



# ANALOG ELECTRONICS

LECTURE NO. 4

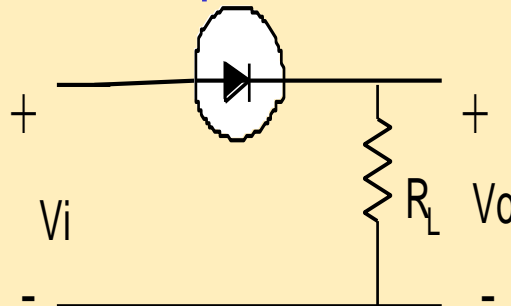
# CLIPPER

Clippers or diode limiting is a diode network that have the ability to “clip” off a portion on the i/p signal without distorting the remaining part of the alternating waveform.

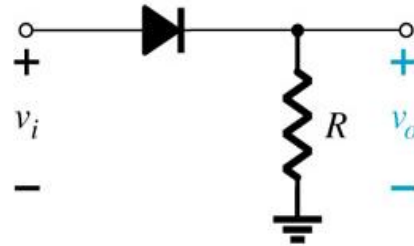
- Clippers are used to eliminate amplitude noise or to fabricate new waveforms from an existing signal.
- 2 general of clippers:
  - a) Series clippers
  - b) Parallel clippers

## Series Clippers

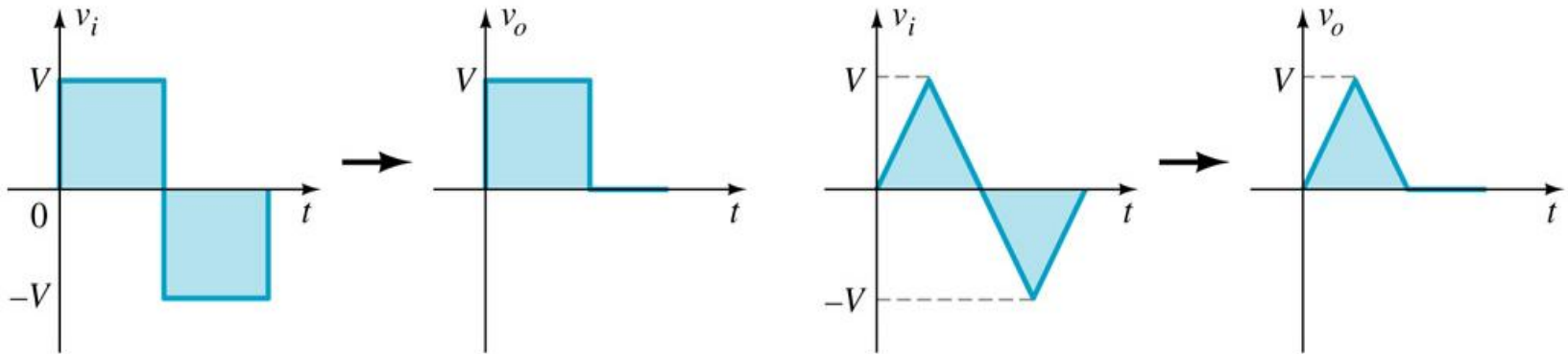
- The series configuration is defined as one where the diode is in series with the load.
- A half-wave rectifier is the simplest form of diode clipper-one resistor and diode.



