

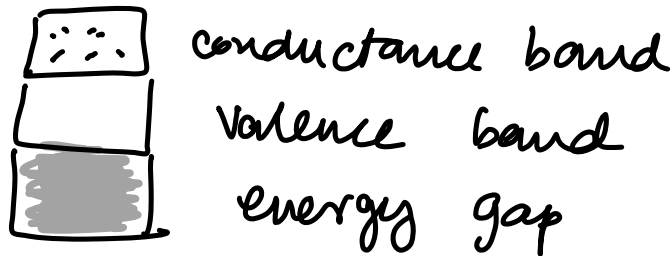
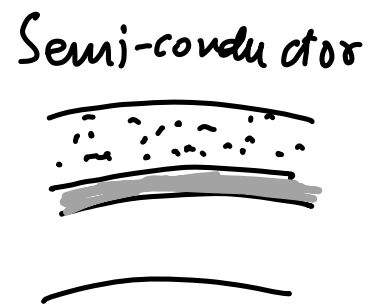
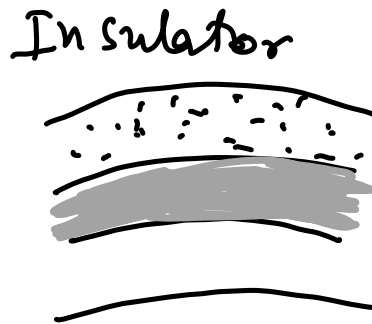
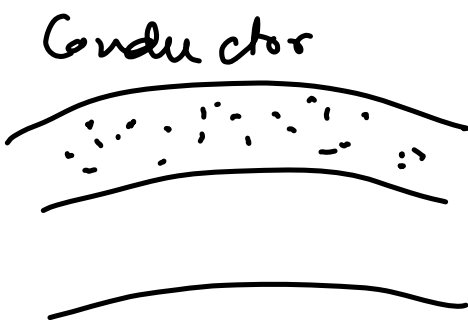
# Junction Diode

Conductor - electrons to flow

Insulator - No electrons to flow

Semi-conductor - allows electrons to flow  
under certain conditions  
(e.g. connected to a voltage source)

Junction diode

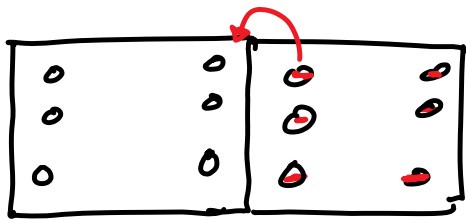


Semi-conductors formed by adding donor elements to Silicon / Germanium

Boron / Gallium : excess holes : p-type

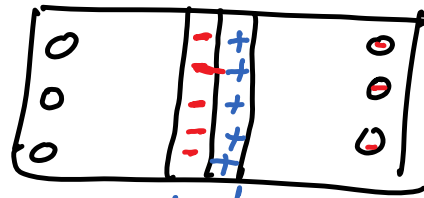
Arsenic / Phosphorous : excess electrons : n-type

