INDUSTRIAL ELECTRONICS
DDPE 3103
TOPIC 5
RELAXATION OSCILLATOR

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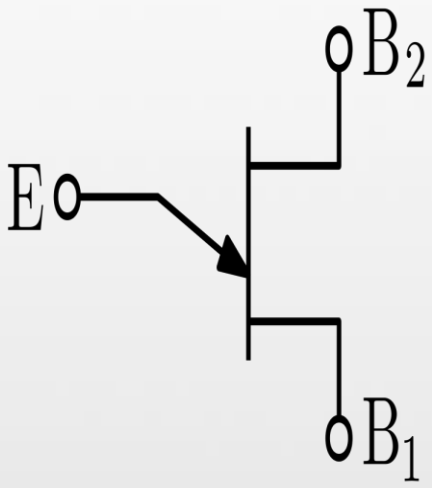
RELAXATION OSCILLTOR

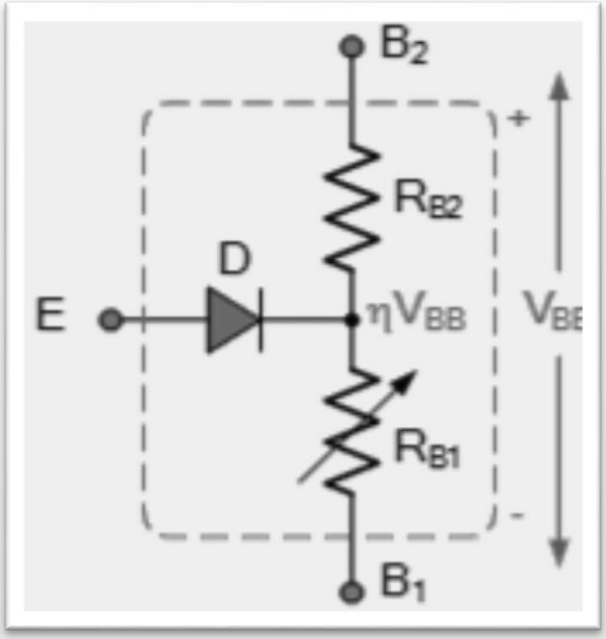
- A **relaxation oscillator** is a circuit that produces output which repeatedly alternates between two states with a period that depends on the charging of a capacitor.

- Two devices commonly used as relaxation oscillator is the Unijuntion transistor **(UJT)** and Programmble Unijunction transistor **(PUT).**

- **UJT** and **PUT** circuit generates pulses.

