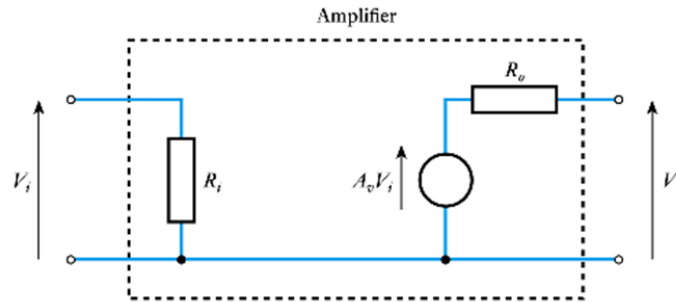


1. What is the open-circuit output voltage of the following arrangement?



- a)  $V_i$                       b)  $R_o$                       c)  $V_o$                       d)  $A_v V_i$
2. An amplifier has a voltage gain of 20, an input resistance of 500 ohms and an output resistance of 50 ohms. The amplifier is connected to a voltage source that produces an output voltage of 1 V and has an output resistance of 75 ohms, and to a load resistance of 800 ohms. What will be the voltage across the load resistor?
- a) 20 V                      b) 16.4 V                      c) 18.8 V                      d) 17.4 V
3. An amplifier has a voltage gain of 20, an input resistance of 500 ohms and an output resistance of 50 ohms. The amplifier is connected to a voltage source that produces an output voltage of 1 V and has an output resistance of 75 ohms, and to a load resistance of 800 ohms. What is the voltage gain of this amplifier? (This is the same amplifier as in the previous question.)
- a) 18.9                      b) 20                      c) 17.4                      d) 16.4
4. An amplifier has an input resistance of 1 kilohms and an output resistance of 25 ohms. The amplifier is connected to a load resistance of 100 ohms. What is the power gain of the amplifier if the input voltage is 3 V and the output voltage is 30 V?
- a) 100                      b) 1000                      c) 400                      d) 4000
5. What is the gain in dB corresponding to a power gain ratio of 300?
- a) -24.8 dB                      b) 24.8 dB                      c) 49.5 dB                      d) 14.8 dB

6. Differential amplifiers are designed to amplify common-mode signals while rejecting differential mode signals.

a) True

b) False

7. Which of the following correctly described the characteristics of a good operational amplifier?

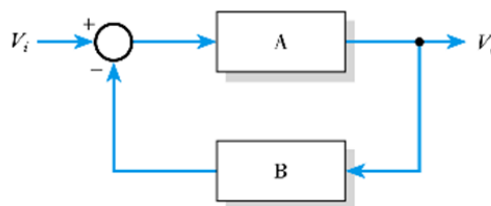
a) A very high voltage gain, a very low input resistance and a very high output resistance.

b) A very high voltage gain, a very high input resistance and a very high output resistance.

c) A very low voltage gain, a very high input resistance and a very high output resistance.

d) A very high voltage gain, a very high input resistance and a very low output resistance.

8. What is the voltage gain of the following arrangement?



a)  $(1+AB)/B$

b)  $B/(1+AB)$

c)  $A/(1+AB)$

d)  $(1+AB)/A$

9. Under what conditions does the gain of a feedback system approximate to  $1/B$ ?

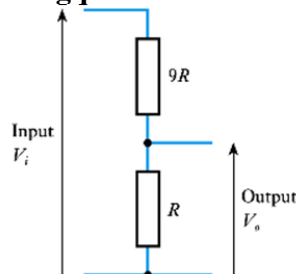
a) The loop gain  $AB \gg 1$ .

b) The feedback path gain  $B \gg 1$ .

c) The loop gain  $AB \ll 1$ .

d) The forward path gain  $A \gg 1$ .

10. What is the gain of the following passive attenuator?



a) 0.1

b) 0.11

c) 9

d) 10

**11. What is the effect of negative feedback on the gain of an amplifier?**

- a) It increases the gain by a factor of  $1/B$ .
- b) It reduces the gain by a factor of  $1/B$ .
- c) It increases the gain by a factor of  $(1 + AB)$ .
- d) It reduces the gain by a factor of  $(1 + AB)$ .

**12. What is the effect of negative feedback on the bandwidth of an amplifier?**

- a) It increases the bandwidth, often by a factor of  $1/B$ .
- b) It reduces the bandwidth, often by a factor of  $(1 + AB)$ .
- c) It reduces the bandwidth, often by a factor of  $1/B$ .
- d) It increases the bandwidth, often by a factor of  $(1 + AB)$ .

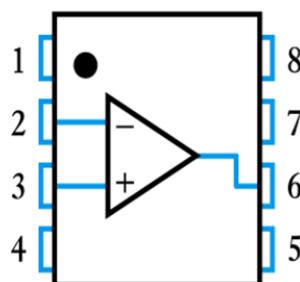
**13. What are the effects of negative feedback on the input and output resistance of an amplifier?**

- a) It either increases or decreases the input and output resistance depending on how it is applied.
- b) It increases input resistance and decreases output resistance.
- c) It decreases input resistance and increases output resistance.
- d) It increases both input and output resistance.

**14. Negative feedback reduces the noise corrupting a signal by a factor of  $(1 + AB)$ .**

- a) True
- b) False

**15. What signal corresponds to pin 3 of this operational amplifier?**

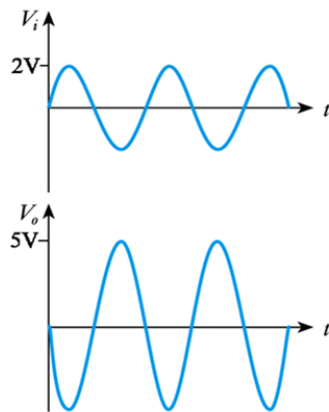


- a) The non-inverting output.
- b) The positive supply voltage.
- c) The inverting input.
- d) The non-inverting input.

**16. What characteristics would characterize an ideal operational amplifier?**

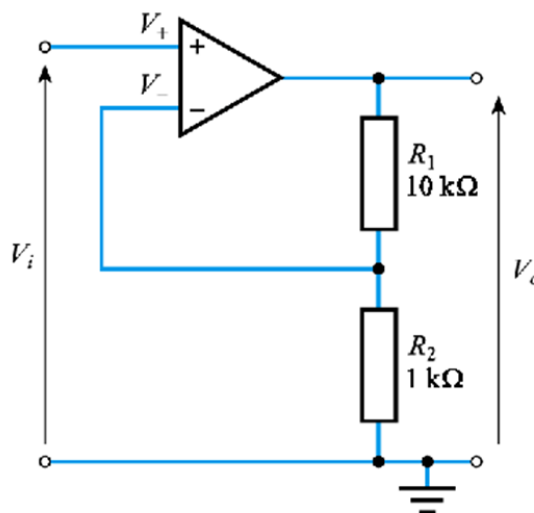
- a) An infinite voltage gain, zero input resistance and an infinite output resistance.
- b) An infinite voltage gain, an infinite input resistance and an infinite output resistance.
- c) An infinite voltage gain, zero input resistance and zero output resistance.
- d) An infinite voltage gain, an infinite input resistance and zero output resistance.