# CLIPPER DIODE CIRCUIT

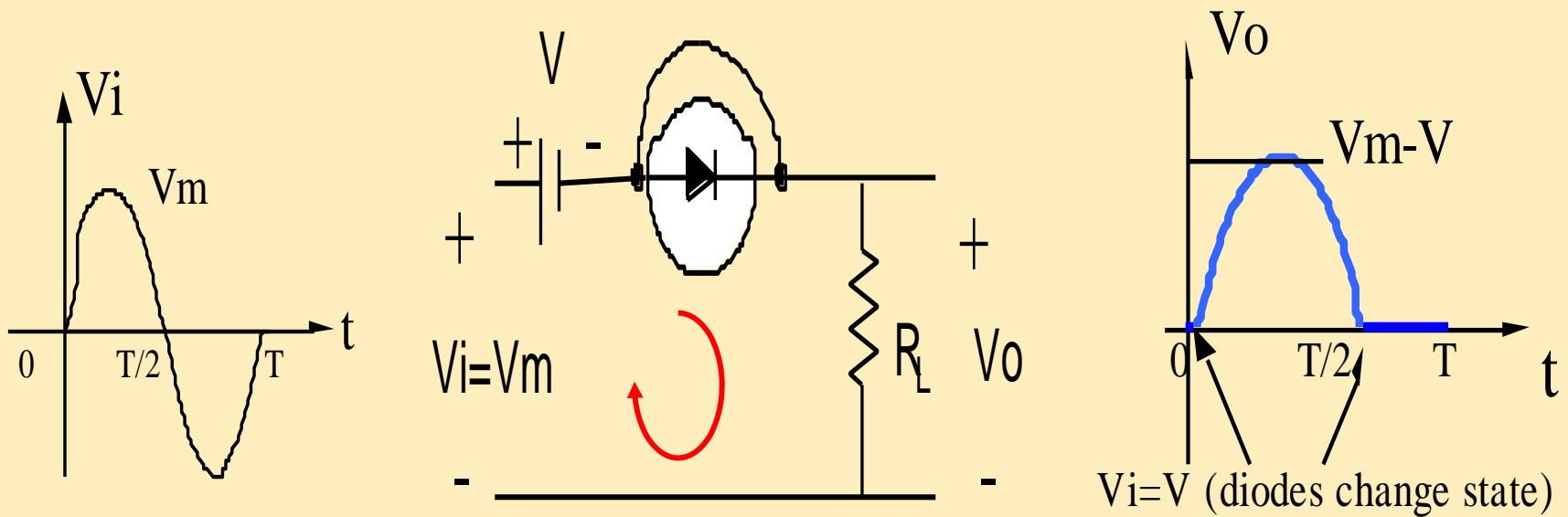


(a)



(b)

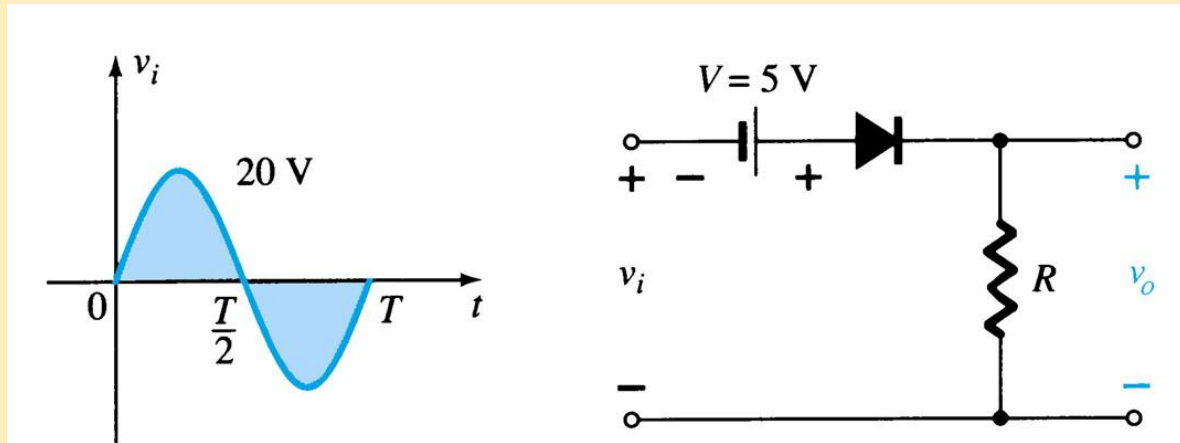
The diode “clips” any voltage that does not put it in forward bias. That would be a reverse biasing polarity and a voltage less than 0.7V for a silicon diode.



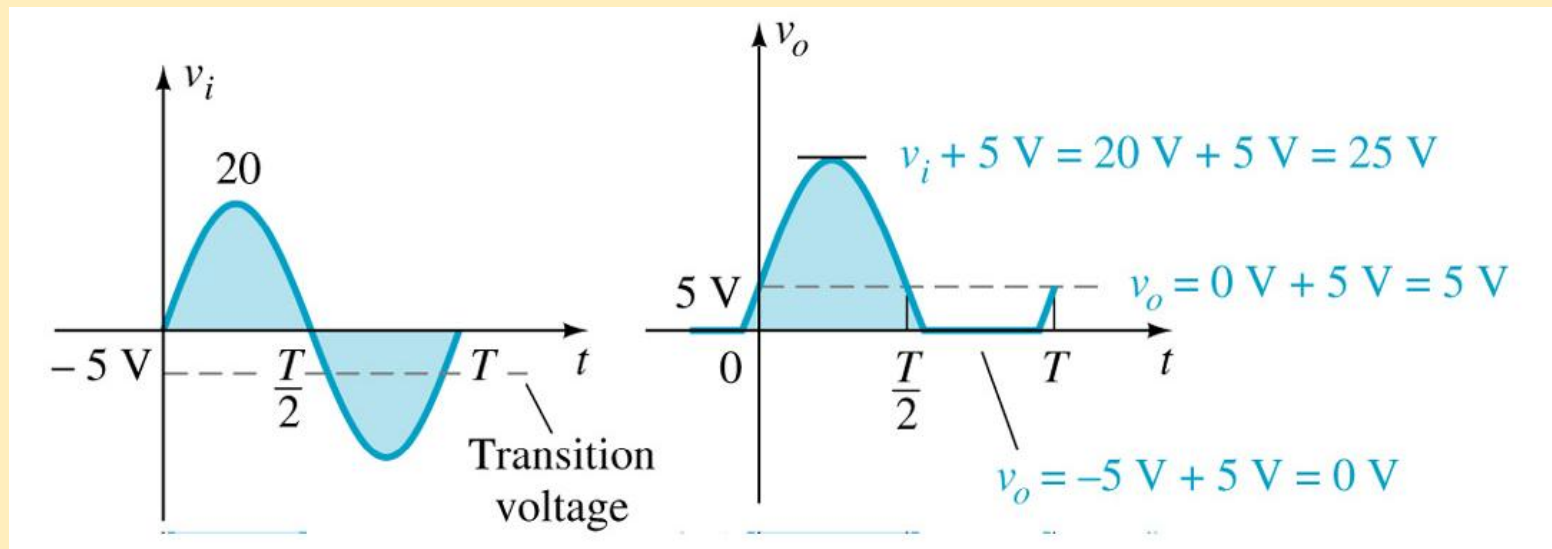
- +ve region turn the diode ON.
- -ve region turn the diode OFF.
- $V_i > V$  to turn ON the diode
- In general diode is open ckt (OFF state) and short ckt (ON state)
- For  $V_i > V$  the  $V_o = V_i - V$
- For  $V_i = V$  the  $V_o = 0 V$
- The complete ckt shown above

# EXAMPLE: VARIATIONS OF THE CLIPPER CIRCUIT

- Determine the o/p waveform for the network below:

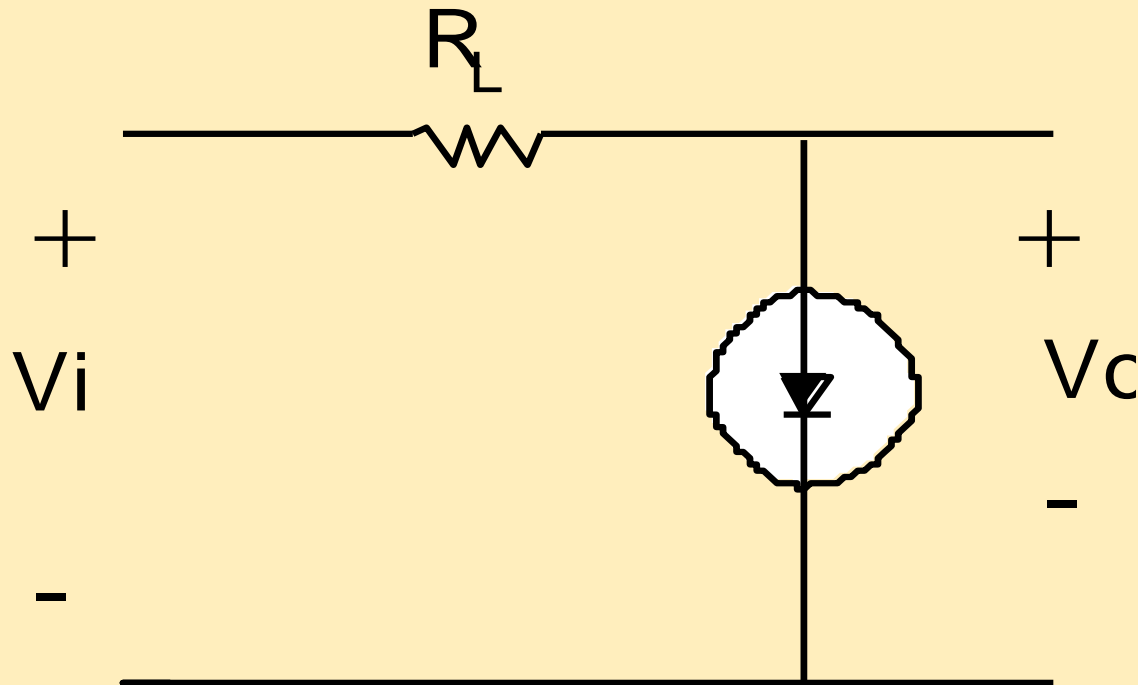


**Solution:**

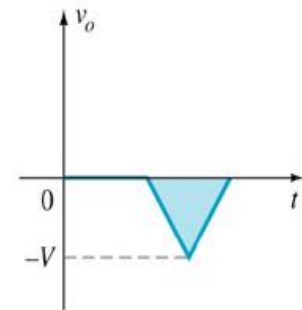
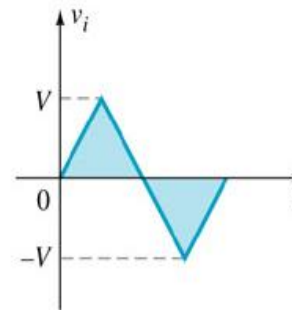
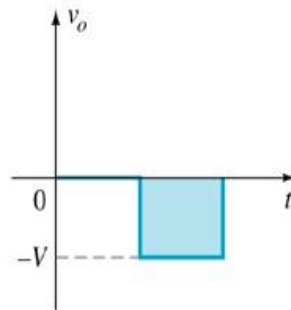
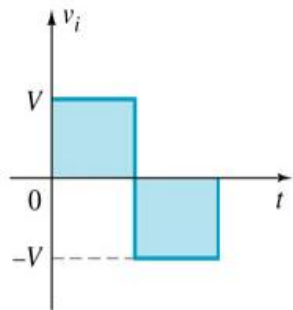
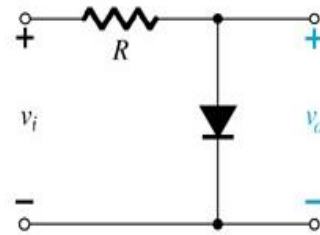


# PARALLEL CLIPPERS

- The diode connection is in parallel configuration with the o/p.
- Diode is ideal



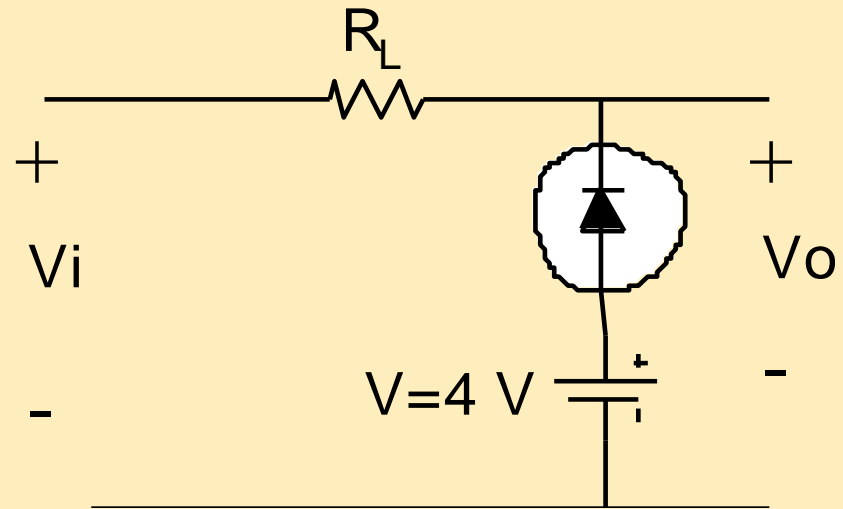
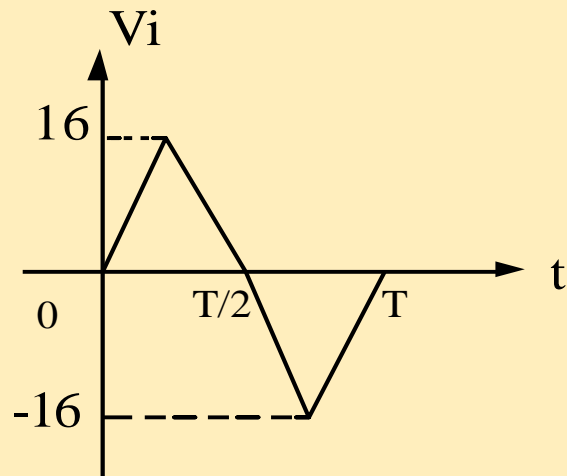
By taking the output across the diode, the output is now the voltage when the diode is not conducting.



A DC source can also be added to change the diode's required forward bias voltage.

## Example :

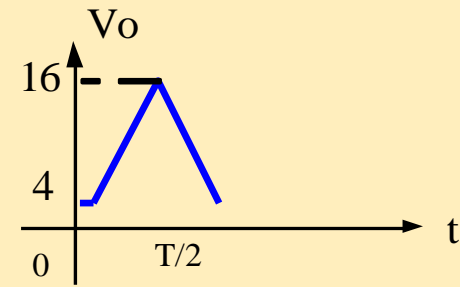
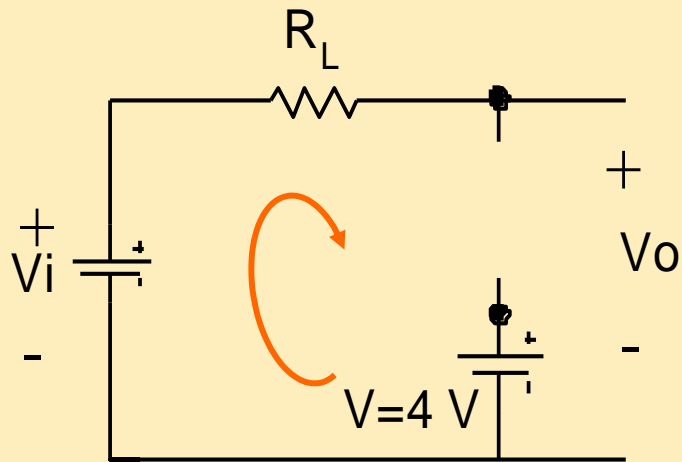
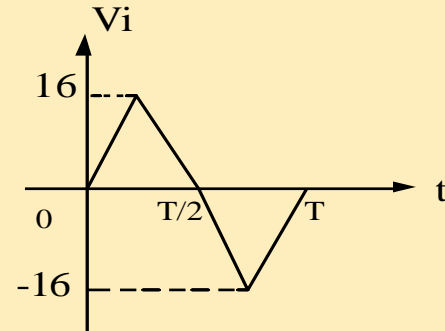
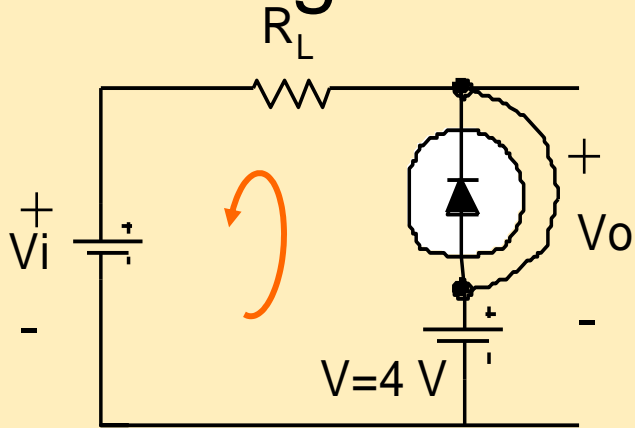
- Determine the  $V_o$  and sketch the o/p waveform for the below network





