

ELECTRONICS LABORATORY

PART 4 EXPERIMENTS

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EXPERIMENT: 4.1

DERIVING 1.REGION CHARACTERISTICS OF TRANSISTOR

EXPERIMENTAL PROCEDURE:

Apply power to supply and adjust output voltage to 0,7 Volt. Cut-off the circuit energy. Plug the Y-0016/007 module. Make the circuit connections as in 12.16

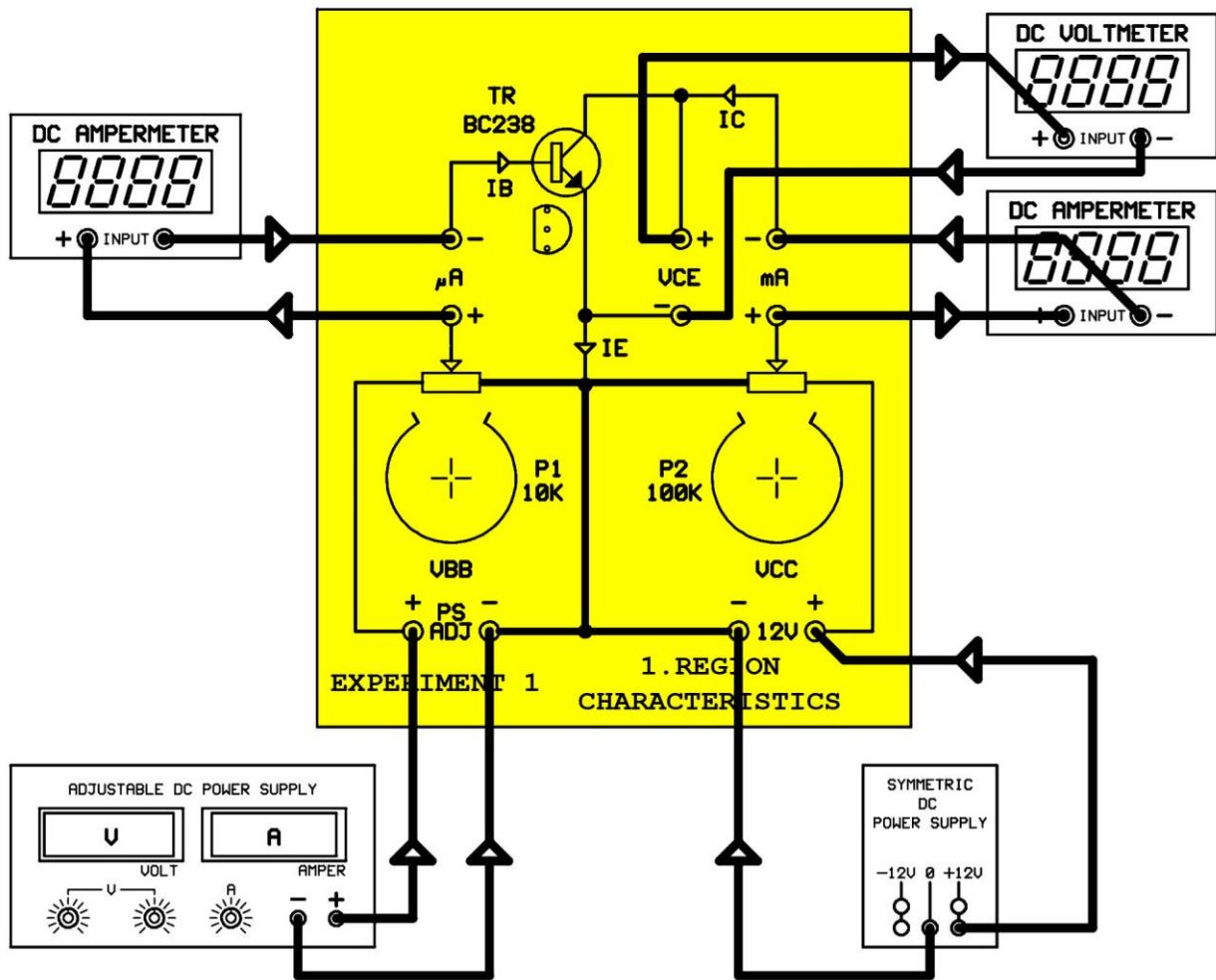


Figure 12.16

- 1- Adjust mid-terminals of P1 and P2 potentiometers to 0Volt. (**Mid-terminals will be in emitter of transistor**)
- 2- Apply energy to the circuit.
- 3- Adjust the base current (I_B) to $10\mu A$ by using P1 potentiometer. This value should be constant until the end of experiment. If a change occurs, re-adjust it to $10\mu A$.

4- According to Figure 12.17, adjust the collector-emitter voltage (V_{CE}) by using P2 potentiometer and write collector current (I_C) to the table.

$I_B = 10\mu A$ Constant		
Order	V_{CE} (V)	I_C
1	0,02	
2	0,04	