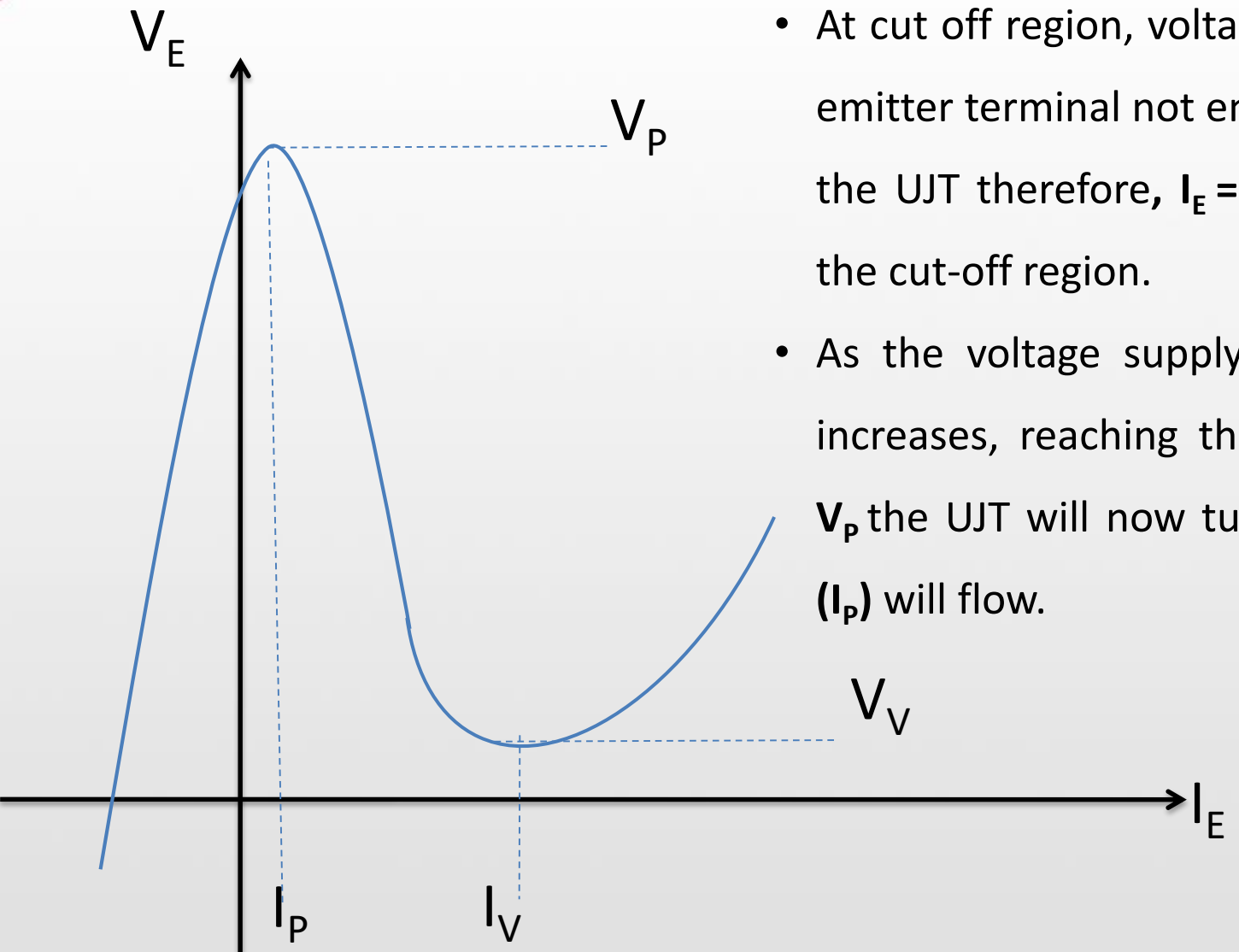
UNIJUNTION TRANSISTOR SYMBOL AND CONSTRUCTION





