1	1	0	1	0
2	0	1	1	1	0	1	0	0	0
3	1	1	1	1	0	1	0	0	1
4	1	1	0	1	0	0	1	0	1
5	1	0	0	0	1	0	1	0	1
6	0	0	0						

电路为同步六进制计数器

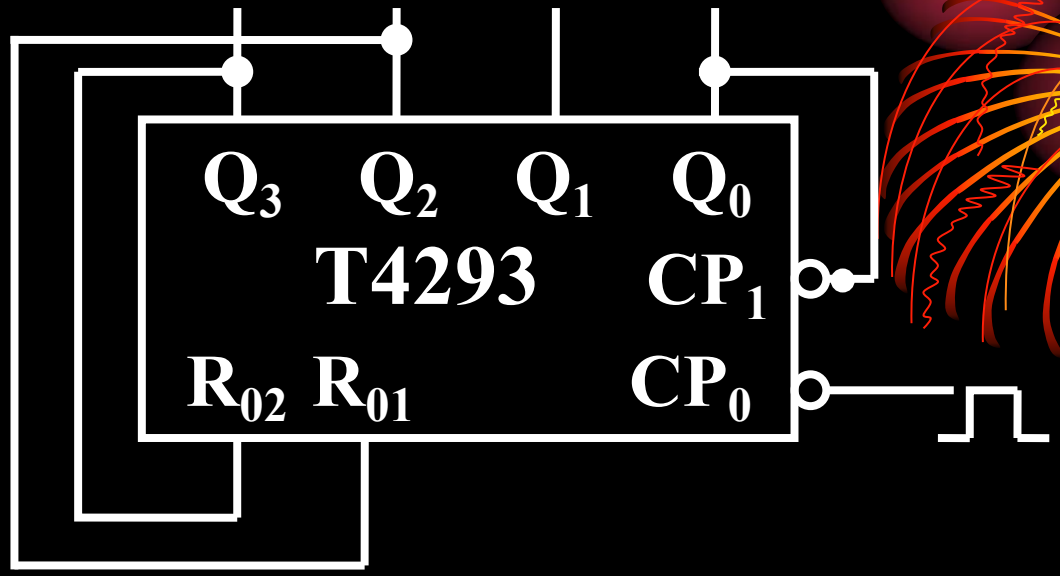
15－15　判断图示电路为几进制计数器。



选用CP_0为输入，　Q_3～Q_0为输出。

$Q_3Q_2\,Q_1Q_0$＝0101，R_{01}＝ R_{02}＝1，复位

电路为五进制计数器



