



SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)
COIMBATORE-35

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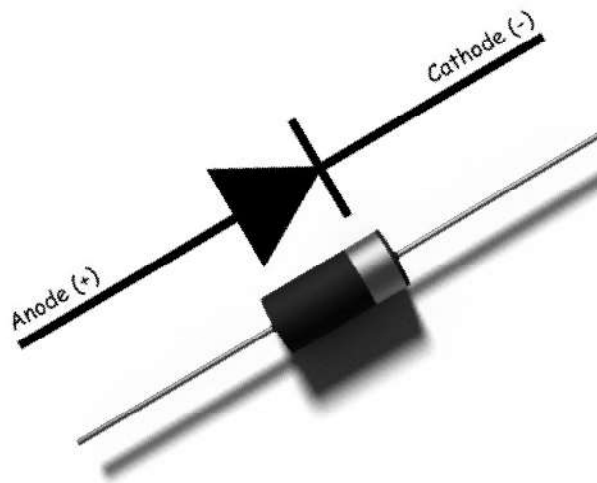


DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

23EET101 / BEEE
I YEAR / I SEMESTER

UNIT-4: ANALOG ELECTRONICS

PN JUNCTION DIODE





TOPIC OUTLINE



- ✓ Introduction
- ✓ Diodes
- ✓ PN Junctions
- ✓ Forward bias
- ✓ Reverse bias
- ✓ VI characteristics

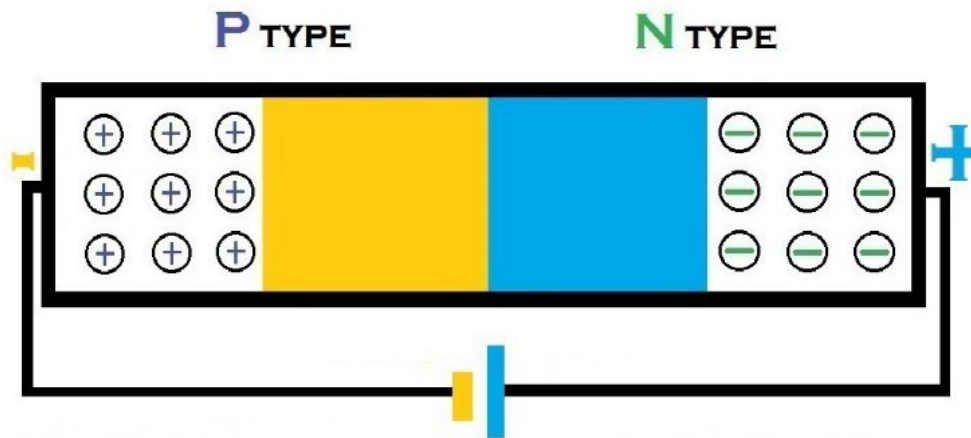




PN JUNCTION



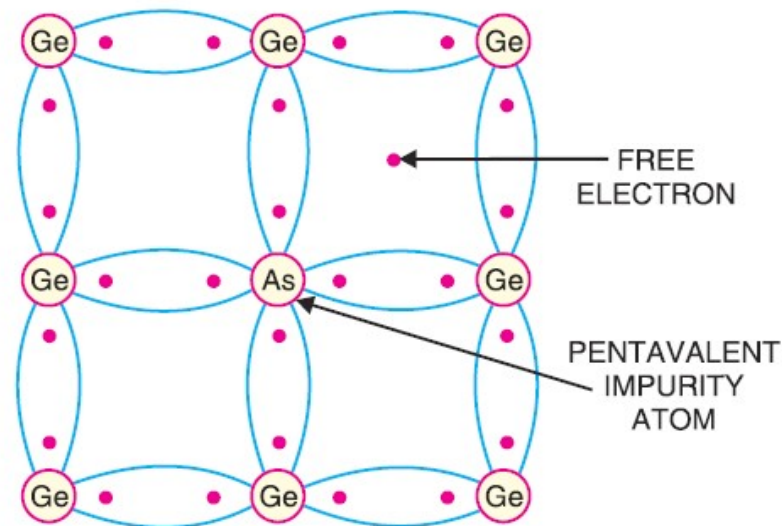
PN-junction: When P-type semiconductor is suitably joined to N-type semiconductor, the contact surface is called PN-junction.





