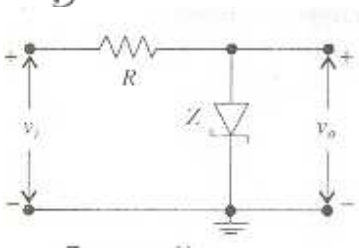
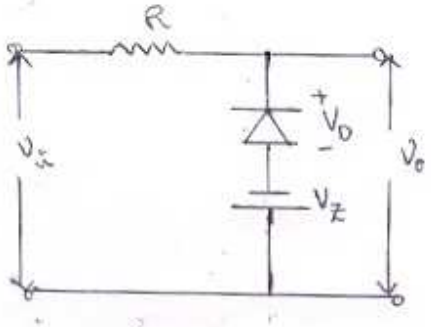
Clipping using zenar diode :

By using zenar diode clipping is done at two levels. We know under forward bias condition zenar diode will operates like a normal pn diode and Equivalent circuit of zenar diode in reverse bias condition is

consider one of the zenar diode clipper is



in the given circuit diagram , for positive half cycle of input zenar diode is in forward bias condition. So here zenar diode is replaced with a normal diode(consider $R_f = 0$, $R_r = \infty$, $V_\gamma \neq 0$) as shown in figure.



Now for the given circuit, $V_D = V_i - V_\gamma$

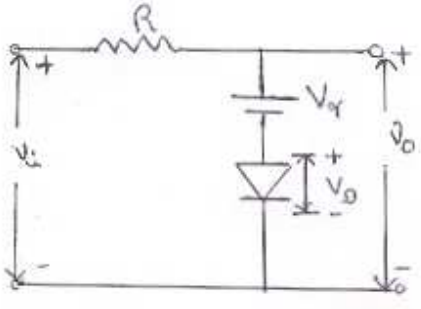
If $V_i > V_\gamma$, V_D = positive value so diode is in ON state(replaced with short circuit)

Then $V_O = V_\gamma$

If $V_i < V_\gamma$, V_D =negative value so diode is in OFF state(replaced with open circuit)

Then V_O = Vi Here the input waveform above the level V_γ has been clipped means positive peak(negative base)of the input signal is clipped.

for negative half cycle of input, zenar diode is in reverse bias condition. So here zenar diode is replaced with its equivalent circuit ,



here $V_D = V_i - (-V_Z)$

If $V_i > -V_Z$, V_D = positive value so diode is in OFF state
Then $V_O = V_i$

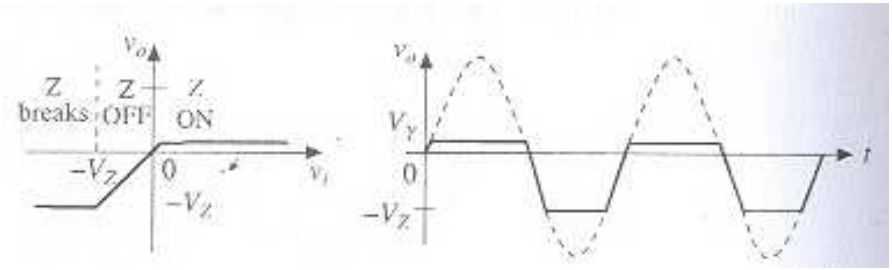
If $V_i < -V_Z$, V_D = negative value so diode is in ON state, Then $V_O = -V_Z$ Here the input waveform below the level $-V_Z$ has been clipped .

Transfer characteristics:

If $V_i > V_\gamma$, Then $V_O = V_\gamma$ so slope of transfer characteristics curve is zero

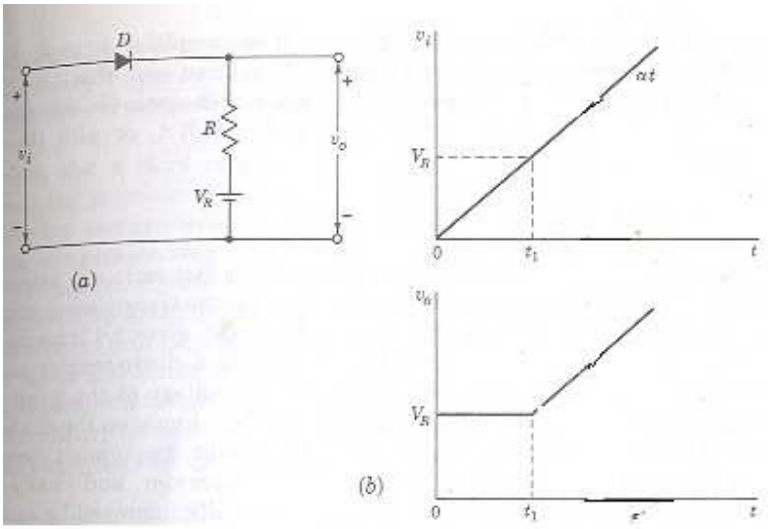
If $V_i < -V_Z$, Then $V_O = -V_Z$ so slope of transfer characteristics curve is zero.

If $-V_Z < V_i < V_\gamma$, Then $V_O = V_I$ so slope of transfer characteristics curve is one.



Comparators : It is an electronic circuit used to compare two signals and gives the output correspondingly.

Diode comparators:
Circuit diagrams for comparator and clippers are same but the aim of the circuits are different. Consider one comparator circuit as shown in figure.



It compares V_i and V_R and gives output as either Vi or V_R depending on the diode connection. Consider diode is an ideal one and input is a ramp signal.
Here $V_D = V_i - V_R$

If $V_i > V_R$, V_D =positive value so diode is in ON state, Then $V_O = V_i$

If $V_i < V_R$, V_D =negative value so diode is in ON state, Then $V_O = V_R$

Applications of voltage comparators: it is used

1. in accurate time measurements
2. in pulse time modulation
3. in phase meters
4. in analog to digital converters
5. to obtain square wave from a sine wave
6. in amplitude distribution analyzers