Notebook

EEE 263

2305084

Intro to Electronics

Passive Elements → R, L, C

Active Elements → ① Diode → 5th ed ch-3

② Bipoles Junction Transaction (BJT) → ch-5

③ Metal Oxide Semiconductor Field Effect Transaction (MOSFET) → ch-4

④ Operational Amplifiers → Building block & IC

Books

1, 2, 3 → Microelectronics Circuits (6th/7th)

4 → OP-AMP → Coughline

Types of materials

① Metal → Au, Fe, Ag, Cu, Al → Abandoned e^-

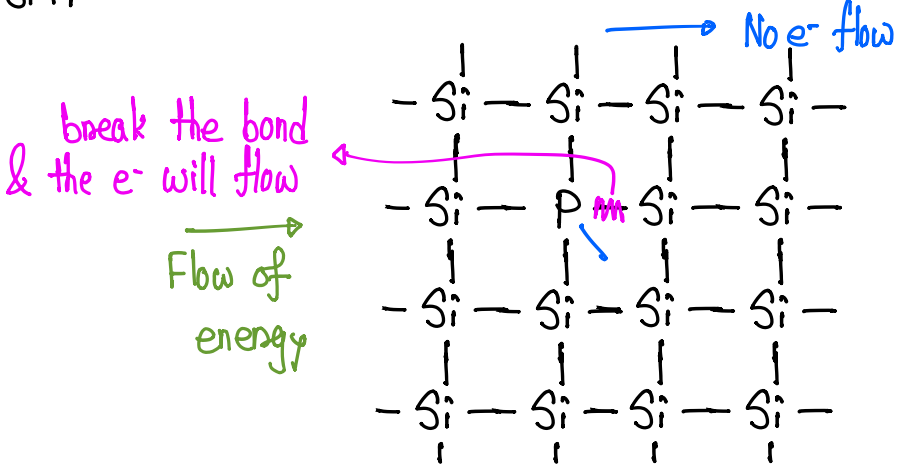
② Insulator → SiO_2, Al_2O_3, TiO_2, HgO_2 → No e^- flow

③ Semiconductor → Current flow under certain condition

↳ Si, Ge, GaAs

Si → G-14, Ge → G-14, GaAs → G-13 & 15

↳ Doping, Temperature, Light, Source Energy, Voltage



* When Al is used, a hole is created, to fill it up another bond will break.

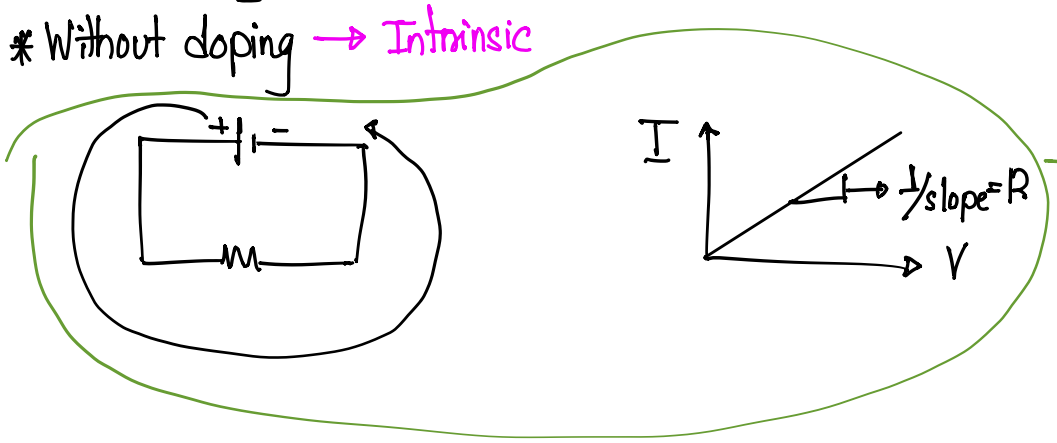
Gp-13 → Free e^- (Through hole) carries the current → p type

