



# SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

COIMBATORE-35

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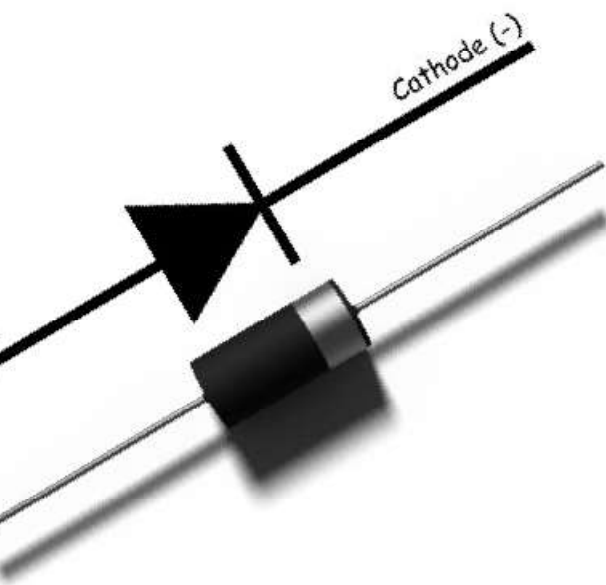
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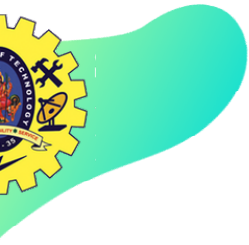
## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

