

Report

1

(a) Plot output and input characteristics of the n-p-n CB transistor.

— Attached graph

(b) Indicate active, linear / saturation and cut-off regions of the characteristics.

— Attached graph

2

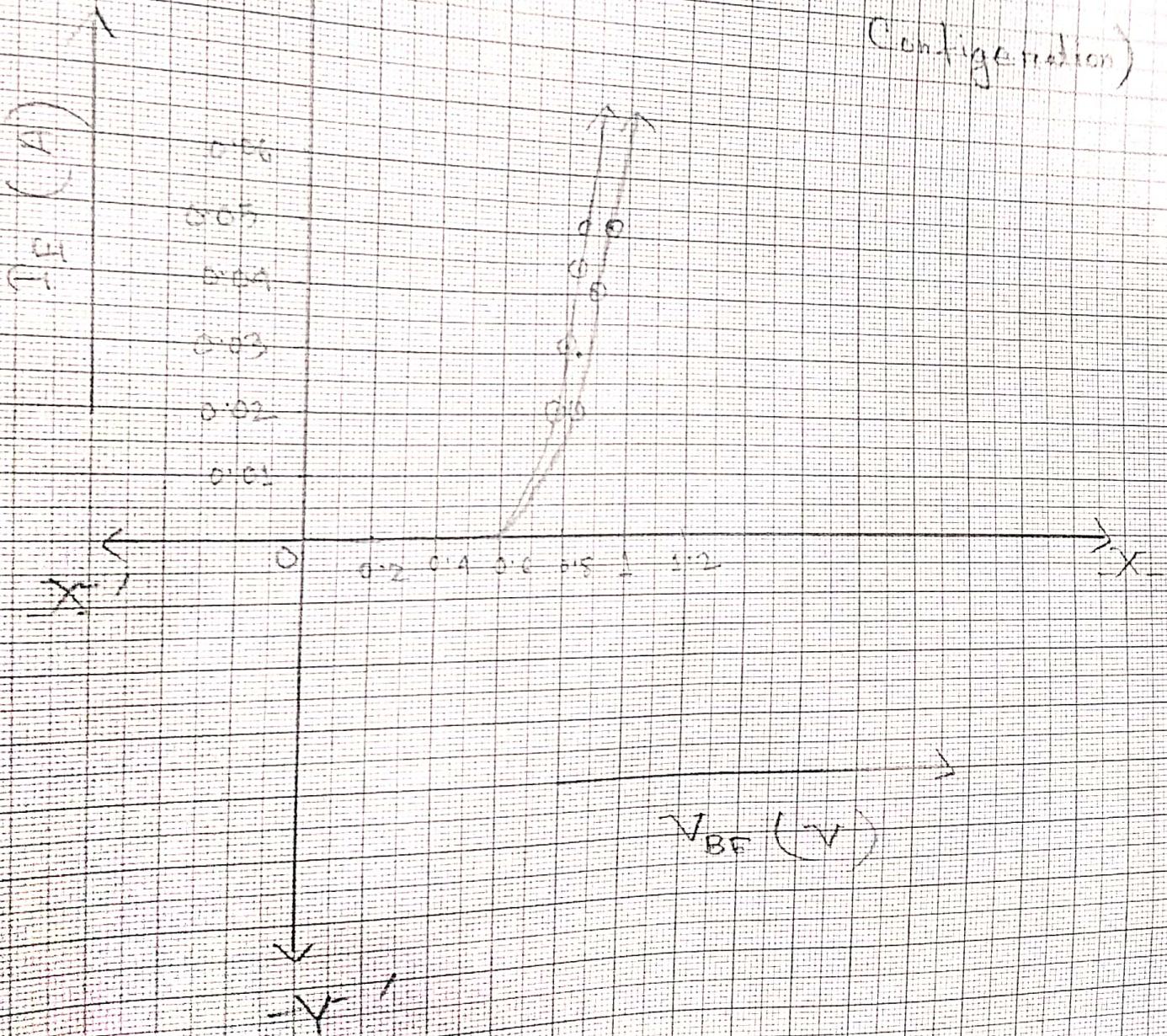
(a) Plot output and input characteristics of CE transistor.

