

EEE-2103: Electronic Devices and Circuits

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Clippers

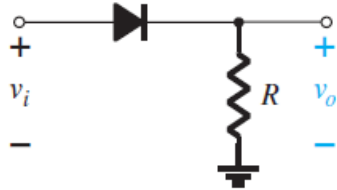
Clippers → networks that employ diodes
clip away portion of input signal
don't distort remaining part of applied waveform.

Example → half-wave rectifier
+ve or -ve region of applied signal is clipped off.

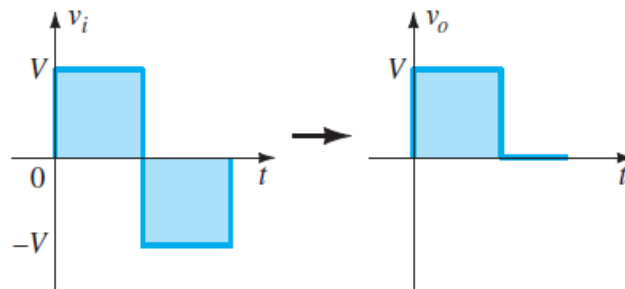
Two categories →

- 1) Series: diode is in series with load
- 2) Parallel: diode in branch parallel to load.

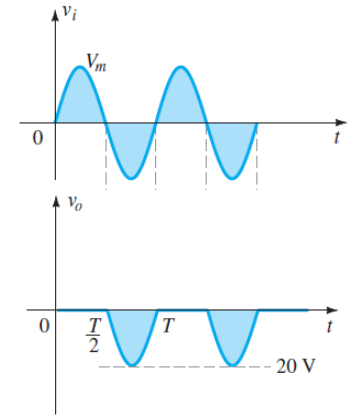
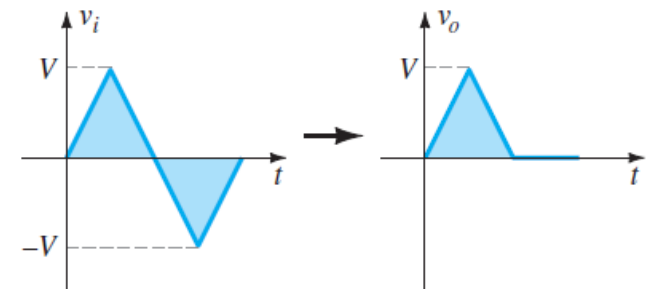
Series clippers →



(a)



(b)



Clippers

Series clippers with dc supply →

Transition voltages →

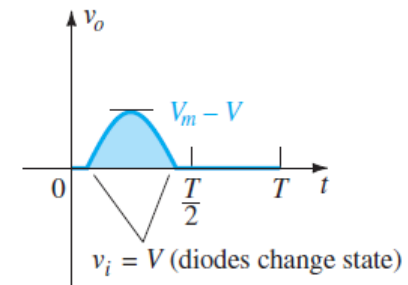
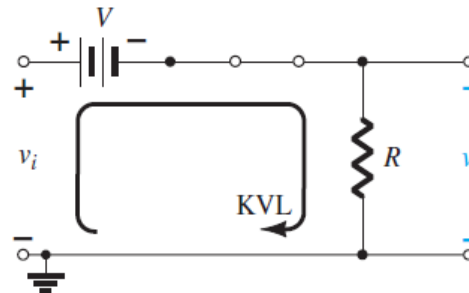
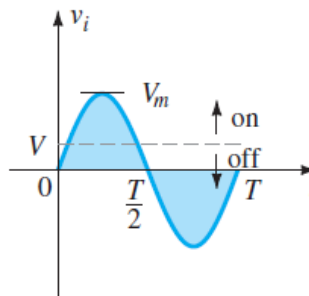
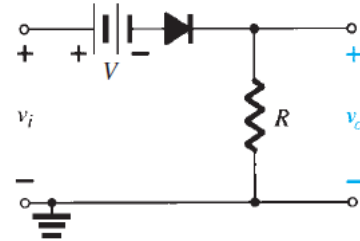
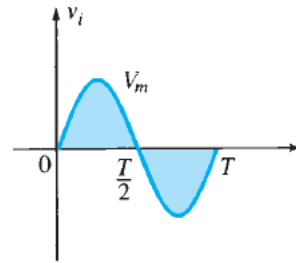
$$v_i = V \text{ and } v_o = 0$$

“on” and “off” regions →

Diode in “on” state →

$$v_o = v_i - V$$

$$V_{opeak} = V_m - V$$



Clippers

Promble-15:

Determine the output waveform for the sinusoidal input of Fig. 15.

Transition voltages \rightarrow

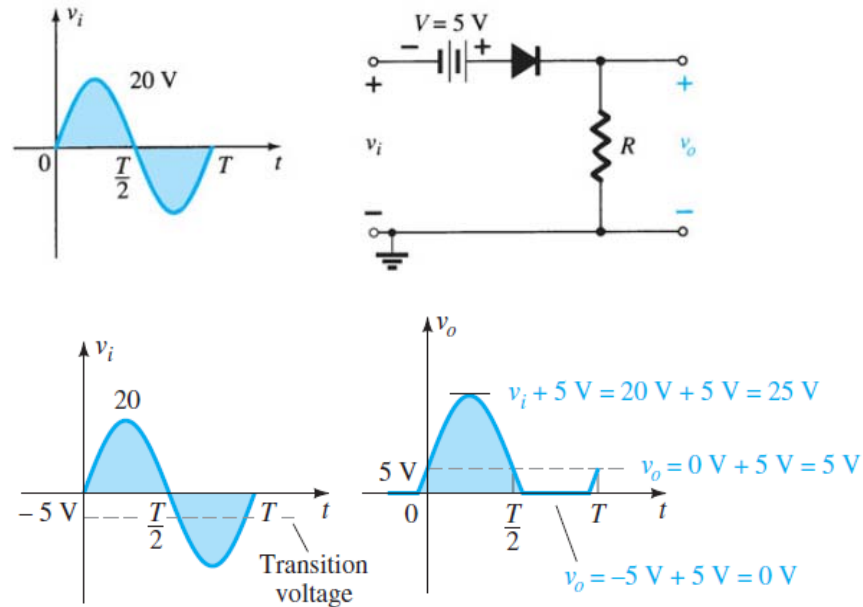
$$v_i = -5 \text{ V and } v_o = 0$$

“on” and “off” regions \rightarrow

Diode in “on” state \rightarrow

$$v_o = v_i + 5 \text{ V}$$

$$V_{opeak} = V_m + 5 \text{ V}$$



Clippers

Promble-16:

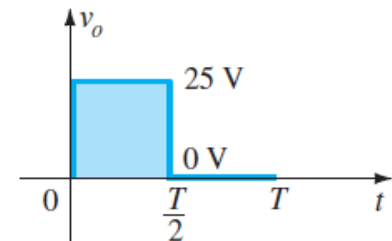
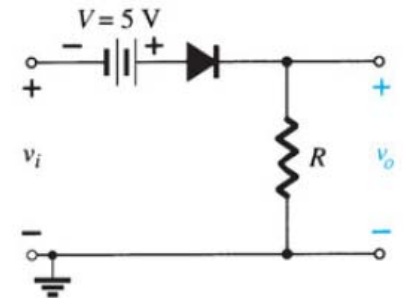
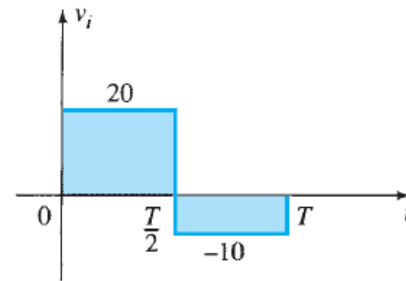
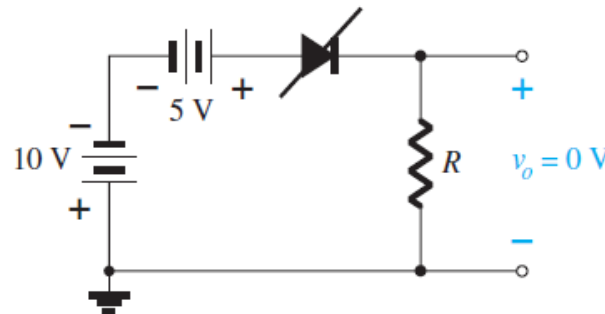
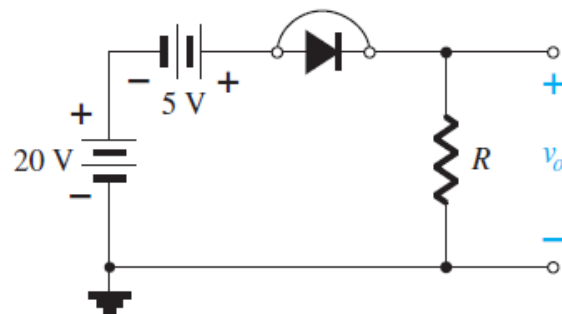
Find the output voltage for the network in Fig. 16.