3	0,06	
4	0,08	
5	0,10	
6	0,50	
7	1,00	
8	2,00	
9	4,00	
10	6,00	
11	8,00	
12	10,00	

Figure 12.17

5- Re-adjust the mid-terminals of P1 and P2 potentiometers to 0 Volt.

6- Adjust the power supply to $V_{BB} = 0.8$ Volt.

7- Adjust the base current (I_B) to $20\mu A$ using P1 potentiometer. If a change occurs during experiment, re-adjust it to $20\mu A$.

8- According to Figure 12.18, adjust the collector-emitter voltage (V_{CE}) by using P2 potentiometer and write collector current (I_C) to the table.

$I_B = 20\mu A$ Constant		
Order	V_{CE} (V)	I_C
1	0,02	
2	0,04	
3	0,06	
4	0,08	
5	0,10	
6	0,50	
7	1,00	
8	2,00	
9	4,00	
10	6,00	
11	8,00	
12	10,00	

Figure 12.18

9- Draw the $I_C=f.(V_{CE})$ characteristics using the values founded in steps 4 and 8.

10- Find the work point by drawing $V_{CC}=6V$ and $R_L=1K$ over load line.

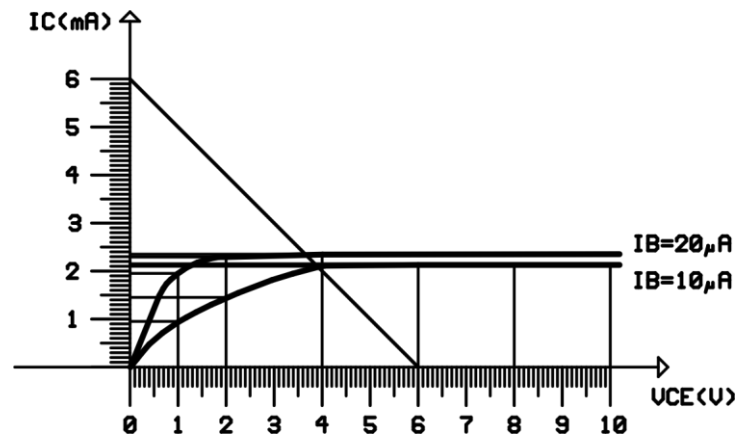


Figure 12.19

11- Calculate the beta current gain using the characteristics.