N-TYPE SEMICONDUCTOR

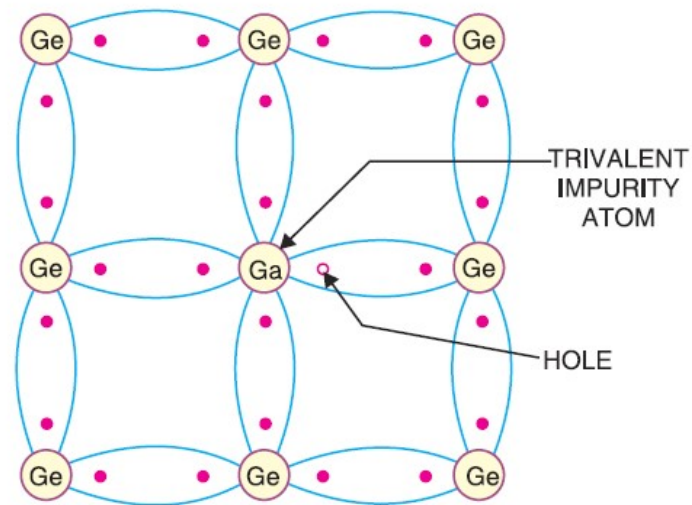
- N-Type: When a small amount of pentavalent impurity is added to a pure semiconductor, it's known as a N-type semiconductor.





P-TYPE SEMICONDUCTOR

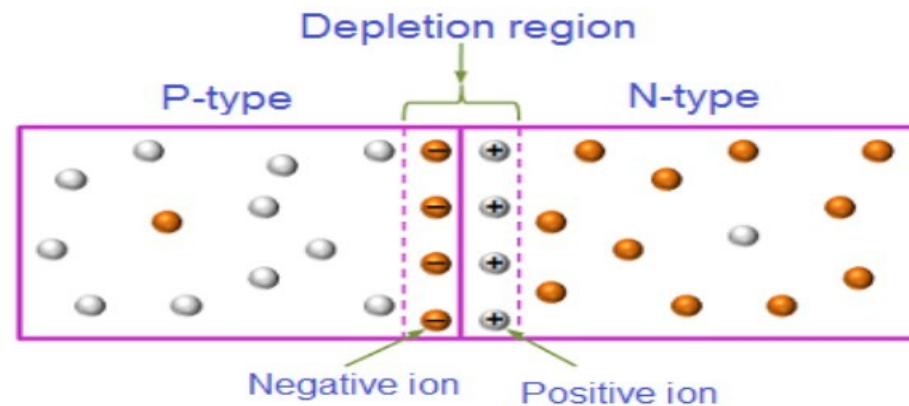
- P-type: when a small amount of trivalent impurity is added to a pure semiconductor, it's called P-type semiconductor.





DEPLETION REGION

- The depletion region, also called depletion layer, depletion zone. The combining of electrons and holes depletes the holes in the P-region and the electrons in the N-region near the junction.





BIASING A PN-JUNCTION



- In relation to a PN junction, there are two bias condition

Biassing a PN-junction

Forward biasing

Reverse biasing



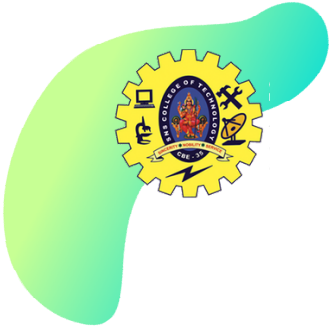
BATTERY CONNECTION



- **Forward Bias Mode:** Positive terminal connected to P-region and negative terminal connected to N-region.

- **Reverse bias mode:** Negative terminal connected to P-region and positive terminal connected to N-region.