### 19EET202 / ANALOG ELECTRONICS II YEAR / III SEMESTER

#### UNIT-I: PN JUNCTION DEVICE

## PN JUNCTION DIODE





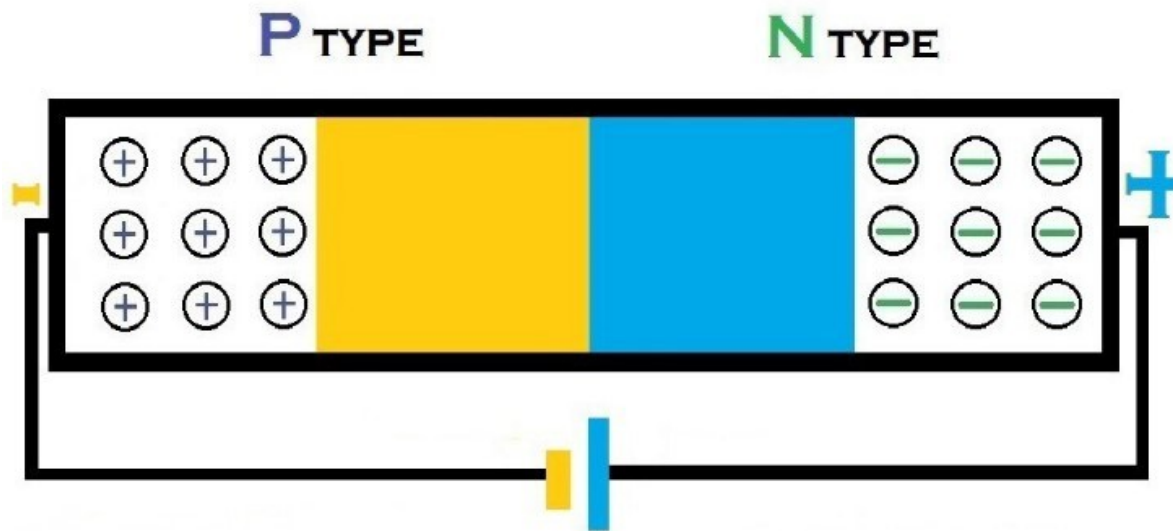
# TOPIC OUTLINE

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



# PN JUNCTION

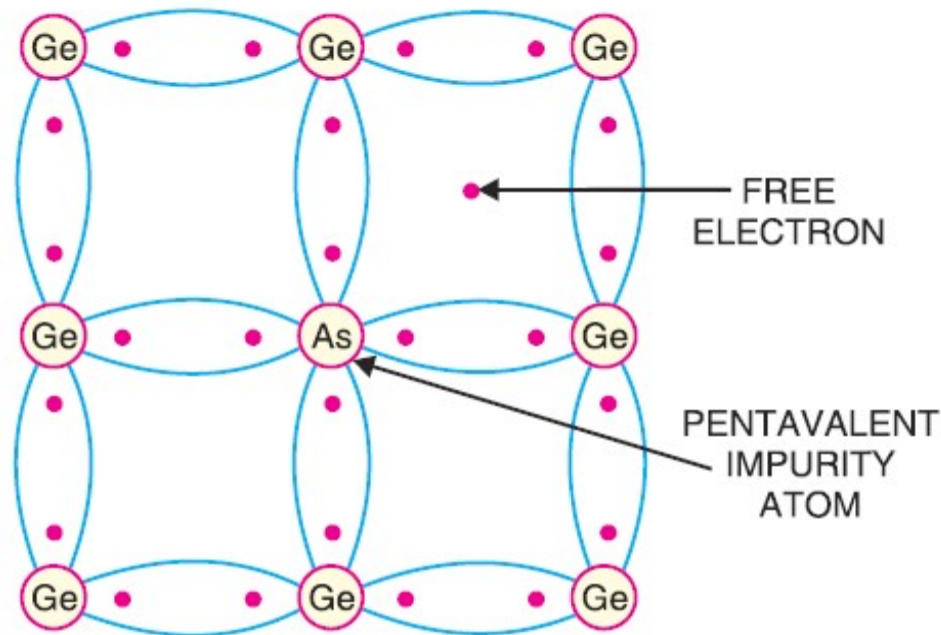
PN-junction: When P-type semiconductor is suitably joined to N-type semiconductor, the contact surface is called PN-junction.





# N-TYPE SEMICONDUCTOR

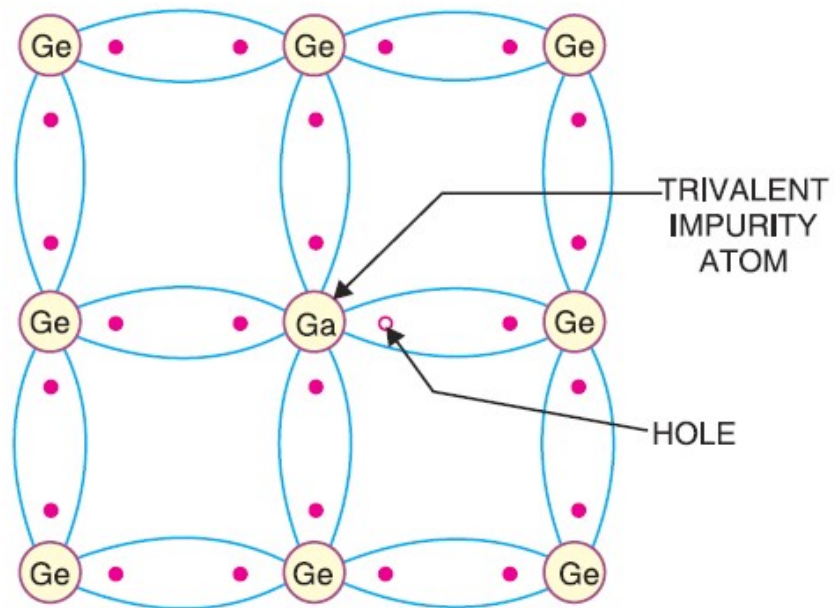
N-Type: When a small amount of pentavalent impurity is added to a pure semiconductor, it's known as a N-type semiconductor.