Gp-15 → Free e^- (Through e^-) carries the current → n type

* Even after doping → whole compound is neutral

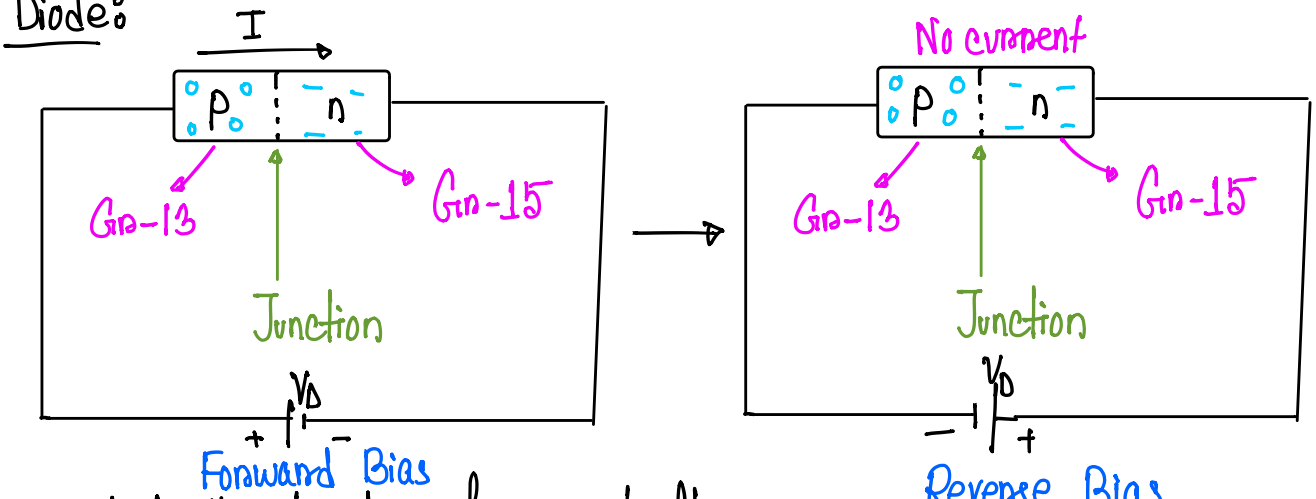
* With doping → Extrinsic

* Without doping → Intrinsic

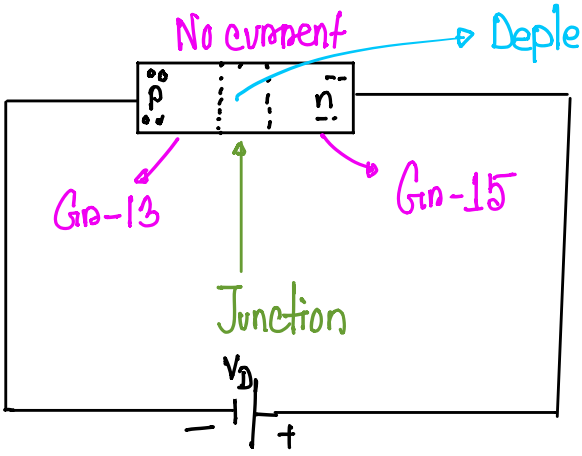


→ Passive Element

Diode:



① Controls the direction of current flow



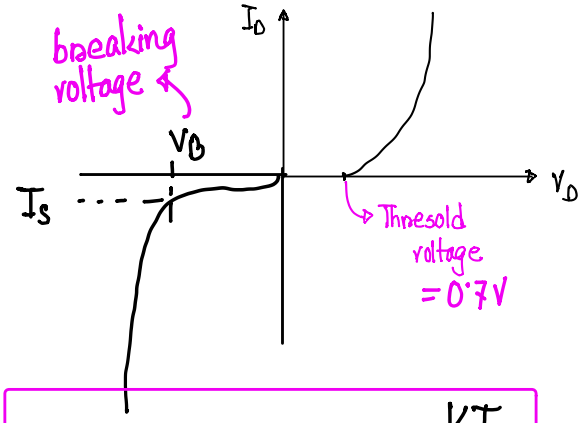
② Magnitude of the current should have some non-linear behaviour

$$I_D = I_s \left(e^{\frac{V_D}{V_T}} - 1\right)$$

I_s → Reverse saturation Point

V_T → Thermal Voltage

* These 2 properties are active properties



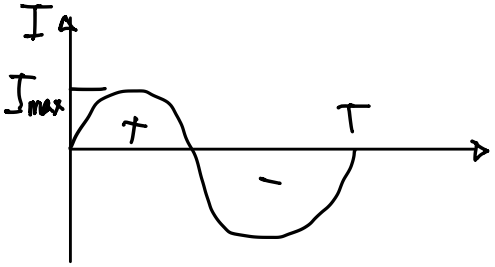
* যদিও Reverse এ দিলে Current যাবার কথা না কিন্তু Temperature এর কারণে Vibrate হয় এবং অল্প Current পাওয়া যায় যেটা হলো I_S।
* V_B তে Current System চেঞ্জ হয়ে যায় এবং Current fall করে।

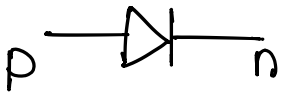
Thermal Voltage, $V_T = \frac{KT}{Q}$

$K = 1.38 \times 10^{-23}\ JK^{-1}$

$Q = 1.6 \times 10^{-19}\ C$

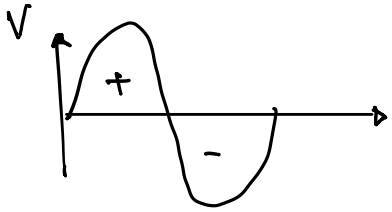
AC → Alternating Current

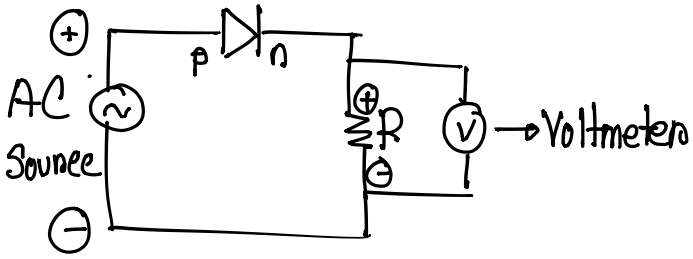




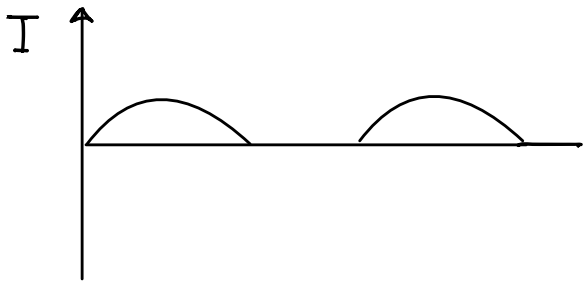
Diode

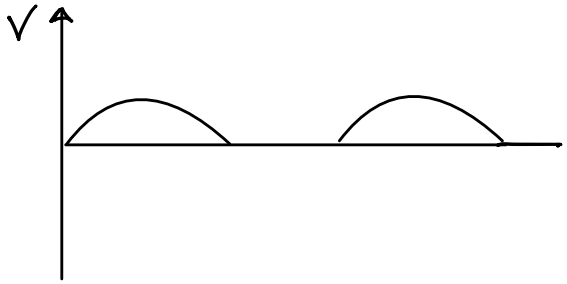
For positive cycle





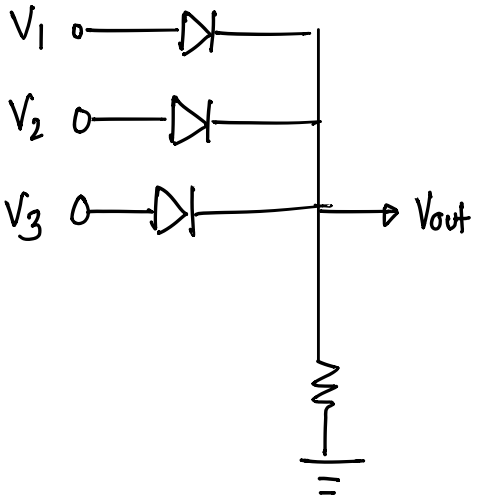
For negative cycle





* এবম্প্রকার প্রবাহ → Rectifiers

↳ AC to DC Conversion using Diode



*If will be a forward bias if

$V_1 > V_{out}$

$V_2 > V_{out}$

$V_3 > V_{out}$

$\rightarrow I = I_1 + I_2 + I_3$

3 input OR gate

1 1 1 → 1

1 0 0 → 1

0 0 1 → 1