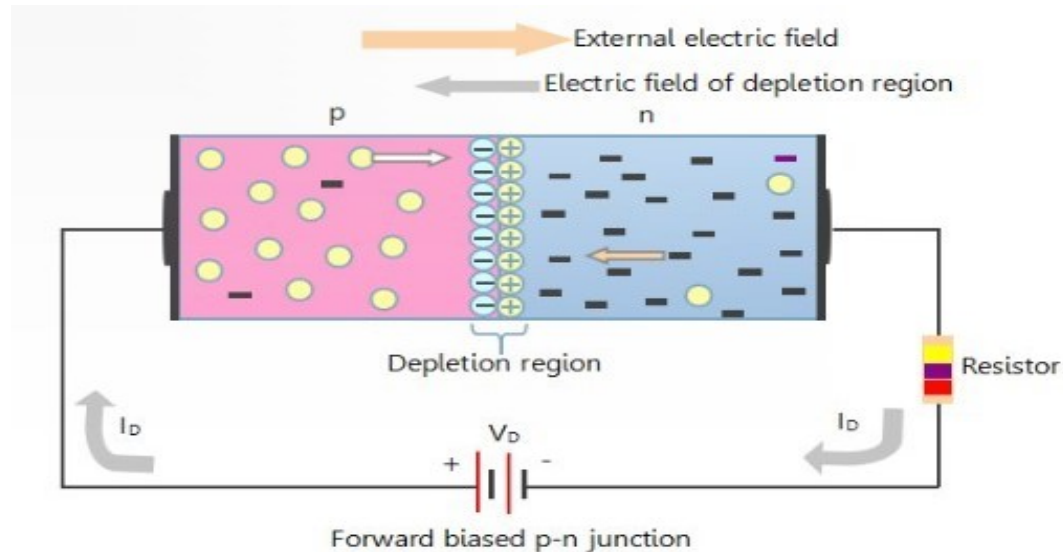




FORWARD BIASING



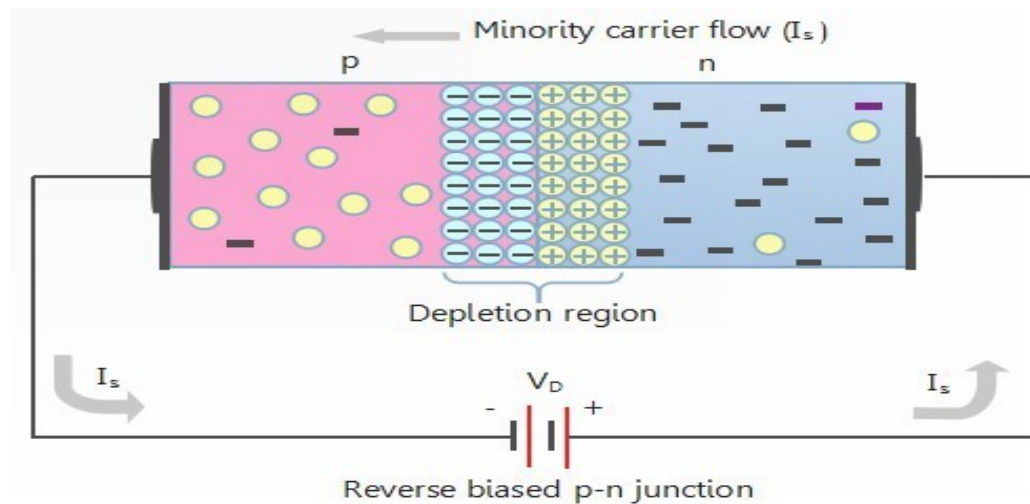
- When voltage is applied across a diode in such a way that the diode allows current and the potential barrier reduced, the diode is said to be forward-biased.