# P-TYPE SEMICONDUCTOR

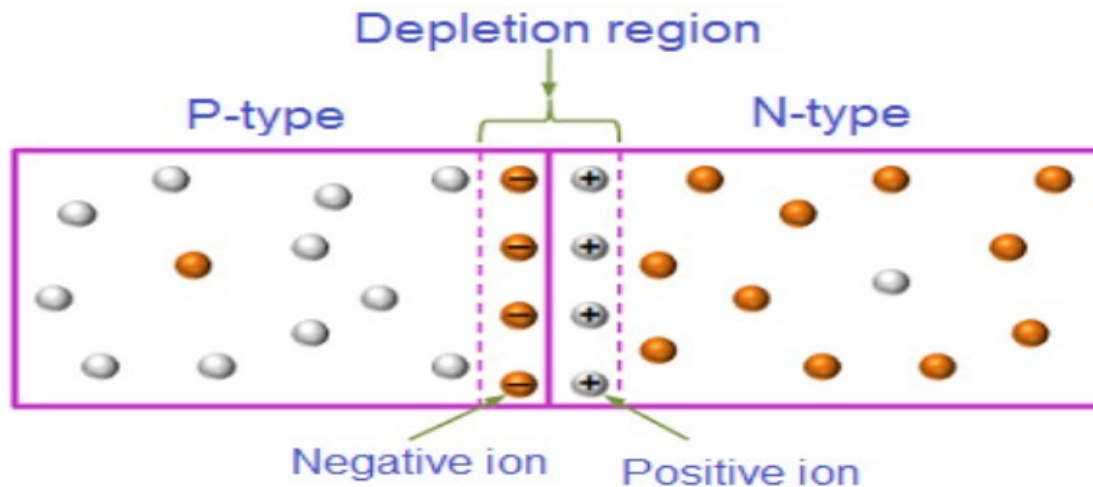
P-type: when a small amount of trivalent impurity is added to a pure semiconductor it's called P-type semiconductor.





