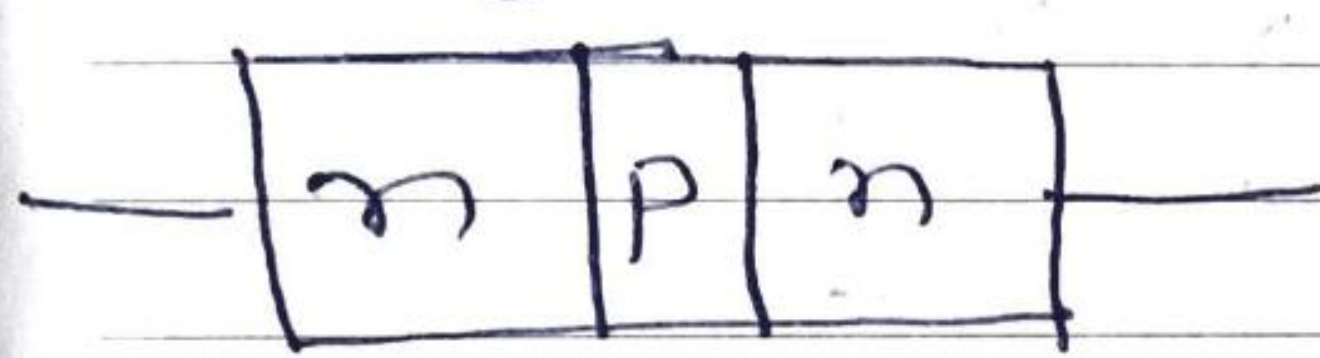


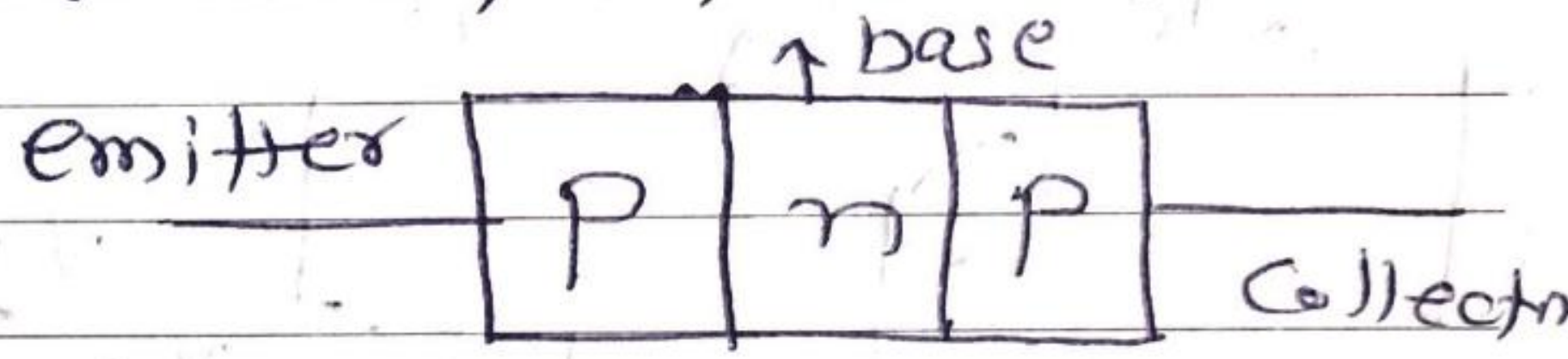
transfer + resistance

12

A transistor consists of two p-n junctions placed back to back. The junctions of a transistor formed by sandwiching a p-type semiconductor between a pair of n-type semiconductor in npn transistor and by sandwiching an n-type semiconductor between a pair of p-type semiconductor in pnp transistor.



npn transistor



pnp transistor

Transistor has three terminals:

- ① **Emitter** → Emitter supply majority charge carriers (either electrons or holes) to the base so this region is heavily doped than other part.
- ② **Base** → It forms the middle section of the transistor, its thickness is very low and lightly-doped.
- ③ **Collector** → It collects majority charge carriers through the base. It is physically larger than emitter because it has to dissipate much greater power.

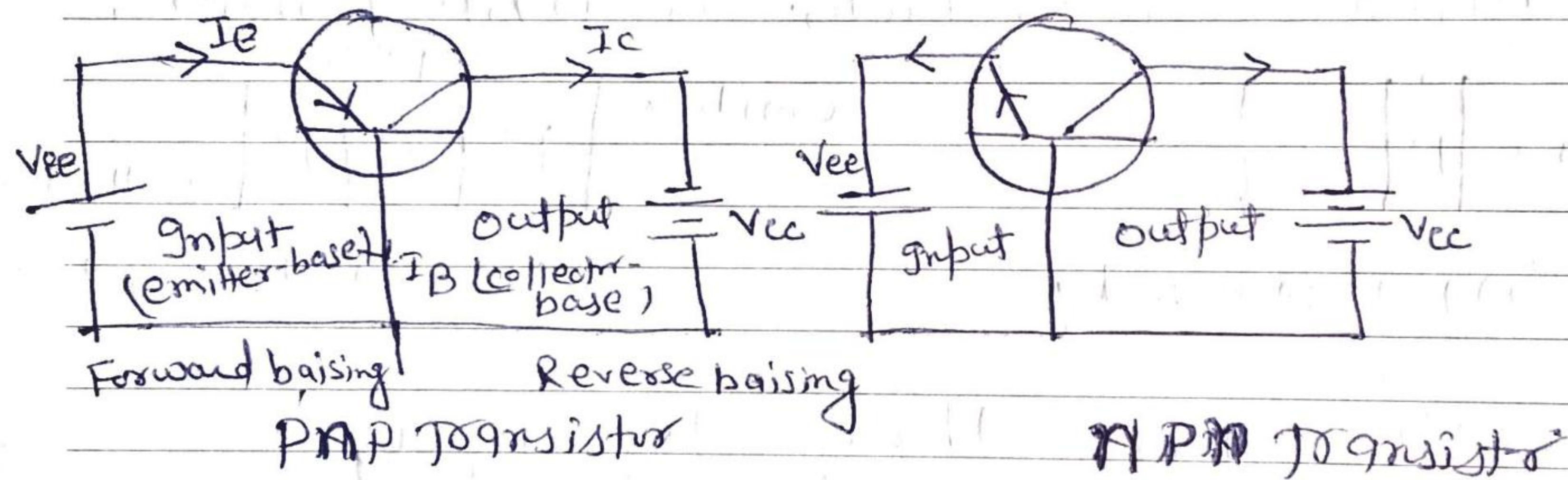
Transistors are made by growing or diffusing processes.

13 TRANSISTOR BIASING →

(1) Emitter-base junction is always forward-biased.

(2) Collector-base junction is always reverse-biased.

Symbolic representation of Transistor



The four basic guideposts about all transistor circuits are →

(1) conventional current flows along the arrow whereas electrons flow against it.

(2) E/B electron-base junction is always forward-biased.

(3) C/B collector-base junction is always reverse-biased.

(4) $I_E = I_B + I_C$ (Emitter current = base current + collector current)

❖ A lie never lives to be old.

January Su Mo Tu We Th Fr Sa Su Mo Tu We Th Fr Sa Su Mo Tu We Th

NOTES

APPOINTMENTS

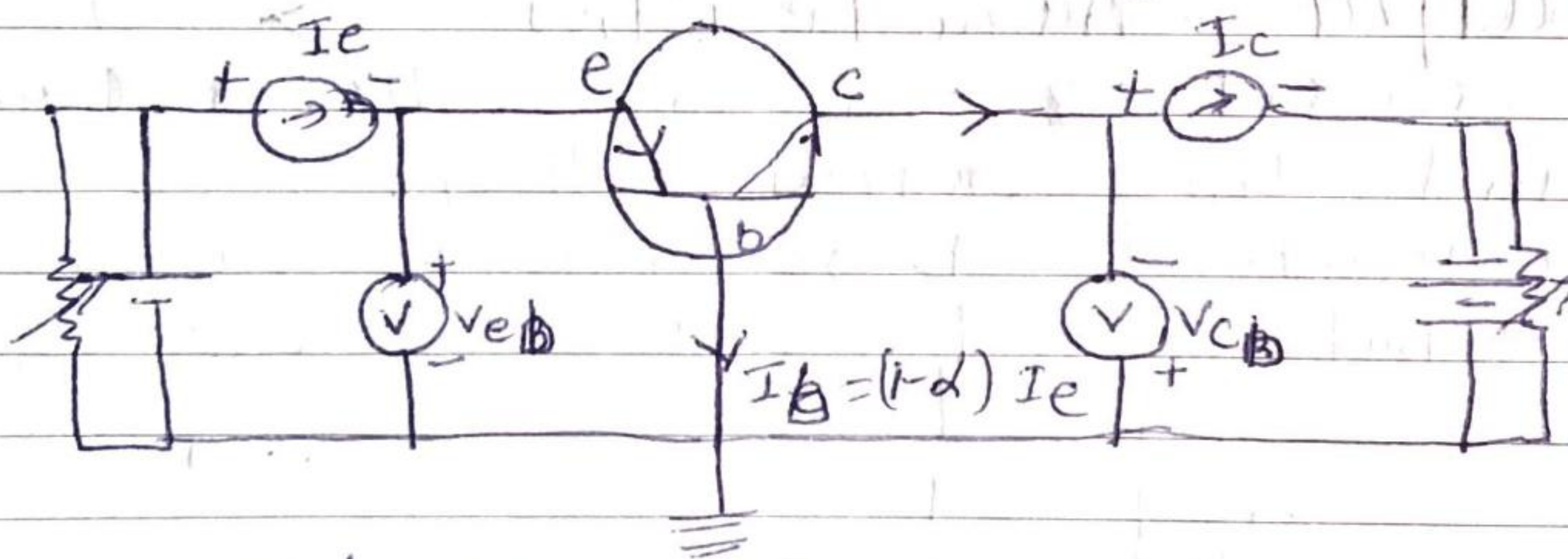
TRANSISTOR CIRCUIT CONFIGURATIONS

There are three types of circuit connections (called configurations) for operating a transistor.

14

- (1) Common base configuration (CB)
- ~~(2) Common (Grounded base configuration)~~
base common to the input and output circuit
- (2) Common-emitter configuration (CE) or grounded emitter configuration. So emitter is common to input and output circuit.
- (3) Common-collector configuration (CC) collector common between input and output circuit or grounded collector configuration.

Common-base configuration (CB) →



Sunday 15

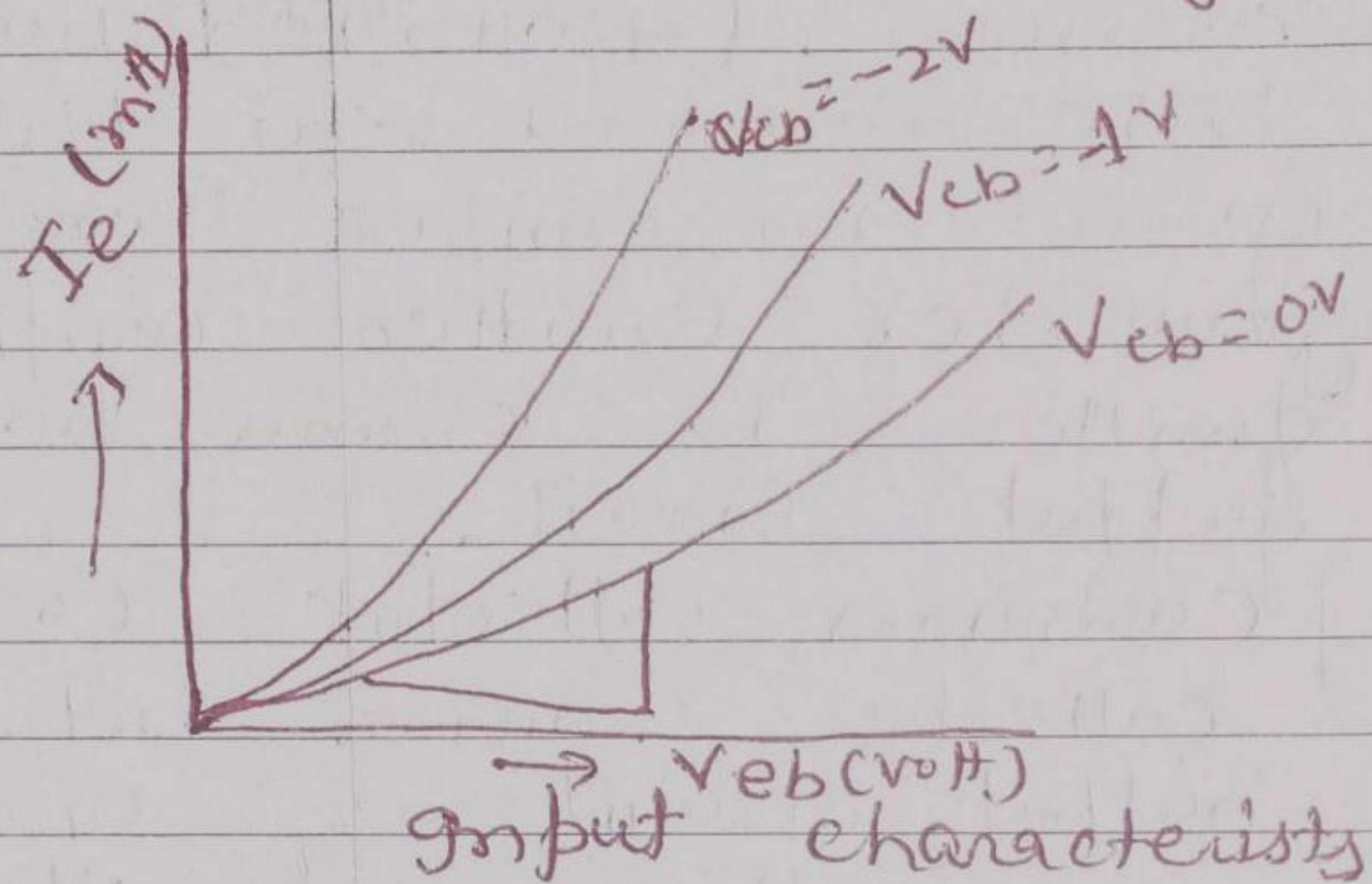
Circuit diagram CB configuration PNP transistor.

In common-base connection input is applied between emitter and base and output is taken from collector and base. Base is common between emitter and collector & is common to both input and output circuit.