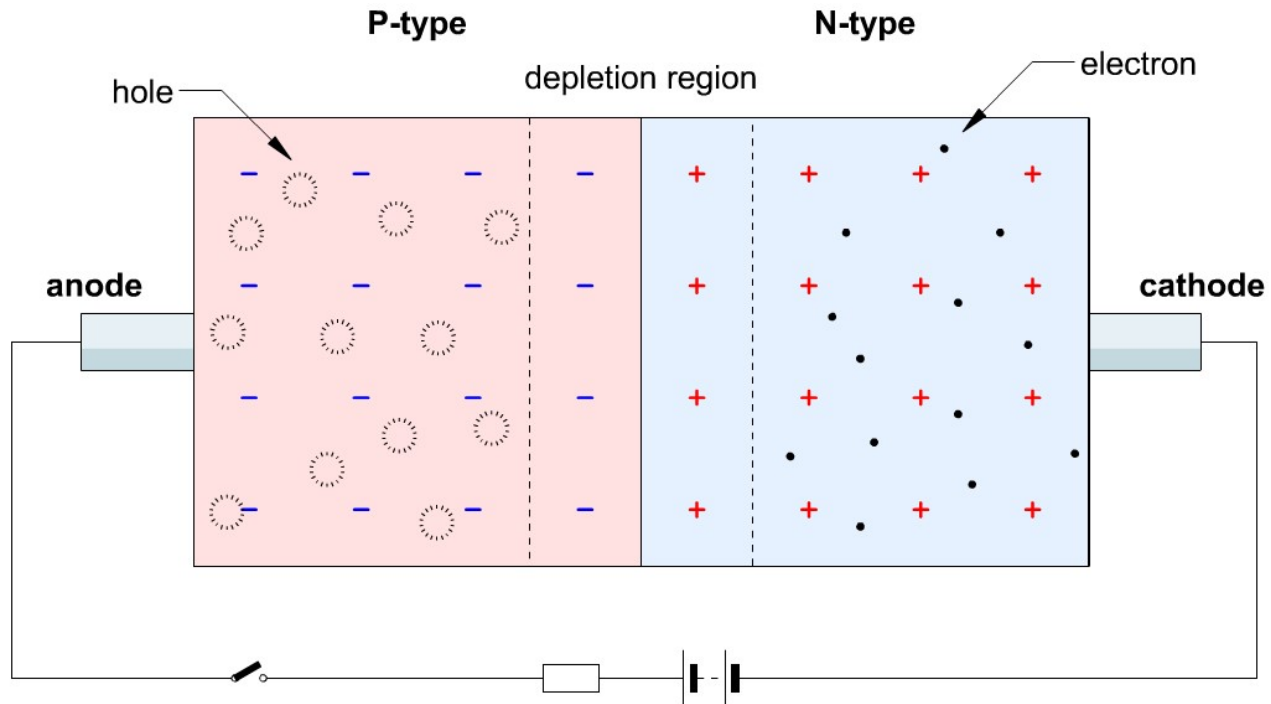


REVERSE BIASING

- When voltage is applied across a diode in such a way that the diode prohibits current and potential barrier increase, the diode is said to be reverse-biased.