# Junction diode



p-type n-type  
just-attached

semi-conductor

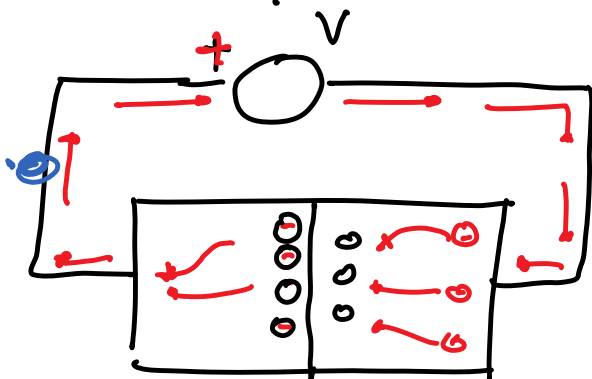


potential barrier

$0.6 \sim 0.7 \text{ V}$

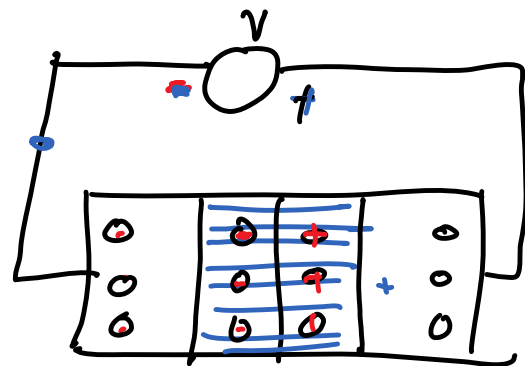
reached steady state

Two-ways of connecting the junction diode



p n

diode is  
conducting

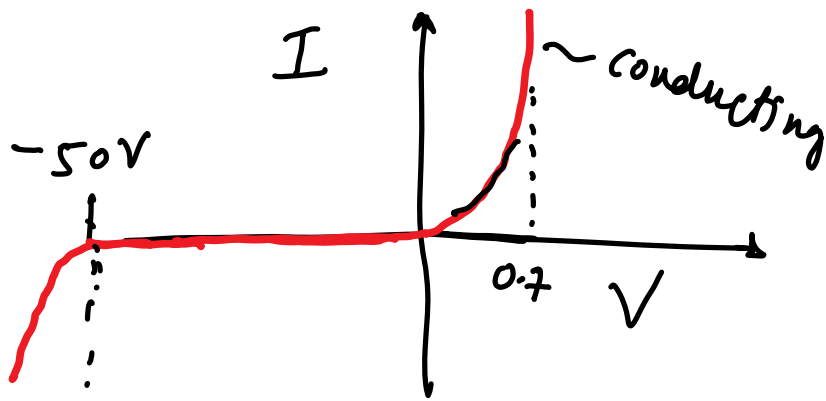
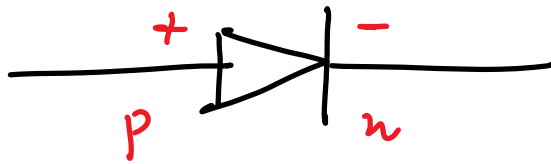


p n

energy barrier  
grows

diode is  
non-conducting

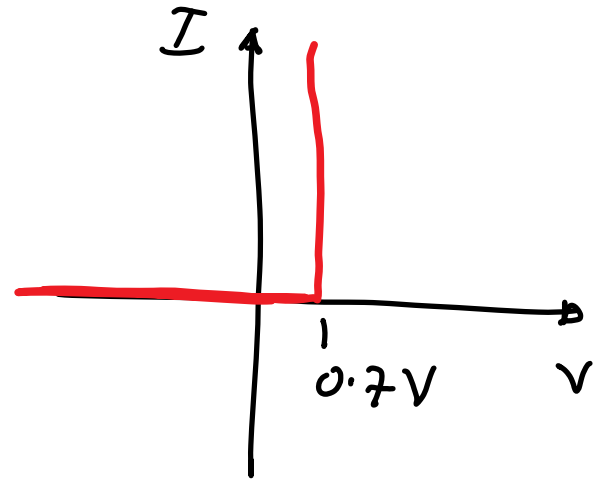
Circuit symbol



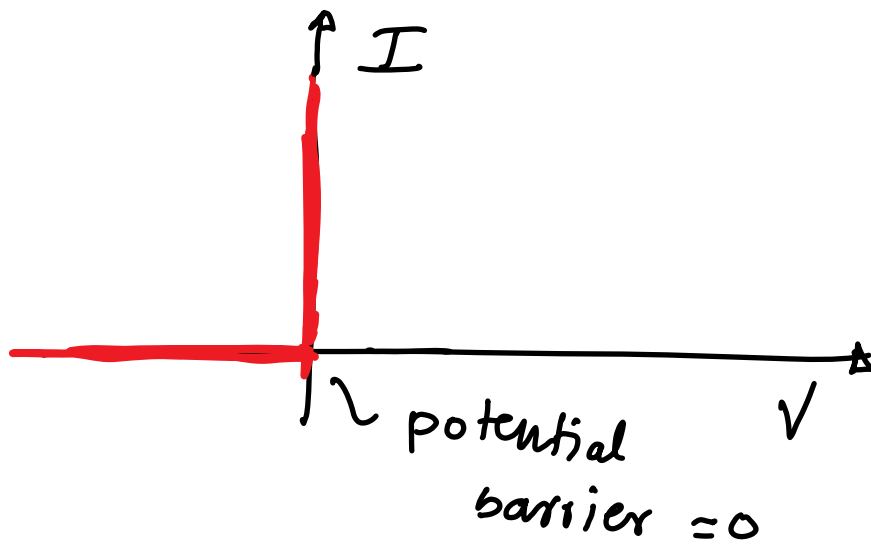
Break  
down voltage

(for the diode)

