NAMA:	TINGKATAN: 5 Ud
NO. KAD PENGENALAN	

SEKOLAH MENENGAH KEBANGSAAN ST. LUKE
SRI AMAN

PEPERIKSAAN PERCUBAAN SPM 2019

Fizik Tingkatan Lima
Kertas 3

4531/3

1 ½ Jam

Satu jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Tulis **nama, tingkatan** dan **nombor kad pengenalan** anda pada ruang yang disediakan.*
2. *Kertas soalan ini adalah dalam dwibahasa.*
3. *Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam bahasa Inggeris atau bahasa Melayu.*
4. *Jawapan kepada **Bahagian A** hendaklah ditulis dalam ruang yang disediakan dalam kertas soalan.*
5. *Rajah tidak dilukis mengikut skala **kecuali** dinyatakan.*
6. *Markah maksimum yang diperuntukkan ditunjukkan dalam kurungan pada hujung tiap-tiap soalan atau*
7. *Penggunaan kalkulator saintifik yang **tidak** boleh diprogramkan adalah dibenarkan.*

Untuk Kegunaan Pemeriksa			
Bahagian	**Soalan**	**Markah Penuh**	**Markah Diperolehi**
A	**1**	**16**	
	2	**12**	
B	**3**	**12**	
	4	**12**	
		Jumlah :	

Kertas soalan ini mengandungi 9 halaman bercetak

Section A

[28 *marks*]

*Answer **all** questions*

1. A student carries out an experiment to investigate how the temperature of water increases with the time of heating.

   Diagram 1.1 shows the set up of the apparatus for the investigation. Before the heater is switched on, the initial temperature, θ_o, of the water is measured.

   Diagram 1.2 shows meniscus of the mercury column in the thermometer.

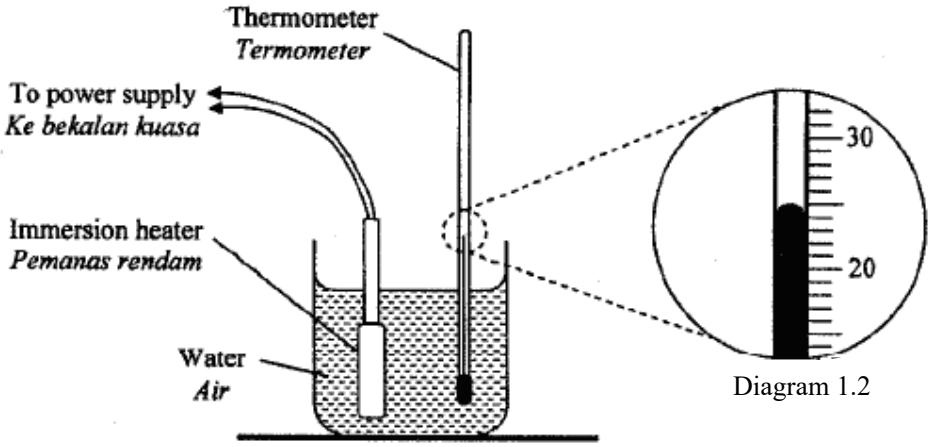


Diagram 1.1

Diagram 1.2

θ_o = ……^oC

   A stopwatch and the heater are switched on simultaneously.

   At time, t = 20 s, the temperature, θ, of the water is read on the thermometer.

   Diagram 1.3 shows the meniscus of the mercury column in the thermometer.

   The procedure is repeated for heating time, t = 40s, 60 s, 80 s, and 100s. The positions of the meniscus of the mercury column in the thermometer are shown in Diagrams 1.4, 1.5, 1.6 and 1.7.