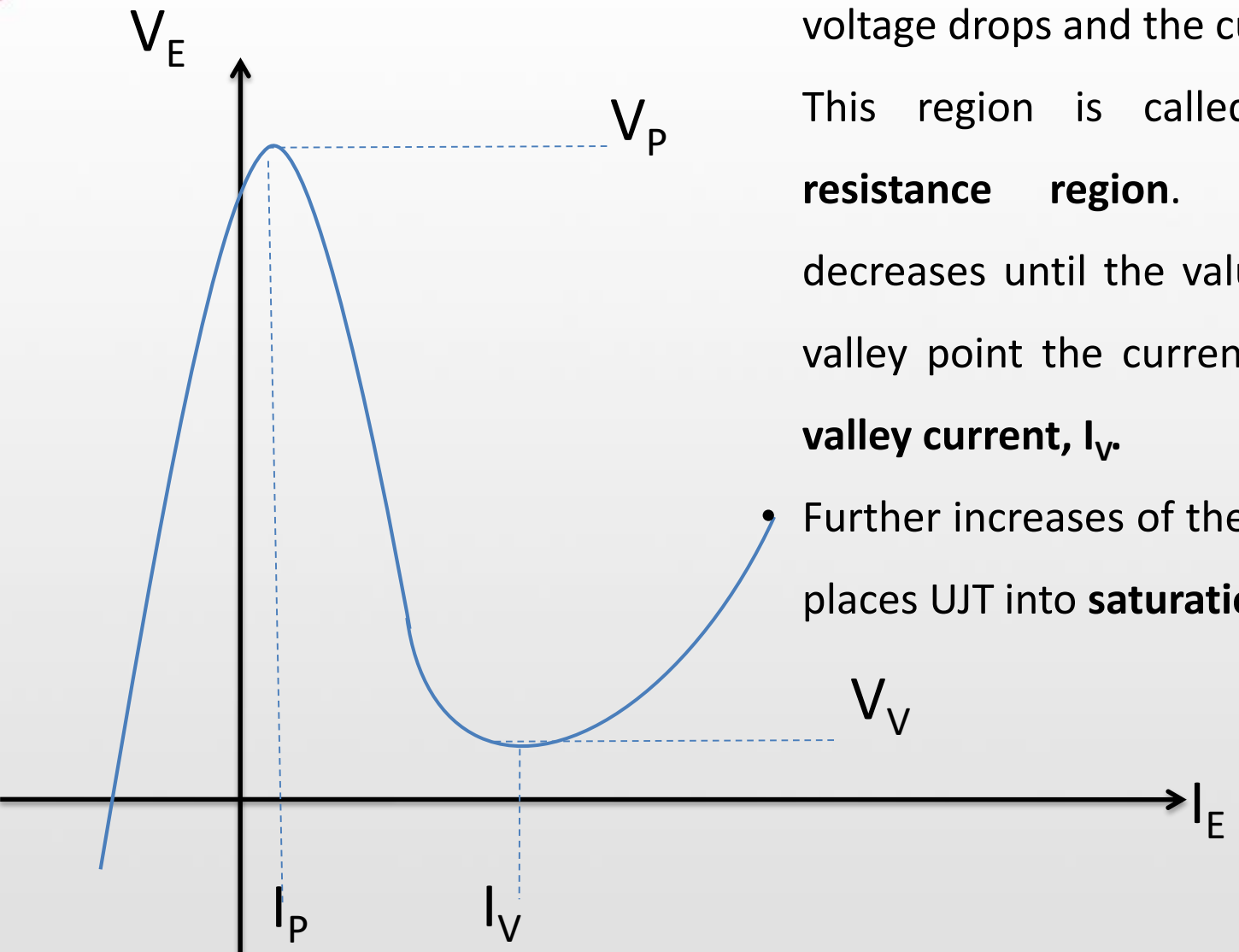
Three terminal : Base$_1$ (B_1), Base$_2$(B_2) and Emitter (E)