**17. The graphs below show the input and output waveforms of an amplifier. What is the gain of this circuit?**



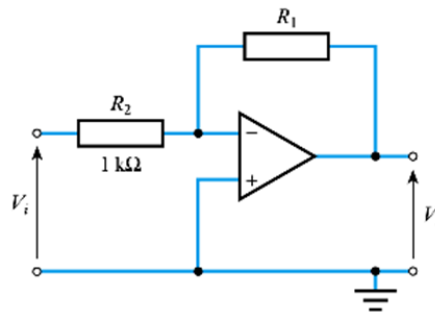
- a) -0.4
- b) 2.5
- c) 0.4
- d) -2.5

**18. What is the voltage gain of this circuit?**



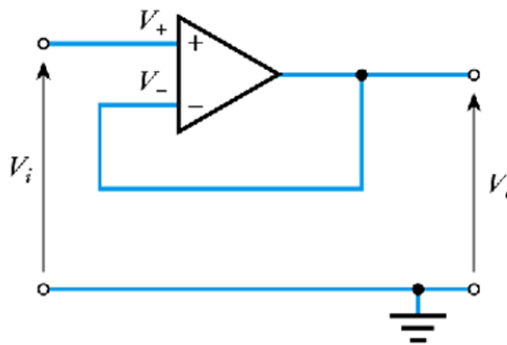
- a) 0.091
- b) 0.1
- c) 10
- d) 11

19. In the following circuit, what value of  $R_1$  is required to give a voltage gain of -50?



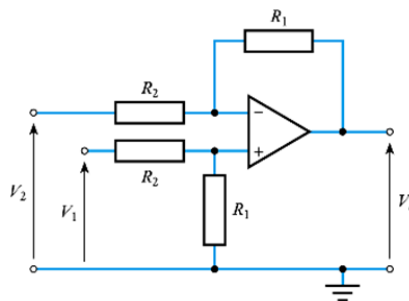
- a) 50 kΩ      b) -50 kΩ      c) -49 kΩ      d) 49 kΩ

20. What are the characteristics of the following circuit?



- a) It has a voltage gain of unity, a low input resistance and a low output resistance.  
 b) It has a voltage gain of unity, a high input resistance and a high output resistance.  
 c) It has a voltage gain of unity, a low input resistance and a high output resistance.  
 d) It has a voltage gain of unity, a high input resistance and a low output resistance.

21. In the following circuit, the use of negative feedback decreases the output resistance.



- a) True      b) False

**22. Which of the following statements is incorrect?**

- a) Conduction within pure semiconductors is termed intrinsic conduction.
- b) The dominant charge carriers within a doped semiconductor are called majority charge carriers.
- c) Doping pure semiconductor material with small amounts of donor impurities produces an *n*-type semiconductor.
- d) At room temperatures, pure semiconductors make excellent conductors.

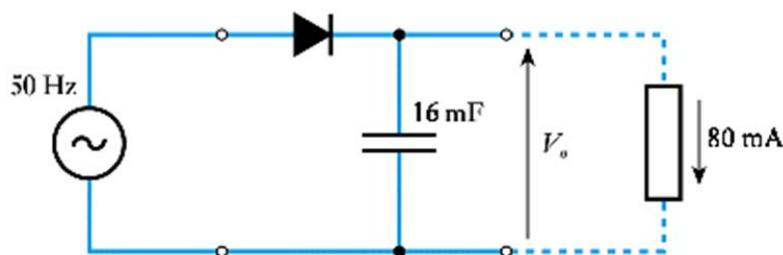
**23. What is a typical conduction voltage for a silicon diode?**

- a) 0.25 V
- b) 0.5 V
- c) 0.7 V
- d) 1.1 V

**24. What would be a typical magnitude for the reverse current in a general-purpose silicon diode?**

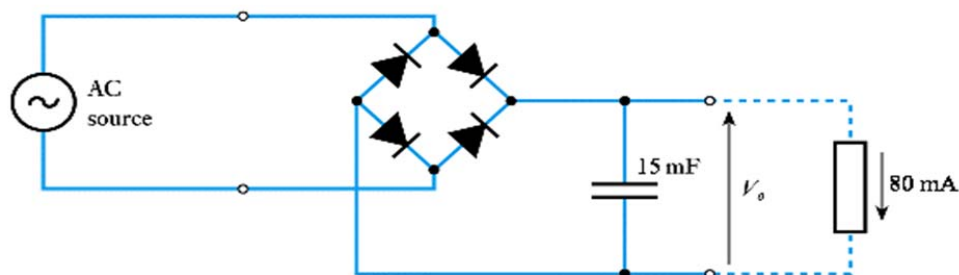
- a) <10 picoamps
- b) <10 nanoamps
- c) <10 microamps
- d) <10 milliamps