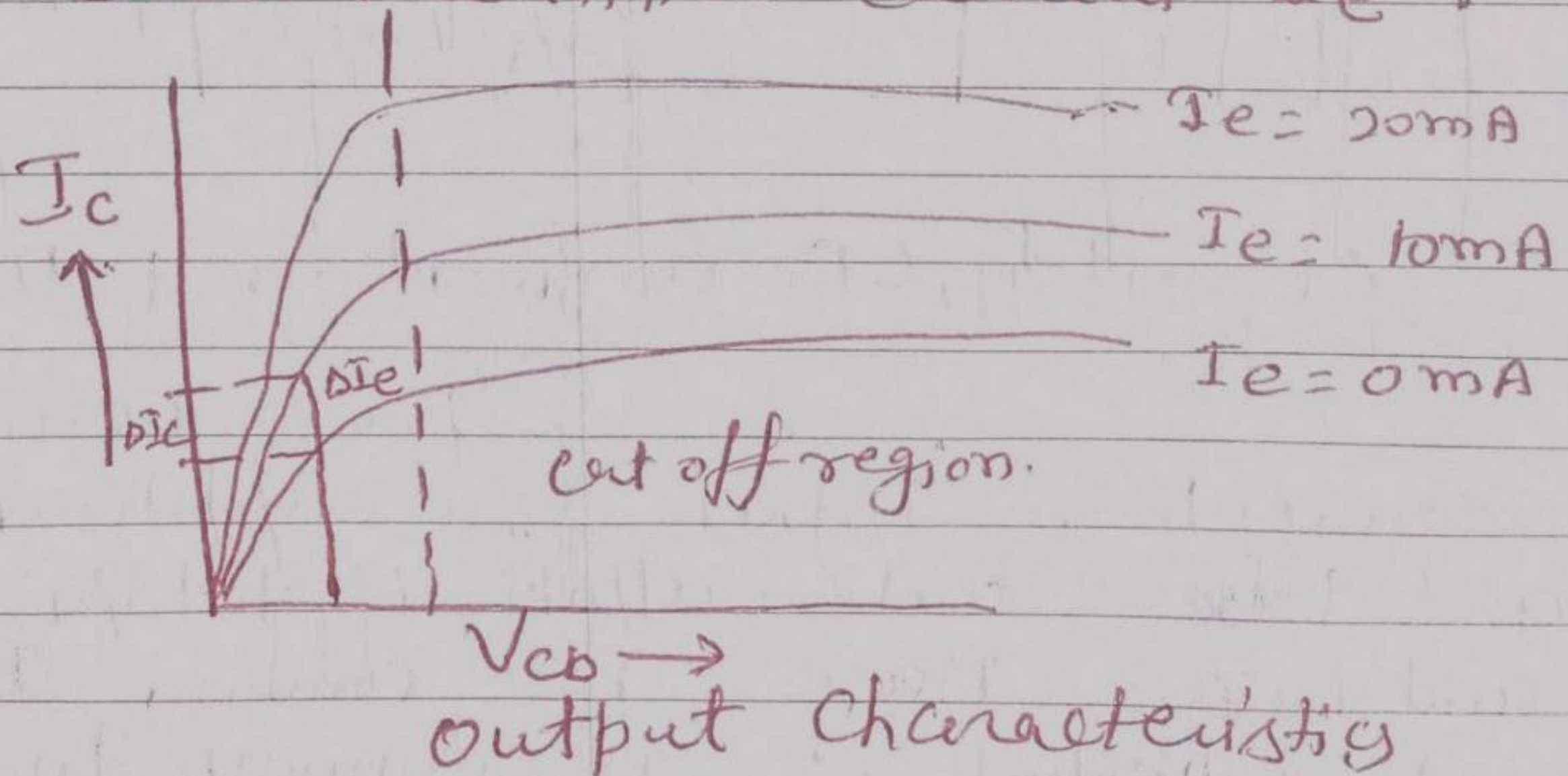
A friend in need is a friend indeed. ❖

APPOINTMENTS

16 (i) Input characteristics → The input current is the emitter current I_e and the input voltage the emitter to base voltage (V_{eb}) varies with ^{const} output voltage collector to base voltage (V_{cb})



(ii) Output characteristics → The output current I_c is the collector current I_c and the output voltage is the collector to base voltage V_{cb} varies with input current i.e. emitter current I_e .



❖ A modest man never talks about himself.

January	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24

Current amplification factor (α) 17

The ratio of change in collector current ΔI_c to the change in emitter current ΔI_e at constant collector-base voltage (V_{cb}) is known as current amplification factor. i.e.

$$\alpha = \frac{-\Delta I_c}{\Delta I_e} \text{ at const } V_{cb}$$

$\alpha < 1$ (unity) for common base configuration

The negative sign is due to the fact that current I_e flows into the transistor whereas collector current I_c flows out of it.

$$\Delta I_c = -\alpha \Delta I_e$$

$$\Delta I_e = \Delta I_B + \Delta I_c$$

$$\Delta I_e = \Delta I_B - \alpha \Delta I_e$$

$$\boxed{\Delta I_e(1-\alpha) = \Delta I_B}$$

The leakage current $I_{leak} \rightarrow$ This current is due to the motion of minority carriers across base-collector junction ~~on account~~ when it is reversed biased. This is very small current.

\therefore Total collector current

$$I_c = \alpha I_e + I_{leakage}$$

A merry heart maketh a cheerful countenance. ♦

leakage current still flows in the collector circuit. February

We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29

APPOINTMENTS

$$I_{\text{peak}} = I_{\text{CBO}} \text{ (collector-base circuit with emitter open)}$$

18

$$I_c = \alpha I_e + I_{\text{CBO}}$$

In this configuration.

(1) Current gain less than one $\alpha = \frac{\Delta I_c}{\Delta I_e}$

(2) High voltage gain $V_g = \left(\frac{\Delta V_{cb}}{\Delta V_{eb}} \right) I_e$

(3) low input resistance $r_i = \left(\frac{\Delta I_{cb}}{\Delta I_{eb}} \right) V_{eb}$

(4) High output resistance $r_o = \left(\frac{\Delta V_{cb}}{\Delta I_{e}} \right) I_e$