Characteristic of a UJT



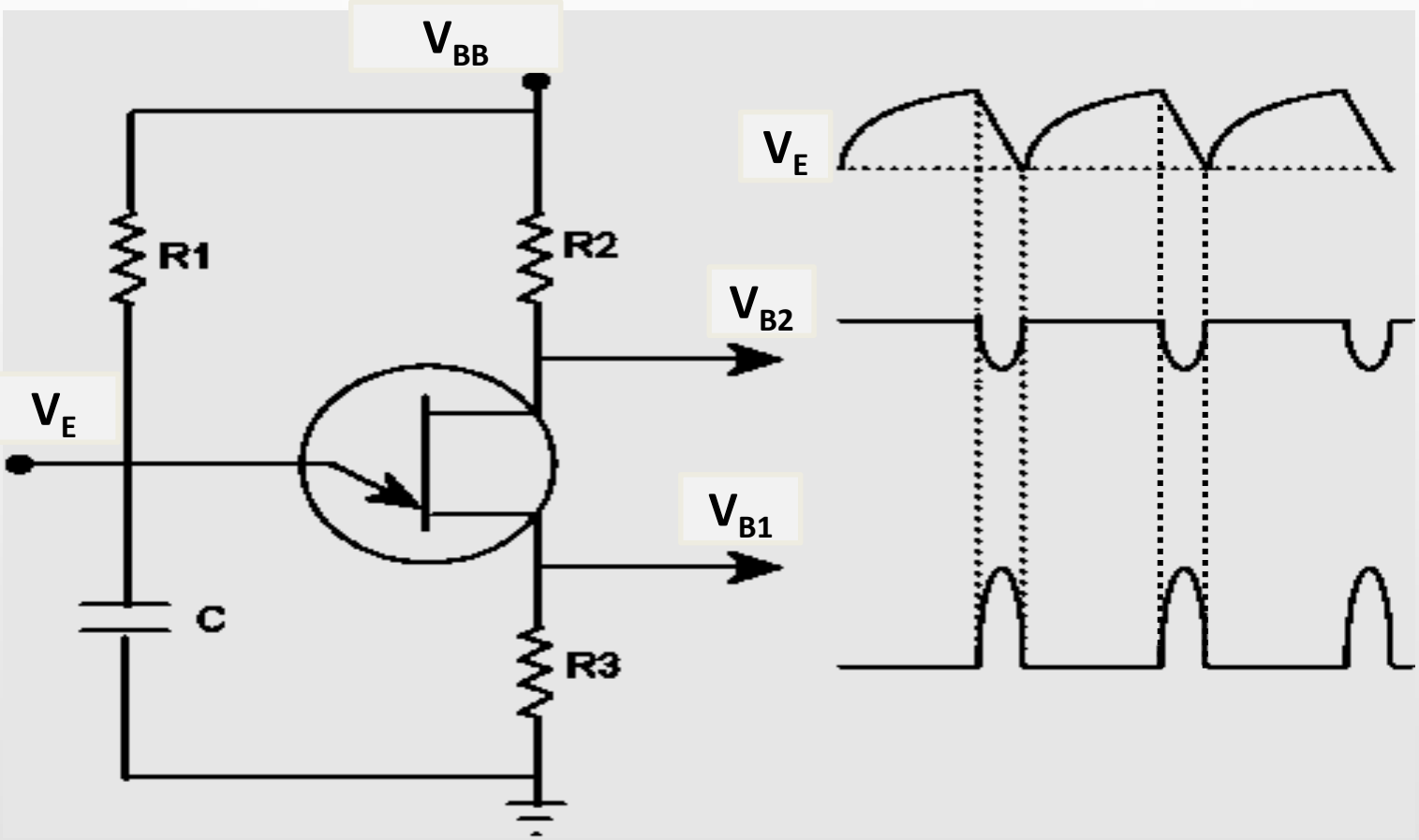
- At cut off region, voltage supply to the emitter terminal not enough to turn on the UJT therefore, $I_E = 0$ and UJT is in the cut-off region.
- As the voltage supply across emitter increases, reaching the **peak voltage,** V_P the UJT will now turn on and I_{peak}, **(I_P)** will flow.

Characteristic of a UJT



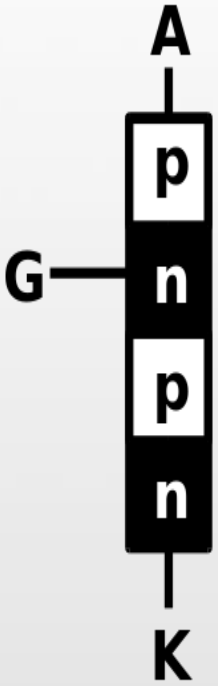
- Between V_P to the **valley point (V_V)** the voltage drops and the current increases. This region is called the **negative resistance region**. The voltage decreases until the value of V_V. At the valley point the current produce is the **valley current, I_V.**
- Further increases of the emitter current, places UJT into **saturation region.**

