EEE-2103: Electronic Devices and Circuits

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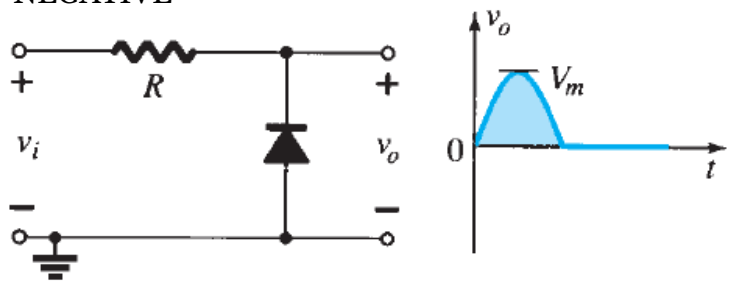
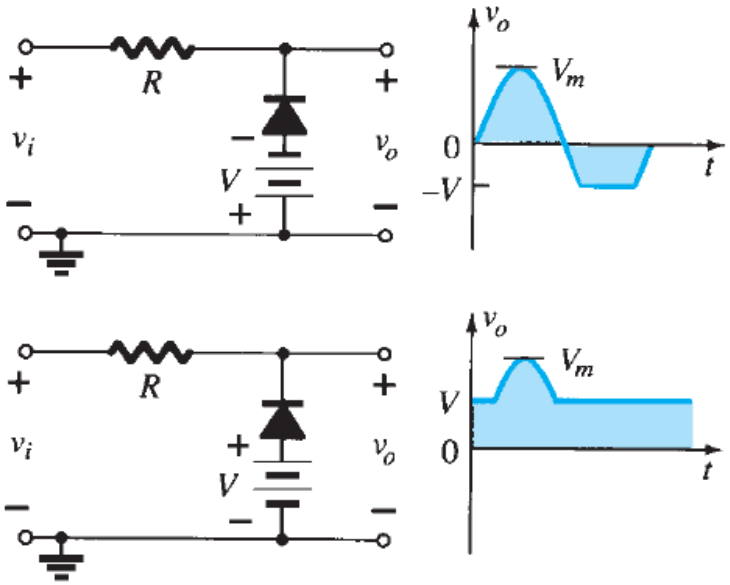
Clippers

Simple parallel clippers:

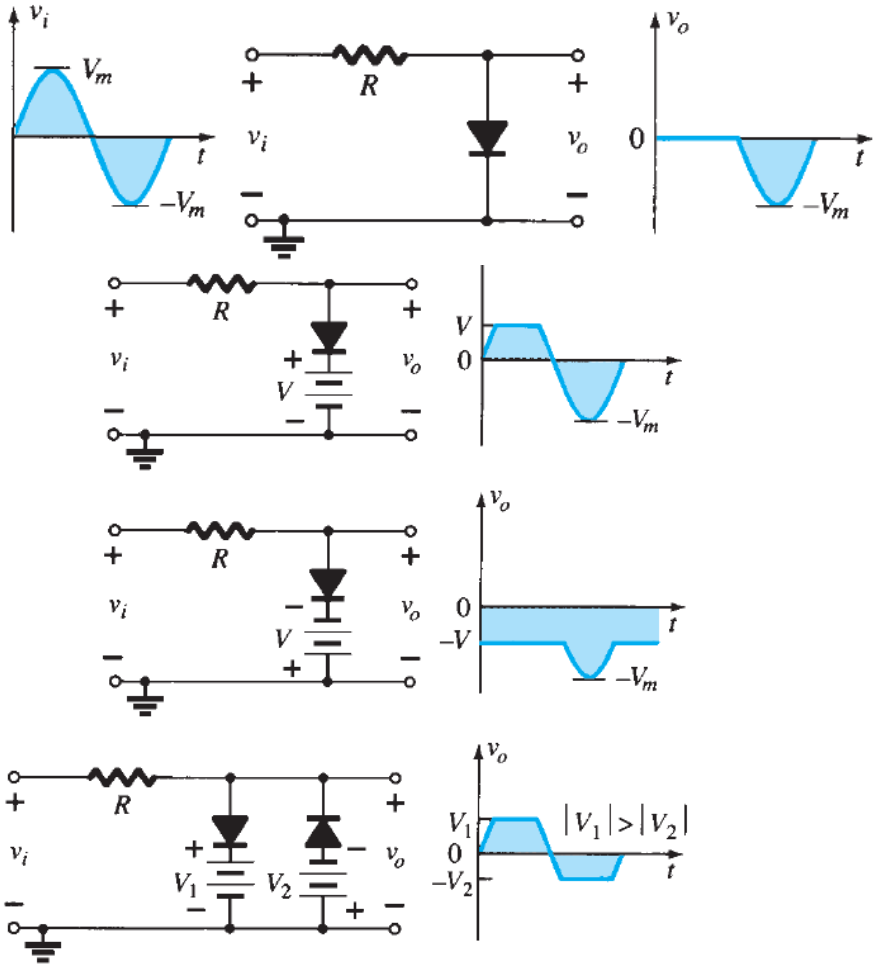
NEGATIVE



Biased series clippers:

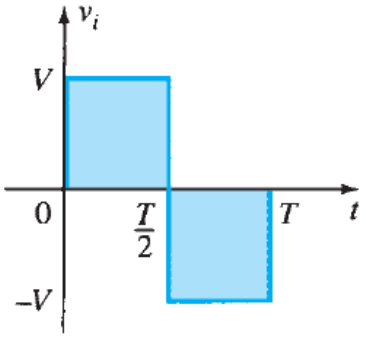


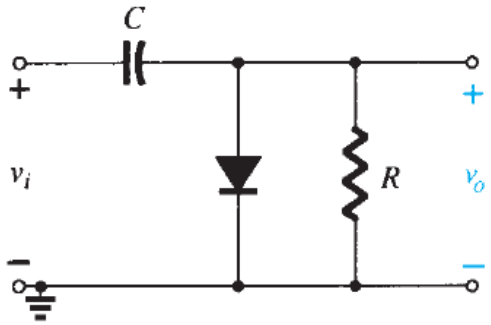
POSITIVE

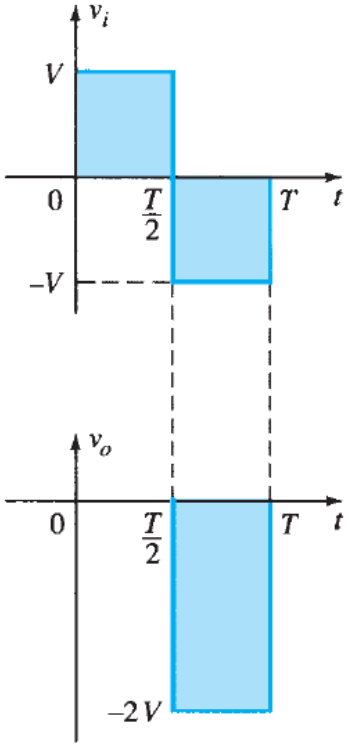


Clampers

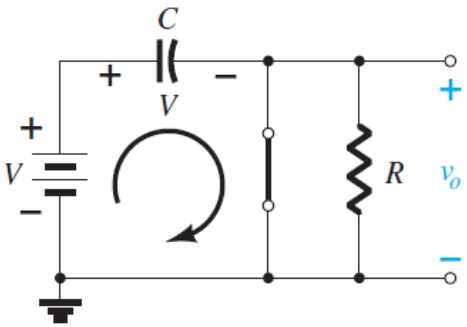
Clampers → shift applied signal to different dc level.
don't change appearance of applied signal.
constructed of diode, resistor, capacitor, dc supply.