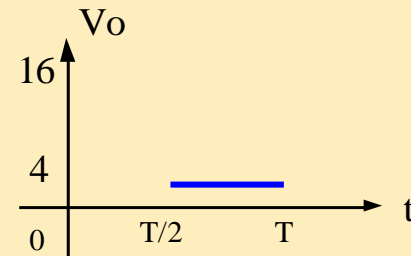
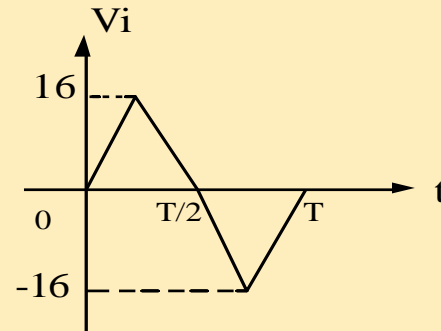
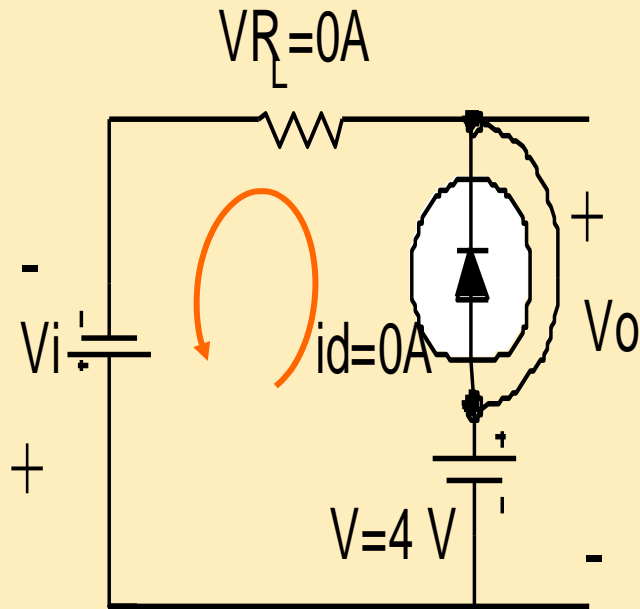
# Solution:

- + ve region



# Solution (continued):

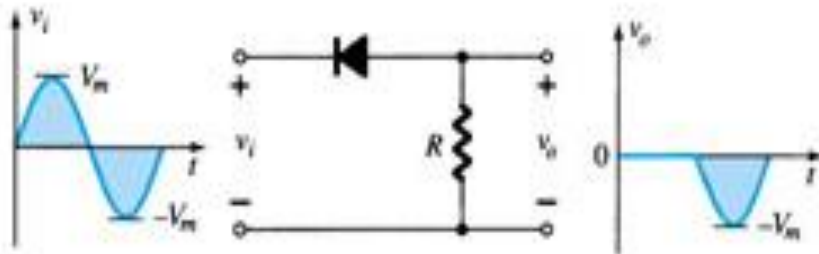
- - ve region



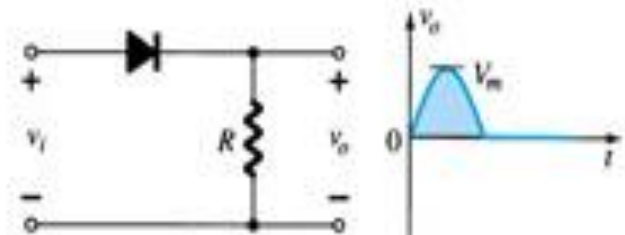
# CLIPPER CIRCUITS SUMMARY

## Simple Series Clippers (Ideal Diodes)

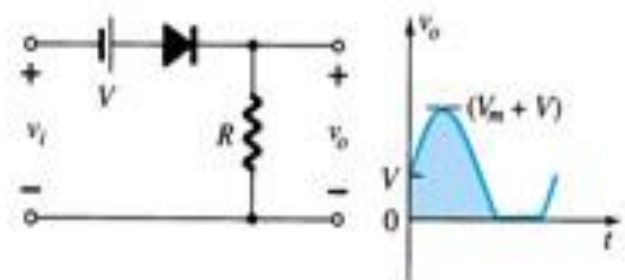
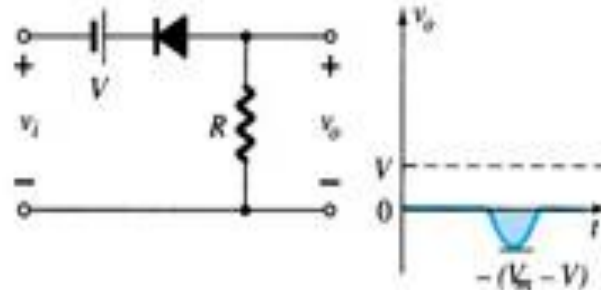
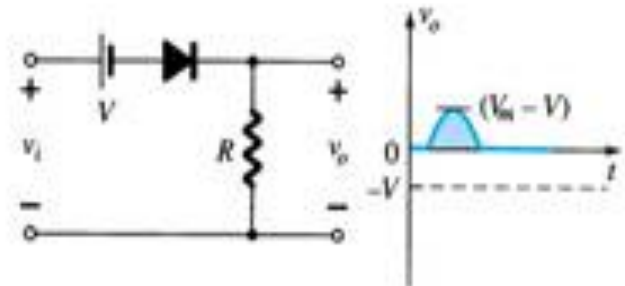
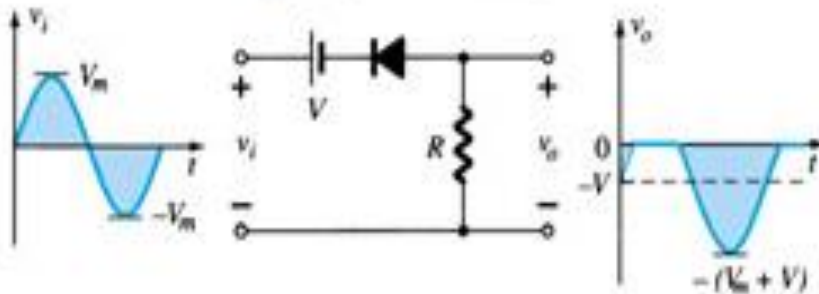
POSITIVE



NEGATIVE

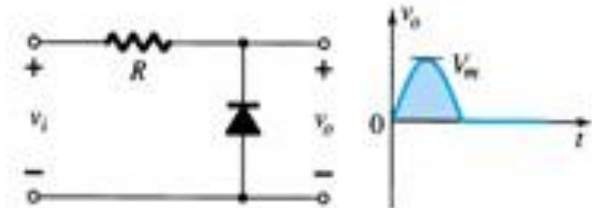
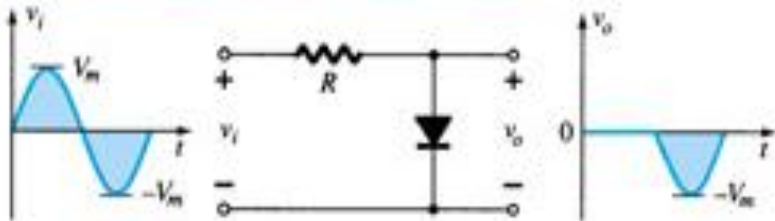


## Biased Series Clippers (Ideal Diodes)



# CLIPPER CIRCUITS SUMMARY

## Simple Parallel Clippers (Ideal Diodes)



## Biased Parallel Clippers (Ideal Diodes)