— Attached graph

Input Characteristics

(Common Base)

(Configuration)

 $V_{BE} (V)$

Output Characteristics

(Common Base

Configuration)

Active Region

Saturation
Region $I_E = 2 \text{ mA}$ $I_E = 1 \text{ mA}$ $I_E = 0 \text{ mA}$

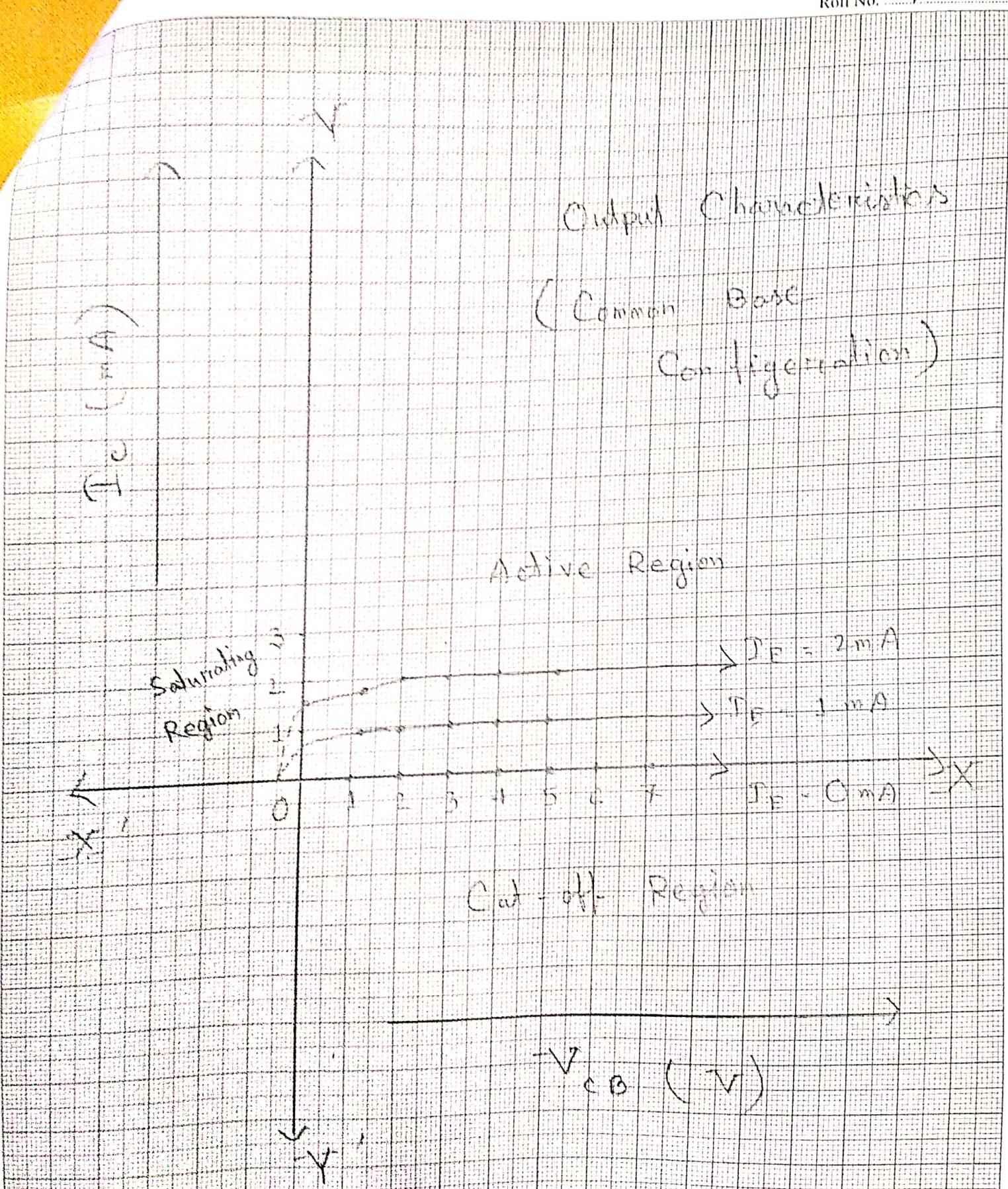
Cut-off Region

 $V_{CB} (V)$

Y

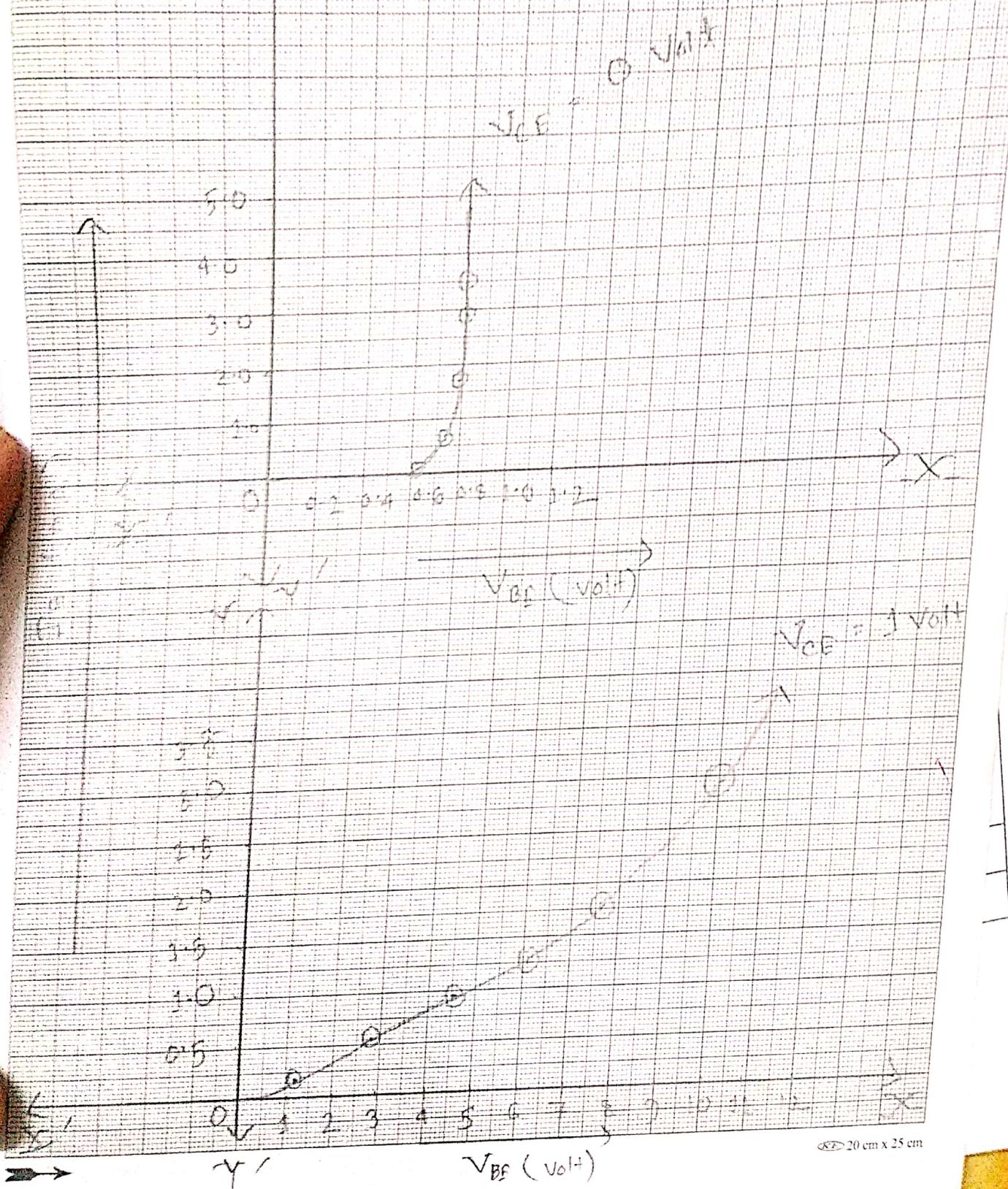
(I_C A)

X



Input Characteristics

Npn Common Emitter
configuration



20 cm x 25 cm

Roll No. 170322

version 11

(V m/s)

12 10 8 6 4 2 0

30 30 30 40 50 60 70 80 90 100

20

10

0

50 50 50

We know,

$$\beta = \frac{\Delta I_c}{\Delta I_B}$$

Here, I_c = Collector current (Output)

I_B = Base current (Input)

We can clearly see that β is proportional to ΔI_c if ΔI_B is fixed.

So, if β which is current gain increases, then ΔI_c will increase and we will get higher output. I_c will decrease if β decreases. So, the output characteristics will be affected

by changing β .

(d) Discuss the effect of changing $-V_{CE}$ on the input characteristics.

Answer:

By increasing V_{CE} , the input characteristics, I_B is reduced. It is because when we increase V_{CE} , the width of the depletion region increases. The base region is slightly doped compared to collector region, the depletion region penetrates more into the base region and less into the collector region. So, input characteristics reduces.

3/

What are the role of the 2K
and 1K Ω fixed resistors in the
circuits?

Answer:

The 1K Ω resistor is used to limit the excessive current flow in the base of the transistor. It is known as base resistor. The base resistor has to be large enough to ensure that the transistor does not get damaged. But it will allow sufficient current so that the transistor switches on and off.

The $2\text{ k}\Omega$ resistor is used to set the collector current I_c and also the emitter voltage V_{CE} . It is known as collector resistor. The resistor is used to set the transistor at the operating point of the amplifier.