# 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.

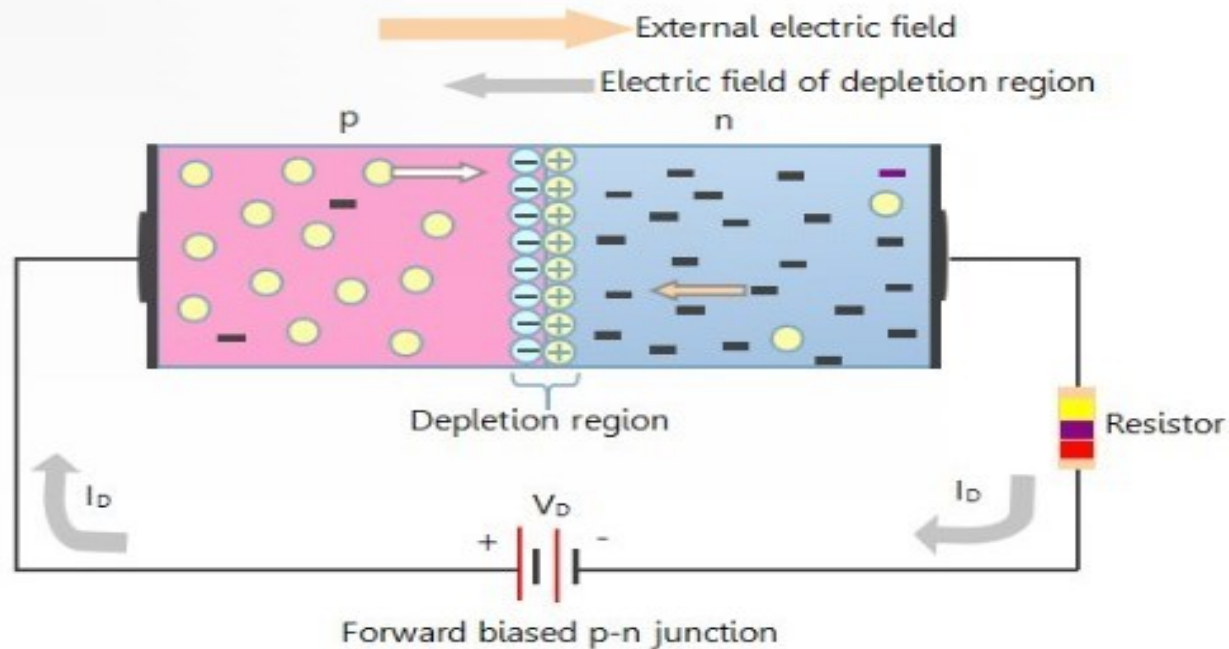






# FORWARD BIASING

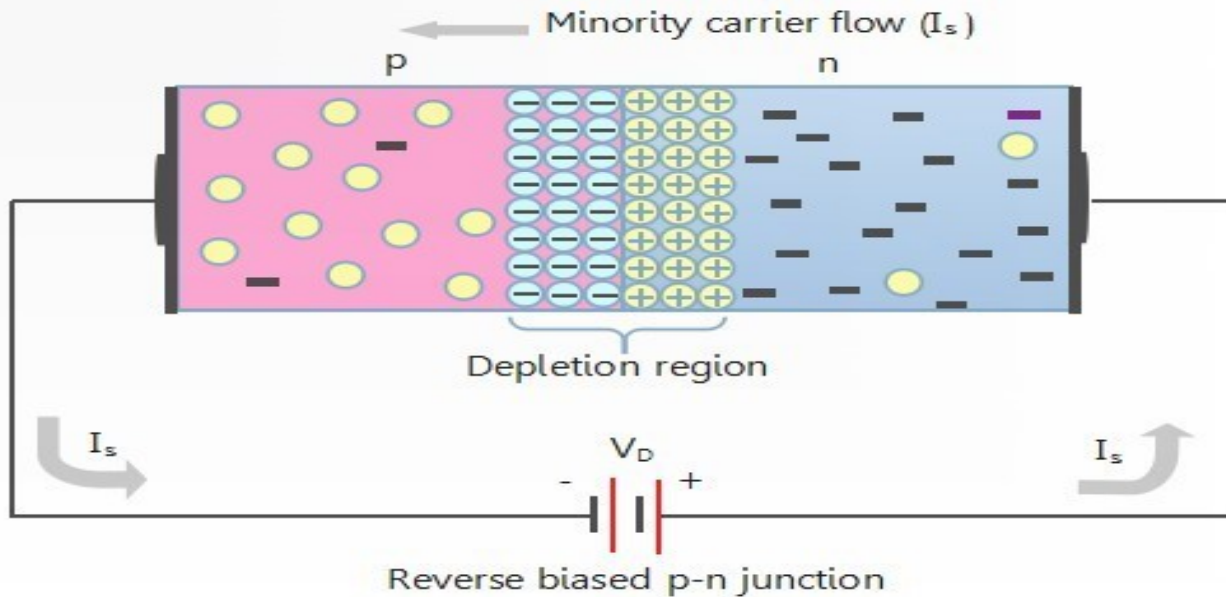
- When voltage is applied across a diode in such a way that the diode allows current and the potential barrier reduced, the diode is said to be forward-biased.