Real diode

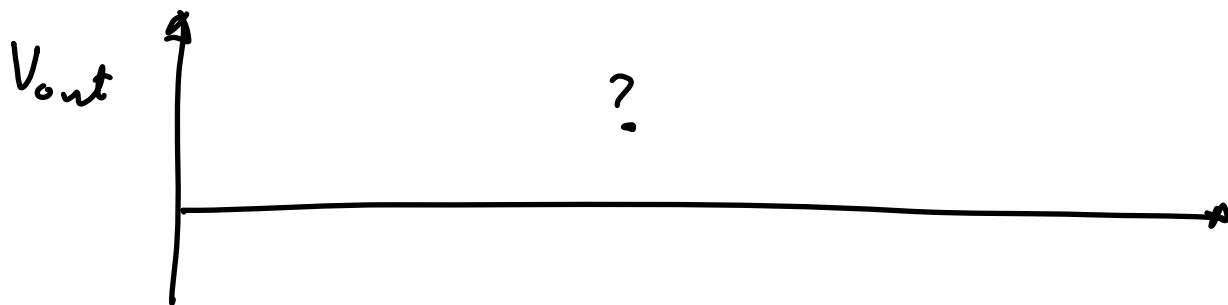
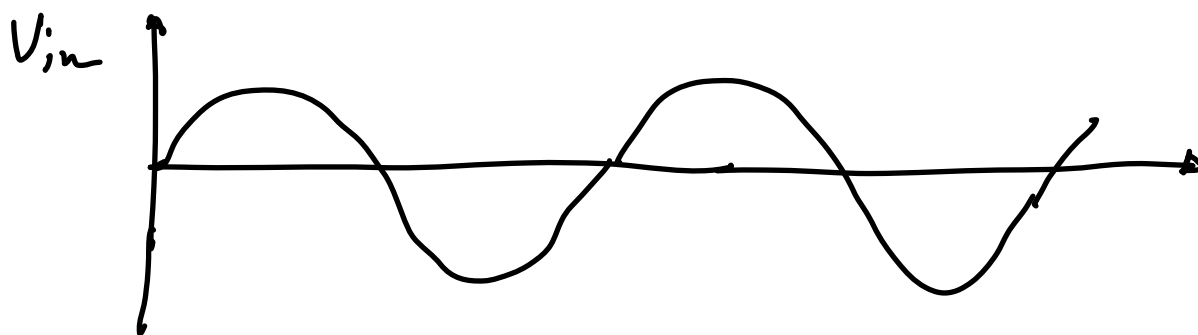
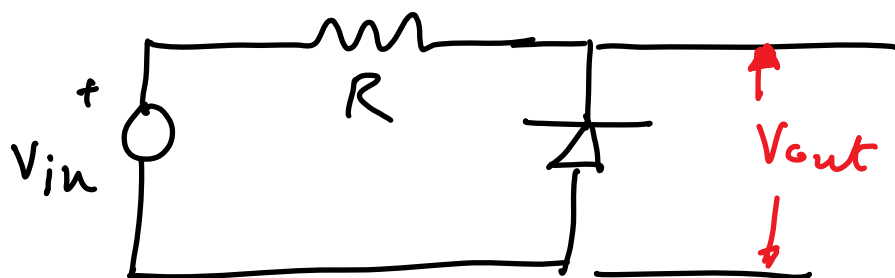


Approximation  
of the real  
diode

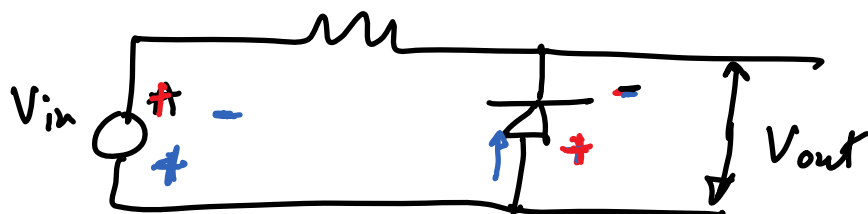
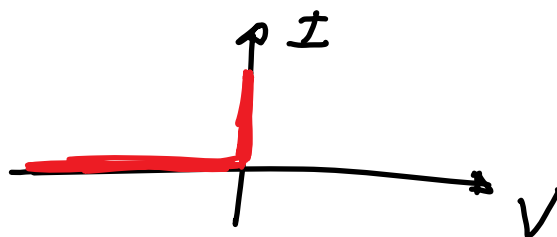


