Four Layer P-N-P-N Switching Devices (Uni Junction Transistor)

Lecture – 4

TDC PART – II
Paper - III (Group - A)
Chapter - 4

by:

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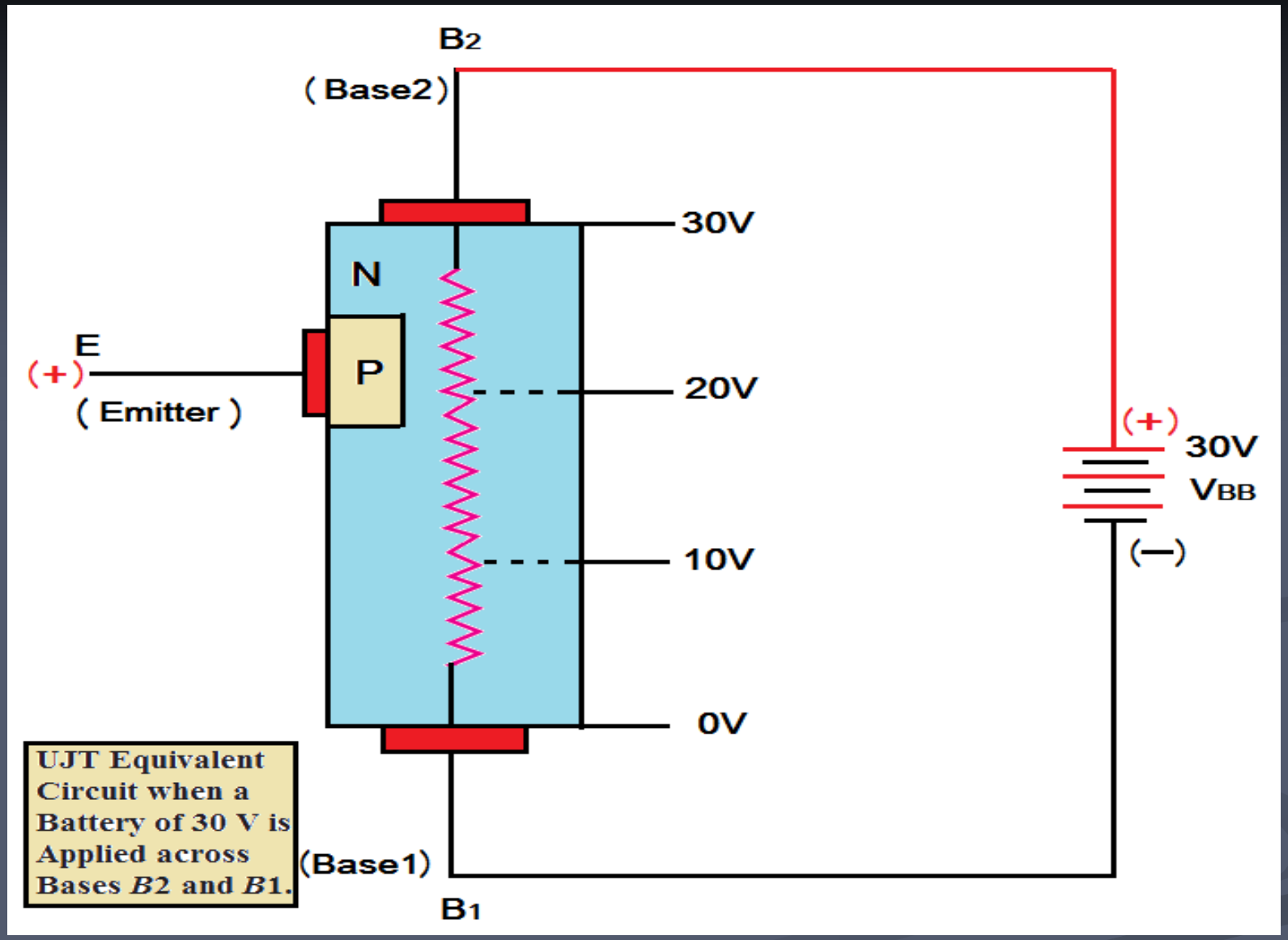
- (Uni Junction Transistor)
- Lecture Content :-
  - UJT Parameters
  - (2) Intrinsic Stand-off Ratio (η) by 1st Method

