

**EKSPERIMEN KENDIRI**

**7**

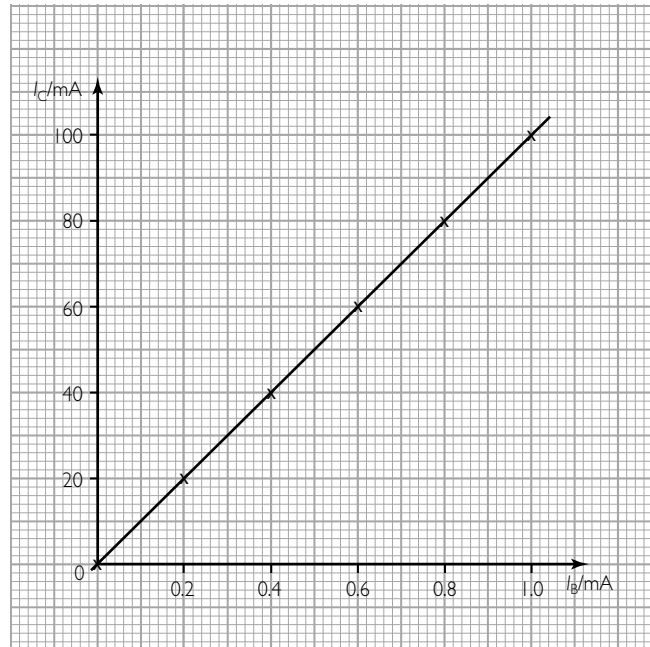
**TRANSISTOR SEBAGAI AMPLIFIER ARUS**

<p><b>Tujuan</b> <i>Aim</i></p>	<p>Untuk mengkaji hubungan antara arus tapak, <math>I_B</math>, dengan arus pengumpul, <math>I_C</math>. <i>To investigate the relationship between the base current, <math>I_B</math>, and collector current, <math>I_C</math>.</i></p>
<p><b>Pernyataan masalah</b> <i>Problem statement</i></p>	<p>Bagaimanakah _____ mempengaruhi _____? <i>How does the _____ affect the _____?</i></p>
<p><b>Hipotesis</b> <i>Hypothesis</i></p>	<p>Arus pengumpul bertambah apabila arus tapak bertambah. <i>The collector current increases when the base current increases.</i></p>
<p><b>Pemboleh ubah</b> <i>Variables</i></p>	<p>(a) Dimanipulasikan: Arus tapak, <math>I_B</math> <i>Manipulated : The base current, <math>I_B</math></i> (b) Bergerak balas : Arus pengumpul, <math>I_C</math> <i>Responding : The collector current, <math>I_C</math></i> (c) Dimalarkan : _____ <i>Constant : _____</i></p>
<p><b>Bahan dan radas</b> <i>Material and apparatus</i></p>	<p>Transistor n-p-n, dua suis, 6 sel kering, reostat, miliammeter (0 – 1 mA), miliammeter (0 – 100 mA) dan wayar penyambung <i>n-p-n transistor, two switches, 6 dry cells, rheostat, milliammeter (0 – 1 mA), milliammeter (0 – 100 mA) and connecting wires</i></p>
<p><b>Prosedur</b> <i>Procedure</i></p>	<div data-bbox="459 1022 1401 1549" data-label="Diagram"> </div> <ol style="list-style-type: none"> <li>1 Susunkan radas-radas seperti yang ditunjukkan dalam rajah. <i>Set up the apparatus as shown in the diagram.</i></li> <li>2 Tutup suis <math>S_1</math> dan selaraskan reostat supaya miliammeter 1 menunjukkan bacaan sifar. <i>Close switch <math>S_1</math> and adjust the rheostat so that milliammeter 1 shows a zero reading.</i></li> <li>3 Tutup suis <math>S_2</math> dan catatkan bacaan miliammeter 2. <i>Close switch <math>S_2</math> and record the reading of milliammeter 2.</i></li> <li>4 Ulang eksperimen dengan bacaan miliammeter 1 menjadi 0.2 mA, 0.4 mA, 0.6 mA, 0.8 mA dan 1.0 mA. <i>Repeat the experiment with milliammeter 1 readings of 0.2 mA, 0.4 mA, 0.6 mA, 0.8 mA and 1.0 mA.</i></li> <li>5 Catatkan bacaan-bacaan yang sepadan daripada miliammeter 2. <i>Record the corresponding readings from milliammeter 2.</i></li> <li>6 Jadualkan nilai-nilai <math>I_B</math> dan <math>I_C</math>. <i>Tabulate the values of <math>I_B</math> and <math>I_C</math>.</i></li> <li>7 Plotkan graf <math>I_C</math> melawan <math>I_B</math>. <i>Plot a graph of <math>I_C</math> against <math>I_B</math>.</i></li> </ol>

**Pemerhatian**  
*Observation*

$I_B/\text{mA}$	0	0.2	0.4	0.6	0.8	1.0
$I_C/\text{mA}$	0	20	40	60	80	100

Graf  $I_C$  melawan  $I_B$   
*A graph of  $I_C$  against  $I_B$*



**Perbincangan**  
*Discussion*

**1** Lukis suatu rajah litar bagi litar transistor itu.  
*Draw a circuit diagram of the transistor circuit.*

**2** Berapakah bacaan miliammeter apabila  
*What are the milliammeter readings when*

(a)  $S_1$  ditutup dan  $S_2$  dibuka?  
 *$S_1$  is closed and  $S_2$  is opened?*

$I_B =$  sebarang bacaan di antara 0 – 1 mA,  $I_C =$  \_\_\_\_\_.

$I_B =$  any reading between 0 – 1 mA,  $I_C =$  \_\_\_\_\_.

(b)  $S_1$  dibuka dan  $S_2$  ditutup?  
 *$S_1$  is opened and  $S_2$  is closed?*

$I_B = 0$  mA,  $I_C =$  \_\_\_\_\_

<p><b>Perbincangan</b> <i>Discussion</i></p>	<p>3 Apakah yang dapat anda deduksikan tentang <math>I_B</math> dan <math>I_C</math> daripada bacaan yang diperoleh di 2? <i>What can you deduce about <math>I_B</math> and <math>I_C</math> from the readings obtained in 2?</i></p> <p>Arus pengumpul, <math>I_C</math>, ditentukan oleh arus tapak, <math>I_B</math>. Walau bagaimanapun, arus tapak, <math>I_B</math>, _____ oleh arus pengumpul, <math>I_C</math>. <i>The collector current, <math>I_C</math>, is determined by the base current, <math>I_B</math>. However, the base current, <math>I_B</math>, is _____ by the collector current, <math>I_C</math>.</i></p> <p>4 Daripada graf, hitung amplifikasi arus bagi transistor itu. <i>From the graph, calculate the current amplification of the transistor.</i></p> <p>Amplifikasi arus/Current amplification = <math>\frac{I_C}{I_B}</math> = kecerunan graf/gradient of the graph = =</p>
<p><b>Kesimpulan</b> <i>Conclusion</i></p>	<p><math>I_C</math> berkadar _____ dengan <math>I_B</math>. <i><math>I_C</math> is _____ proportional to <math>I_B</math>.</i></p>

**EKSPERIMEN KENDIRI**

**8**

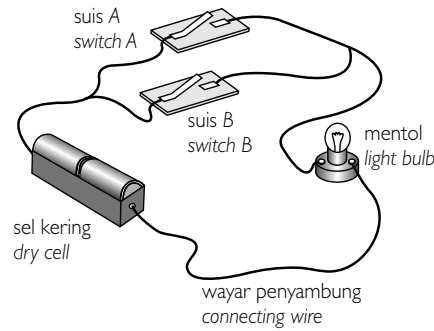
**GET LOGIK**

<p><b>Tujuan</b> <i>Aim</i></p>	<p>Untuk mengkaji tindakan get-get logik yang berikut: <i>To study the action of the following logic gates:</i> (a) DAN/AND (b) ATAU/OR (c) TAK/NOT (d) TAKDAN/NAND (e) TAKATAU/NOR</p>												
<p><b>Pernyataan masalah</b> <i>Problem statement</i></p>	<p>Bagaimanakah get-get logik seperti get DAN, get ATAU, get TAK, get TAKDAN dan get TAKATAU berfungsi? <i>How does the logic gates such as gate AND, gate OR, gate NOT, gate NAND and gate NOR are function?</i></p>												
<p><b>Hipotesis</b> <i>Hypothesis</i></p>	<p>Tindakan get logik boleh dihuraikan dalam bentuk jadual kebenaran dan _____. <i>The action of logic gates can be described by truth table and _____.</i></p>												
<p><b>Pemboleh ubah</b> <i>Variables</i></p>	<p>(a) Dimanipulasikan : Susunan radas <i>Manipulated : Apparatus set up</i> (b) Bergerak balas : _____ <i>Responding : _____</i> (c) Dimalarkan : Input <i>Constant : Input</i></p>												
<p><b>Bahan dan radas</b> <i>Material and apparatus</i></p>	<p>Dua sel kering, dua suis, satu mentol, satu perintang dan wayar penyambung <i>Two dry cells, two switches, one light bulb, one resistor and connecting wires</i></p>												
<p><b>Prosedur</b> <i>Procedure</i></p>	<p>1 Pasangkan radas-radas seperti yang ditunjukkan dalam Rajah (a). <i>Set up the apparatus as shown in Diagram (a).</i></p> <div data-bbox="715 1188 1150 1510" data-label="Diagram"> <p>The diagram shows a series circuit. On the left is a 'sel kering dry cell'. Two wires connect it to two switches, labeled 'A' and 'B', which are collectively labeled 'suis switch'. The circuit then connects to a 'mentol light bulb' and returns to the dry cell. The wires are labeled 'wayar penyambung connecting wire'.</p> </div> <p>Rajah (a)/Diagram (a)</p> <p>2 Input dan output diwakili oleh 0 atau 1. Jadual yang berikut menunjukkan bagaimana tindakan setiap input dan output diwakili. <i>The input and output are represented by either 0 or 1. The table below shows how each input and output is represented.</i></p> <table border="1" data-bbox="497 1721 1417 1936"> <thead> <tr> <th colspan="2">Input</th> <th colspan="2">Output</th> </tr> <tr> <th>0</th> <th>1</th> <th>0</th> <th>1</th> </tr> </thead> <tbody> <tr> <td>Suis dibuka <i>The switch is opened</i></td> <td>Suis ditutup <i>The switch is closed</i></td> <td>Mentol tidak menyala <i>The light bulb does not glow</i></td> <td>Mentol menyala <i>The light bulb glows</i></td> </tr> </tbody> </table> <p>3 Jalankan aktiviti-aktiviti mengikut input yang dinyatakan dalam jadual yang berikut. Perhatikan perubahan pada mentol itu dan catatkan pemerhatian anda dalam jadual. <i>Carry out the activity according to the input stated in the table. Observe the changes on the light bulb and record your observations in a table.</i></p>	Input		Output		0	1	0	1	Suis dibuka <i>The switch is opened</i>	Suis ditutup <i>The switch is closed</i>	Mentol tidak menyala <i>The light bulb does not glow</i>	Mentol menyala <i>The light bulb glows</i>
Input		Output											
0	1	0	1										
Suis dibuka <i>The switch is opened</i>	Suis ditutup <i>The switch is closed</i>	Mentol tidak menyala <i>The light bulb does not glow</i>	Mentol menyala <i>The light bulb glows</i>										

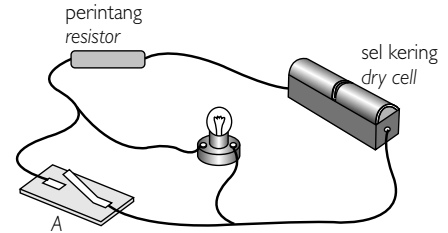
**Prosedur**  
*Procedure*

4 Ulang aktiviti-aktiviti dengan memasangkan radas-radas seperti yang ditunjukkan dalam Rajah (b), (c), (d) dan (e) dan catatkan pemerhatian anda dalam jadual-jadual yang berikut.