Ideal diode

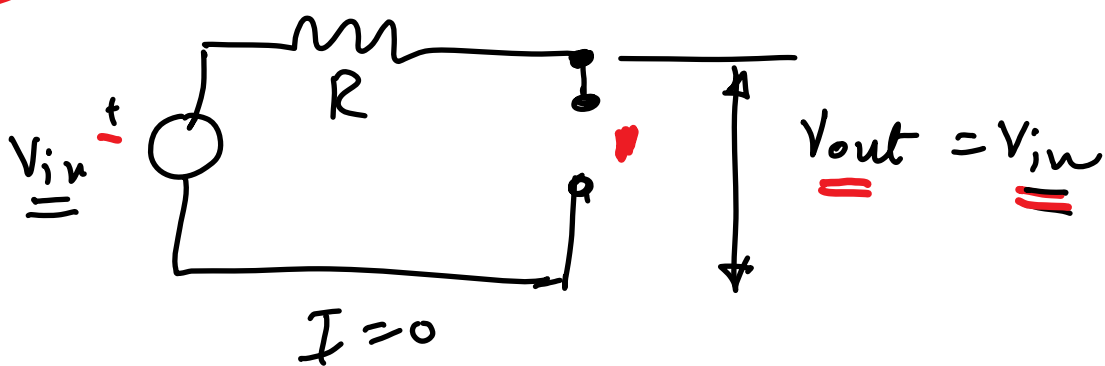
# Diode as a rectifier



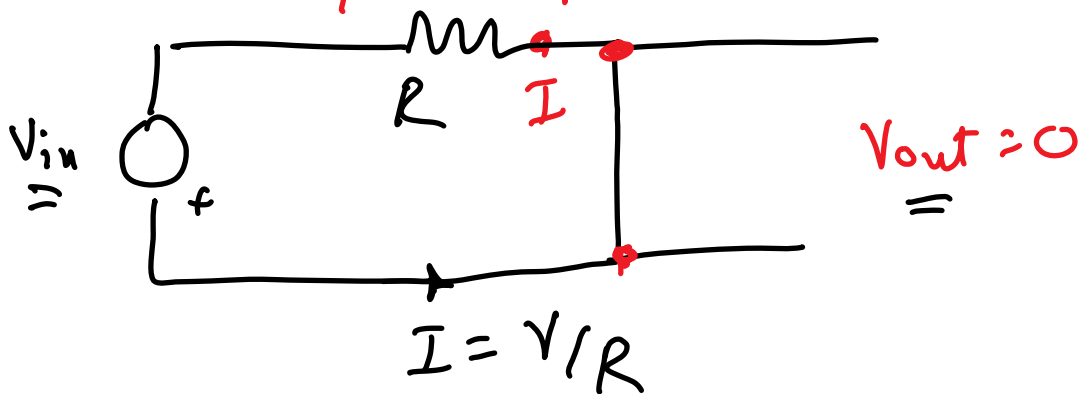
Assume ideal diode

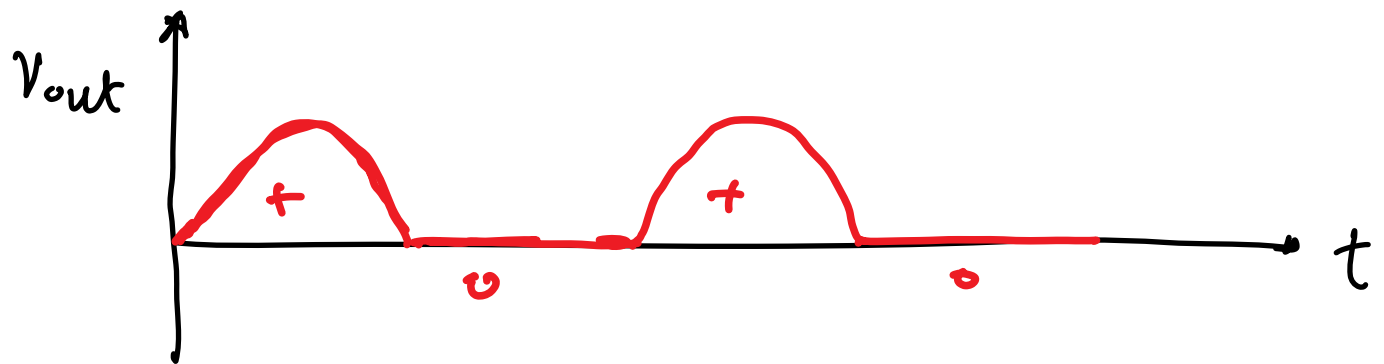