For $v_i = 20 \text{ V}$ ($0 \sim T/2$) \rightarrow

diode is in short-circuit state, and $v_o = 20 \text{ V} + 5 \text{ V} = 25 \text{ V}$.

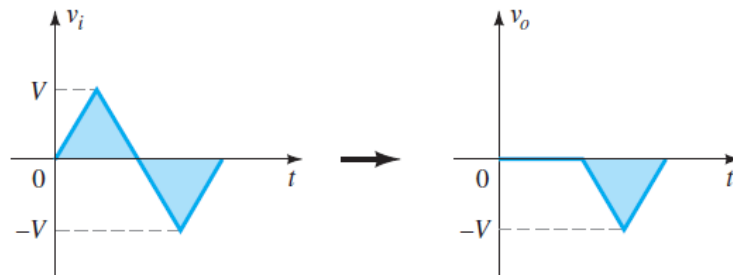
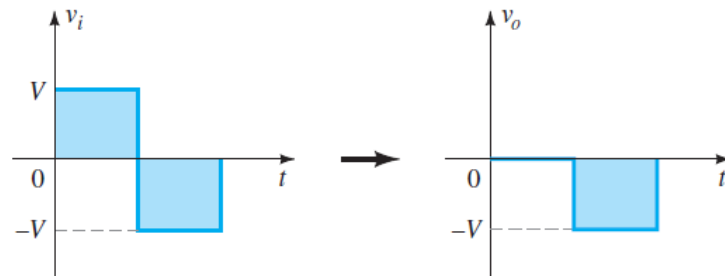
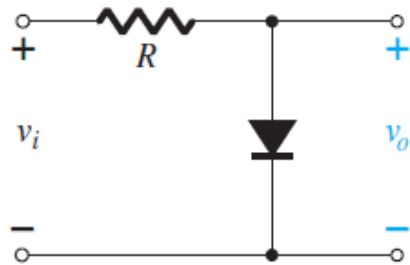
For $v_i = -10 \text{ V}$ ($T/2 \sim T$) \rightarrow

diode is in “off” state, and $v_o = i_R R = (0)R = 0 \text{ V}$.



Clippers

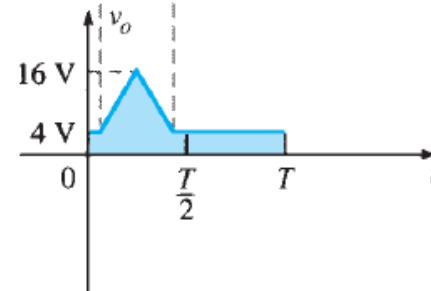
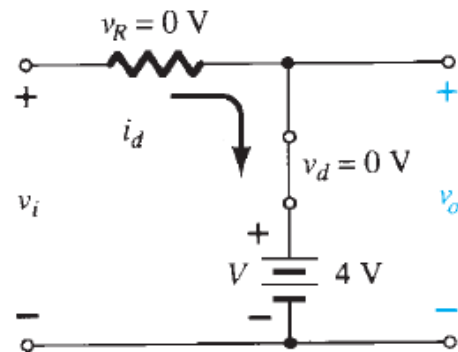
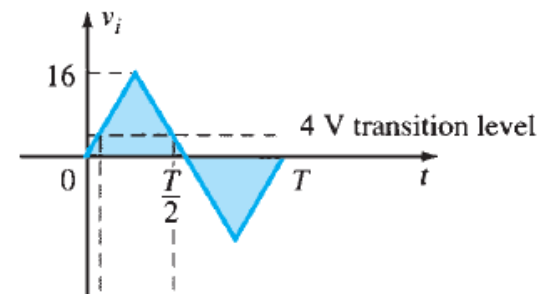
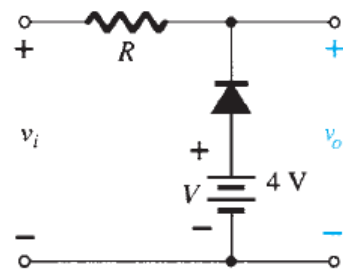
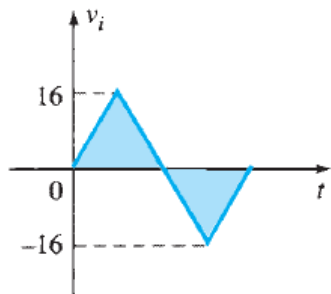
Parallel clipper \rightarrow