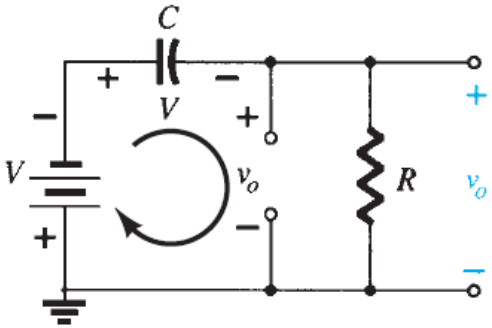




For interval 0 to $T/2$



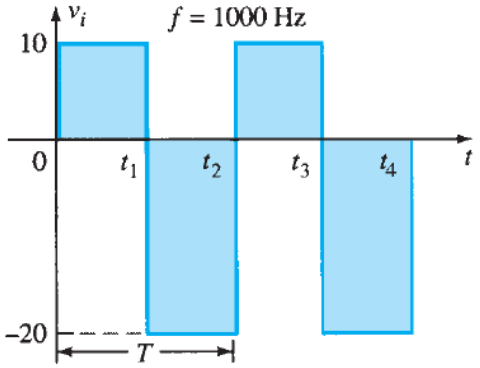
For period $T/2$ to T

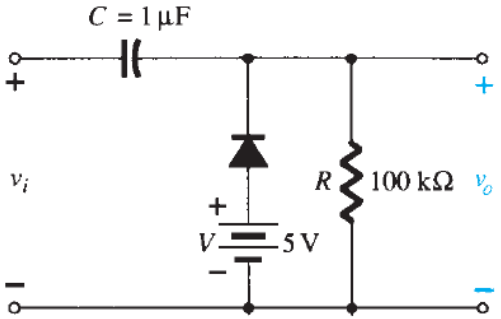


Clampers

Promble-19:

Determine v_o for the network of Fig. 19 for the input indicated.





f_{in} = 1000 Hz

$T = 1/f$ = 1 ms, and interval between levels = 0.5 ms.

For period $t_1 \sim t_2$ →

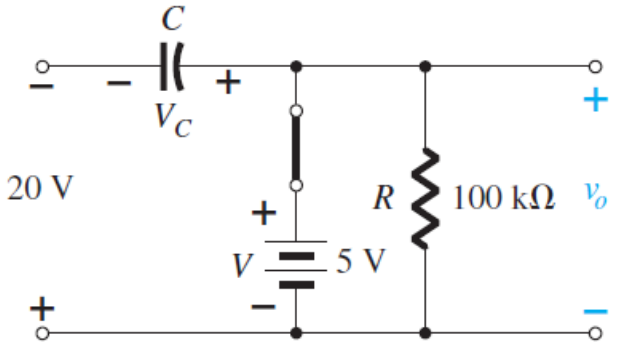
diode is in short-circuit state.

v_o = 5 V

Applying Kirchhoff's voltage law

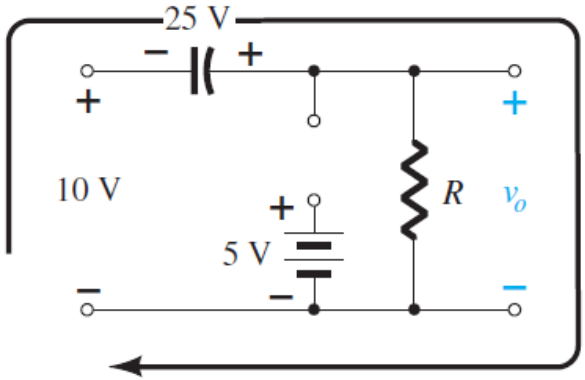
$-20\text{ V} + V_C - 5\text{ V} = 0$

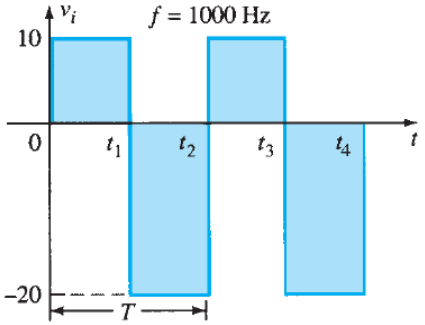
V_C = 25 V

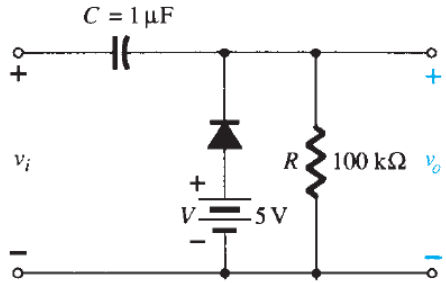


Clampers

Promble-19:





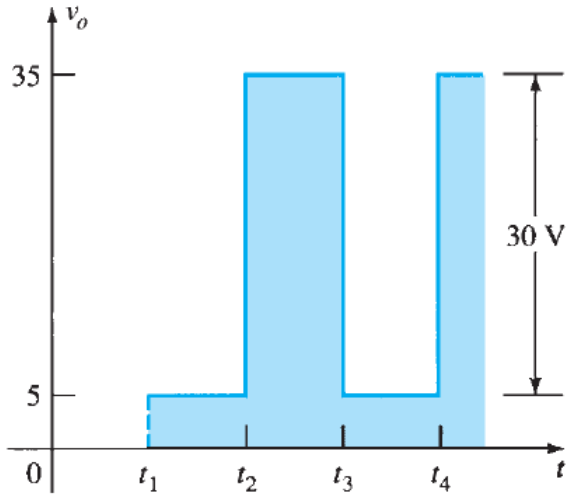


For period $t_2 \sim t_3$ → diode is in open-circuit state.

Applying Kirchhoff's voltage law

$+10\text{ V} + 25\text{ V} - v_o = 0$

$v_o = 35\text{ V}$



$\tau = RC = (100\text{ k}\Omega)(0.001\text{ mF}) = 0.1\text{ s} = 100\text{ ms}$

total discharge time = $5\tau = 5(100\text{ ms}) = 500\text{ ms}$.

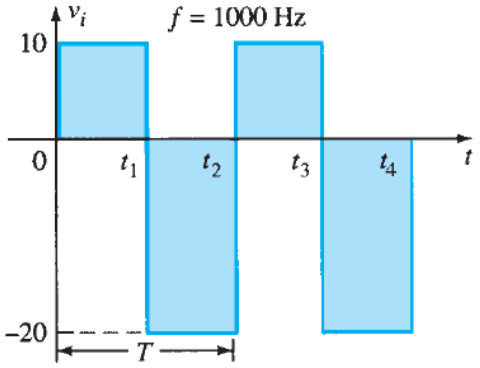
interval $t_2 \sim t_3 = 0.5\text{ ms}$

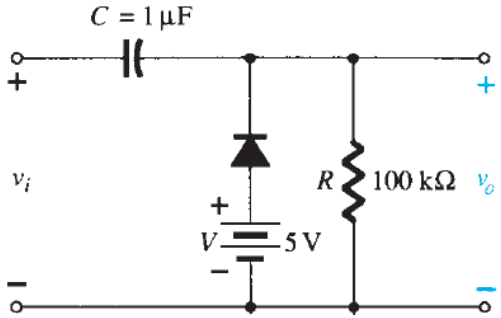
capacitor will hold its voltage during discharge period.

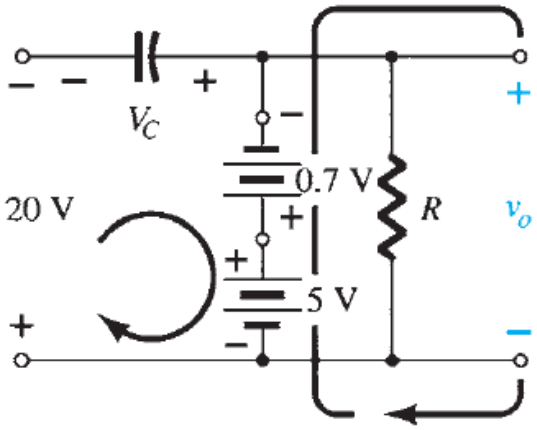
Clampers

Promble-20:

Determine v_o for the network of Fig. 20 using a silicon diode with V_K = 0.7 V for the input indicated.







f_{in} = 1000 Hz

$T = 1/f$ = 1 ms, and interval between levels = 0.5 ms.

