



**COLLEGE OF ENGINEERING AND TECHNOLOGIES**  
**ALMUSTAQBAL UNIVERSITY**

**Electronics**

**CTE 207**

**Lecture 12**

**- Clippers -**

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Dr. Zaidoon AL-Shammari

Lecturer / Researcher

[zaidoon.waleed@mustaqbal-college.edu.iq](mailto:zaidoon.waleed@mustaqbal-college.edu.iq)

- There are a variety of diode networks called clippers
- It has the ability to clip off a portion of the input signal without distorting the remaining part of the alternating waveform.

There are two general categories of clippers: series and parallel.

## ➤ Series Clippers

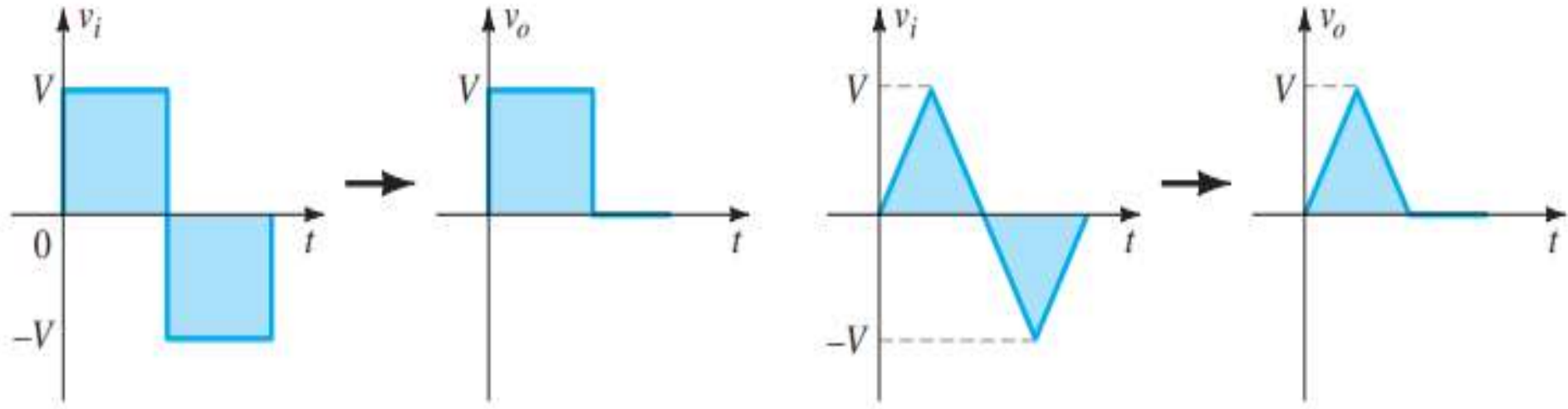
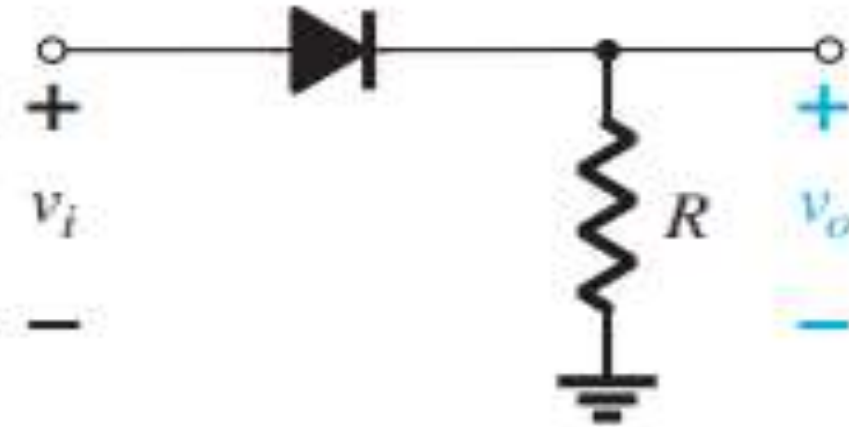
The series configuration is defined as one where the diode is in series with the load.

