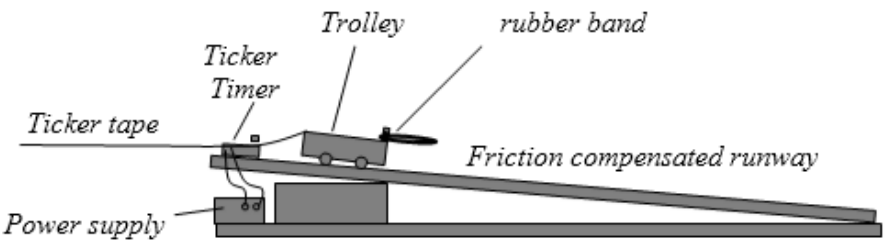
<table>
<tr><th>Question</th><th>Answer</th><th>Mark</th><th></th></tr>
<tr><td>1 (a)(i)</td><td>Manipulated variable = Depth of the rod immersed // d</td><td>1</td><td></td></tr>
<tr><td>(ii)</td><td>Responding variable = Reading of spring balance // Bouyant Force // F</td><td>1</td><td></td></tr>
<tr><td>(iii)</td><td>Constant variable = Cross sectional area of rod // Density of liquid // Gravitational Force, g</td><td>1</td><td></td></tr>
<tr><td>(b) (i)</td><td>W_0 = 0.10 N</td><td>1</td><td></td></tr>
<tr><td>(ii)</td><td>W = 0.88, 0.76, 0.64, 0.52, 0.40
All correct : 2 marks
At least 3 correct : 1 mark</td><td>2</td><td></td></tr>
<tr><td>(iii)</td><td>F = 0.12, 0.24, 0.36, 0.48, 0.60</td><td>1</td><td></td></tr>
<tr><td>(c)</td><td>
<table>
<tr><th>d/cm</th><th>W/N</th><th>F/N</th></tr>
<tr><td>5.0</td><td>0.88</td><td>0.12</td></tr>
<tr><td>10.0</td><td>0.76</td><td>0.24</td></tr>
<tr><td>15.0</td><td>0.64</td><td>0.36</td></tr>
<tr><td>20.0</td><td>0.52</td><td>0.48</td></tr>
<tr><td>25.0</td><td>0.40</td><td>0.60</td></tr>
</table>
1 mark – 3 columns for d, W and F

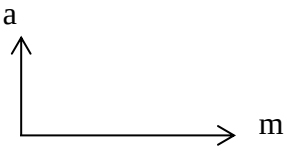
1 mark – correct units for each d, W and F

1 mark – all values W and F are consistent 2 d.p
</td><td>3</td><td></td></tr>
</table>

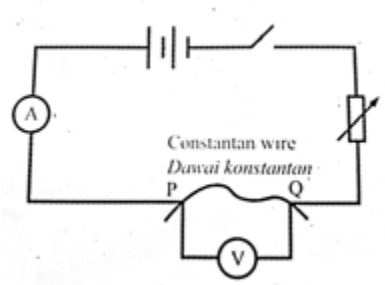
(d)	**Draw the graph of F against d.** A - Label y-axis and x-axis correctly √ B - States the unit at the axis correctly √ - Both axes with the even and uniform scale √ - 5 points correctly plotted: √ √ - at least 3 points correctly plotted √ E - a smooth best straight line √ F - minimum size of the graph is 5 x 4 squares of 2 cm x 2 cm. √ 7 √ - 5 marks 6-5 √ - 4 marks 3-4 √ - 3 marks 2 √ - 2 marks 1 √ - 1 marks	5	
(e)	**State the correct relationship based on the candidate's graph** F is directly proportional d	1	
	Total marks	16	
Question	Answer	Mark	
2 (a)(i)	f is directly proportional to $1/x$ *** must show extrapolation line pass through origin**	1	
(ii)	$1/x = 1/1.25 = 0.8$ straight line from $x = 0.8$ to the graph $f = 500$ Hz (with correct unit)	1 1 1	
(iii)	Draw a sufficient large triangle (minimum size 6 x 8 cm) $\frac{1000 - 0}{1.6 - 0}$ * Correct substitution (follow candidate's triangle) = 625 Hz m// ms^{-1} (with correct unit)	1 1 1	
(b)	$v = \frac{fx}{D} = \frac{k}{D}$ $= \frac{625}{1.8}$ $= 347.22$ m s^{-1}	1 1 1	