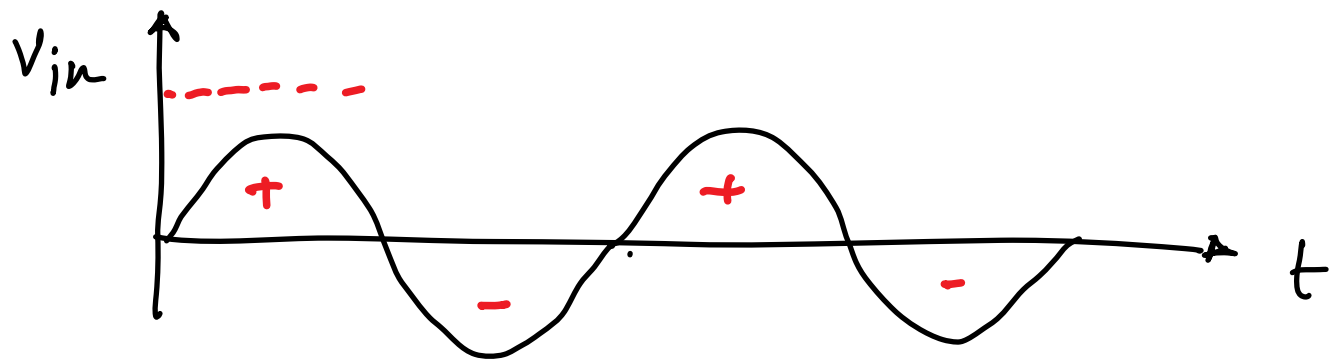


(a)  $V_{in}$  is +ive



(b)  $V_{in}$  is -ive  $V_R = IR = \frac{V_{in}}{R} R = V_{in}$

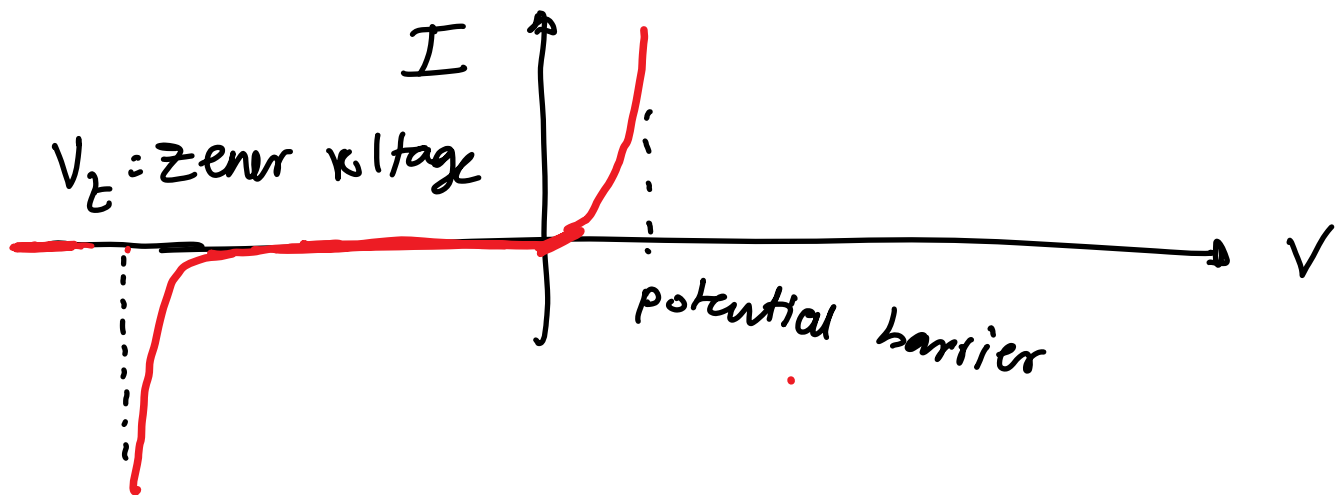
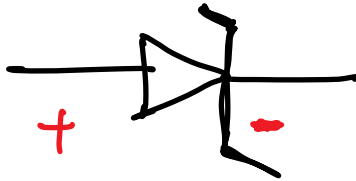


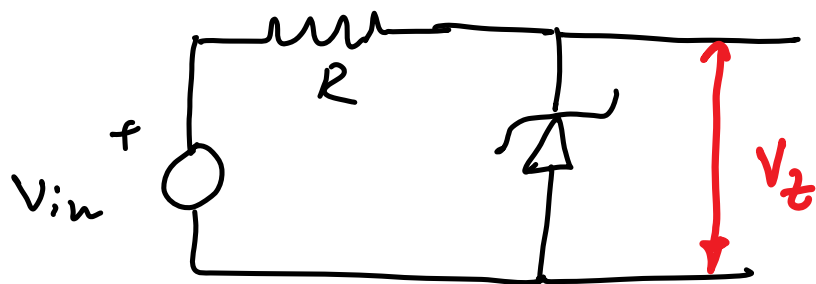


# Zener diode

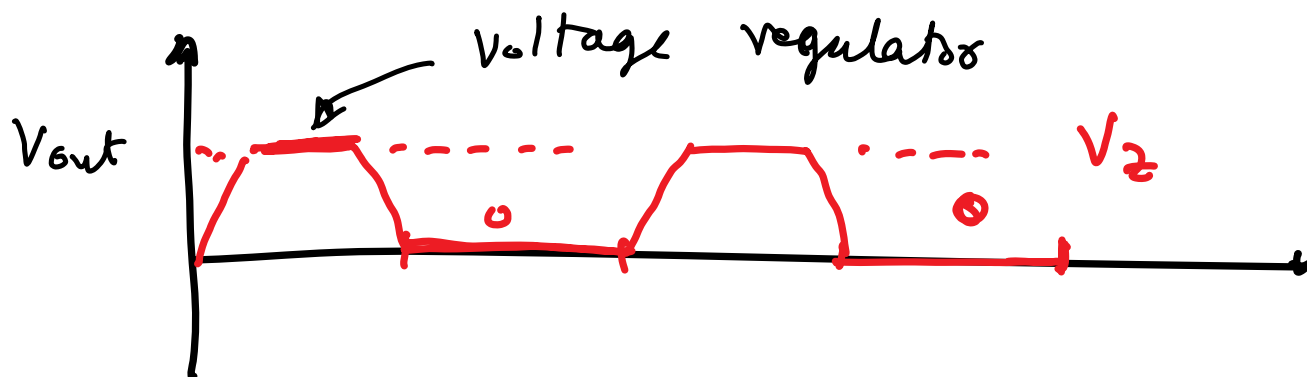
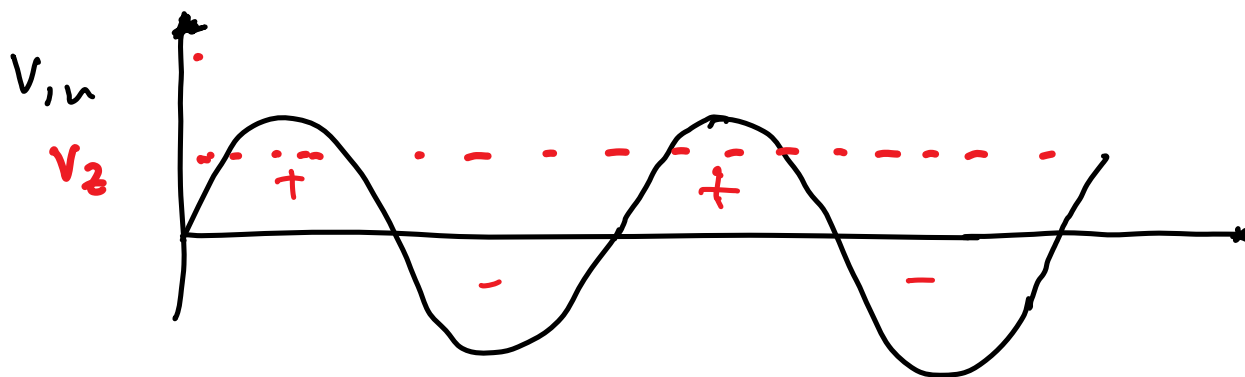
used in reverse bias

Symbol :





Zener behaves similar to a junction diode in forward bias



Voltage regulator IC is a better way to regulate the voltage.

LM 78XX      XX = 05, 12, 15