For $V_{CC} = 6V :$	$\beta = \Delta I_C / \Delta I_B$
$I_{B1} =$	$\Delta I_C = I_{C2} - I_{C1} =$
$I_{C1} =$	$\Delta I_B = I_{B2} - I_{B1} =$
$I_{B2} =$	$\beta =$
$I_{C2} =$	

EXPERIMENT: 4.2

DERIVING 2.REGION CHARACTERISTICS OF TRANSISTOR

EXPERIMENTAL PROCEDURE:

Apply power to supply and adjust output voltage to 0,7 Volt. Cut-off the circuit energy. Plug the Y-0016/007 module. Make the circuit connections as in 12.21

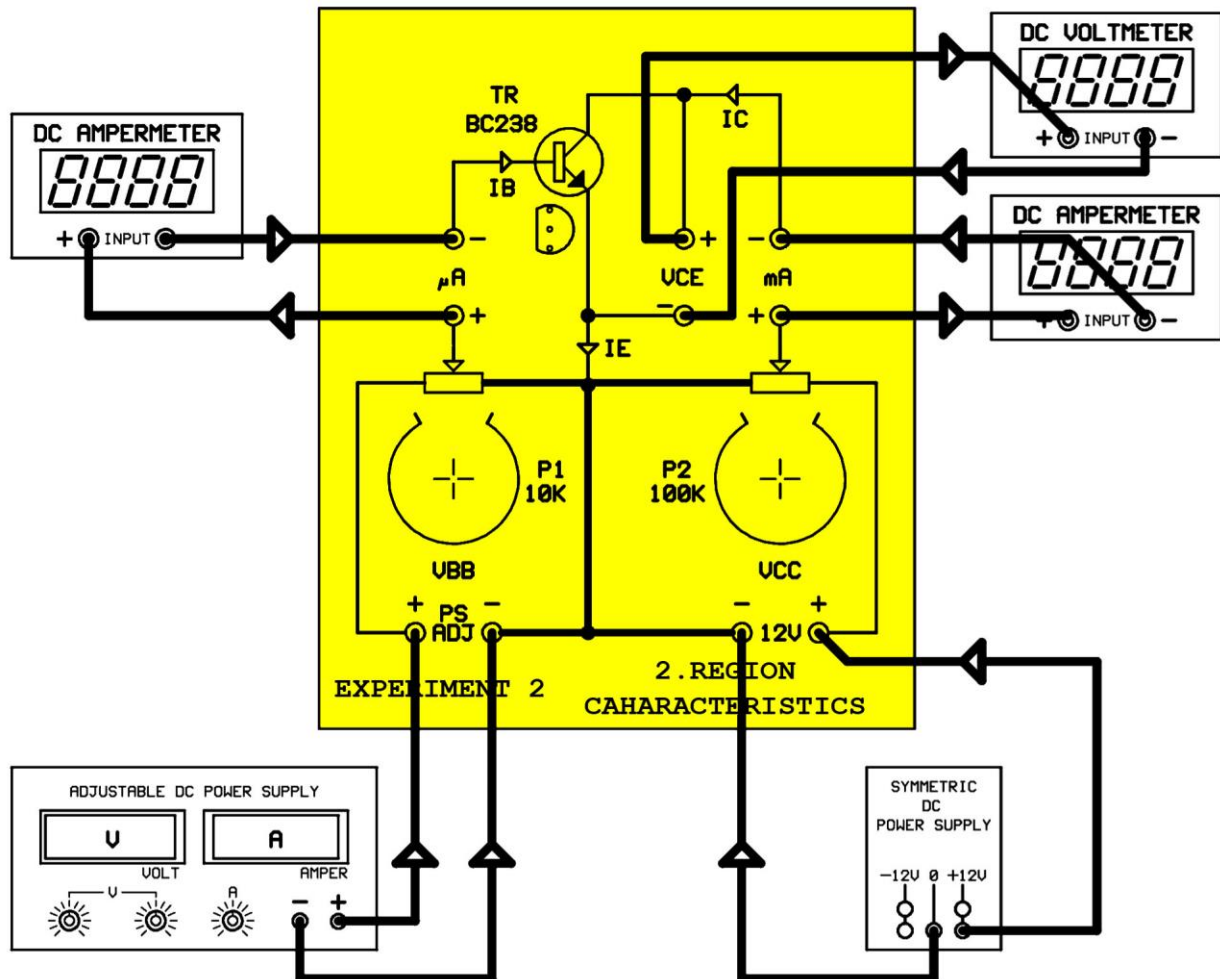


Figure 12.21

- 1- Adjust mid-terminals of P₁ and P₂ potentiometers to 0 Volt. (**Mid-terminals will be in emitter of transistor**).
- 2- Apply energy to the circuit.
- 3- Adjust $V_{CE}=5\text{V}$ by P₂ potentiometer. This value should be constant until the end of experiment. If a change occurs, re-adjust it to $V_{CE}=5\text{V}$.