## ➤ Parallel Clippers

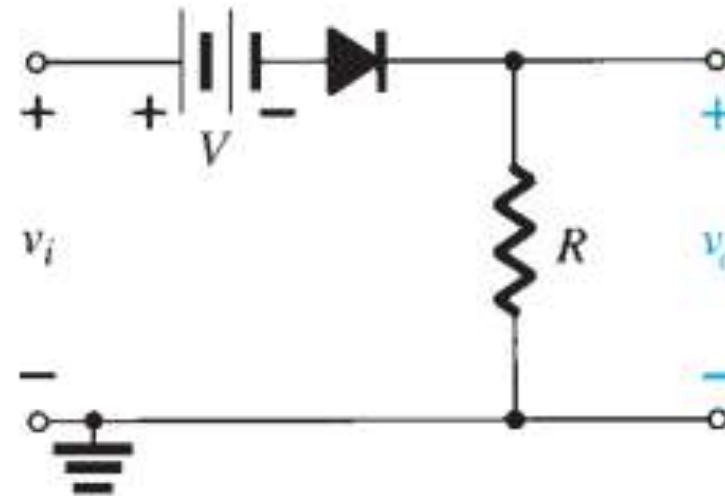
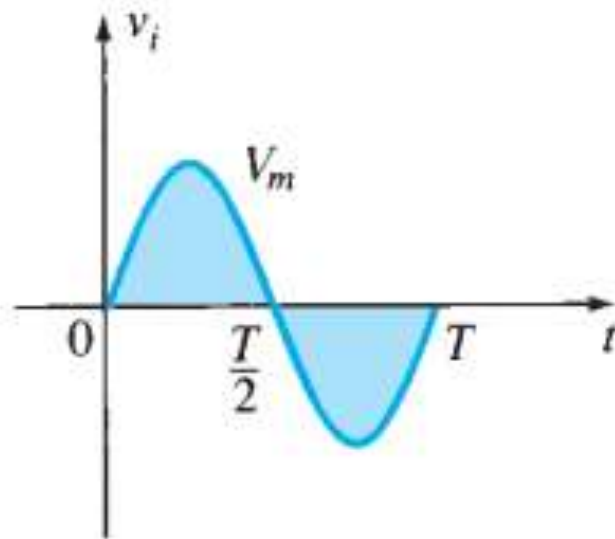
The parallel variety has the diode in a branch parallel to the load.

- The response of the series configuration to a variety of alternating waveforms is provided in Figure below.
- Although first introduced as a half-wave rectifier (for sinusoidal waveforms), there are no boundaries on the type of signals that can be applied to a clipper.

# Series Clippers



- The addition of a DC supply such as shown in Figure below can have a pronounced effect on the output of a clipper.

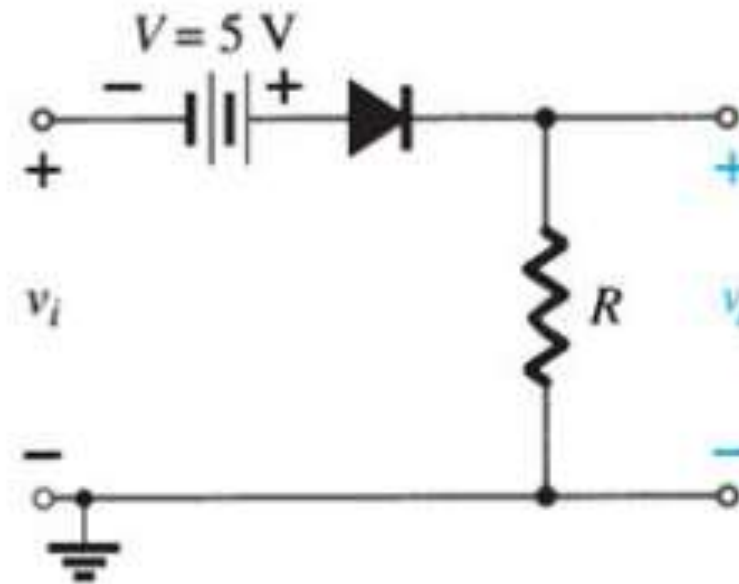
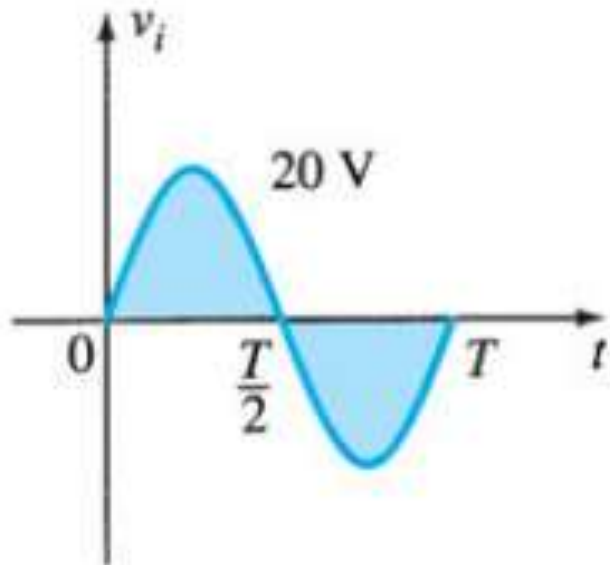


There are a few thoughts to keep in mind as you work toward a solution

1. Make a mental sketch of the response of the network based on the direction of the diode and the applied voltage levels.
2. Determine the applied voltage (transition voltage) that will cause a change in state for the diode.
3. apply Kirchhoff's voltage law, and be continually aware of the defined terminals and polarity of  $v_o$ .
4. It can be helpful to sketch the input signal above the output and determine the output at instantaneous values of the input.

# Example

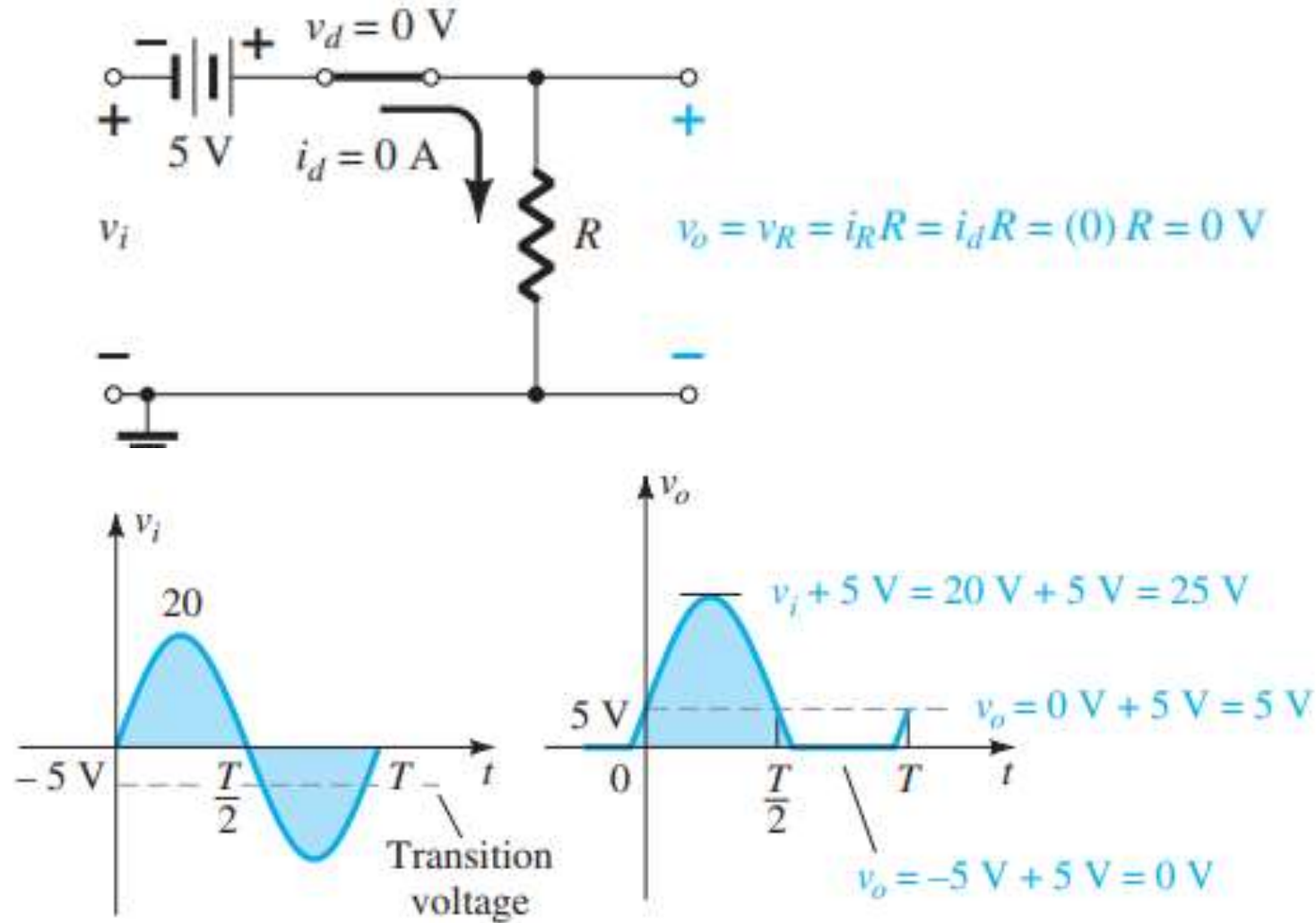
Determine the output waveform for the sinusoidal input of the Figure below





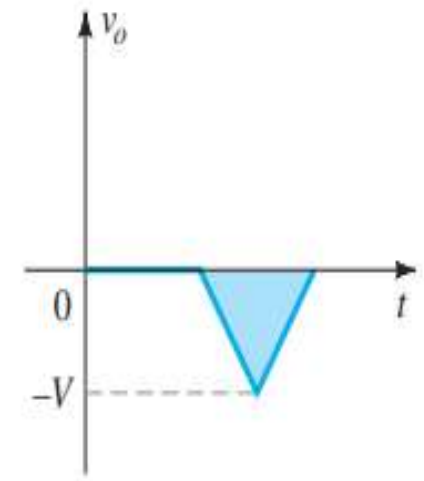
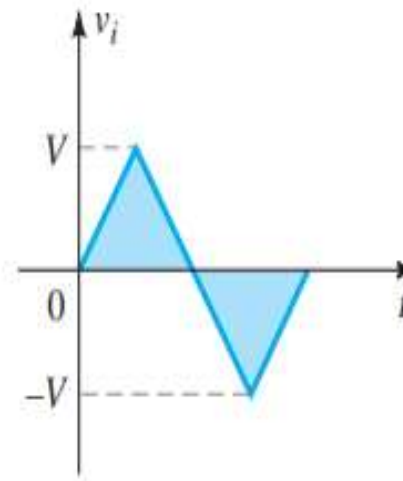
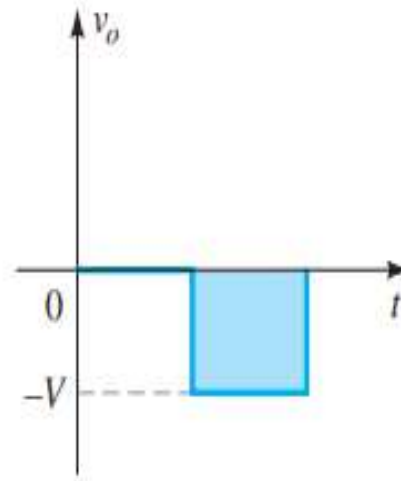
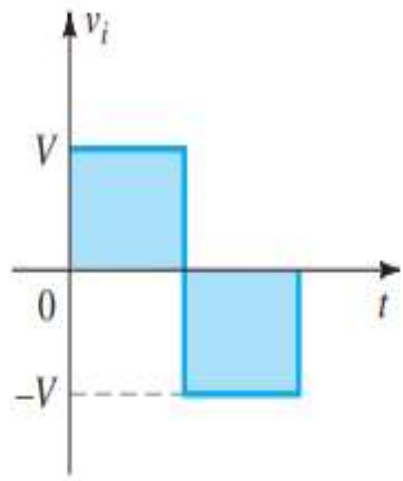
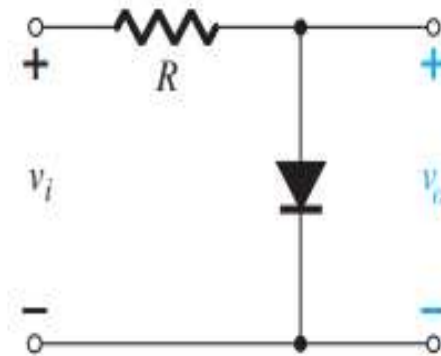
- Past experience suggests that the diode will be in the ON state for the positive region of  $v_i$  especially when we note the aiding effect of  $V=5\text{v}$ .
- For  $v_i$  more negative than  $-5\text{v}$  the diode will enter its open circuit state,
- While for voltages more positive than  $-5\text{v}$  the diode is in the short circuit state.