(c)	*v* increases	1	
(d)	- position of the must be perpendicular to scale of meter ruler - experiment must be carried out at open space	1	
	Total marks	12	

Question		Answer	Mark	Total Mark
3	(a)	**State a suitable inference** Acceleration is influenced by the mass	**1**	**1**
	(b)	**State a relevant hypothesis** When the mass increased, the acceleration will be decreased.	**1**	**1**
	(c)(i)	**State the aim of experiment** To investigate the relationship between the acceleration and the mass.	**1**	**1**
	(ii)	**State the manipulated variable and the responding variable** **Manipulated :** mass(m) **Responding :** acceleration(a)	**1** **1**	**1** **1**
		State ONE variable that kept constant Force applied	**1**	**1**
	(iii)	**Complete list of apparatus and materials** 5 Trolleys, ticker timer, ticker tape, a rubber band, a wooden runway, 12 V a.c power supply, ruler	**1**	**1**
	(iv)	**Arrangement of apparatus :**  	**1**	**1**
	(v)	**State the method of controlling the manipulated variable** 1. The apparatus is set up as shown in the diagram. The ticker-timer is switched on and a trolley is pulled using a rubber band. The extension of the rubber band is ensured to be of the same length **State the method of measuring the responding variable** Acceleration of the trolley is calculated using the ticker-tape. a = (v-u) / t **Repeat the experiment at least 4 times** 4. The experiment is repeated by using 2, 3, 4 and 5 trolleys.	**1** **1**	**3**

<table>
<tr><th colspan="2">Question</th><th>Answer</th><th>Mark</th><th>Total Mark</th></tr>
<tr><td></td><td></td><td></td><td>1</td><td></td></tr>
<tr><td></td><td>(vi)</td><td>Tabulation of data:<table><tr><td>m</td><td>a</td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr></table></td><td>1</td><td>1</td></tr>
<tr><td></td><td>(vii)</td><td>Analyze the data.
 
</td><td>1</td><td>1</td></tr>
<tr><td></td><td></td><td>Total marks</td><td>13</td><td>Max 12</td></tr>
</table>

Question	Answer	Mark	
4 (a)	Inference: Resistance// brightness of bulb depends on the diameter/thickness of the conductor wire	1	
4 (b)	Hypothesis When the diameter/thickness increase , the resistance decrease	1	
4 (c) (i)	Aim : To investigate the relationship between the diameter /thickness of the conductor wire and resistance	1	
(c) (ii)	Variables : Manipulated : diameter / thickness Responding : resistance / voltage	1 1	

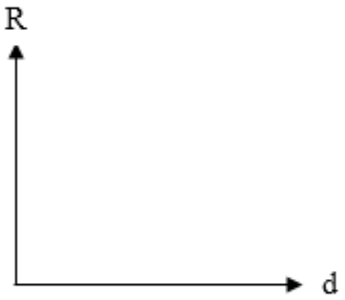
<table>
<tr><td></td><td>Fixed : length of conductor / temperature</td><td>1</td><td></td></tr>
<tr><td>(c) (iii)</td><td>Apparatus and material:
Dry cells, constantan wire, connector wire, ammeter, voltmeter, rheostat , switch, meter rule, micrometres screw gauge</td><td>1</td><td></td></tr>
<tr><td>(c) (iv)</td><td>Set up apparatus : draw a functional diagram
 
</td><td>1</td><td></td></tr>
<tr><td>(c) (v)</td><td>Procedur
A 10 cm length of constantan wire of diameter of 0.1 mm is connected to a circuit as shown in diagram above. Switch is closed.

Adjust the rheostat and until the ammeter reading is I = 0.2A. Measure the corresponding reading on the voltmeter, V
Calculate the resistance, R of conductor using equation R = V/I

Repeat the experiment with the diameter of constantan wire , 0.2 mm , 0.3 mm, 0.4mm and 0.5mm.</td><td>1

1

1</td><td></td></tr>
<tr><td>(c) (vi)</td><td>Tabulating data
<table>
<tr><th>Diameter,d/mm</th><th>Resistance,R/ Ω</th></tr>
<tr><td>0.1
0.2
0.3
0.4
0.5</td><td></td></tr>
</table></td><td>1</td><td></td></tr>
</table>

	(Accept : swg as a scale of diameter)		
(c) (vii)	Analyzing data:  	1	
	TOTAL MARKS	13	Max 12