Department of Computer Science & Engineering (CSE)
School of Engineering, Technology & Sciences
INDEPENDENT UNIVERSITY, BANGLADESH (IUB)

Course Title: Electronics I
Course Code: CSE210
Section: 01

SUBMITTED FROM

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Submission Date: 29/08/2024

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Assignment Web Version Link Here

Example 3.1

(a) So, $I_C \cong I_E$

$\therefore I_C = 3mA$

Here
$I_E = 3mA$
$V_{CB} = 10V$

(b) So, $I_C \cong I_E$

$\therefore I_C = 3mA$

Here,
$I_E = 3mA$
$V_{CB} = 2V$

(c) From the figure 3.7 the curve of $V_{CB} = 20V$ and the point when I_C (y-axis) is 4mA the ~~x-axis~~ V_{BE} (x-axis) point approximately 0.73 mA

Here
$I_C = 4mA$
$V_{CB} = 20V$

(d) From the figure 3.10(c) it an simplified ~~ide~~ curve with value of 0.7V ~~V_{BE}~~ V_{BE}. So, for any value of I_E and V_{CB} V_{BE} remain same 0.7V

Here
$I_E = 4mA$
$V_{CB} = 20V$

Example 3.2

(a) So, From the 3.13(a) when $I_B = 30\mu A$ and $V_{CE} = 10V$ (x-axis) the I_C (y-axis) value approximately 3.2mA

Here
$I_B = 30\mu A$
$V_{CE} = 10V$

(b) From 3.13(b) $V_{CE} = 15V$ between 10 to 20V and $V_{BE} = 0.7$ So, $I_B = 20\mu A$

Now ~~B~~ In 3.13(a) $I_B = 20\mu A$ and $V_{CE} = 15V$

Here
$V_{CE} = 15V$
$V_{BE} = 0.7V$

So $I_C = 2.25mA$ approximately

Exercise 11

From figure 3.8
~~$I_C \approx I_E$~~
~~$\therefore I_C = 5mA$~~

Here,
$I_E = 5mA$
$V_{CB} = 1, 10, 20\ V$

From figure 3.7
$I_E = 5mA$ always

So, when $V_{CB} = 1V$, $V_{BE} = 0.8V$

$V_{CB} = 10V$, $V_{BE} = 0.78V$

$V_{CB} = 20V$, $V_{BE} = 0.76V$

In the figure 3.7 ~~there are~~ ~~thee~~ three curve lines for V_{CB} 1V, 10V & 20V. and for I_E fixed (5mA) V_{BE} have three different value, but close enough. So we can say that in V_{BE} and I_E relationship graph V_{CB} has slight effect.

Exercise 12

Let
$\Delta V_d = (0.8 - 0.7)\ V$
$\Delta I_d = (5 - 0)\ mA$

(a) average ac resistance, $r_{av} = \left.\frac{\Delta V_d}{\Delta I_d}\right|_{pt.\ to\ pt.}$

$= \frac{0.8 - 0.7}{(5-0)m}\ \Omega$

$= \frac{0.1}{5m} = 0.02 \times 10^{3}\ \Omega$

$= 20\ \Omega$

(b) In part a the resistance is 20Ω which is negligiable for the resistive elements is typically in kilohms magnitude.

~~Exercise 19~~

~~(a) From the figure 3.13(a) when $V_{CE} = 6V$ and $I_C = 2mA$~~

~~I_B will be 18 μA approximately~~

~~Here $V_{CE} = 6V$ $I_C = 2mA$~~

Exercise 19

(a) From the figure 3.13(a) when $V_{CE} = 6V$ and $I_C = 2mA$ then the I_B approximately 18 μA

Here, $V_{CE} = 6V$ $I_C = 2mA$

Now
$$\beta_{dc} = \frac{I_C}{I_B} = \frac{2m}{18\mu} = \cancel{500}\ 111.11$$

(b) We know,
$$\alpha = \frac{\beta}{\beta+1} = \frac{111.11}{111.11+1} = 0.991$$

(c) We know,

Here. $V_{CE} = 6V$

$$I_{CEO} = \beta I_{CBO}$$

$$\Rightarrow I_{CEO} = \beta(1-\alpha)I_C \quad \text{When } I_B = 0$$

1 cell = 2 unit

$$\Rightarrow I_{CEO} = 111.11 \times (1-0.991) \times (0.17 \times 2)$$ [from figure 3.13(a)] when $V_{CE} = 6V$ and $I_B = 0 \mu A$

$$\therefore I_{CEO} = \cancel{0.17\ mA}\ 0.34$$

(d) We know
$$I_{CEO} = \beta I_{CBO}$$
$$\Rightarrow I_{CBO} = \frac{I_{CEO}}{\beta} = \frac{\cancel{0.17m}\ 0.34m}{111.11} = \cancel{1.53\mu A}\ 3.06\mu A$$

Exercise 26

Here
$V_{be} = 0.1V$
$R_E = 1k\Omega$
$V_i = 2V$

Now,

$$V_o = V_i - V_{be}$$
$$= (2 - 0.1) = 1.9V$$

$$\therefore A_v = V_o/V_i = \frac{1.9}{2} = 0.95$$

$$\therefore \cancel{\text{Emitter}}\ I_E = \frac{V_E}{R_E} = \frac{1.9}{1K}$$
$$= 1.9mA$$