4- According to Figure 12.22, adjust the base current (I_B) by using P1 potentiometer and write the collector current (I_C) to the table.

$V_{CE}=5V$ Constant		
Order	I_B (μA)	I_C (mA)
1	1	
2	2	
3	4	
4	8	
5	10	
6	15	
7	20	

Figure 12.22

5- Draw the $I_C=f.(I_B)$ characteristics using the values you reached at step 4.

Figure 12.23

EXPERIMENT: 4.3

DERIVING 3.REGION CHARACTERISTICS OF TRANSISTOR

EXPERIMENTAL PROCEDURE:

Apply power to supply and adjust output voltage to 0,7 Volt. Cut-off the circuit energy. Plug the Y-0016/007 module. Make the circuit connections as in 12.25

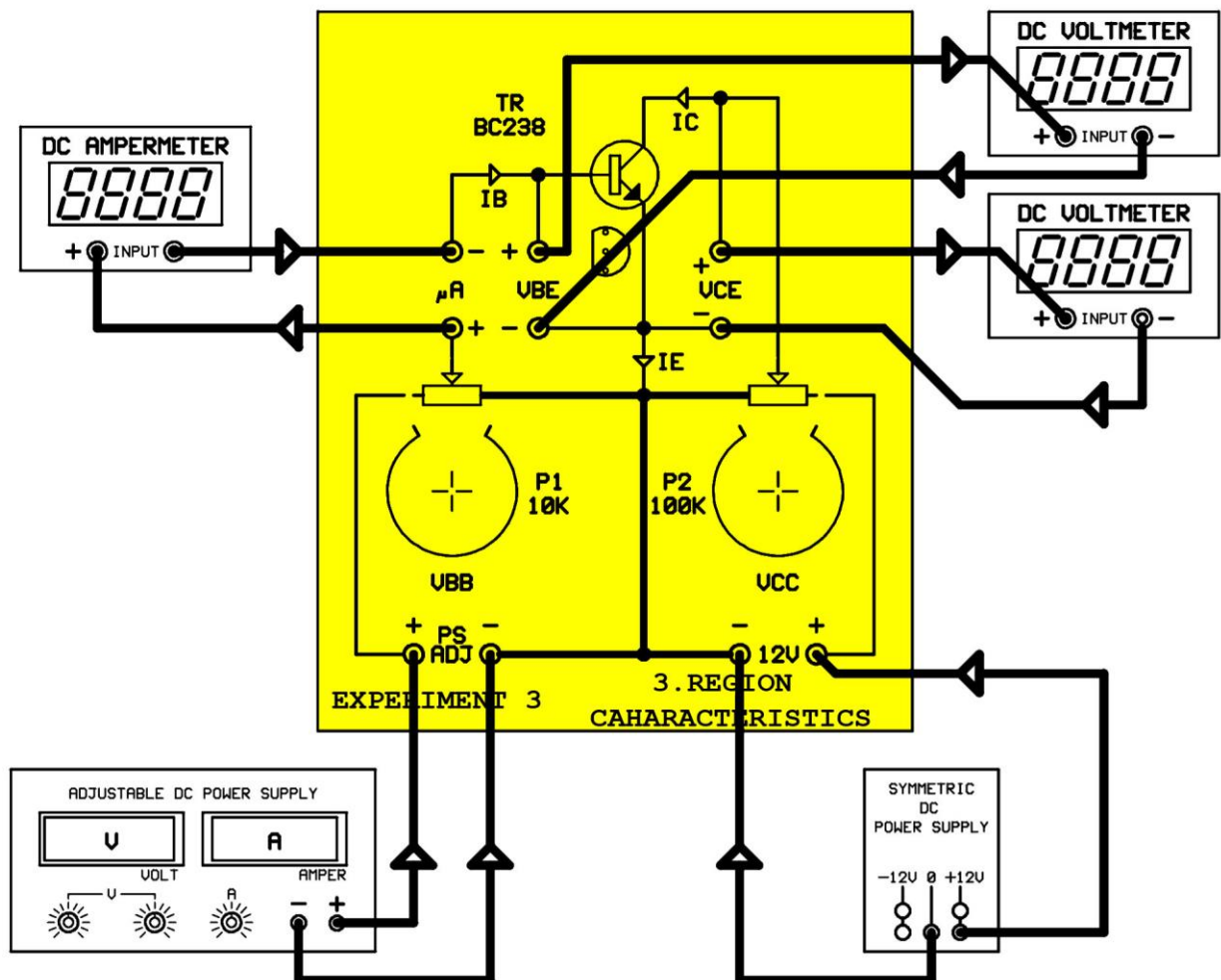


Figure 12.25

- 1- Adjust mid-terminals of P1 and P2 potentiometers to 0 Volt. (**Mid-terminals will be in emitter of transistor**).
- 2- Apply energy to the circuit.
- 3- Adjust collector-emitter (V_{CE}) to $V_{CE}=0,7\text{Volt}$ using P2 potentiometer. This value should be constant during the experiment. If a change occurs, re-adjust it to 0,7Volt.

4- According to Figure 12.26, adjust the base-emitter voltage (V_{BE}) by using P1 potentiometer and write base current (I_B) to the table.

$V_{CE}=0.7V$ Constant		
Order	$V_{BE}(mV)$	$I_B(\mu A)$
1	550	
2	570	
3	600	
4	620	
5	640	
6	650	
7	660	
8	670	
9	680	
10	690	

Figure 12.26

5- Draw the $I_B=f.(V_{BE})$ characteristics using the values you found in steps 4.

Figure 12.27

EXPERIMENT: 4.4

DERIVING 4.REGION CHARACTERISTICS OF TRANSISTOR

EXPERIMENTAL PROCEDURE:

Apply power to supply and adjust output voltage to 0,7 Volt. Cut-off the circuit energy. Plug the Y-0016/007 module. Make the circuit connections as in 12.29

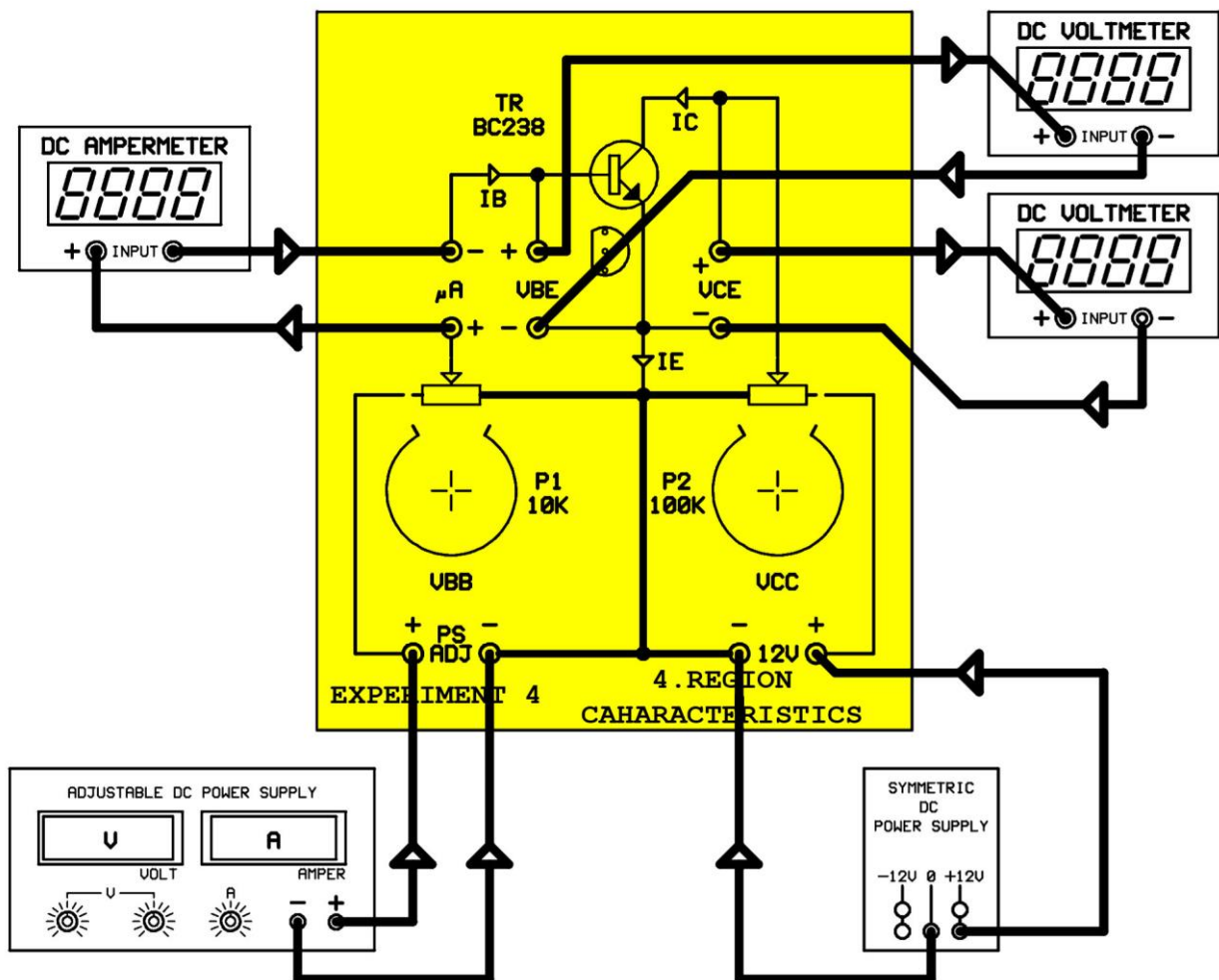


Figure 12.29

- 1- Adjust mid-terminals of P1 and P2 potentiometers to 0 Volt. (**Mid-terminals will be in emitter of transistor**).
- 2- Apply energy to the circuit.
- 3- Adjust the base current (I_B) to 10uA by P1 potentiometer. This value should be constant until the end of experiment. If a change occurs, re-adjust it to 10uA.

4- According to Figure 12.30, adjust the collector-emitter voltage (V_{CE}) by using P2 potentiometer and write base-emitter voltage (V_{BE}) to the table.

$I_B=10\mu A$ Constant		
Order	V_{CE} (V)	V_{BE} (V)
1	0	
2	0,1	
3	0,2	
4	0,4	
5	0,6	
6	1,0	

Figure 12.30

5- Re-adjust the mid-terminals of P1 and P2 potentiometers to 0 Volt. Adjust the base current (I_B) to $20\mu A$ using P1 potentiometer and do the experiment again.

6- Using P2 potentiometer, type the collector-emitter voltage (V_{CE}) and base-emitter voltage (V_{BE}) to the table in figure 12.31.

$I_B=20\mu A$ Constant		
Order	V_{CE} (V)	V_{BE} (V)
1	0	
2	0,1	
3	0,2	
4	0,4	
5	0,6	
6	1,0	

Figure 12.31

7- Draw the $V_{BE}=f.(V_{CE})$ characteristics using the values you found in step 6.

Figure 12.32