# Solution



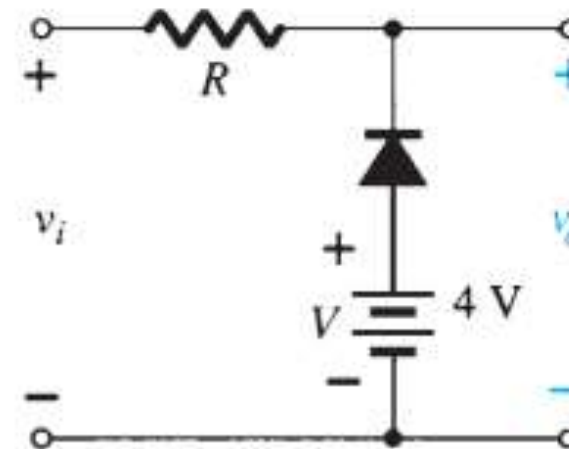
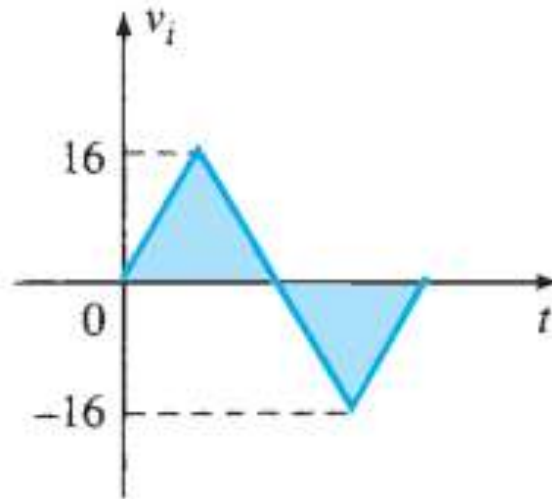
- The network below is the simplest of parallel diode configurations with the output for the same inputs in Figure below.
- The analysis of parallel configurations is very similar to that applied to series configurations.

# Parallel clipper



# Example

Determine  $v_o$  for the network of Figure below



Solution:

The polarity of the DC supply and the direction of the diode strongly suggest that the diode will be in the ON state for the negative region of the input signal.

# Solution

Since the DC supply is obviously “pressuring” the diode to stay in the short-circuit state, the input voltage must be greater than 4v for the diode to be in the OFF state.

Any input voltage less than 4v will result in a short-circuited diode.