Unijunction transistor as relaxation oscillator

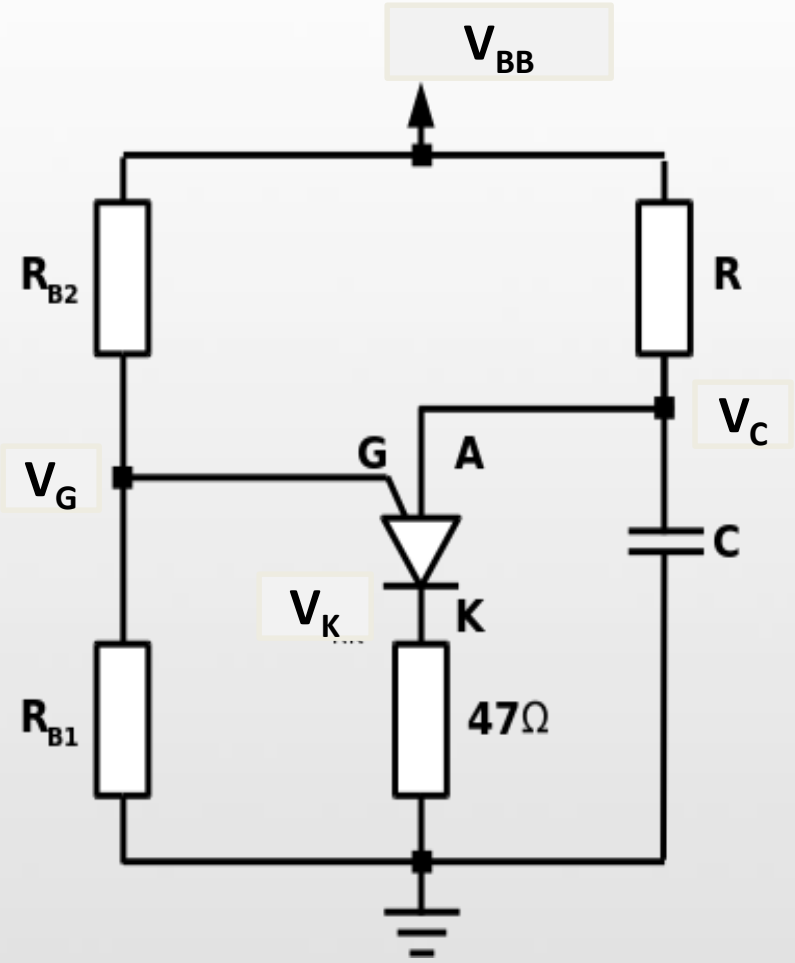


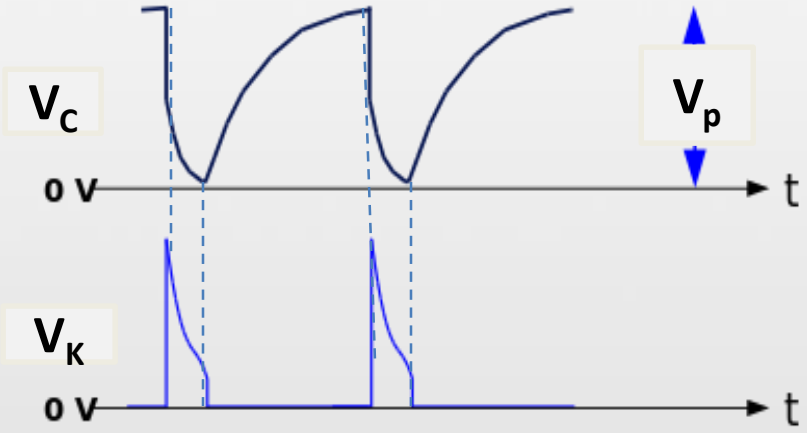
Programmable Unijunction Transistor (PUT)

- In a UJT, the parameters such as V_P , η and etc are fixed and cannot be change.
- However, for a PUT these parameters can be programmed with the help of two external resistor.



PUT AS RELAXATION OSCILLTOR





References

1. Electronic Devices and Circuit Theory , Robert L. Boylestad & Louis Nashelsky , 9th Edition, 2006
2. Electronic Devices, Thomas L. Floyd, 5th Edition, 1999
3. Wikimedia Commons for images