Clippers

Promble-17:

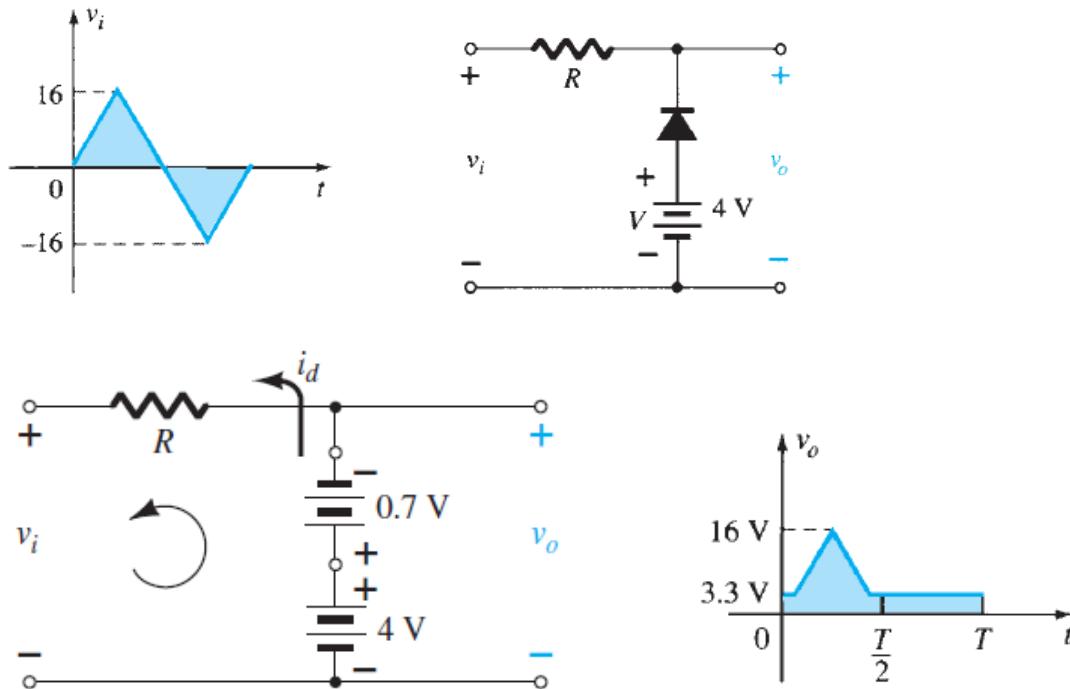
Determine v_o for the network of Fig. 17.



Clippers

Promble-18:

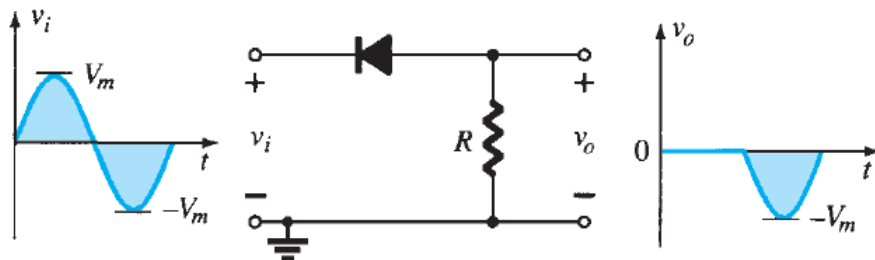
Determine v_o for the network of Fig. 18 using a silicon diode with $V_K = 0.7\text{ V}$.



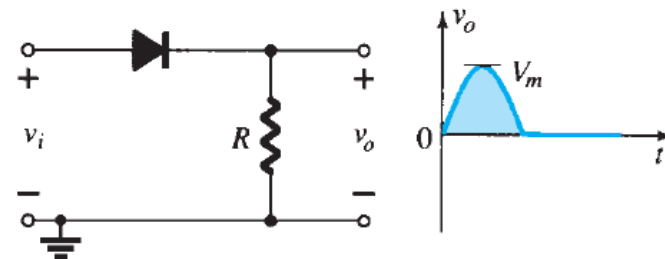
Clippers

Simple series clippers:

POSITIVE



NEGATIVE



Biased series clippers:

