Final examination questions in Autumn 2021

返回

本次考试仅有一次作答机会，共 *46* 道题，总分 *100*

考试总时长： *180*分钟

请您认真阅读以下注意事项，再开始考试

1.在电脑端进行考试，推荐使用最新版谷歌浏览器；

2.答题时请关闭聊天工具、视频等其他无关的软件、工具、插件，避免影响您本次答题；

3.如果本场考试开启了防作弊功能，以下几种操作都会占用切屏次数：

F5 刷新，Alt + tab切换页面、Esc退出全屏、Alt + F4 关闭当前页面、唤起文件夹、点击超链接进行跳转；

4.需要一次性作答并提交，答题过程中不要切换或关闭页面，一旦开启考试，倒计时将不会停止；

5.完成答题后，如果截止时间未到，请您手动提交，不要踩点，不要等系统自动回收试卷，并在页面上确认考试提交成功再离开考试；

6.主观题单个题目的文本答题字数不能超过2000字，如果带有格式，请选择粘贴为纯文本或在TXT文本中刷一下格式，再粘贴到文本框内，字数较多的建议使用附件/图片上传；

☐

依照学术诚信条款，我保证此考试是本人独立完成的。

开始考试

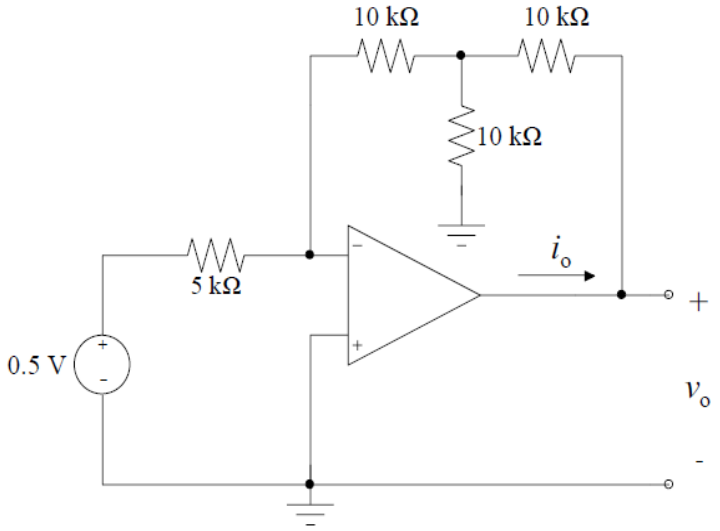
The test questions include single choice questions, multiple choice questions, judgment questions and fill in the blanks. You must complete them within three hours and only one chance to submit.

倒计时： 02:56:59

1

单选(2分)

For the circuit in Figure,the output voltage vo is (　)V.



参考答案：

B：-3

- ○
  A.

  1
- ○
  B.

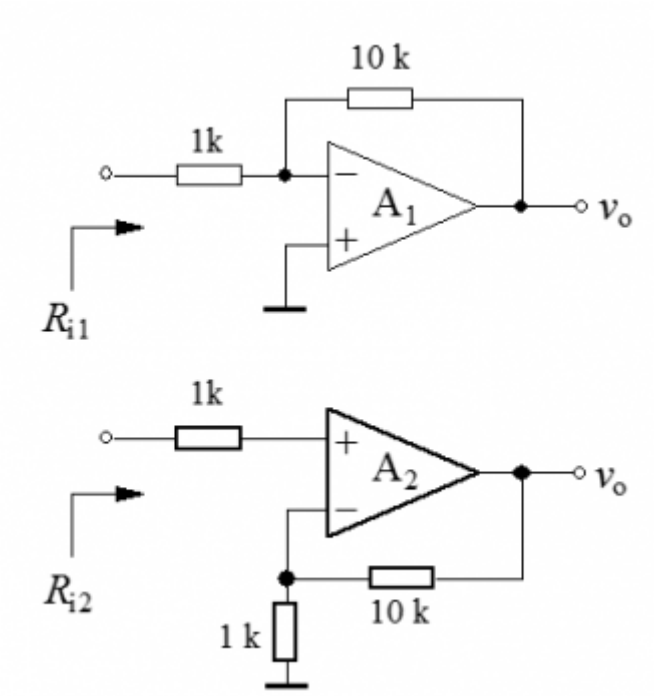
  -3
- ○
  C.

  2
- ○
  D.

  3

2
单选(2分)

For the circuit in the Figure, the op-amps are ideal, the input resistance is( )



参考答案:
D：Ri1<Ri2

- ○
  A.

  Ri1=Ri2=∞
- ○
  B.

  Ri1=Ri2=1k ohm
- ○

C.

Ri1>Ri2

- ○

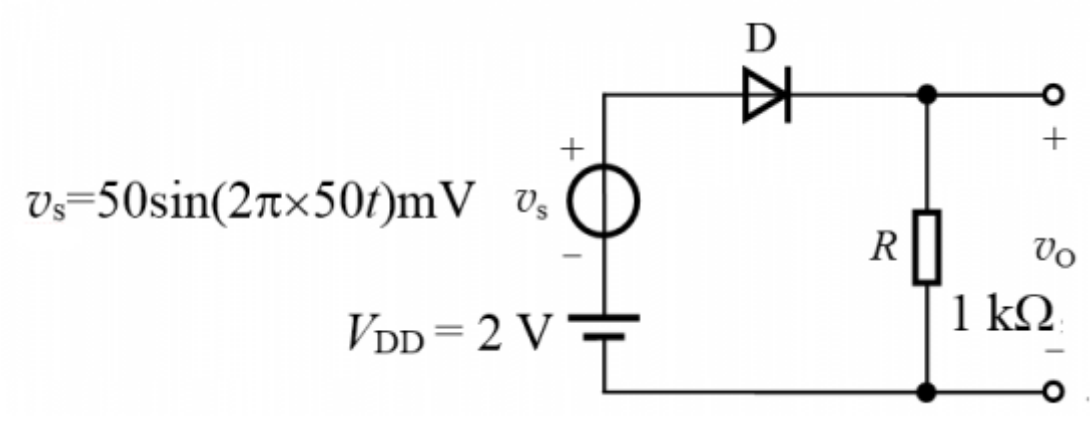
D.

Ri1<Ri2

3

单选(2分)

The circuit is shown as figure, the diode is silicon diode, and VDD = 2 V，R = 1kohm,vs=50sin(2pi*50t)mV，and Vγ=0.7V, then the quiescent current of the diode is (　), the quiescent voltage of the output vO is (　), and the ac voltage amplitude of the output is (　)



参考答案：

D：1.3mA，1.3V；0.049V

- ○

A.

2mA，2V；0.05V

- ○

B.

2mA，2V；0.049V

- ○

C.

1.3mA，1.3V；0.05V

- ○

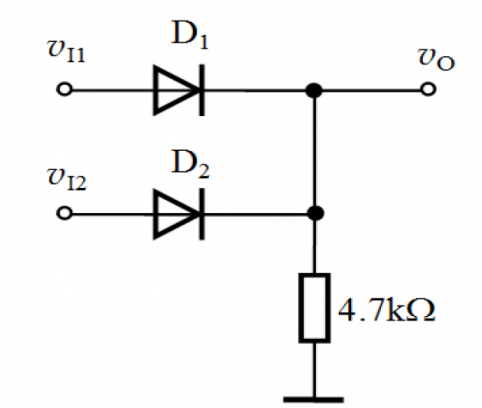
D.

1.3mA，1.3V；0.049V

4

单选(2分)

The circuit is shown as figure, the input voltages are shown in the table, the output voltage should be (　)



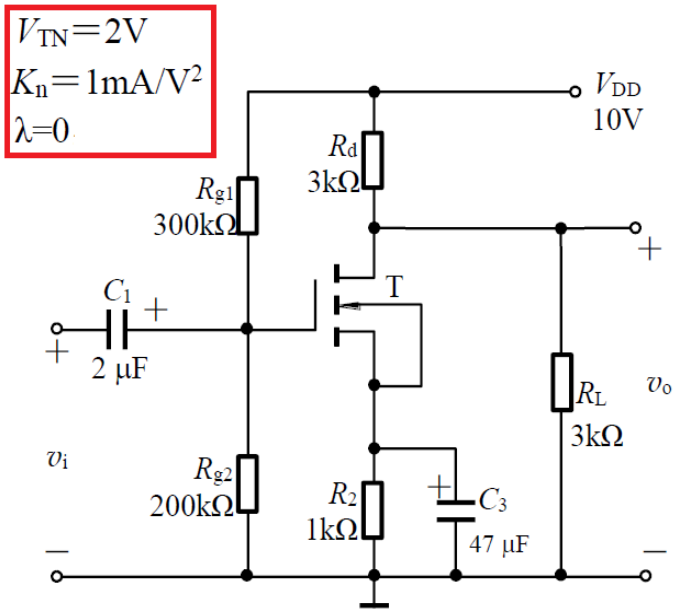
v_{I1}	v_{I2}	v_O			
		a	b	c	d
0V	0V	0V	0V	0V	0V
0V	5V	0V	5V	5V	0V
5V	0V	0V	5V	5V	0V
5V	5V	5V	5V	10V	10V

参考答案:
C：b

- ○ A. c
- ○ B. d
- ○ C. b
- ○ D. a

5
单选(2分)

In the circuit in Figure， VGSQ=（ ）V，ID=（ ）mA，VDS=( )V;

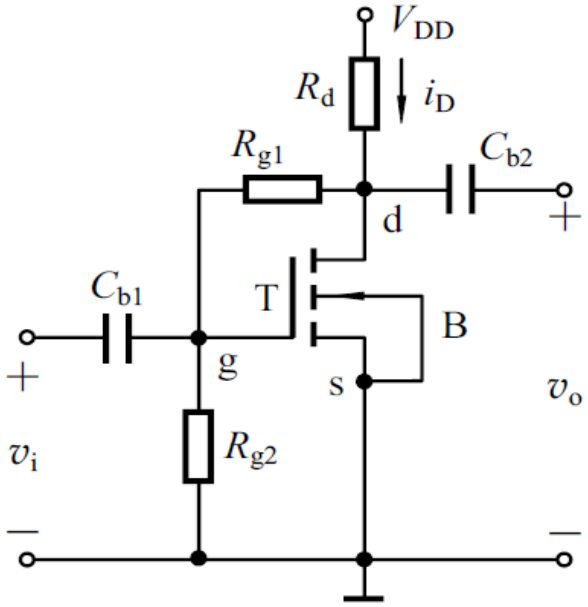


参考答案：
B：VGSQ=3V,IDQ=1mA,VDSQ=2.5V;

- ○
  A.
  VGSQ=4V,IDQ=4mA,VDSQ=-2V;
- ○
  B.
  VGSQ=3V,IDQ=1mA,VDSQ=2.5V;
- ○
  C.
  VGSQ=3V,IDQ=1mA,VDSQ=6V;
- ○
  D.
  VGSQ=4V,IDQ=1mA,VDSQ=7V;

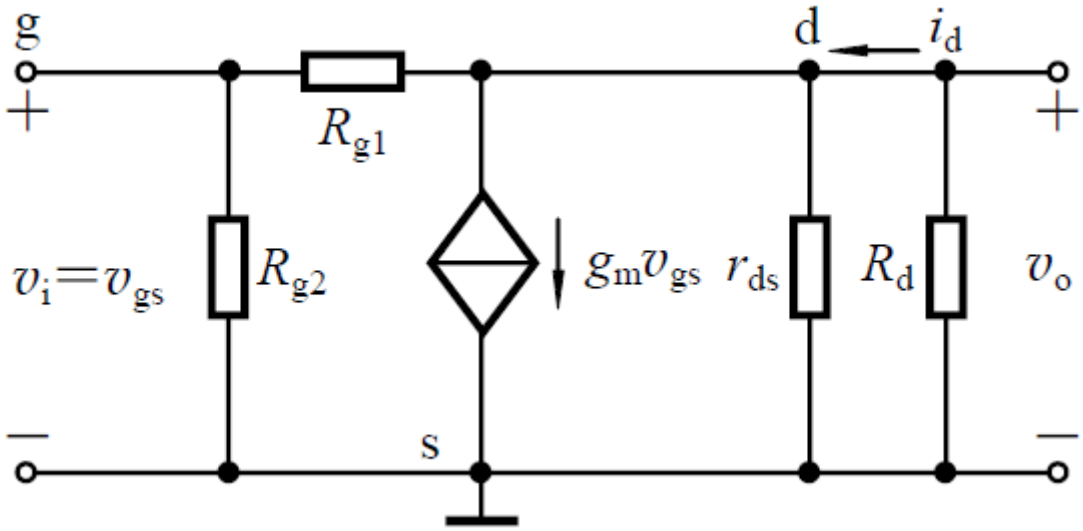
6
单选(2分)

Assuming that the capacitors in the circuit are very large and can be regarded as short circuit to AC signal, the small signal equivalent circuit is （ ）？


V_{DD}
R_d
i_D
R_{g1}
C_{b2}
d
C_{b1}
T
B
g
s
v_o
v_i
R_{g2}

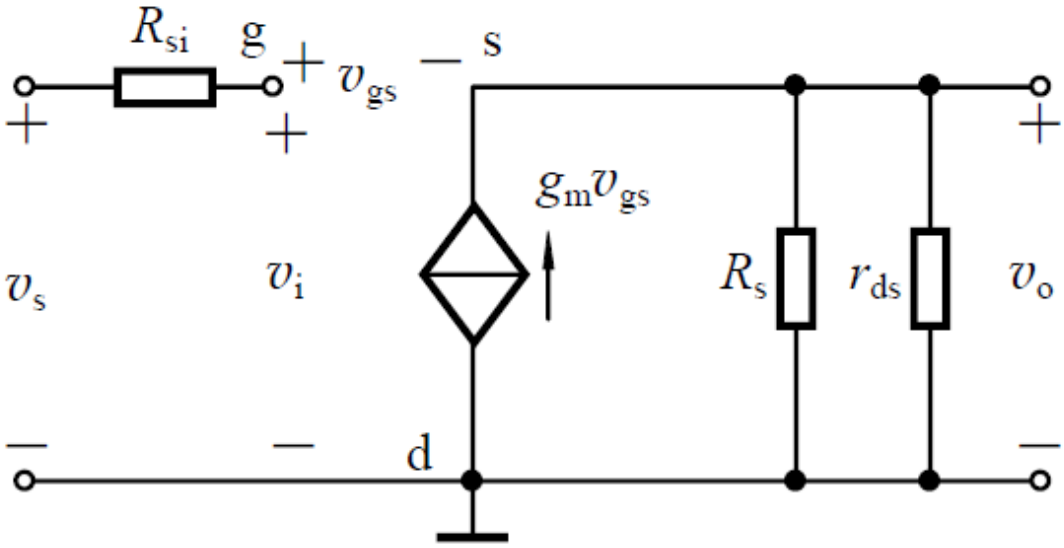
参考答案：

B：


g
d
i_d
R_{g1}
$v_i = v_{gs}$
R_{g2}
$g_m v_{gs}$
r_{ds}
R_d
v_o
s

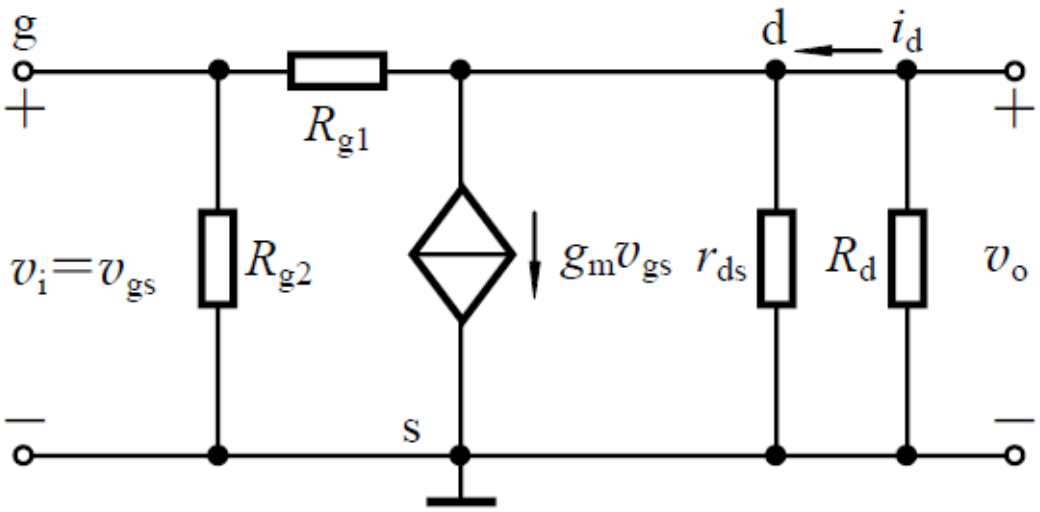
- ○

A.


R_{si}
g
v_{gs}
s
$g_m v_{gs}$
v_s
v_i
R_s
r_{ds}
v_o
d

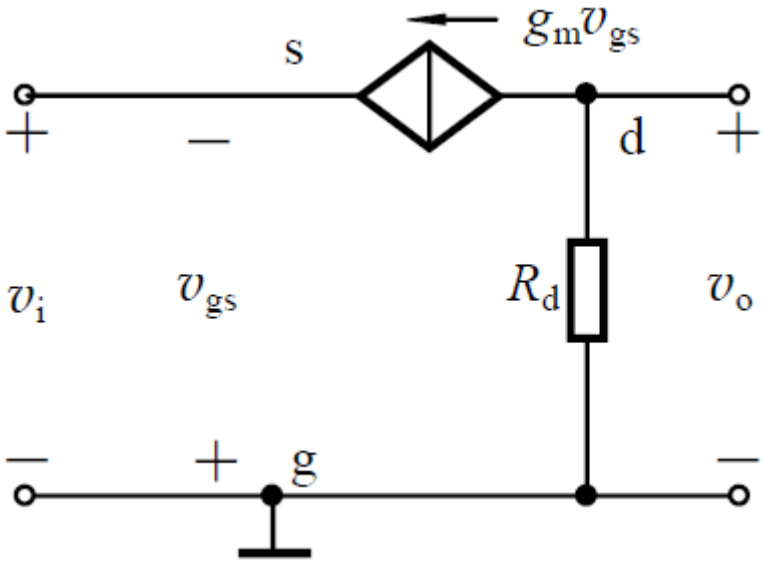
- ○

B.


g
d
i_d
R_{g1}
$v_i = v_{gs}$
R_{g2}
$g_m v_{gs}$
r_{ds}
R_d
v_o
s

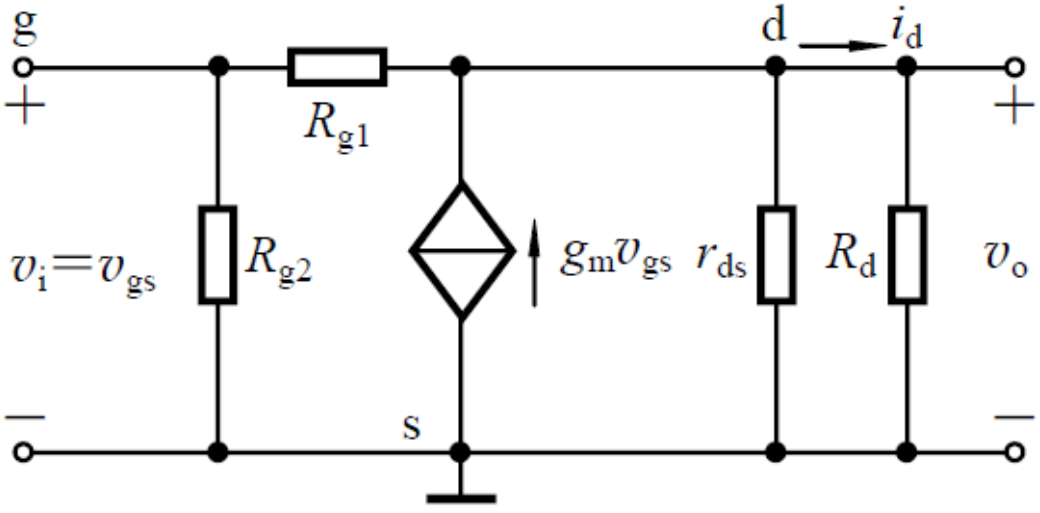
- ○

C.


$g_m v_{gs}$
s
d
v_i
v_{gs}
R_d
v_o
g

- ○

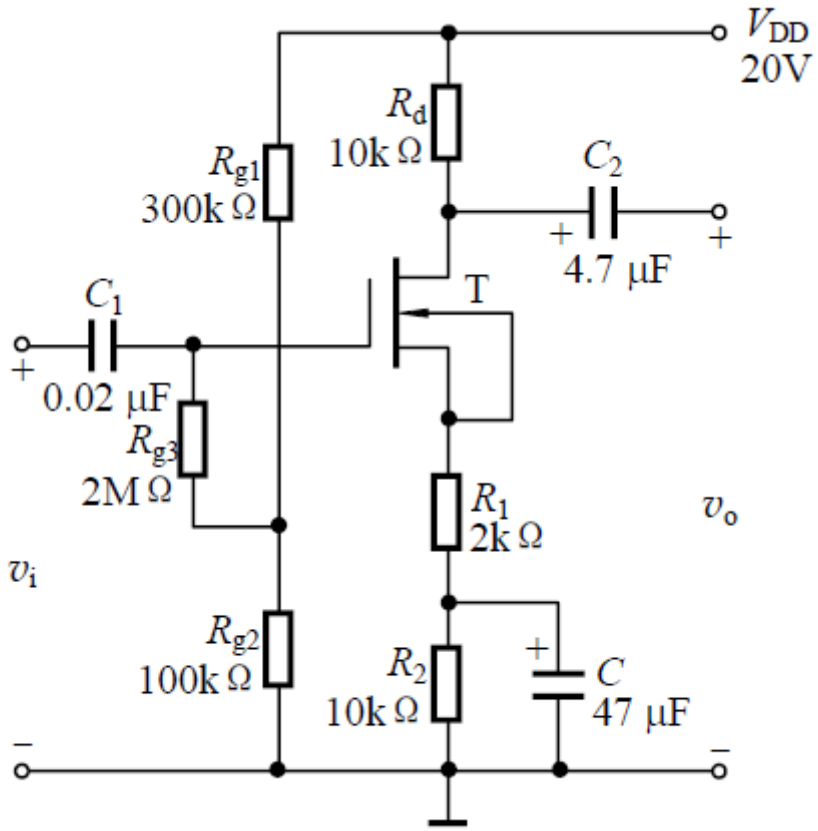
D.


g
d
i_d
R_{g1}
$v_i = v_{gs}$
R_{g2}
$g_m v_{gs}$
r_{ds}
R_d
v_o
s

7

单选(2分)

The circuit is as shown in the figure, and the capacitance in the passband can be regarded as a short circuit. The gm of T1 is gm=1mS.Determine the voltage gain of the circuit Av=vo/vi=（ ）



参考答案：
C：-3.3

- ○ A. 3.3
- ○ B. -0.77
- ○ C. -3.3
- ○ D. -10

8
单选(2分)

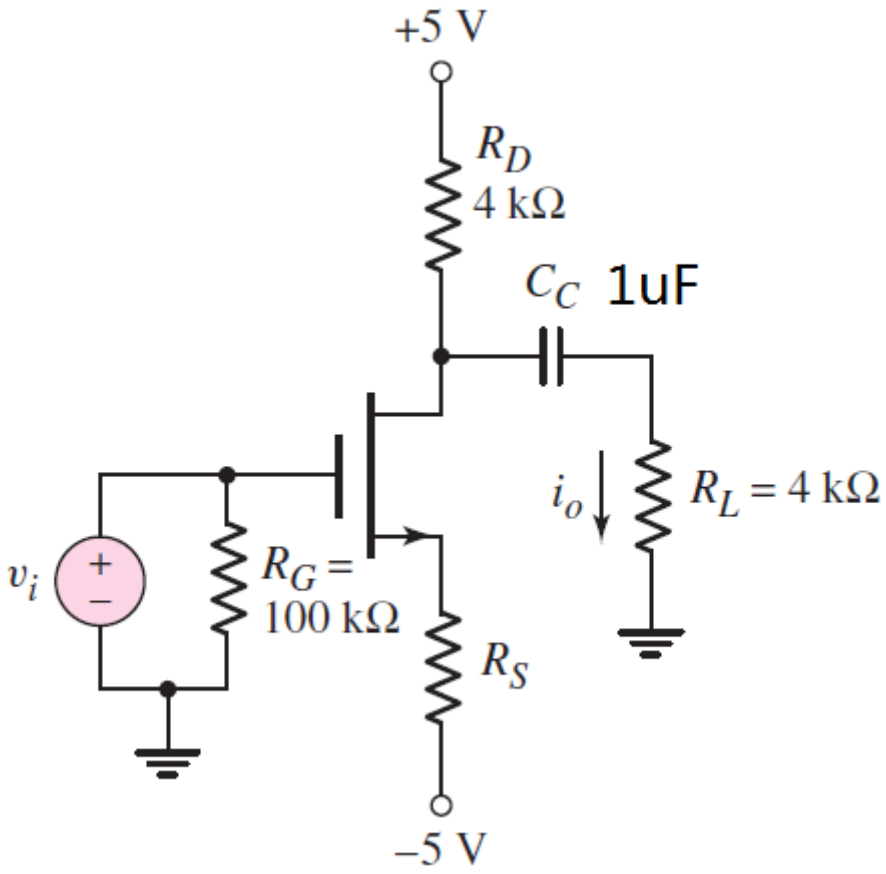
If the source resistance of the signal source is 1kohm，and when the amplifying circuit is not connected,the voltage amplitude of the signal source is 10mV， but when the amplifying circuit is connected,the voltage of the input port of the amplifying circuit is 8mV， then the input resistance of the amplifying circuit is（ ）

参考答案：
C：4k ohm

- ○
  A.
  3k ohm
- ○
  B.
  2k ohm
- ○
  C.
  4k ohm
- ○
  D.
  5k ohm

9
单选(2分)

Consider the circuit in the figure, what is the time constant τ associated with Cc?



参考答案：
C：8ms

- ○
  A.

4ms

- ○ B. 2ms
- ○ C. 8ms
- ○ D. 10ms

10
单选(2分)

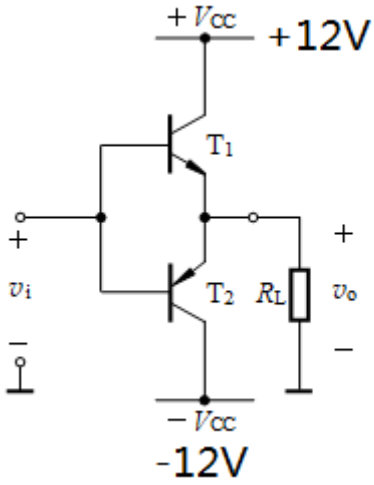
If the maximum output power of a class B power amplifier is 20W, the maximum power of each power transistor shall be at least ( ).

参考答案：
B：4W

- ○ A. 10W
- ○ B. 4W
- ○ C. 20W
- ○ D. 2W

11
单选(2分)

For the circuit shown in figure, the BJT transistor parameters are VBE(on)=0.7V,VCE(sat)=2V, VA=∞,so the maximum collector-emitter voltage is ( )V.

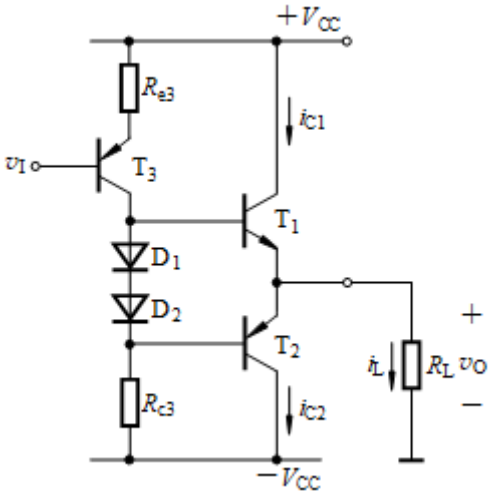


参考答案:
D：22

- ○ A. 20
- ○ B. 12
- ○ C. 24
- ○ D. 22

12
单选(2分)

For the circuit shown in figure ,the function of the two diodes in the circuit is (　)

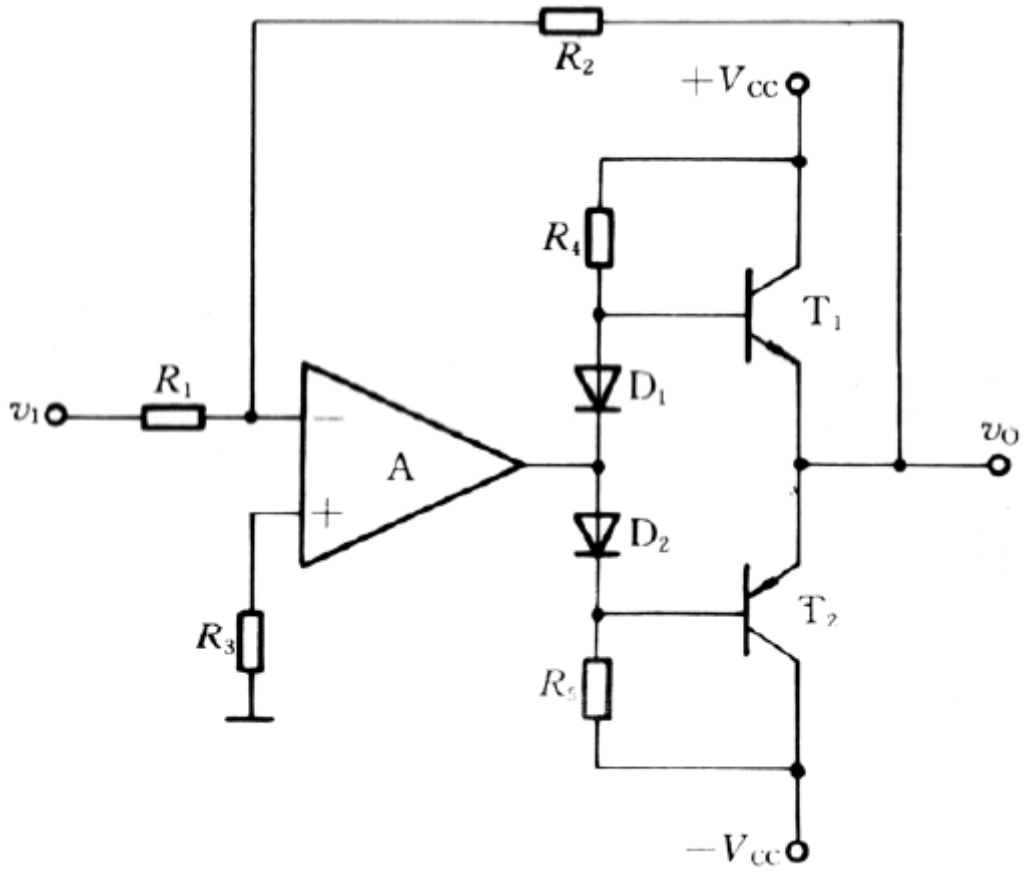


参考答案：
D：get a constant DC bias voltage

- ○
  A.
  convert DC to AC
- ○
  B.
  filtering out unnecessary signals
- ○
  C.
  convert AC to DC
- ○
  D.
  get a constant DC bias voltage

13
单选(2分)

For the circuit shown in Figure, the ac feedback between two stages is （ ）



参考答案：
A：Shunt-Shunt

- ○ A. Shunt-Shunt
- ○ B. Series-Shunt
- ○ C. Shunt-Series
- ○ D. Series-Series

14
单选(2分)

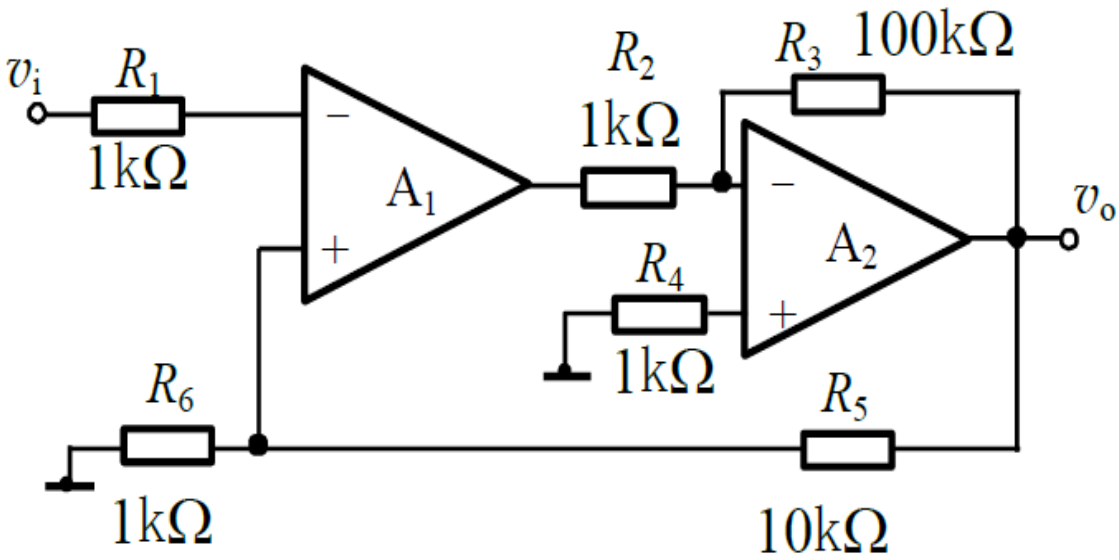
If the output current of the feedback circuit tends to be stabilized, and the input resistance tends to be increased, which negative feedback should be used (　).

参考答案：
B：Series-Series

- ○
  A.
  Series-Shunt
- ○
  B.
  Series-Series
- ○
  C.
  Shunt-Series
- ○
  D.
  Shunt-Shunt

15
单选(2分)

Consider the feedback circuit in Figure （10-3）, if |1+Aβ|>>1,determine the closed-loop voltage gain is (　)



参考答案:
D：11

- ○
  A.
  -11
- ○
  B.
  -10
- ○

C.

10

- ○

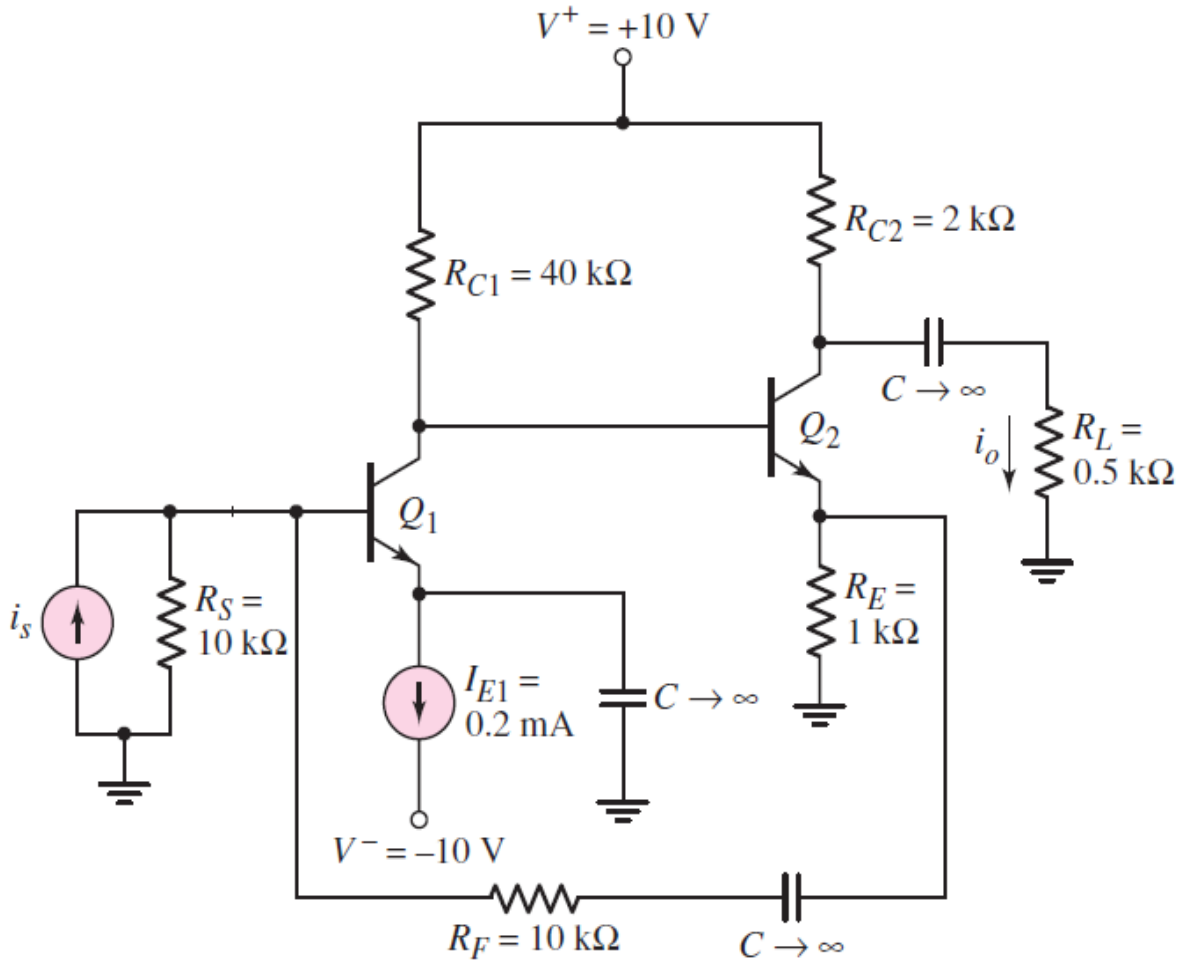
D.

11

16

单选(2分)

Consider the feedback circuit in Figure, if |1+Aβ|>>1,determine the closed-loop gain io/is is (　)



参考答案:

A：8.8

- ○

A.

8.8

- ○

B.

-5

- ○

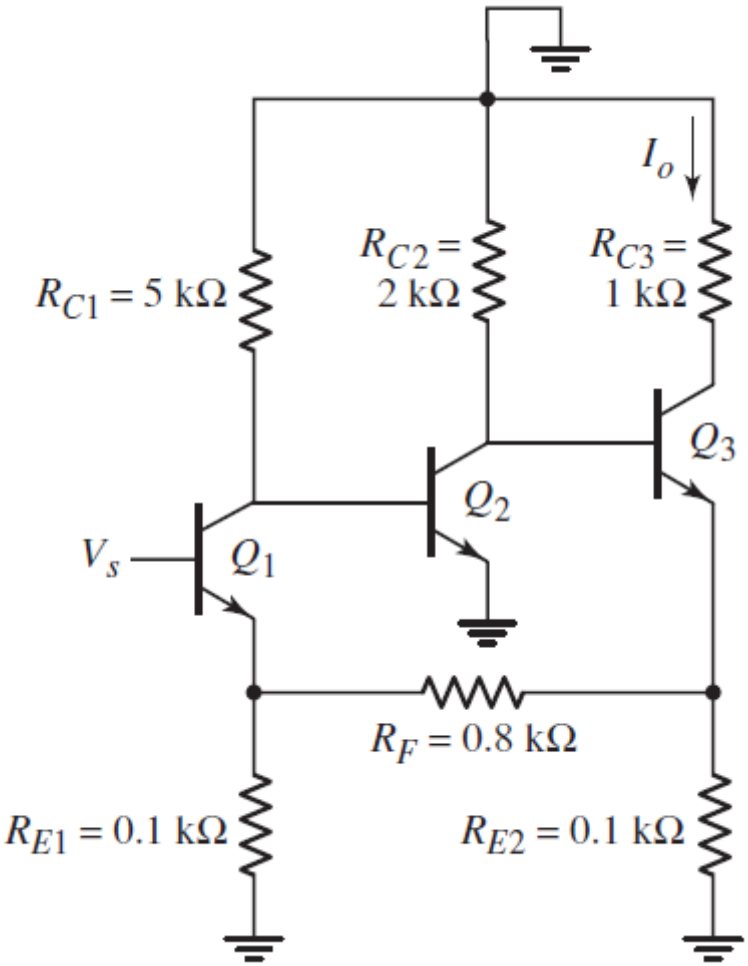
C.

-6

- ○
  D.
  -8.8

17
单选(2分)

Consider the feedback circuit in Figure , if |1+Aβ|>>1,determine the closed-loop gain io/vs is (　)

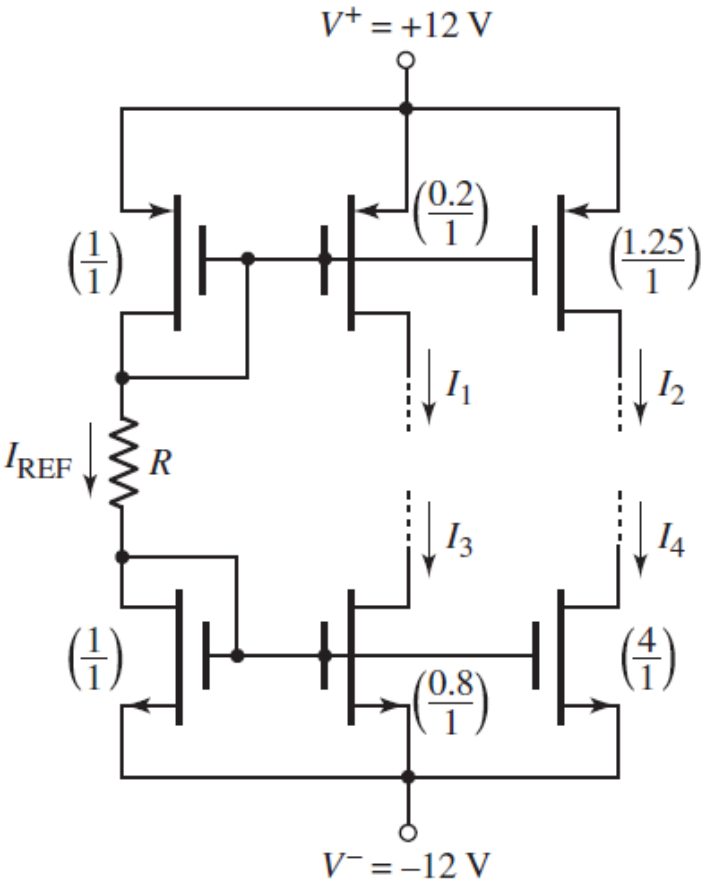


参考答案:
C：100ms

- ○
  A.
  98ms
- ○
  B.
  -100ms
- ○
  C.
  100ms
- ○
  D.
  -98ms

18
单选(2分)

Consider the circuit shown in Figure, the transistor parameters and the W/L ratios are given in the figure, then I1= ( )mA



$V_{TN} = 0.8\,\text{V},$
$V_{TP} = -0.8\,\text{V},$
$k_n' = 100\,\mu\text{A/V}^2,$
$k_p' = 60\,\mu\text{A/V}^2,$
$\lambda_n = \lambda_p = 0.$
$R = 100\,\text{k}\Omega.$

参考答案:
B：0.0361

- ○ A. 0.1805
- ○ B. 0.0361
- ○ C. 0.4248
- ○ D. 0.2256

19
单选(2分)

The goal of the design of the differential amplifiers is to ( ).

参考答案：
A：minimize the effect of the common-mode input signal

- ○
  A.
  minimize the effect of the common-mode input signal
- ○
  B.
  improve the voltage gain
- ○
  C.
  decrease the output resistance
- ○
  D.
  increase the input resistance

20
单选(2分)

Consider the differential amplifier shown in figure, if CMRR=100, and Avd2=100, vi=20mV, then the

output vo=( )mV;

参考答案：
B：1990

- ○
  A.
  2000
- ○
  B.
  1990
- ○
  C.
  980
- ○
  D.
  1000

21
单选(2分)

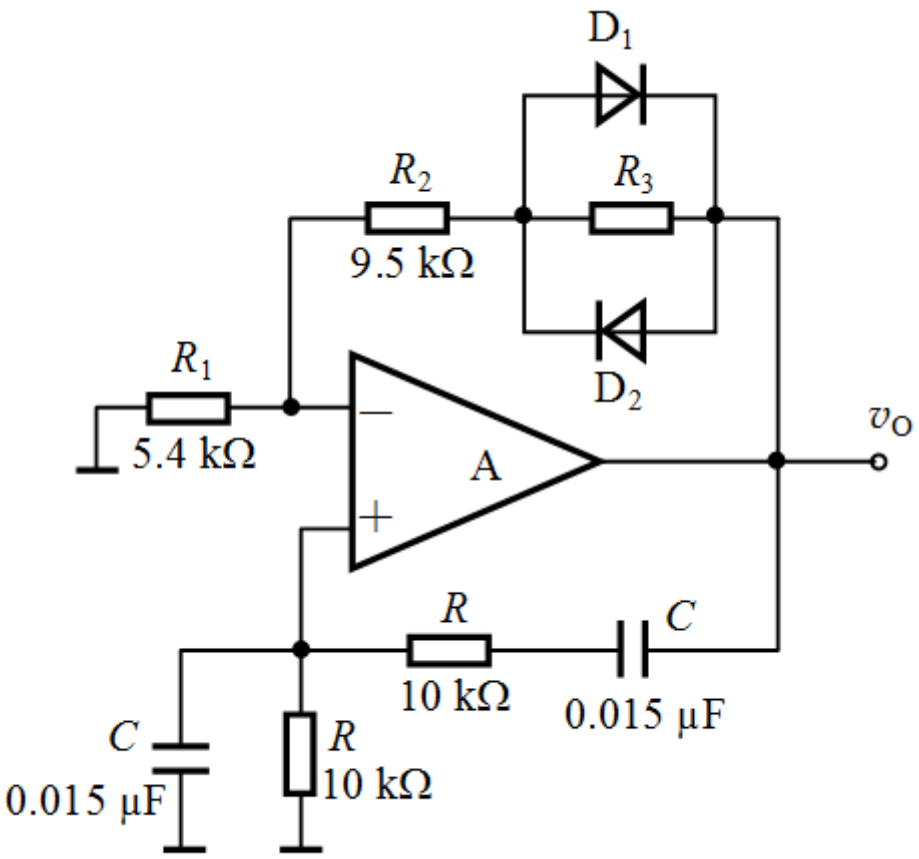
When the signal frequency from 500Hz to 50kHz, what kind of filter should be selected?

参考答案：
B：Band pass filter

- ○
  A.
  Band-reject filter
- ○
  B.
  Band pass filter
- ○
  C.
  Low-pass filter
- ○
  D.
  High-pass filter

22
单选(2分)

The circuit is shown in the figure. In order to make the circuit oscillate, the value of resistance R3 must be （ ） and the oscillation frequency of the circuit is （ ）.



参考答案：
D：>1.3k ohm，1kHz

- ○
  A.
  >2.7k ohm，1kHz
- ○
  B.
  <1.3k ohm，1kHz
- ○
  C.
  >1.3k ohm，10kHz
- ○
  D.
  >1.3k ohm，1kHz

23
单选(2分)

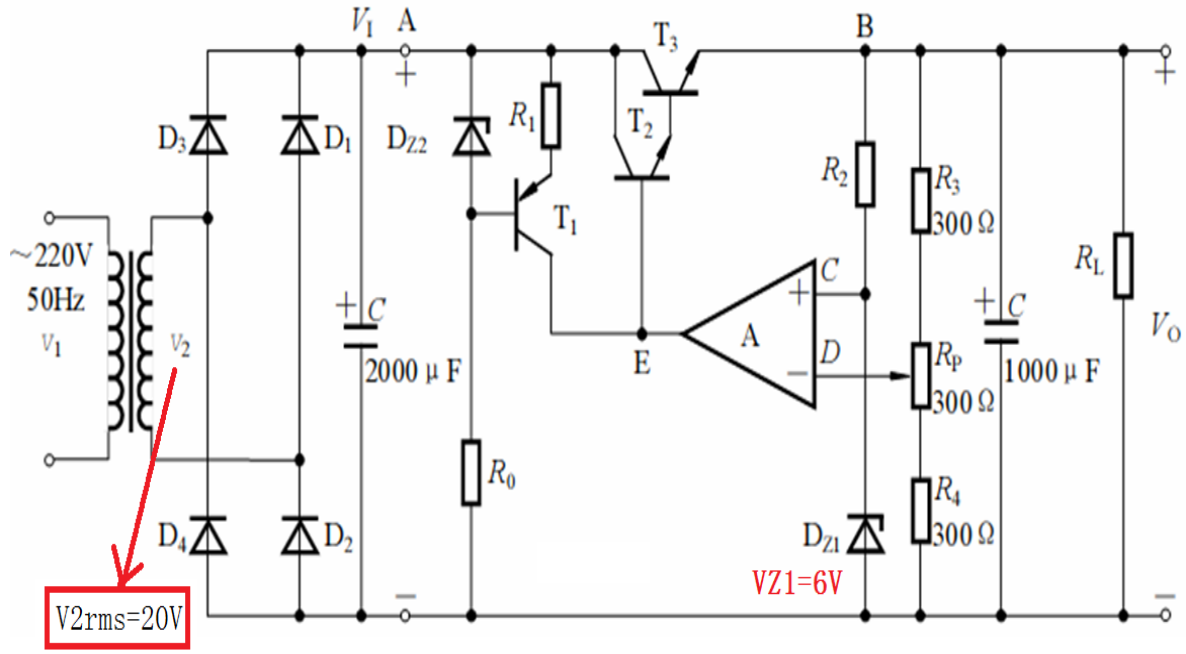
For the series regulator circuit, when the circuit is working normally, the regulating transistor is always in the (　)

参考答案：
C：Forward active region

- ○
  A.
  Switch
- ○
  B.
  Cut-off
- ○
  C.
  Forward active region
- ○
  D.
  Unable to determine

24
单选(2分)

For the circuit in Figure, the maximum value of the voltage on the load is (　) the minimum value is (　)

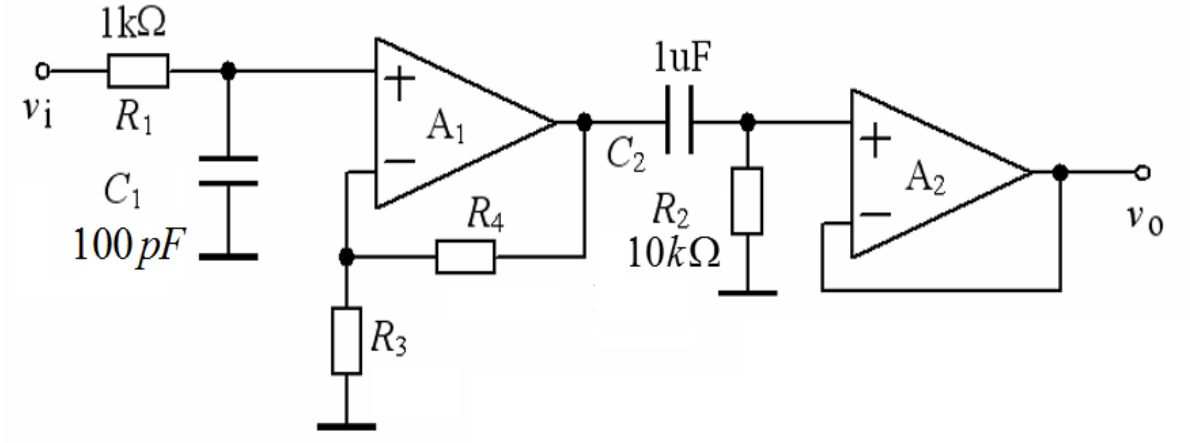


参考答案：
C：18V，9V

- ○
  A.
  28V，9V
- ○
  B.
  20V，9V
- ○
  C.
  18V，9V
- ○
  D.
  28V，18V

25
单选(2分)

The circuit is shown in the figure,the lower corner frequency is （ ）rad/s.



参考答案：
B：100

- ○
  A.
  1000
- ○
  B.
  100
- ○
  C.
  50
- ○
  D.
  10000

26
多选(3分)

For the inverting and noninverting amplifiers, assume all the Op-Amps are ideal, which of the following statements are NOT true?

参考答案：
B：The input resistances are approximately equal.
D：The current from the output terminal is zero.

- ☐
  A.
  The current into the input terminals is zero.
- ☐
  B.
  The input resistances are approximately equal.
- ☐
  C.
  The differential voltage across the input terminals is zero.
- ☐

D.

The current from the output terminal is zero.

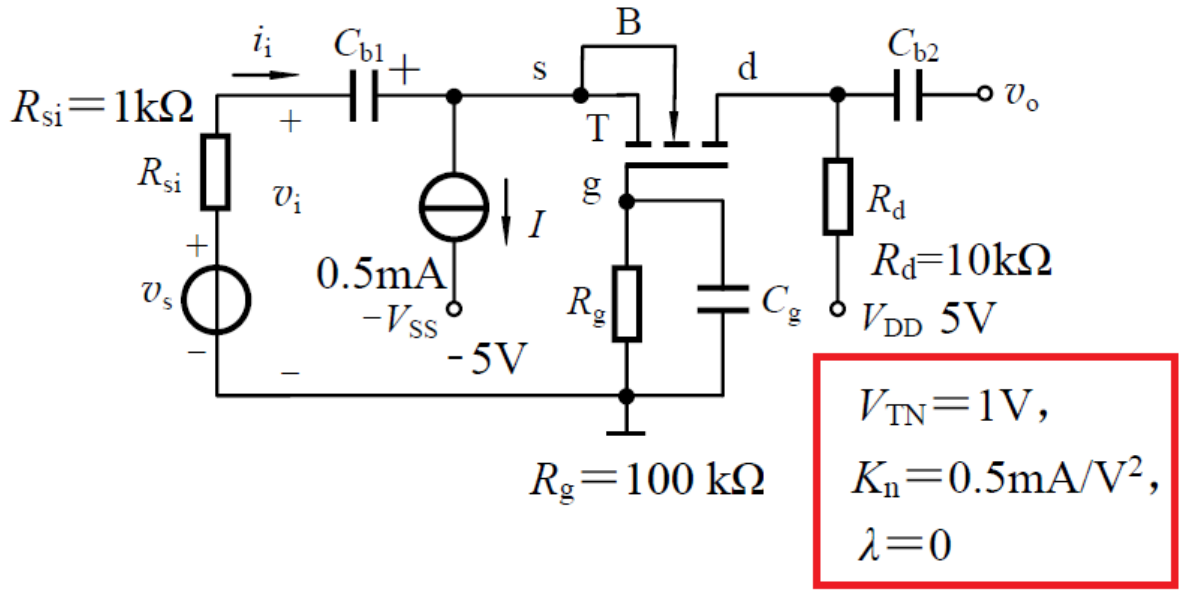
27

多选(3分)

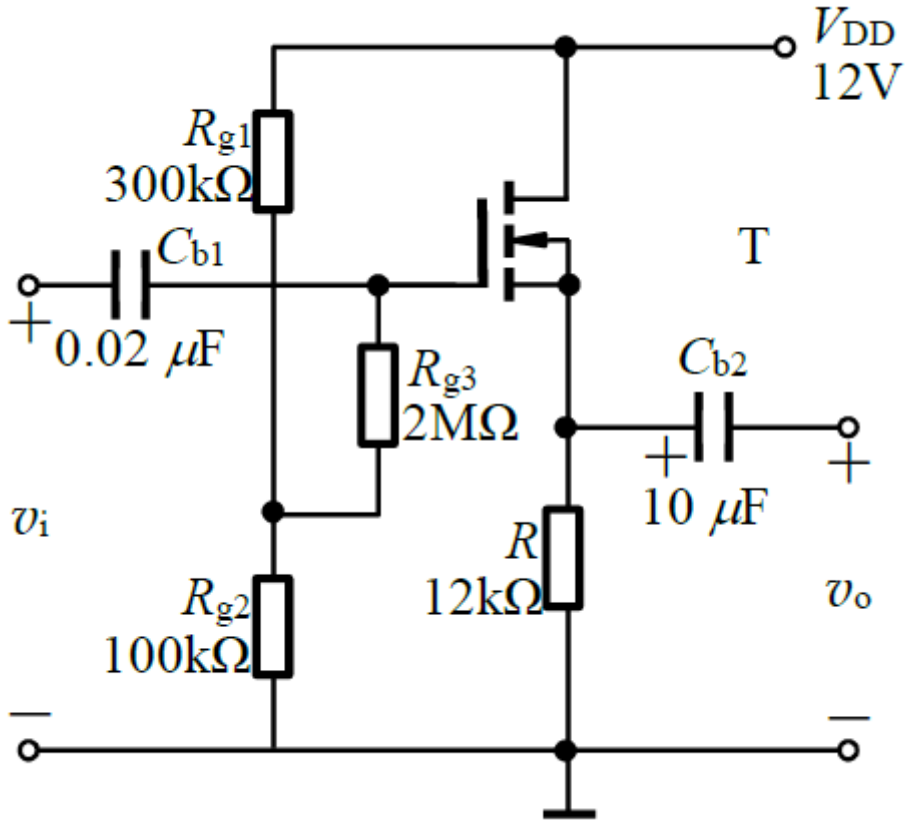
Assuming that the DC operating points of all the following amplifier circuits are normal, all of the capacitors to AC signal can be regarded as a short circuit, and which circuits have output and input signals in phase（ ）

参考答案:

A:

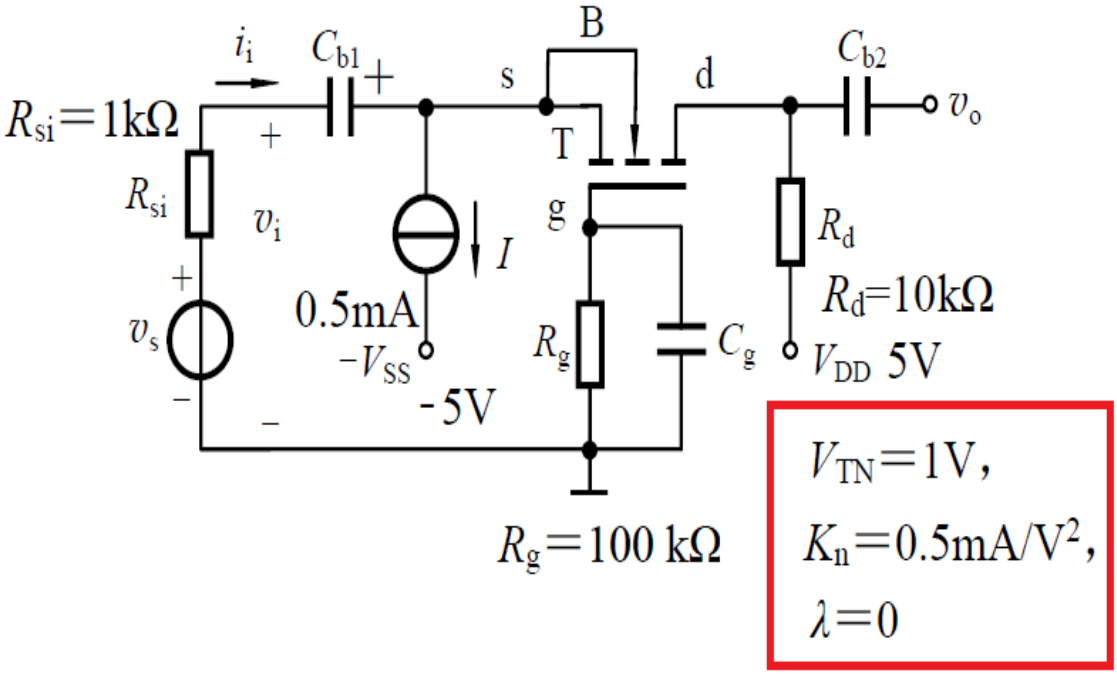


D:



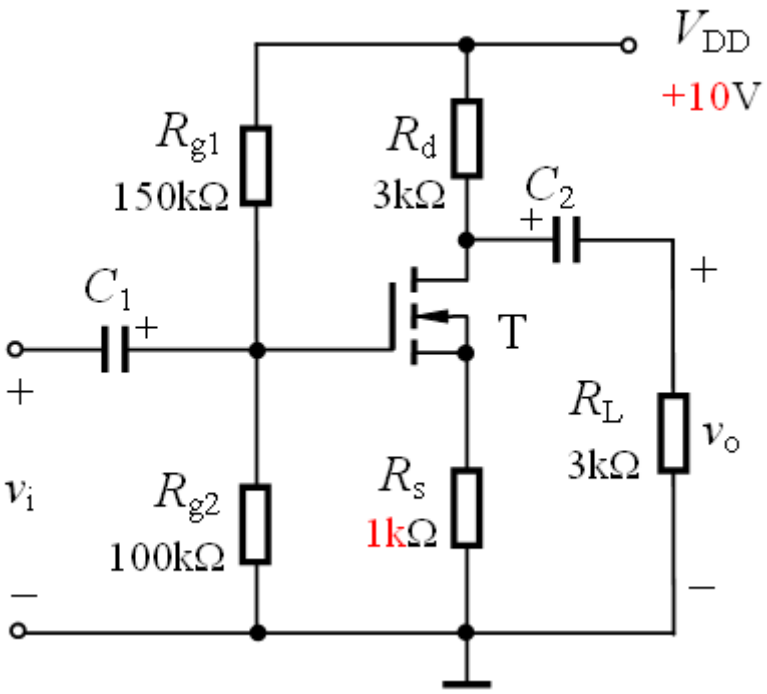
- ☐

A.


i_i
C_{b1}
B
s
d
C_{b2}
v_o
$R_{si}=1k\Omega$
T
R_{si}
v_i
g
R_d
I
$R_d=10k\Omega$
0.5mA
v_s
$-V_{SS}$
R_g
C_g
V_{DD} 5V
-5V
$V_{TN}=1V,$
$K_n=0.5mA/V^2,$
$\lambda=0$
$R_g=100\ k\Omega$

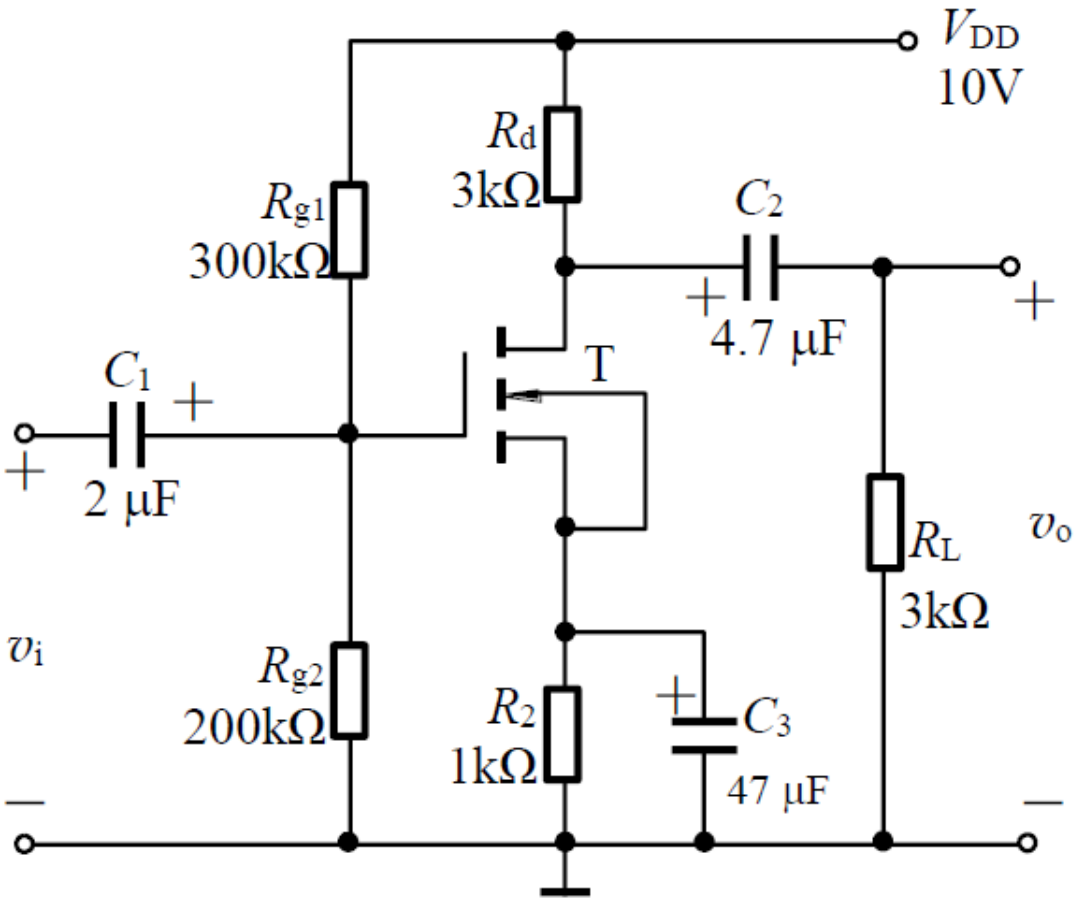
- ☐

B.


V_{DD}
+10V
R_{g1}
150kΩ
R_d
3kΩ
C_2
C_1
T
R_L
3kΩ
v_o
v_i
R_{g2}
100kΩ
R_s
1kΩ

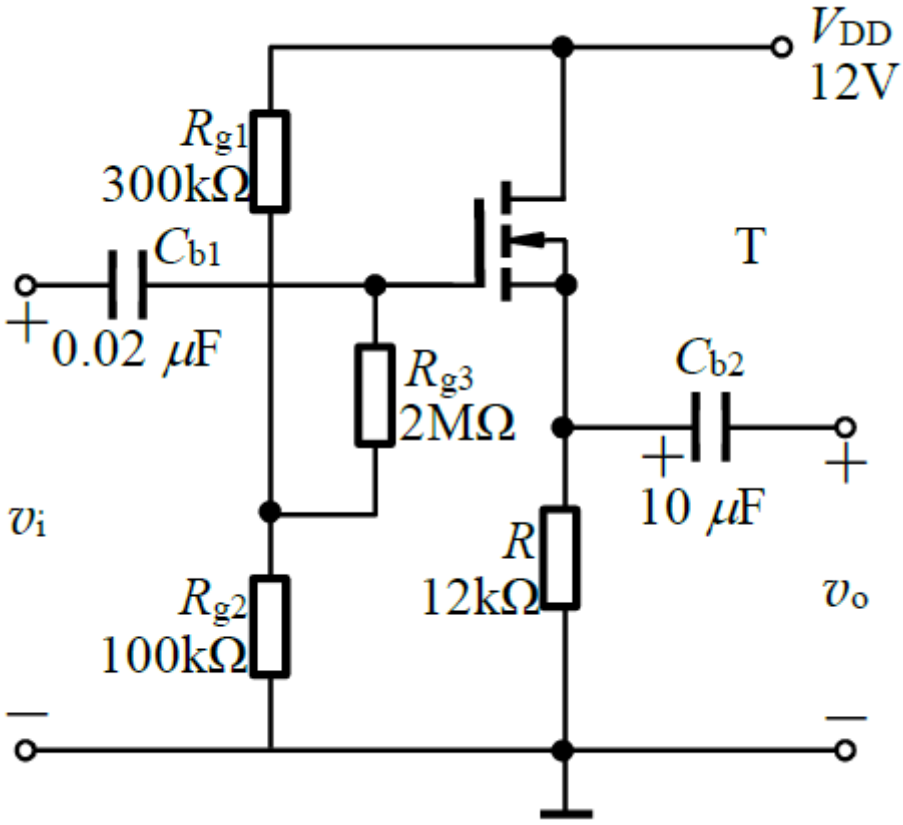
- ☐

C.


V_{DD}
10V
R_d
3kΩ
R_{g1}
300kΩ
C_2
4.7 μF
T
C_1
2 μF
R_L
3kΩ
v_o
v_i
R_{g2}
200kΩ
R_2
1kΩ
C_3
47 μF

- ▢

D.


V_{DD}
12V
R_{g1}
300kΩ
C_{b1}
T
0.02 μF
R_{g3}
2MΩ
C_{b2}
10 μF
v_i
R
12kΩ
v_o
R_{g2}
100kΩ

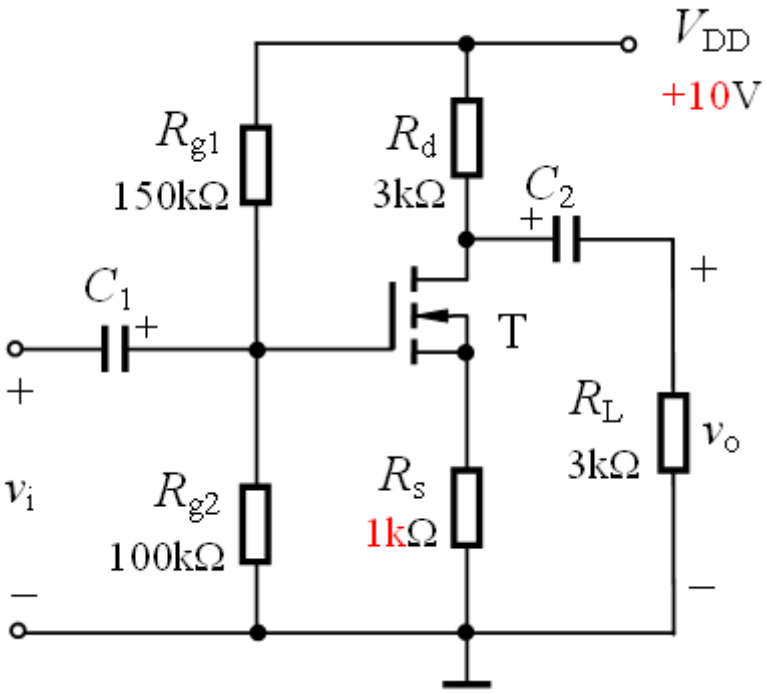
28

多选(3分)

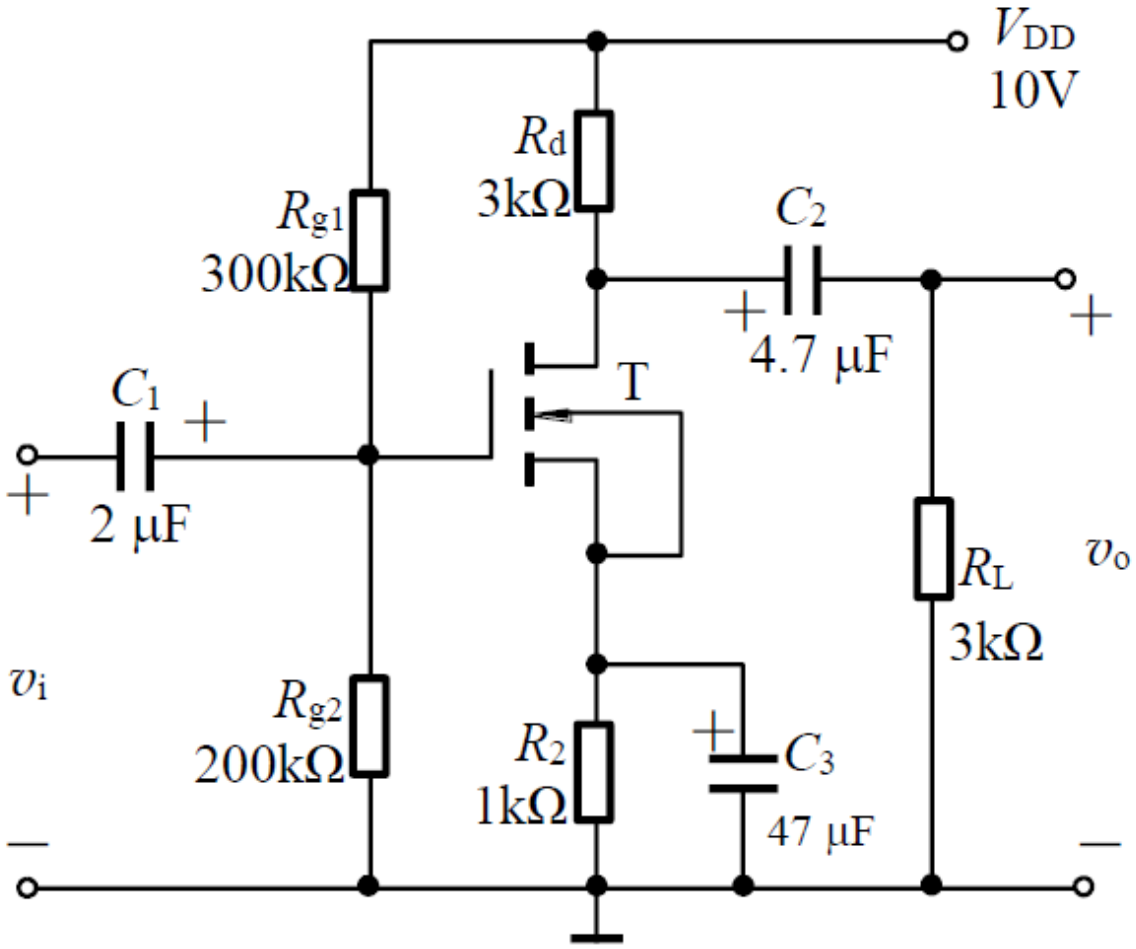
Assuming that the DC operating points of all the following amplifier circuits are normal, all of the capacitors to AC signal can be regarded as a short circuit, and which circuits have output and input signals opposite phase（ ）

参考答案:

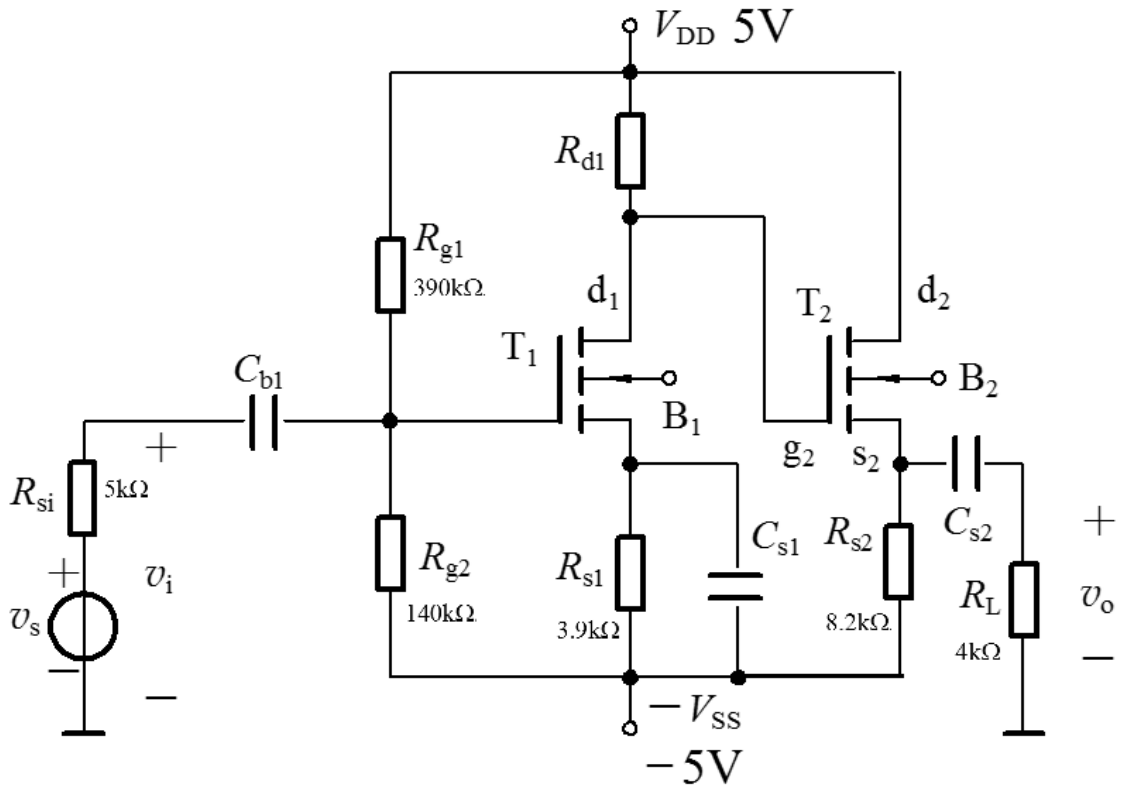
A:



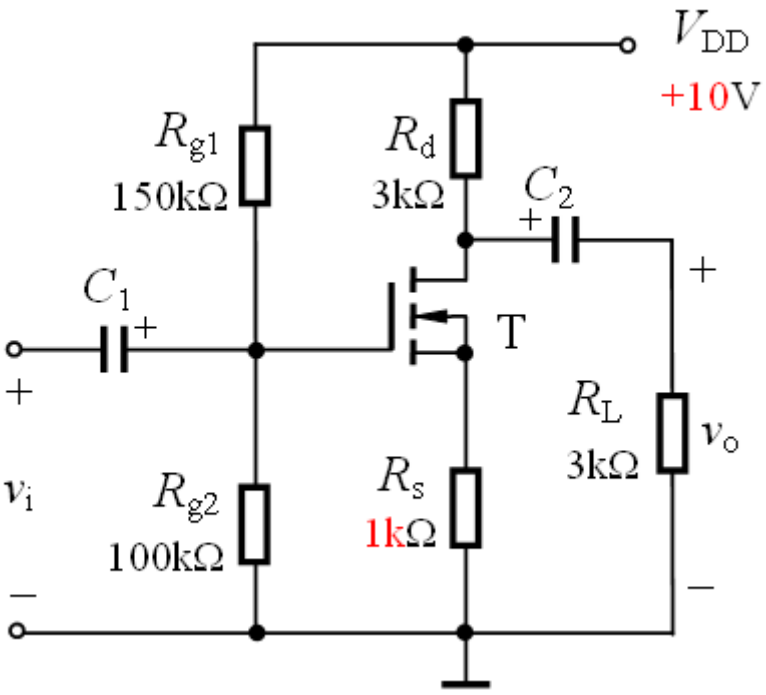
B:



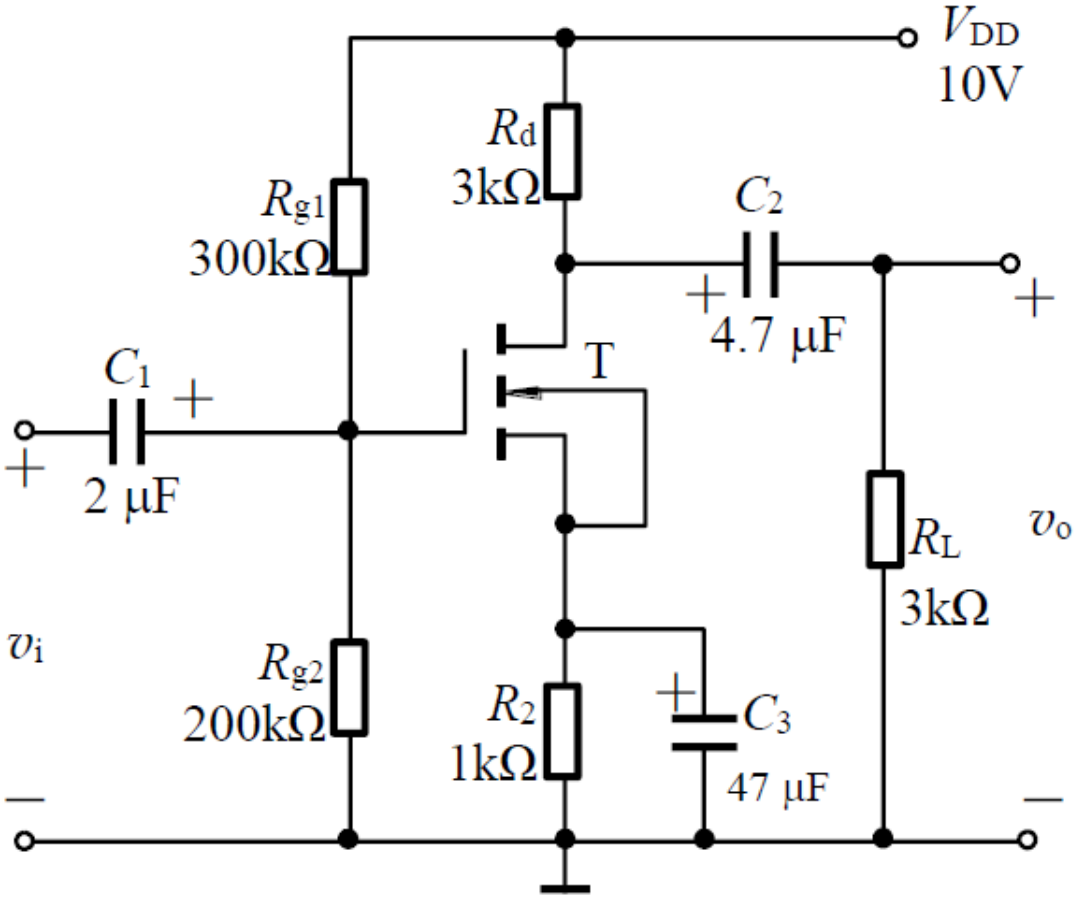
D:


V_{DD} 5V
R_{d1}
R_{g1}
390kΩ
d_1
T_1
B_1
T_2
d_2
B_2
C_{b1}
g_2
s_2
R_{si}
5kΩ
v_i
v_s
R_{g2}
140kΩ
R_{s1}
3.9kΩ
C_{s1}
R_{s2}
8.2kΩ
C_{s2}
R_L
4kΩ
v_o
$-V_{SS}$
−5V

- ☐ A.

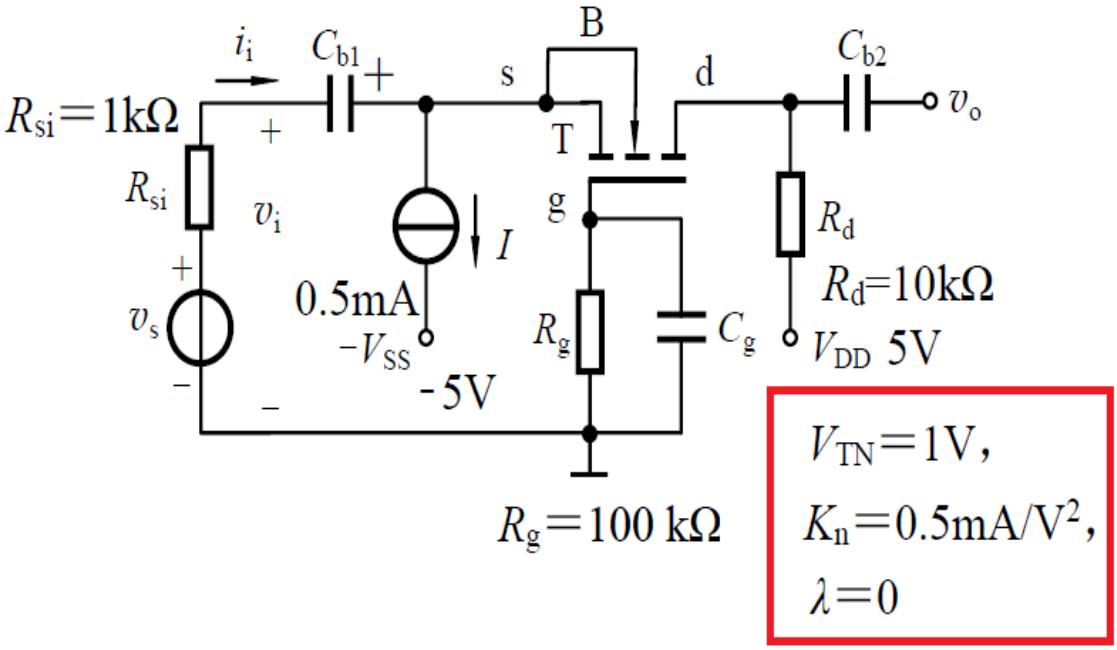

V_{DD}
+10V
R_{g1}
150kΩ
R_d
3kΩ
C_2
C_1
T
R_L
3kΩ
v_o
v_i
R_{g2}
100kΩ
R_s
1kΩ

- ☐ B.


V_{DD}
10V
R_d
3kΩ
R_{g1}
300kΩ
C_2
4.7 μF
T
C_1
2 μF
R_L
3kΩ
v_o
v_i
R_{g2}
200kΩ
R_2
1kΩ
C_3
47 μF

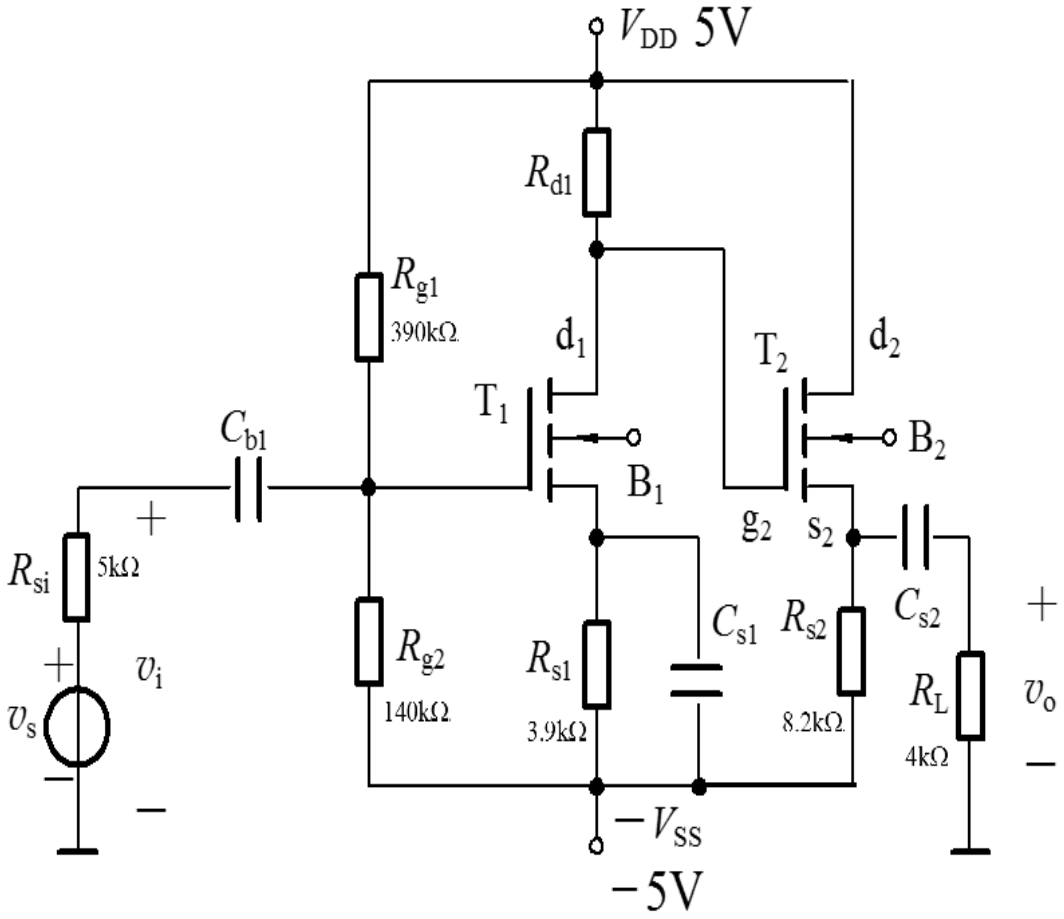
- ☐

C.


i_i
C_{b1}
B
C_{b2}
R_{si}=1kΩ
s
d
v_o
T
R_{si}
v_i
g
R_d
I
R_d=10kΩ
0.5mA
R_g
C_g
v_s
$-V_{SS}$
V_{DD} 5V
-5V
R_g=100 kΩ
V_{TN}=1V,
K_n=0.5mA/V²,
λ=0

- ☐

D.



29

多选(3分)

Which of the following are the advantages of negative feedback?(　　)

参考答案:

A：Gain sensitivity is improved

C：Can reduce nonlinear distortion

- ☐ A.

  Gain sensitivity is improved

- ☐ B.

  the closed-loop gain decreases

- ☐ C.

  Can reduce nonlinear distortion

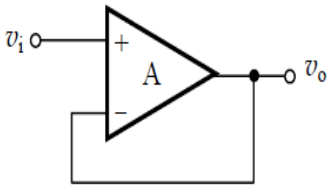
- ☐ D.

  the circuit may oscillate

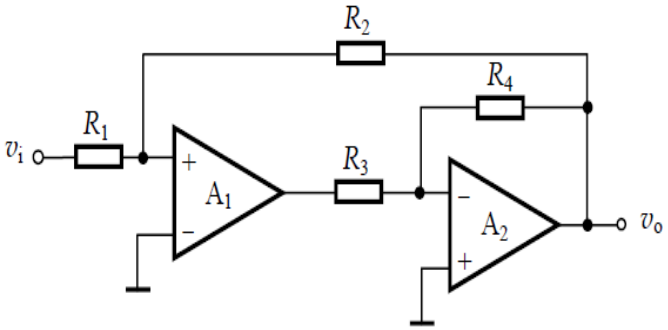
30

多选(3分)

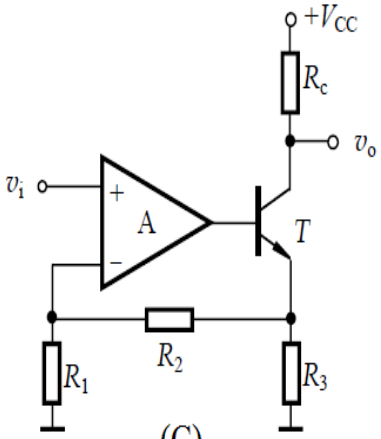
Find out the feedback path in the circuit shown in the figure and which is negative feedback .



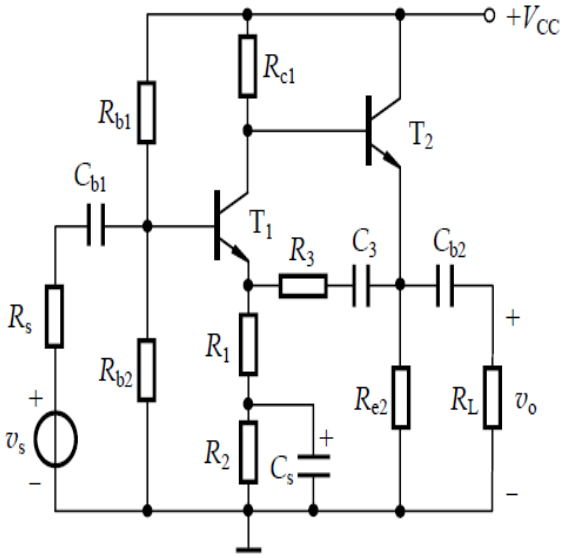
(A)



(B)



(C)



(D)

参考答案：

A：A

B：C

C：B

- ☐ A.

  A

- ☐ B.

  C

- ☐ C.

  B

- ☐ D.

  D

31

多选(3分)

The output current of the current source is constant, and its AC equivalent resistance is （ ）

参考答案：
A：maybe infinite
B：more and more greater than DC equivalent resistance

- ▢
  A.
  maybe infinite
- ▢
  B.
  more and more greater than DC equivalent resistance
- ▢
  C.
  same to DC equivalent resistance.
- ▢
  D.
  zero.

32
多选(3分)

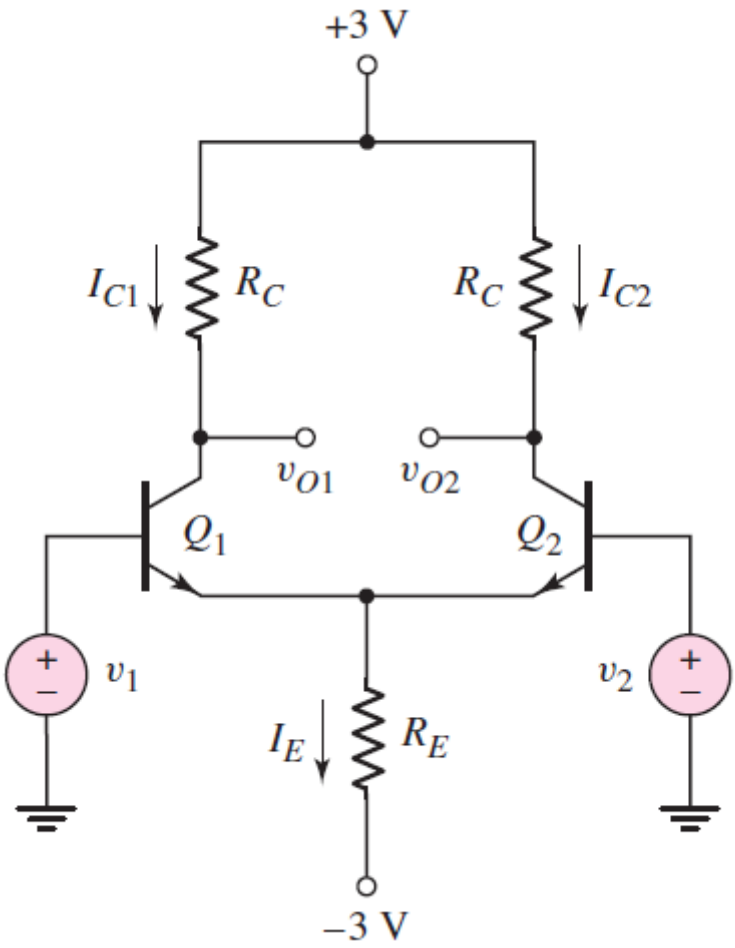
which of the following are the characteristics of differential amplifier circuit （ ）

参考答案：
A：The circuit has a strong ability to reject noise;
D：Usually the difference mode voltage gain maybe not very large,but the common mode voltage gain is very very small;

- ▢
  A.
  The circuit has a strong ability to reject noise;
- ▢
  B.
  Both the difference mode voltage gain and common mode voltage gain of the circuit are very large;
- ▢
  C.
  Both the difference mode voltage gain and common mode voltage gain of the circuit are very small;
- ▢
  D.
  Usually the difference mode voltage gain maybe not very large,but the common mode voltage gain is very very small;

33
多选(3分)

Consider the differential amplifier shown in figure,the main function of RE in the circuit is(　)



参考答案：
A：Improve common mode rejection ratio CMRR；
B：Increase common mode input resistance；

- ☐
  A.
  Improve common mode rejection ratio CMRR；
- ☐
  B.
  Increase common mode input resistance；
- ☐
  C.
  Increase differential mode voltage gain；
- ☐
  D.
  Improve the input resistance of differential mode；

34
判断(2分)

For general diodes, LEDs and photodiodes, forward bias voltage is required for normal operation.

参考答案：
A：错误

- ○ A.
- ○ B.

35
判断(2分)

Because the structures of n-channel enhancement MOSFET and p-channel enhancement MOSFET are different, the DC bias of amplifier circuit is different, and the small model used in AC analysis is also different.

参考答案：
A：错误

- ○ A.
- ○ B.

36
判断(2分)

The field effect transistor (FET) works in the saturation region and can be used as an amplifier. The AC amplification performance is independent of the DC operating point.

参考答案：
A：错误

- ○ A.
- ○ B.

37
判断(2分)

The lower corner frequency of the amplifier circuit can be reduced by selecting the transistor with small junction capacitance.

参考答案：
B：错误

- ○ A.
- ○ B.

38
判断(2分)

The current source can also input AC signal for amplification.

参考答案：
B：错误

- ○ A.
- ○ B.

39
判断(2分)

The one-sided output of differential amplifier is equivalent to the two-sided output.

参考答案：
B：错误

- ○ A.
- ○ B.

40
判断(2分)

nder the condition of positive, if the phase shift of the feedback network if φβ, the phase shift of the amplifier circuit is φa, then the phase condition must be satisfied φβ+φa=(2n+1)π.

参考答案：
A：错误

- ○ A.
- ○ B.

41
判断(2分)

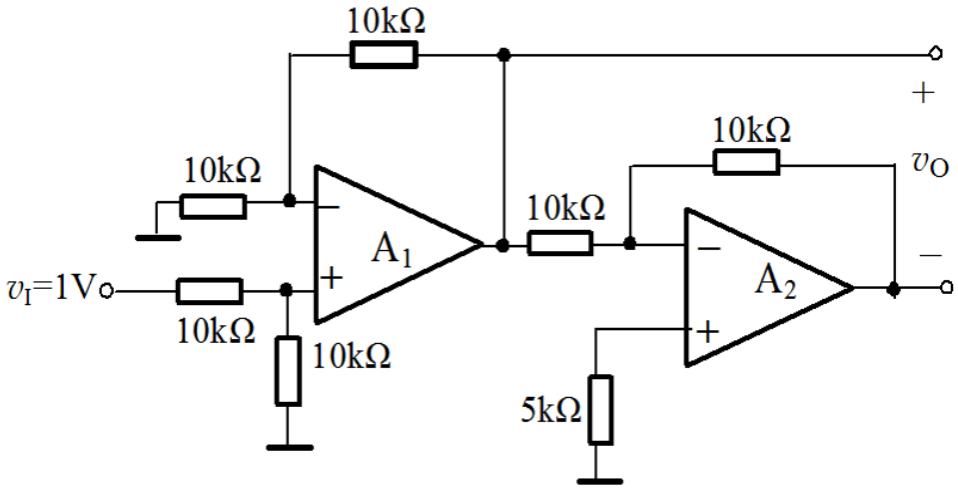
As long as the phase condition is satisfied, and |Aβ|>1, the oscillation can be produced.

参考答案：
B：错误

- ○ A.
- ○ B.

42
填空(2分)

Assume the operational amplifiers are ideal,if the input voltage is 1V，Determine vo=(　)V



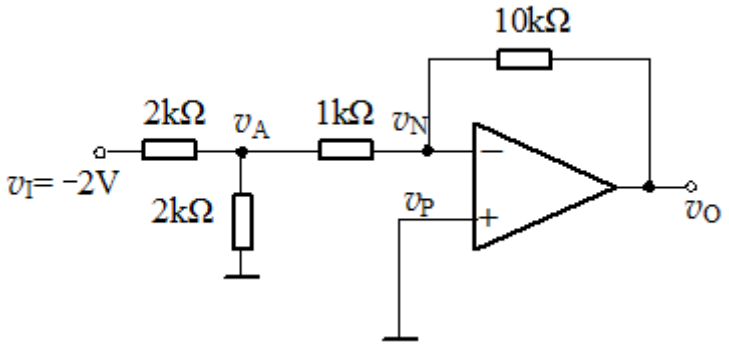
参考答案：
2

请输入答案

43

填空(2分)

For the circuit in Figure,the output voltage vo is(　)V.



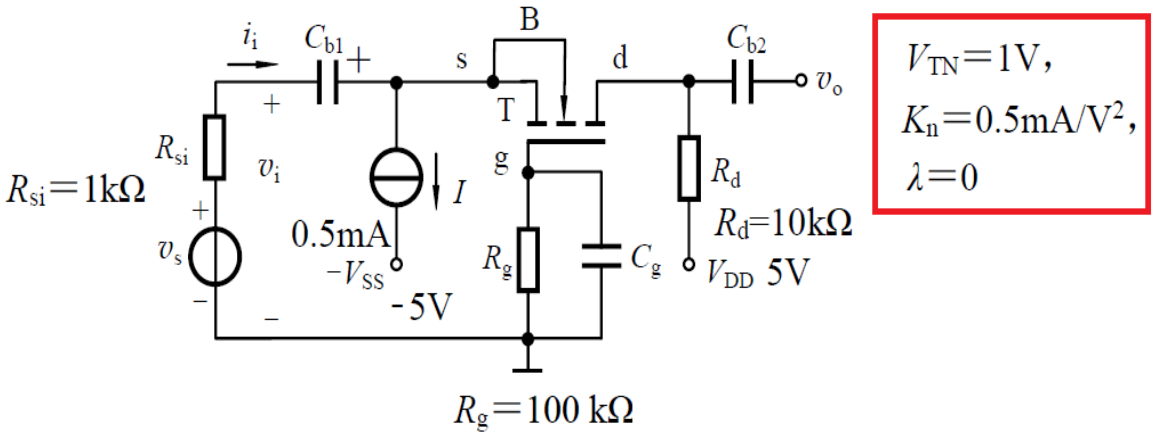
参考答案：
5

请输入答案

44

填空(2分)

The circuit is as shown in the figure, and the capacitance in the passband can be regarded as a short circuit.Determine the input resistance is (　)ohm



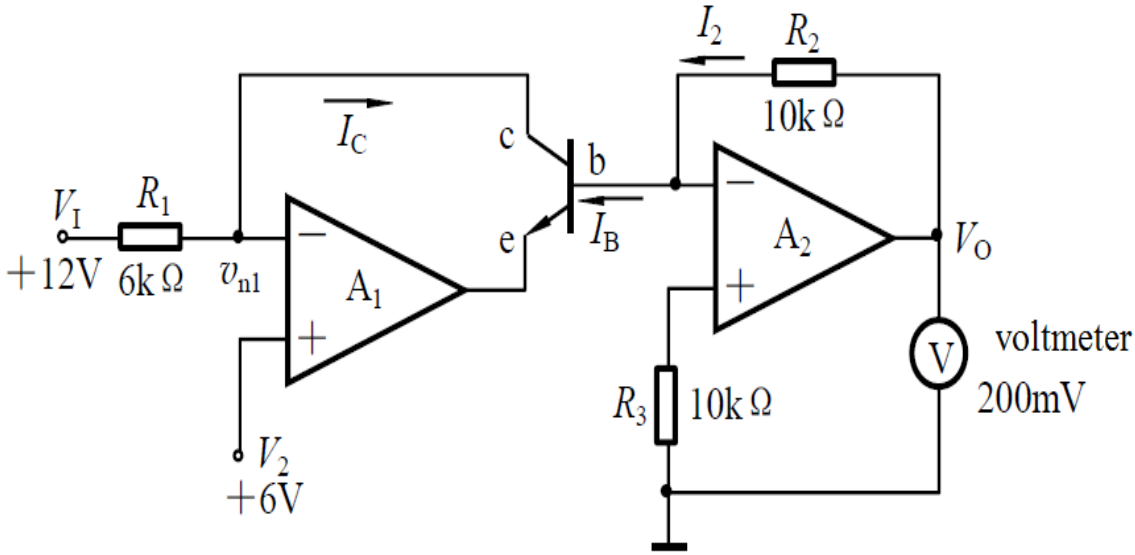
参考答案:
1000

请输入答案

45

填空(2分)

For the circuit shown in Figure 20, the operational amplifier is assumed to be ideal, fot the transistor VBE=VB-VE=0.7V,if the reading of the voltmeter is 200mV,then the current gain β of the transistor is (　)



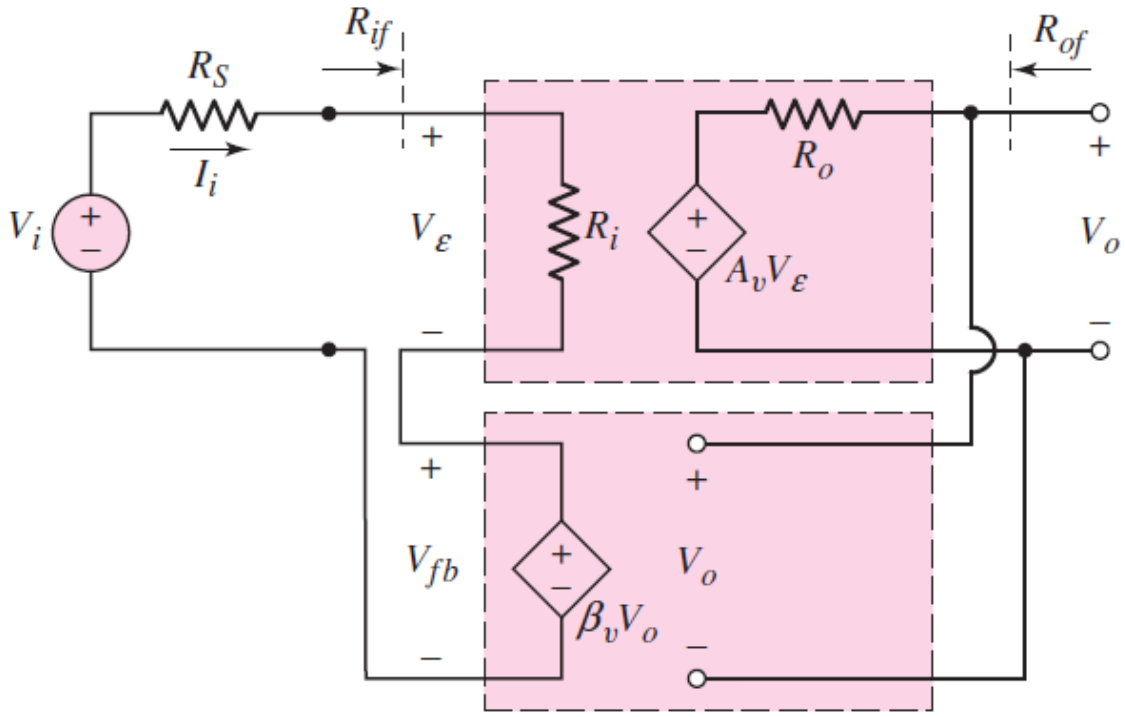
参考答案:
50

请输入答案

46

填空(2分)

Consider the ideal series-shunt circuit shown in figure，Let Av=5000V/V,β=0.008V/V, Ri=9k ohm, Ro=1k ohm, then Rif=(　)k ohm



参考答案:
369

请输入答案

提交答案