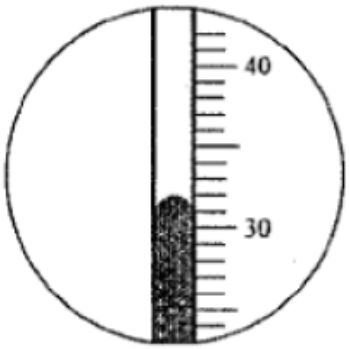


Diagram 1.3

t = 20 s

θ = ……°C

Δθ = θ – θ$_o$

= ……°C

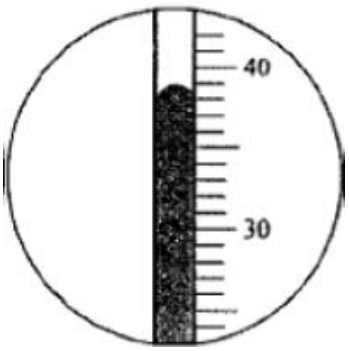


Diagram 1.4

t = 40 s

θ = ……°C

Δθ = θ – θ$_o$

= ……°C

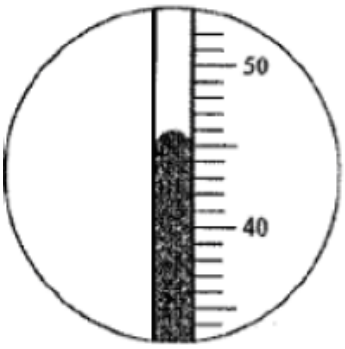


Diagram 1.5

t = 60 s

θ = ……°C

Δθ = θ – θ$_o$

= ……°C

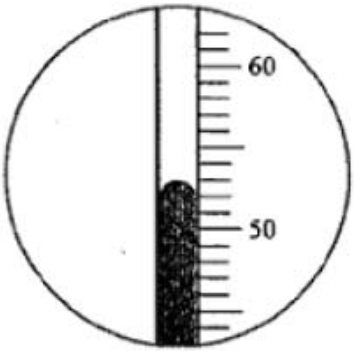


Diagram 1.6

t = 80 s

θ = ……°C

Δθ = θ – θ$_o$

= ……°C

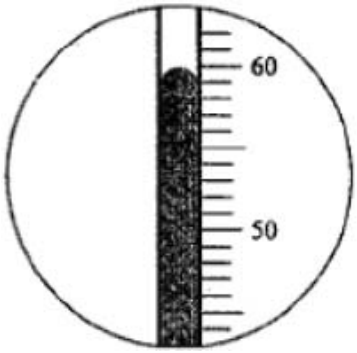


Diagram 1.7

t = 100 s

θ = ……°C

Δθ = θ – θ$_o$

= ……°C

(a) For the experiment described above, identify:

(i) The manipulated variable : [1 *mark*]

……..

(ii) The responding variable : [1 *mark*]

……..

(iii) The constant variable : [1 *mark*]

……..

(b) Based on Diagram 1.2, determine the initial temperature, θ_o, of the water. [1 *mark*]

Initial temperature, θ_o = …… °C

(c) Based on Diagrams 1.3, 1.4, 1.5, 1.6 and 1.7.

(i) Record the thermometer readings, θ, in the spaces provided. [1 *mark*]

(ii) For each value of θ in 1(c)(i), calculate the temperature of water increases, Δθ by using the following equation:

$$\Delta\theta = \theta - \theta_o$$

Record the values of Δθ in the spaces provided on the diagram. [2 *marks*]

(iii) Tabulate your results for all values of t, θ and Δθ in the space below. [3 *marks*]

(d) On the graph paper provided, plot a graph of Δ θ against *t*. [5 *marks*]

(e) Based on your graph, state the relationship between Δ θ and *t*. [1 *mark*]

.....

graph of $\Delta \theta$ against t

2. A student carried an experiment to investigate the relationship between the collector current, I_C and the base current, I_B of a transistor.
The result of this experiment is shown in the graph of I_C against I_B in Diagram 2.

Graph of I_C against I_B

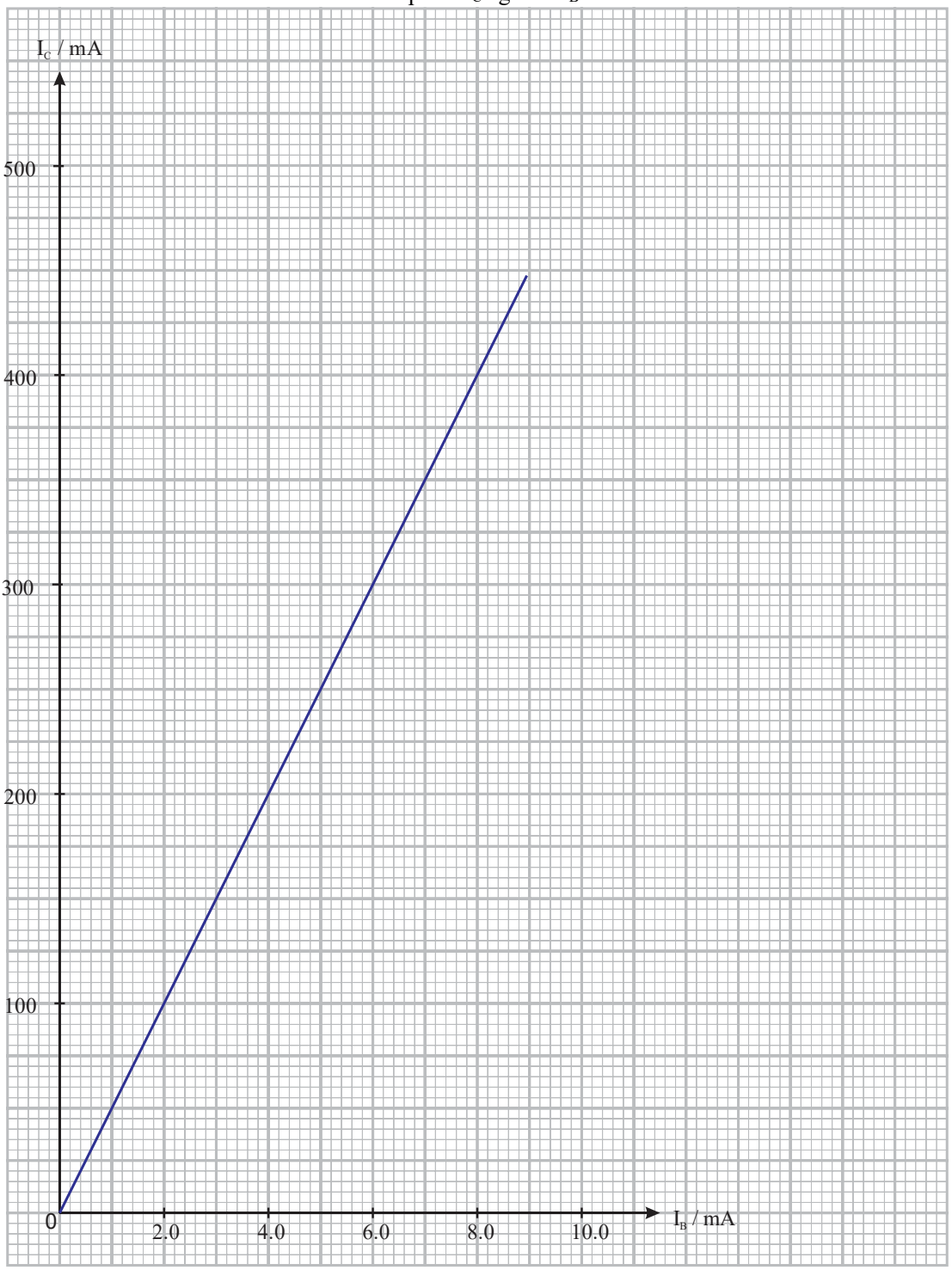


Diagram 2

(a) Base on Diagram 2

(i) State the relationship between I_C and I_B. [1 *mark*]

……

(ii) Determine the value of I_C when I_B = 10.0 mA. Show on the graph how you determine the I_C. [3 *marks*]

I_C = …….

(iii) Calculate the gradient, *m* of the graph. Show on the graph how you determine *m*. [3 *marks*]

m = …….

(b) (i) By using the answer in a(iii) and formula $I_E = (m + 1)I_B$, calculate the value of I_E when I_B = 25.0 mA. [2 *marks*]

I_E = …….

(ii) The common base current gain, α is given by the formula : $\alpha = m\left(\frac{I_B}{I_E}\right)$

By using the answers in a(iii) and b(i), calculate the value of α when I_B = 25.0 mA. [2 *marks*]

α = …….

(c) State one precaution steps that should be taken to improve the accuracy of the result in this experiment. [1 *mark*]

……

Section B

[12 *marks*]

Answer any one question from this section

3. Diagram 3.1 and Diagram 3.2 show a worker pushing a wheelbarrow on soft ground. He noticed that the tyre sinks deeper into the ground when the wheelbarrow is loaded.

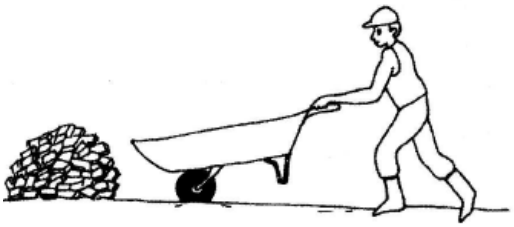


Diagram 3.1

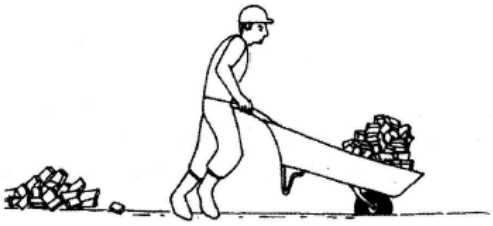


Diagram 3.2

Based on the information and observation:

(a) State one suitable inference. [1 *mark*]

(b) State one suitable hypothesis that could be investigated. [1 *mark*]

(c) With the use of apparatus such as plasticine, weights and other apparatus, describe one experiment to investigate the hypothesis stated in 3(b).

In your description, state clearly the following:

(i) The aim of the experiment.

(ii) The variables in the experiment.

(iii) The list of apparatus and materials.

(iv) The arrangement of the apparatus.

(v) The procedure used in the experiment which should include one method of controlling the manipulated variable and one method of measuring the responding variable.

(vi) The way to tabulate the data.

(vii) The way to analyse the data.

[10 *marks*]

4. Diagram 4 shows the water wave propagated from the sea to the shore.

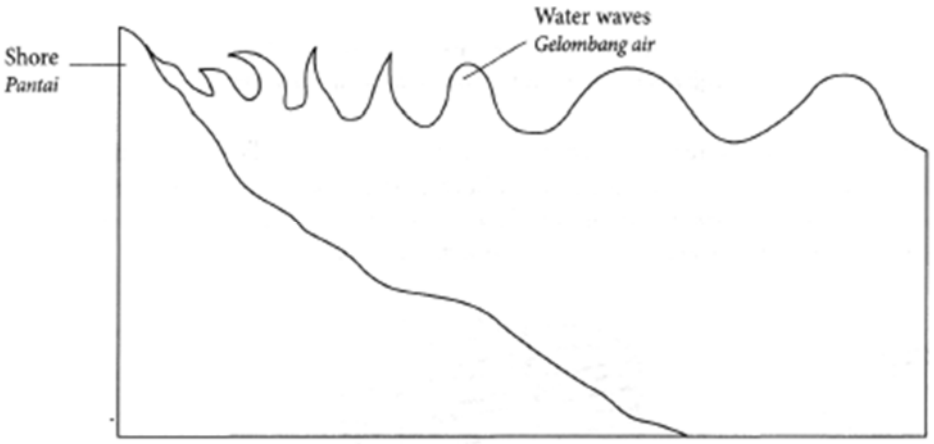


Diagram 4

Based on the information and observation:

(a) State one suitable inference. [1 *mark*]

(b) State one suitable hypothesis that could be investigated. [1 *mark*]

(c) With the use of apparatus such as a ripple tank, glass block and other suitable apparatus, describe one experiment to investigate the hypothesis stated in 4(b).
In your description, state clearly the following:

(i) The aim of the experiment.

(ii) The variables in the experiment.

(iii) The list of apparatus and materials.

(iv) The arrangement of the apparatus.

(v) The procedure used in the experiment which should include one method of controlling the manipulated variable and one method of measuring the responding variable.

(vi) The way to tabulate the data.

(vii) The way to analyse the data.

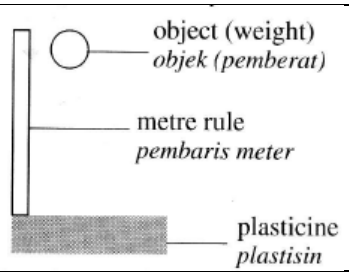
[10 *marks*]

ENDS OF QUESTION PAPER

Peperiksaan Percubaan SPM 2019
Physics F5 (Paper 3)
Answer scheme

<table>
<tr><td></td><td></td><td></td><td></td><td>Mark</td></tr>
<tr><td>1.</td><td>(a)</td><td>(i)</td><td>Time (of heating)</td><td>1</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>Temperature (of water increases)</td><td>1</td></tr>
<tr><td></td><td></td><td>(iii)</td><td>Mass of water / specific heat capacity of water / power of heater / energy supply</td><td>1</td></tr>
<tr><td></td><td>(b)</td><td colspan="2">$\theta_o = 25\ ^oC$</td><td>1</td></tr>
<tr><td></td><td>(c)</td><td>(i)</td><td>.
<table><tr><td></td><td>Diagram 1.3</td><td>Diagram 1.4</td><td>Diagram 1.5</td><td>Diagram 1.6</td><td>Diagram 1.7</td></tr><tr><td>θ / °C</td><td>32</td><td>39</td><td>46</td><td>53</td><td>60</td></tr></table>.</td><td>2</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>.($\Delta\theta = \theta - \theta_o$)
<table><tr><td></td><td>Diagram 1.3</td><td>Diagram 1.4</td><td>Diagram 1.5</td><td>Diagram 1.6</td><td>Diagram 1.7</td></tr><tr><td>Δθ / °C</td><td>7</td><td>14</td><td>21</td><td>28</td><td>35</td></tr></table>.</td><td>2</td></tr>
<tr><td></td><td>(c)</td><td colspan="2"><table><tr><td>t / s</td><td>θ / °C</td><td>Δθ / °C</td></tr><tr><td>20</td><td>32</td><td>7</td></tr><tr><td>40</td><td>39</td><td>14</td></tr><tr><td>60</td><td>46</td><td>21</td></tr><tr><td>80</td><td>53</td><td>28</td></tr><tr><td>100</td><td>60</td><td>35</td></tr></table>.</td><td>3</td></tr>
<tr><td></td><td>(d)</td><td colspan="2">(graph of Δθ against t)
<table><tr><td>Δθ at vertical-axis and t at horizontal-axis</td><td>√</td></tr><tr><td>correct unit for both axes</td><td>√</td></tr><tr><td>suitable scale – both axes start from zero and uniform scale</td><td>√</td></tr><tr><td>all the values plotted correctly</td><td>√√</td></tr><tr><td>best straight line</td><td>√</td></tr><tr><td>size - min scale (10 x 8) cm</td><td>√</td></tr><tr><td></td><td></td></tr></table>7 ticks - 5 marks
5-6 ticks - 4 marks
3-4 ticks - 3 marks
2 ticks - 2 marks
1 tick - 1 mark</td><td>5</td></tr>
<tr><td></td><td>(e)</td><td colspan="2">Δθ is directly proportional to t.</td><td>1</td></tr>
</table>

2.	(a)(i)	I_C is directly proportional with I_B	1
	(a)(ii)	I_C = 500 mA Extrapolation line Interpolation line	1 1 1
	(a)(iii)	Show triangle minimum 4 x 3 **Correct calculation:** $\frac{500\times10^{-3}}{10.0\times10^{-3}}$ **Correct answer:** 5	1 1 1
	(b)(i)	5	2
	(ii)	**Correct calculation**: = (5 + 1) (25 x10^{-3}) **Correct answer**: 1.50 x 10^{-1}	1 1
	(c)	Switch off the circuit when it is not in used to avoid overheating. // The eyes should perpendicular to the scale reading of miliammeter to avoid parallax error.	1
			12

	Suggested Answer	Marks	Notes
(a)	The depth to which a tyre sinks depends on its mass.	**1M**	Base on observation
(b)	The larger the mass is, the greater the pressure will be.	**1M**	Using M.V. and R.V.
(c)(i)	To investigate the relationship between mass and pressure	**1M**	Using M.V. and R.V.
(ii)	M.V. : Mass R.V. : Depth of depression C.V. : Height of the steel ball	**1M** **1M**	 Physical quantity
(iii)	Plasticine, weight and metre rule	**1M**	List out the important apparatus and materials
(iv)	(iv) 	**1M**	Functional experiment frame work with label.
(v)	Drop a weight of 50 g on the surface of the plasticine.	**1M**	State method of controlling the M.V.
	Measure the depth of depression made on the plasticine.	**1M**	State the method of measuring the R.V.
	Repeat the experiment 4 times with mass of 60 g, 70 g, 80 g and 90 g.	**1M**	Repeat the experiment at least 4 times with different values
(vi)	(vi) **Mass/g** *Jisim* / **Depth/cm** *Kedalaman* 50 60 70 80 90	**1M**	State variables, symbols and units.
(vii)	A graph of depth against mass is plotted.	**1M**	M.V. at x-axis, R.V. at y-axis
	Total	**12M**	

<table>
<tr><th>Section</th><th>Answer</th><th>Marks</th><th>Notes</th></tr>
<tr><td>(a)</td><td>The wavelength of the wave affect by the depth of the sea bad.</td><td>1M</td><td>Base on observation</td></tr>
<tr><td>(b)</td><td>The depth of the water increases, the wavelength of the water wave increases.</td><td>1M</td><td>Using M.V. and R.V.</td></tr>
<tr><td>(c)(i)</td><td>To study the relationship between the depth of the water and the wavelength of the wave.</td><td>1M</td><td>Using M.V. and R.V.</td></tr>
<tr><td>(ii)</td><td>Manipulated variable : The depth of water, d
Responding variable : The wavelength of water wave, λ
Constant variable : The frequency of the water wave</td><td>1M

1M</td><td>

Physical quantity</td></tr>
<tr><td>(iii)</td><td>Ripple tank, glass block, …(ripple tank experiment)
Stroboscope, metre rule</td><td>1M</td><td>List out the important apparatus and materials</td></tr>
<tr><td>(iv)</td><td>(functional diagram)</td><td>1M</td><td>Functional experiment frame work with correct symbols.</td></tr>
<tr><td rowspan="3">(v)</td><td>(controlling MV)
Measured depth of water, d = 1.0 cm using metre rule.</td><td>1M</td><td>State method of controlling the M.V.</td></tr>
<tr><td>The switch is closed and using the stroboscope to freeze the wave motion, mark the distance between two consecutive fringes and measured the wavelength using metre rule.</td><td>1M</td><td>State the method of measuring the R.V.</td></tr>
<tr><td>The experiment is repeated using depth of water 1.5 cm, 2.0 cm, 2.5 cm, 3.0 cm and 3.5 cm.</td><td>1M</td><td>Repeat the experiment at least 4 times with different values</td></tr>
<tr><td>(vi)</td><td><table><tr><th>Depth of water, d / cm</th><th>Wavelength of water wave, λ / cm</th></tr><tr><td>1.0</td><td></td></tr><tr><td>1.5</td><td></td></tr><tr><td>2.0</td><td></td></tr><tr><td>2.5</td><td></td></tr><tr><td>3.0</td><td></td></tr><tr><td>3.5</td><td></td></tr></table></td><td>1M</td><td>State variables, symbols and units.</td></tr>
<tr><td>(vii)</td><td>The graph of λ against d is plotted.</td><td>1M</td><td>M.V. at x-axis,
R.V. at y-axis</td></tr>
<tr><td colspan="2">Total</td><td>12M</td><td></td></tr>
</table>