**25. Estimate the peak ripple voltage in the following arrangement.**



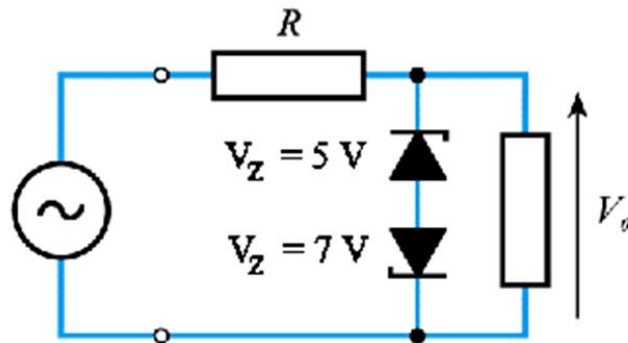
- a) 10 mV
- b) 25 mV
- c) 50 mV
- d) 100 mV

**26. Estimate the peak ripple voltage in the following arrangement.**



- a) 10 mV
- b) 25 mV
- c) 50 mV
- d) 100 mV

27. Estimate the maximum positive voltage produced by the following arrangement.

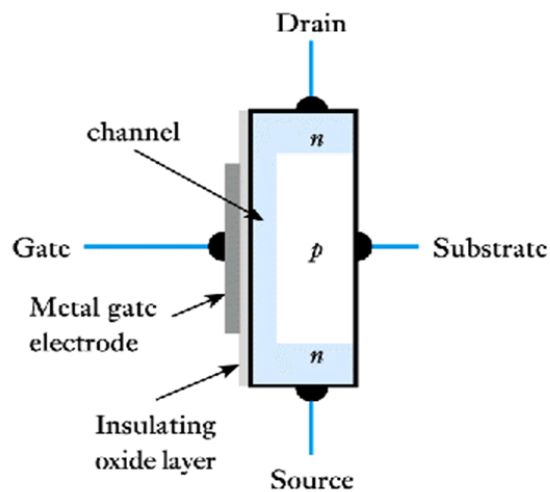


- a) 4.3 V                      b) 5.7 V                      c) 6.3 V                      d) 7.7 V

28. Which terminal represents the control input of a FET?

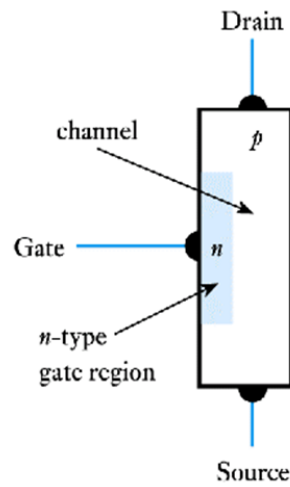
- a) The drain.                      b) The source.                      c) The base.                      d) The gate.

29. What form of FET is shown here?



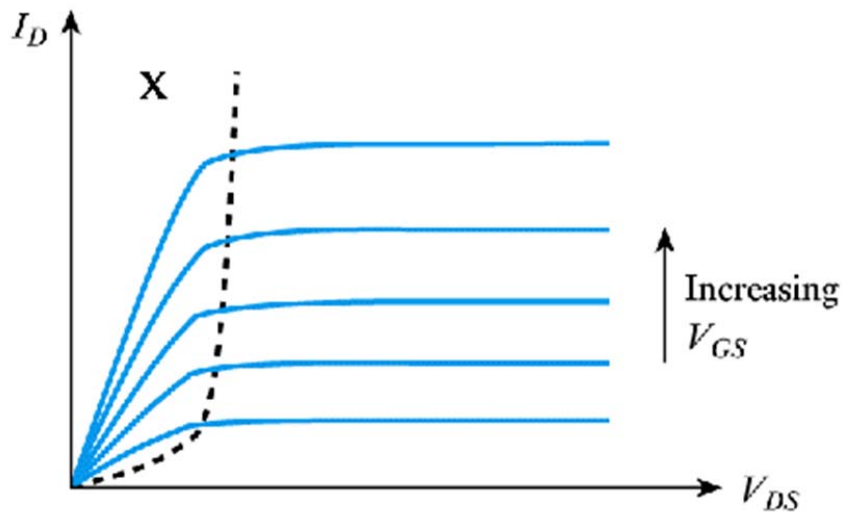
- a) An *n*-channel MOSFET.                      b) An *n*-channel JFET.  
c) A *p*-channel JFET.                      d) A *p*-channel MOSFET.