For period $t_1 \sim t_2$ → diode is in short-circuit state.

Applying Kirchhoff's voltage law

$+5\text{ V} - 0.7\text{ V} - v_o = 0$

$v_o = 5\text{ V} - 0.7\text{ V} = 4.3\text{ V}$

Applying Kirchhoff's voltage law

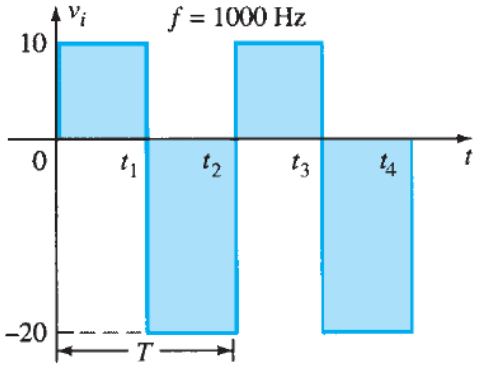
$-20\text{ V} + V_C + 0.7\text{ V} - 5\text{ V} = 0$

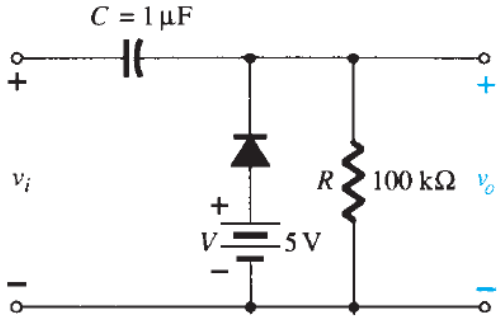
$V_C = 25\text{ V} - 0.7\text{ V} = 24.3\text{ V}$

Clampers

Promble-20:

Determine v_o for the network of Fig. 20 using a silicon diode with V_K = 0.7 V for the input indicated.





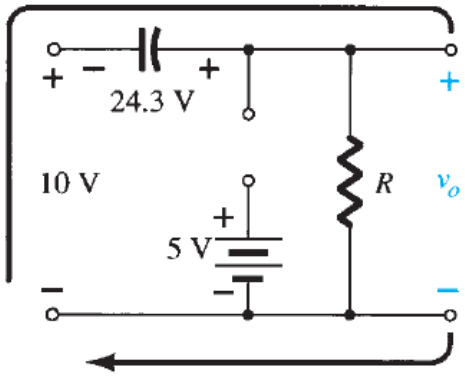
For period $t_2 \sim t_3$ →

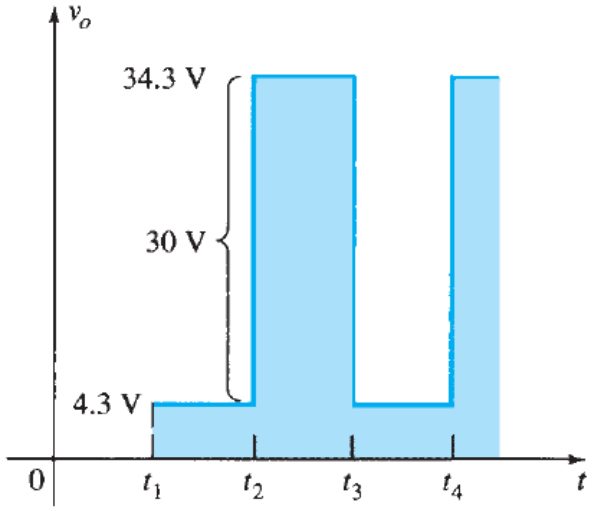
diode is in open-circuit state.

Applying Kirchhoff's voltage law

$+10\text{ V} + 24.3\text{ V} - v_o = 0$

$v_o = 34.3\text{ V}$





Clampers

Clamping networks: