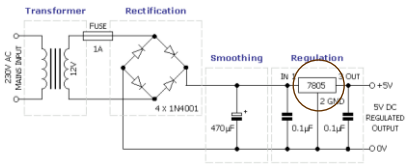
Regulated DC Power Supply with IC regulator



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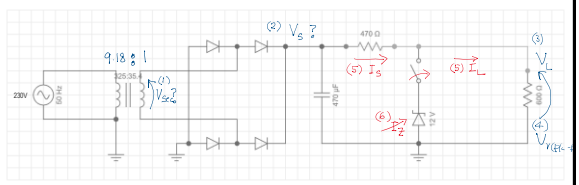
Tutorial Question :



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Diode Clipper Circuits

- Diode circuits that clip off portions of signal voltages above or below certain limits.
- Purposes:
  - To protect the next stage
  - Generate nearly-square waveforms

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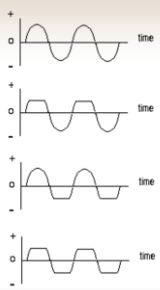
Waveform Clipping



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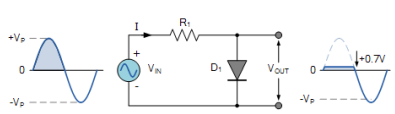
Clipping at cut-in voltage of a diode



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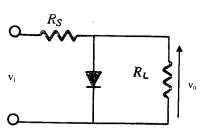
With Load…



When the diode is reverse biased,

$$v_o = \left[\frac{R_L}{R_L + R_S}\right] v_i$$

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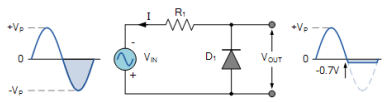
Clipping at cut-in voltage of a diode



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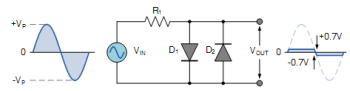
Clipping at cut-in voltage of a diode



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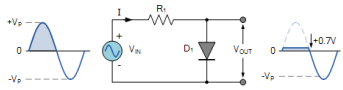
Clipping at a desired voltage level



- The level at which the signal is clipped can be adjusted by adding a d.c. bias voltage in series with the diode.

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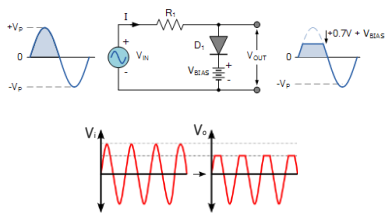
Clipping at a desired positive voltage level (Positive Bias Diode Clipping)



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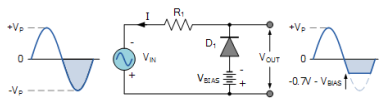
Clipping at a desired negative voltage level Negative Bias Diode Clipping



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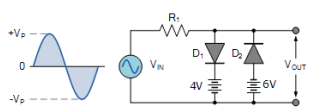
Clipping both peaks



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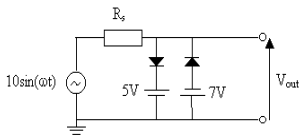
Tutorial Question



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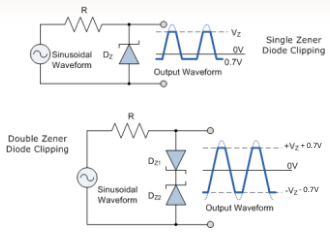
Clipper with Zener Diodes



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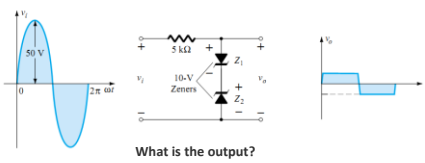
Tutorial Question



What is the output?
If 2 kΩ load is connected
If 1 kΩ load is connected

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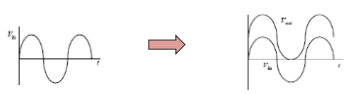
DC Clamping Circuits

- Clamping means adding an offset.
  - Whole waveform shifting up or down
- We can add DC offsets to AC signals.



Input *Output is the clamped version of input*

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DC Clamp Circuit Operation

- During the first negative half cycle of the input the capacitor get charged. (It charges up to the peak value of input, say V_m)
- After the capacitor is charged [input voltage+V_m] is the output.

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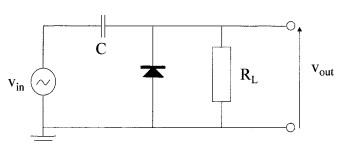
DC Clamper Circuit



Villard circuit

Lets do a simulation and see the operation

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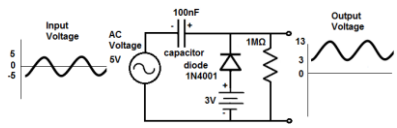
Diode Clamper with a Bias Voltage

- A bias voltage can be added to pin the output to a level other than zero.



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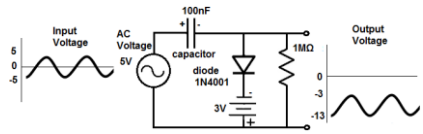
Diode Clamper with a Bias Voltage



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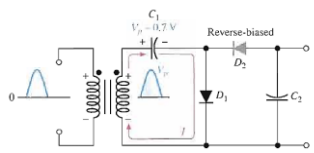
Voltage Doubler Circuit



Greinacher voltage doubler

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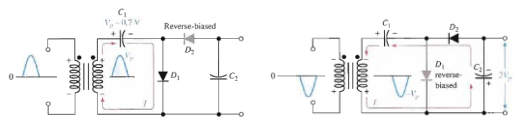
Greinacher voltage doubler

During Positive half cycle

During negative half cycle



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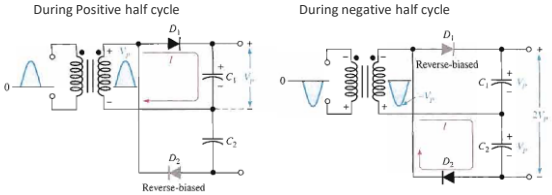
Bridge Voltage Doubler / Delon Voltage Doubler

During Positive half cycle

During negative half cycle



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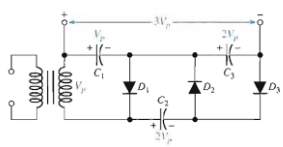
Voltage Tripler Circuit



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