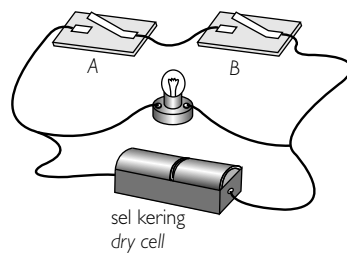
*Repeat the activity by setting up the apparatus as shown in Diagrams (b), (c), (d) and (e) and record your observations in the following tables.*



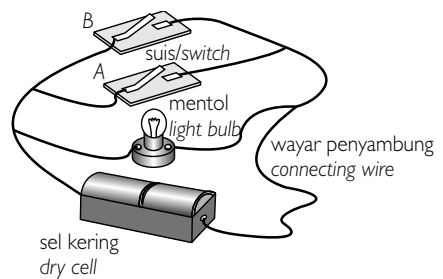
Rajah (b)/Diagram (b)



Rajah (c)/Diagram (c)



Rajah (d)/Diagram (d)



Rajah (e)/Diagram (e)

**Pemerhatian**  
*Observation*

Rajah (a)/Diagram (a)

Input		Output
A	B	X
0	0	0
0	1	0
1	0	0
1	1	1

Rajah (b)/Diagram (b)

Input		Output
A	B	X
0	0	0
0	1	1
1	0	1
1	1	1

Rajah (c)/Diagram (c)

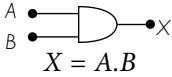
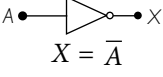
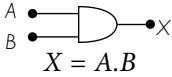
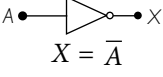
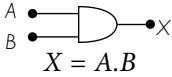
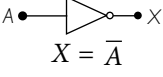
Input	Output
A	X
0	1
1	0

Rajah (d)/Diagram (d)

Input		Output
A	B	X
0	0	1
0	1	1
1	0	1
1	1	0

Rajah (e)/Diagram (e)

Input		Output
A	B	X
0	0	1
0	1	0
1	0	0
1	1	0

<p><b>Perbincangan</b> <i>Discussion</i></p>	<p><b>1</b> Namakan get-get logik yang diwakili oleh setiap rajah itu. <i>Name the logic gates represented by each diagram.</i> Rajah (a)/Diagram (a): Get DAN/AND gate</p> <p>Rajah (b)/Diagram (b): _____</p> <p>Rajah (c)/Diagram (c): Get TAK/NOT gate</p> <p>Rajah (d)/Diagram (d): _____</p> <p>Rajah (e)/Diagram (e): _____</p> <p><b>2</b> Lukis simbol dan nyatakan persamaan Boole bagi setiap get logik yang diwakili oleh: <i>Draw the symbols and state the Boolean equations for the logic gates represented by:</i></p> <table border="1" data-bbox="496 546 1422 1022"> <tr> <td data-bbox="496 546 810 784"> <p>Rajah (a)/Diagram (a) Get DAN/AND gate</p>  <p><math>X = A.B</math></p> </td> <td data-bbox="810 546 1126 784"> <p>Rajah (b)/Diagram (b)</p> </td> <td data-bbox="1126 546 1422 784"> <p>Rajah (c)/Diagram (c) Get TAK/NOT gate</p>  <p><math>X = \bar{A}</math></p> </td> </tr> <tr> <td data-bbox="496 784 810 1022"> <p>Rajah (d)/Diagram (d)</p> </td> <td data-bbox="810 784 1126 1022"> <p>Rajah (e)/Diagram (e)</p> </td> <td data-bbox="1126 784 1422 1022"></td> </tr> </table>	<p>Rajah (a)/Diagram (a) Get DAN/AND gate</p>  <p><math>X = A.B</math></p>	<p>Rajah (b)/Diagram (b)</p>	<p>Rajah (c)/Diagram (c) Get TAK/NOT gate</p>  <p><math>X = \bar{A}</math></p>	<p>Rajah (d)/Diagram (d)</p>	<p>Rajah (e)/Diagram (e)</p>	
<p>Rajah (a)/Diagram (a) Get DAN/AND gate</p>  <p><math>X = A.B</math></p>	<p>Rajah (b)/Diagram (b)</p>	<p>Rajah (c)/Diagram (c) Get TAK/NOT gate</p>  <p><math>X = \bar{A}</math></p>					
<p>Rajah (d)/Diagram (d)</p>	<p>Rajah (e)/Diagram (e)</p>						
<p><b>Kesimpulan</b> <i>Conclusion</i></p>	<p>Setiap tindakan get logik boleh dihuraikan dalam bentuk _____ dan _____.</p> <p><i>Each action of logic gates can be described by _____ and _____.</i></p>						