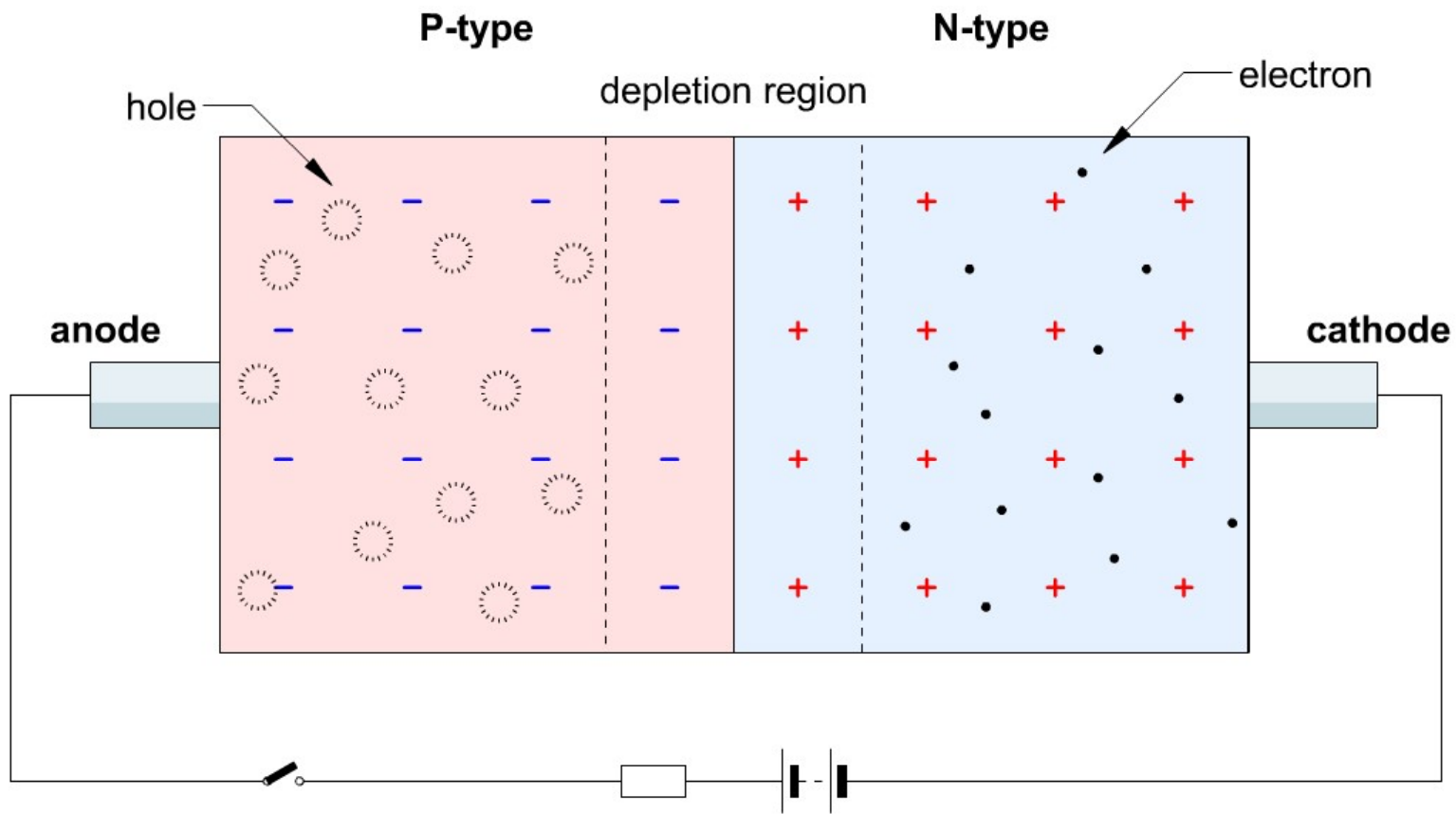
# REVERSE BIASING

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

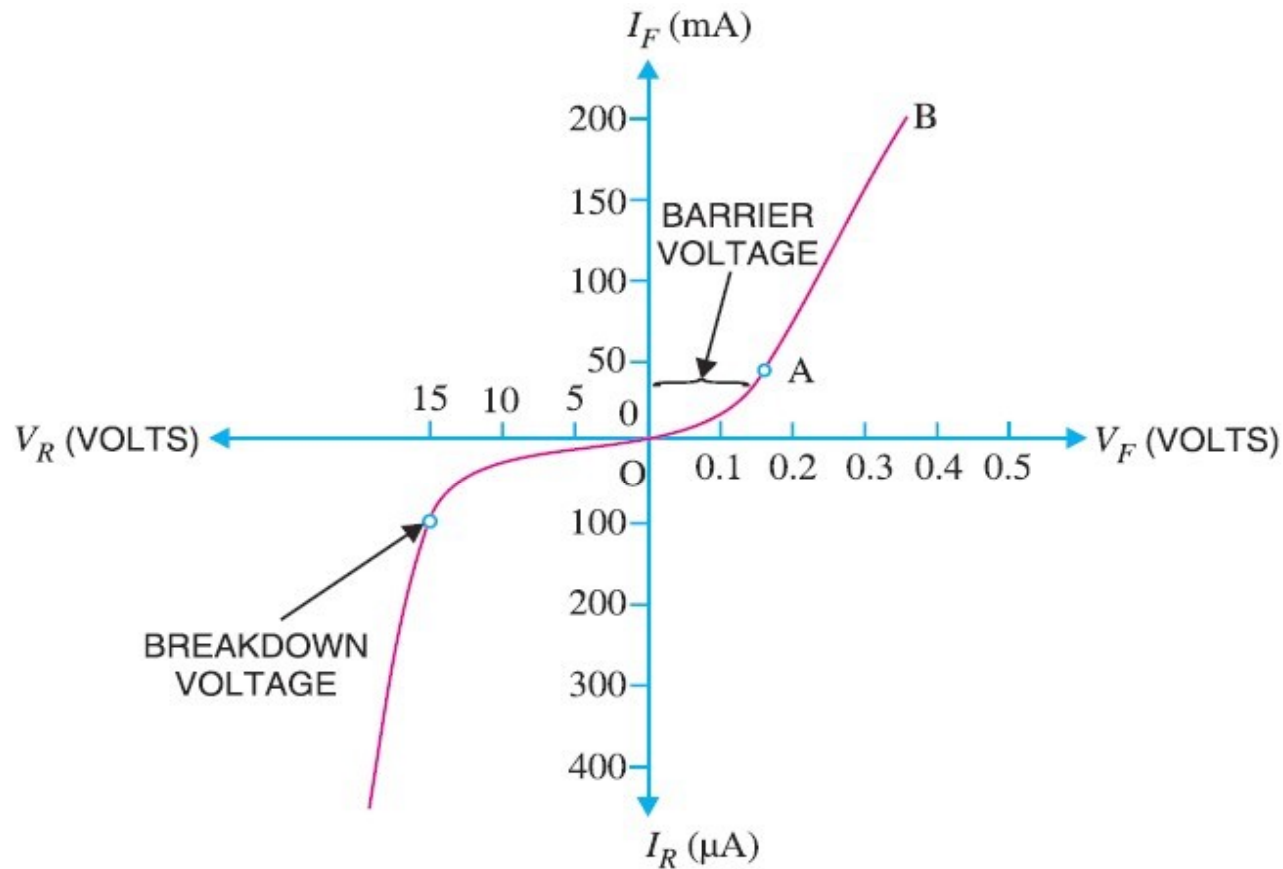


<https://www.youtube.com/watch?v=OyC02DWq3ml>





# 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 PN junction.

**Maximum Power Rating** – Maximum power that can be dissipated at the junction without Damaging the junction.





# Assessment

Which among the following is the most commonly used semiconductor?

Silicon

Carbon

Germanium

Sulphur

A semiconductor has generally ..... valence electrons.

2

3

6

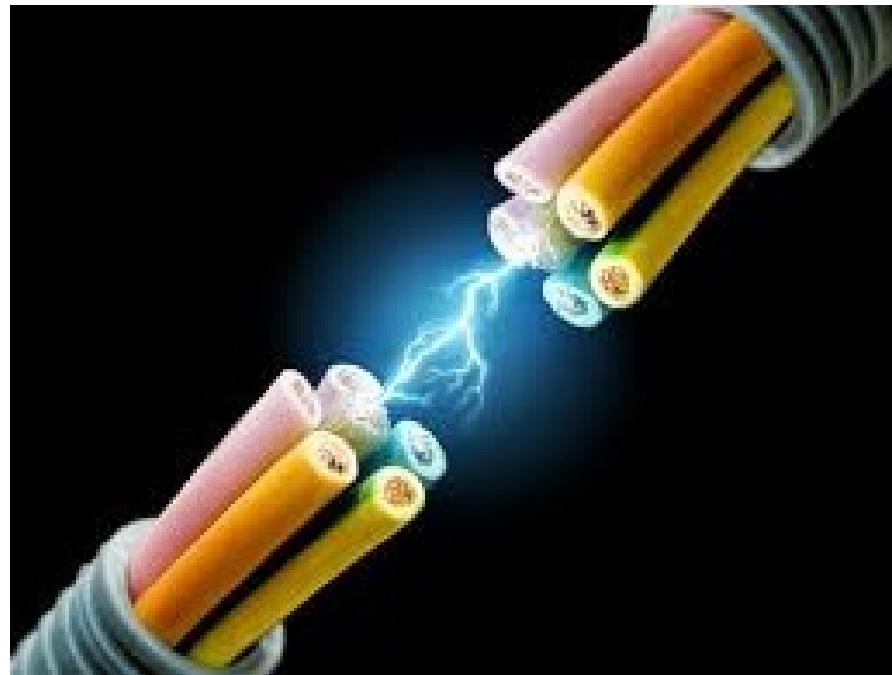
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# RECAP...



# ...THANK YOU