30. What form of FET is shown here?



- a) An  $n$ -channel JFET.
- b) A  $p$ -channel MOSFET.
- c) A  $p$ -channel JFET.
- d) An  $n$ -channel MOSFET.

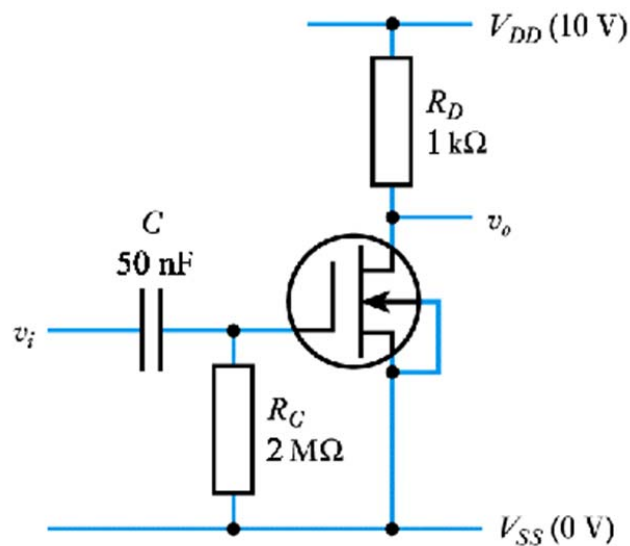
31. In the FET output characteristics shown below, what region is represented by the symbol 'X'?



- a) The operating region.
- b) The space-charge region.
- c) The saturation region.
- d) The ohmic region.

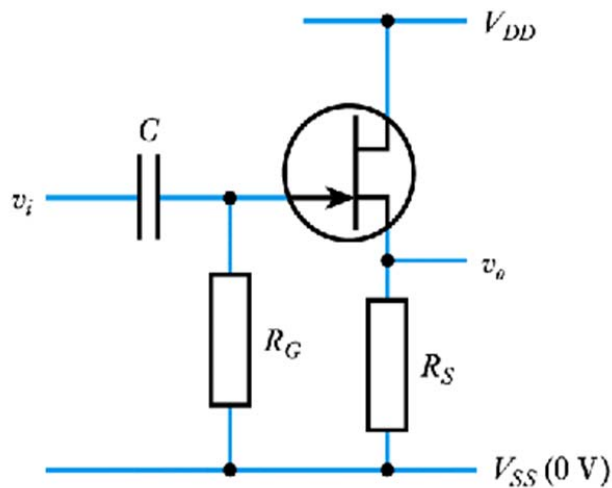


32. Determine the cut-off frequency of the following circuit.



- a) 0.63 Hz      b) 1.6 Hz      c) 3.6 Hz      d) 10 Hz

33. What are the characteristics of the following circuit?



- a) A voltage gain of 1, a low input resistance and a high output resistance.  
 b) A high voltage gain, a high input resistance and a low output resistance.  
 c) A high voltage gain, a low input resistance and a high output resistance.  
 d) A voltage gain of 1, a high input resistance and a low output resistance.

34. FETs may be used as both analogue and logical switches.

- a) True      b) False