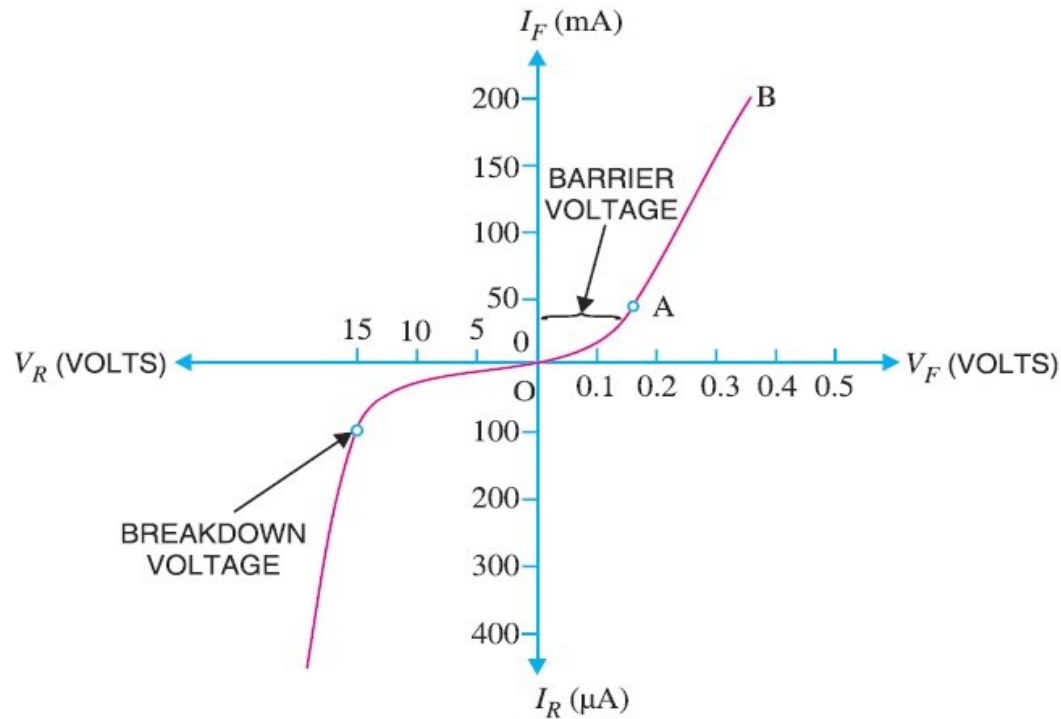
ANIMATION



<https://www.youtube.com/watch?v=OyC02DWq3ml>



V-I CHARACTERISTICS OF PN-JUNCTION



The curve drawn between voltage across the junction along x axis and current through the y axis.



IN FORWARD BIAS



- No current flows until the barrier voltage (0.3 for Ge) is overcome.
- Then the curve has linear rise and the current increases with the increase in forward voltage.
- Above the 3V, the majority carriers passing the junction gain sufficient energy to knock out the electrons.
- Therefore, the forward current increases sharply.





IN REVERSE BIAS



- Junction resistance, potential barrier increase.
- When reverse voltage is increased beyond a value, called breakdown voltage.
- Reverse current increase sharply.
- Above 25 reverse voltage, destroys the junction permanently.



Contd..



- **Maximum Forward Current** – It is the highest instantaneous current under forward bias Condition that can flow through the junction.
- **Peak Inverse Voltage** – It is the maximum reverse voltage that can be applied to the PN junction.
- **Maximum Power Rating** – Maximum power that can be dissipated at the junction without Damaging the junction.
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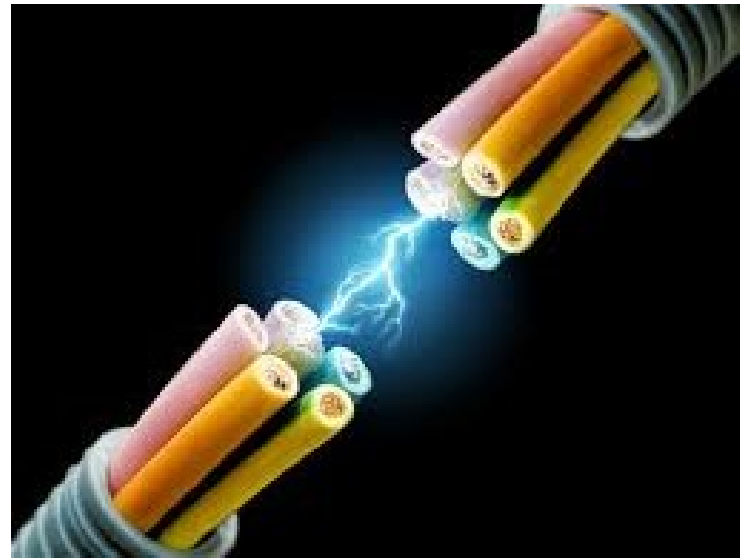
Assessment



1. Which among the following is the most commonly used semiconductor?
 - a. Silicon
 - b. Carbon
 - c. Germanium
 - d. Sulphur
2. A semiconductor has generally valence electrons.
 - a. 2
 - b. 3
 - c. 6
 - d. 4



RECAP....



...THANK YOU