UJT Parameters

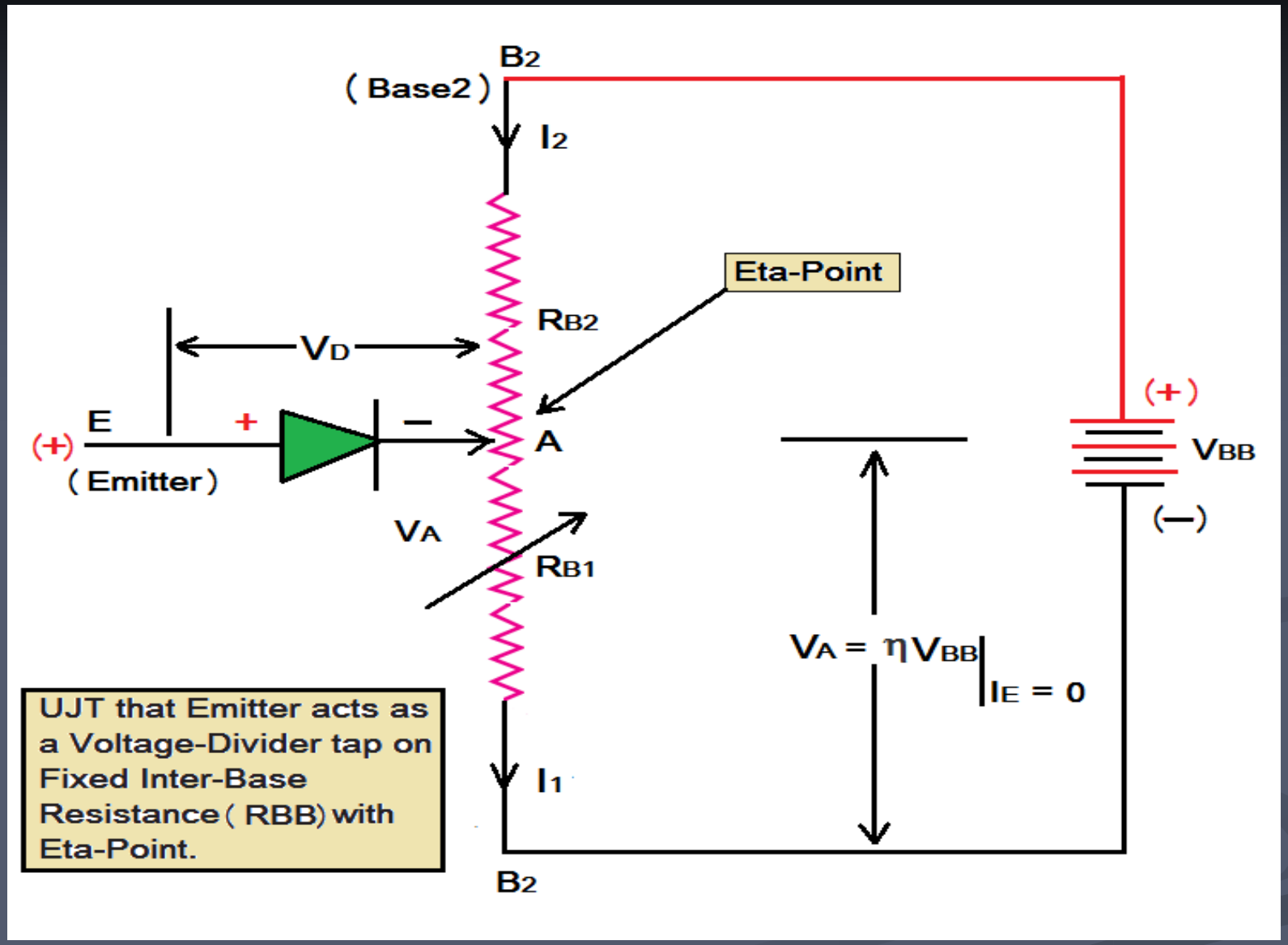
(2) Intrinsic Stand-off Ratio (η) by 1st Method

- As seen from **Figure (11)** below when a battery of **30 V** is applied across **(Base2) B2** and **(Base1) B1**, there is a progressive fall of voltage over **R_{BB}** provided **Emitter (E) Terminal** is open. It is obvious from **Figure (12)** that Emitter acts as a **Voltage-Divider** tap on fixed **Resistance R_{BB}**. With **Emitter (E)** open, **$I_1 = I_2$**, the **Inter-base Current** is given by **Ohm's Law.**

- **$I_1 = I_2 = V_{BB} / R_{BB}$**



- **Fig (11)** Shown UJT Equivalent Circuit when a Battery of 30 V is applied across Base B_2 and B_1.



- **Fig (12)** Shown UJT that Emitter acts as a Voltage-Divider tap on Fixed Inter Base Resistance (R_{BB}) with **Eta – Point**.

- **For example: - If V_{BB} = 30 V and R_{BB} = 15 K, $I_1 = I_2$ = 2 mA.**

- It may be noted that part of **V_{BB}** is dropped over **R_{B2}** and part on **R_{B1}**. Let us call the voltage drop across **R_{B1}** as **V_A**. Using simple **voltage divider** relationship,

- $V_A = V_{BB}\ (R_{B1} / R_{B1} + R_{B2})$

- The **voltage division factor** is given a special symbol (η) and the name of '**Intrinsic Stand – off Ratio**'. **Intrinsic Stand – off Ratio** is the ratio of R_{B1} to the sum of R_{B1} and R_{B2}. It can be expressed as,

- $$\eta = R_{B1} / R_{B1} + R_{B2}$$

- $$V_A = \eta V_{BB}$$

- The **Intrinsic Stand-off Ratio (η)** is the property of the **UJT** and is always **Less than Unity (0.4 to 0.85).** If **V_{BB} = 30 V** and **η = 0.6,** then potential of **Point A** with respect to **Point B_1 = 0.6 × 30 = 18 V**. The remaining **12 V** drop across **R_{B2}**.

to be continued .....