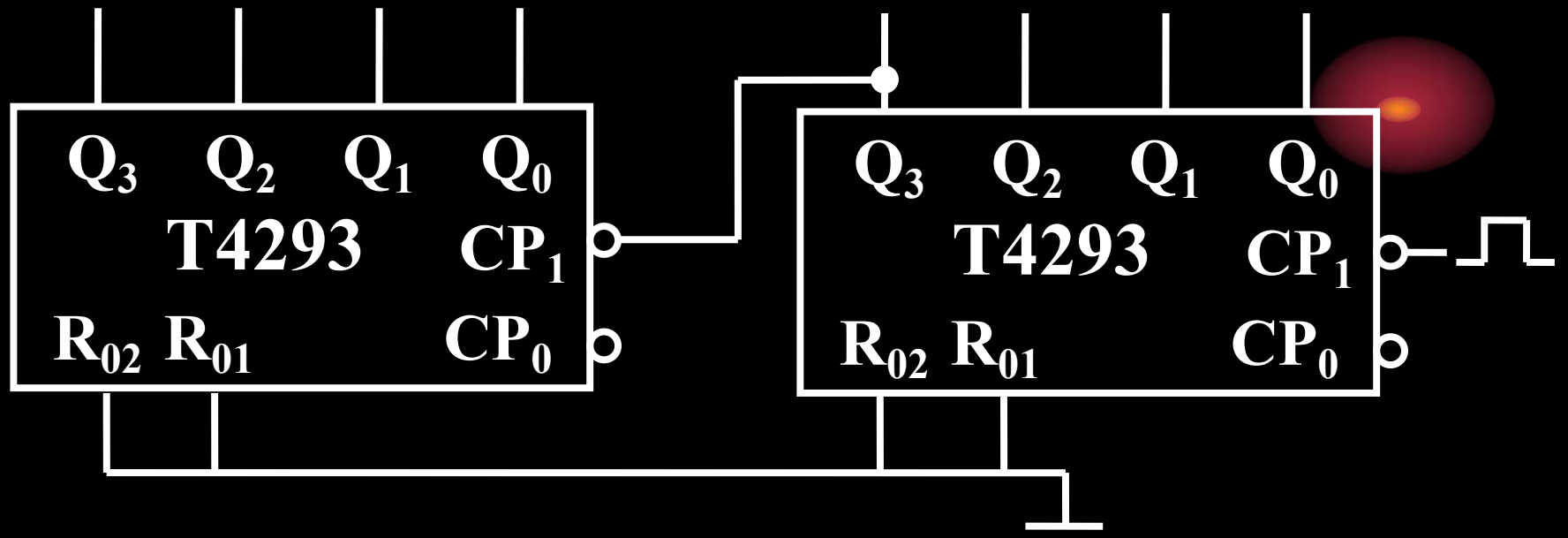
选用CP_0为输入，　Q_3～Q_0为输出。

$Q_3Q_2\,Q_1Q_0$＝1100，R_{01}＝ R_{02}＝1，复位

电路为十二进制计数器

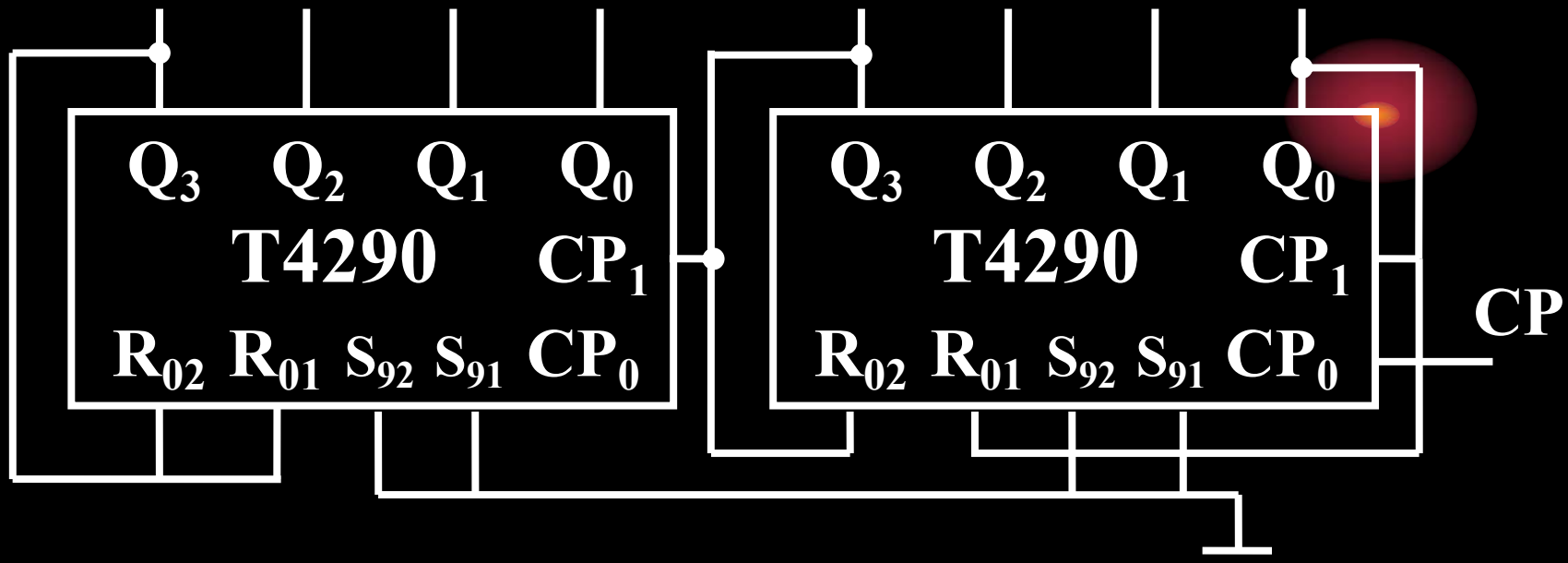
15－16　用T4293设计64进制计数器。

$8 \times 8 = 64$



15－17　用T4290设计一个36进制计数器

$36 = 4 \times 9$



四进制　　九进制