

**Physics Paper 1**  
**Trial Examination SBP 2011**  
**Marking Scheme**

1	C	26	B
2	C	27	C
3	C	28	A
4	B	29	A
5	A	30	B
6	B	31	B
7	D	32	A
8	C	33	D
9	B	34	B
10	B	35	C
11	B	36	D
12	C	37	D
13	B	38	C
14	C	39	D
15	B	40	A
16	A	41	B
17	B	42	B
18	D	43	B
19	C	44	D
20	C	45	C
21	D	46	D
22	B	47	A
23	C	48	A
24	B	49	C
25	A	50	A

[ 50 marks ]

# PEPERIKSAAN PERCUBAAN SBP FIZIK 2011

## MARKING SCHEME FOR PHYSICS PAPER 2

No		Answer	Mark
1	(a)	Voltage	1
	(b)	0.8 V	1
	(c)	Subtract with reading of zero error	1
	(d)	0.1V	1
		<b>Total</b>	<b>4</b>
2	(a)	Lights with one colour or one wavelength	1
	(b)	Constructive interference takes place and bright fringes are observed.	1
		Destructive interference takes place and dark fringes are observed.	1
	(c)	$x = \frac{4.05}{3} = 1.35 \text{ mm}$ $= 1.35 \times 10^{-3} \text{ m}$ $\lambda = \frac{a x}{D}$ $= \frac{0.5 \times 10^{-3} \times 1.35 \times 10^{-3}}{1.5}$ $= 4.5 \times 10^{-7} \text{ meter}$	1 1
		<b>Total</b>	<b>5</b>
3	(a)	Total number of proton and number of neutron	1
	(b)	$\begin{matrix} 222 \\ \text{Rn} \\ 86 \end{matrix} \longrightarrow \begin{matrix} 218 \\ \text{P}_o \\ 84 \end{matrix} + \begin{matrix} 4 \\ \text{He} \\ 2 \end{matrix}$	2
	(c)	Pb 210	1

	(d)		$3\alpha$ and $2\beta$	2
			<b>Total</b>	<b>6</b>
4	(a)		Convex mirror	1
	(b)		It can provide a wider field of view than plan mirror	1
	(c)	(i)		3
		(ii)	Virtual, upright and diminished	1
	(d)		Size of image increase	1
			<b>Total</b>	<b>7</b>
5	(a)		To measure gas pressure	1
	(b)	(i)	Volume in Diagram 5.1 is higher	1
		(ii)	The reading of Bourdon Gauge in 5.1 is less	1
		(iii)	Temperature is constant	1
	(c)		When the volume of gas decreases the reading of Bourdon Gauge increasing	1
	(d)		Boyle's Law	1
	(e)		<ul style="list-style-type: none"> <li>When the volume of gas decrease, the collision per unit area increases</li> <li>The pressure of gas will increase.</li> </ul>	1
				1
			<b>Total</b>	<b>8</b>



		(iii)	<ul style="list-style-type: none"> <li>• Lower</li> <li>• Voltage lost (voltage drop) will decrease</li> </ul>	1 1
			<b>Total</b>	<b>10</b>
8	(a)	(i)	To limit the current through the transistor	1
		(ii)	The higher the resistance the higher the potential difference	1
	(b)	(i)	Range value of resistance of LDR is 4 k $\Omega$ until 6 k $\Omega$ $V_{BC} = \frac{6}{8} \times 6 = 4.5 \text{ V}$ // $V_{BC} = \frac{4}{8} \times 6 = 4 \text{ V}$	1 1
		(ii)	Range value of resistance of LDR is 4 k $\Omega$ until 6 k $\Omega$ $V_{BC} = \frac{2}{8} \times 6 = 1.5 \text{ V}$ // $V_{BC} = \frac{2}{6} \times 6 = 2.0 \text{ V}$	1 1
		(iii)	Across BC	1
	(c)	(i)	npn  Reason: the terminals of the transistor are correctly connected to the terminals of the batteries // produce forward biased connection.	1 1
		(ii)	Relay switch Reason: to switch on the secondary circuit which need higher voltage	1 1
	(d)		Circuit J	1
			<b>Total</b>	<b>12</b>
9.	(a)		Atmospheric pressure	1
	(b)	(i)	1. Volume in Diagram 9.1 is bigger 2. mass of air trapped same 3. pressure of air trapped in Diagram 9.2 higher	1 1 1
		(ii)	<ul style="list-style-type: none"> <li>• The higher the volume of air trapped the smaller the air pressure // volume inversely proportional with pressure</li> <li>• Boyle's law</li> </ul>	1 1
	(c)		<ul style="list-style-type: none"> <li>• The beaker accelerates upwards</li> </ul>	1

		<ul style="list-style-type: none"> <li>Because buoyant force increase as depth increase // weight of water displace increases</li> <li>This is due to the depth of water increases // pressure of water is high</li> <li>So, buoyant force more than weight / resultant force</li> </ul>	1 1 1												
	(d)	<table border="1"> <thead> <tr> <th>Suggestion</th> <th>Explanation</th> </tr> </thead> <tbody> <tr> <td>Low density // strong // nylon</td> <td> <ul style="list-style-type: none"> <li>Light</li> <li>Does not tear easily.</li> </ul> </td> </tr> <tr> <td>Big size</td> <td>Buoyant force increases // weight of water displace increases.</td> </tr> <tr> <td>Gas burner</td> <td>To heat up air in balloon // reduce density of air in the balloon</td> </tr> <tr> <td>Rope tied to the balloon</td> <td>Avoid the balloon moves away // to hold the balloon.// easy to descend the balloon</td> </tr> <tr> <td>Early in the morning // late evening</td> <td>Air surrounding is cooler // has high density.</td> </tr> </tbody> </table>	Suggestion	Explanation	Low density // strong // nylon	<ul style="list-style-type: none"> <li>Light</li> <li>Does not tear easily.</li> </ul>	Big size	Buoyant force increases // weight of water displace increases.	Gas burner	To heat up air in balloon // reduce density of air in the balloon	Rope tied to the balloon	Avoid the balloon moves away // to hold the balloon.// easy to descend the balloon	Early in the morning // late evening	Air surrounding is cooler // has high density.	2 2 2 2 2
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		<b>Total</b>	<b>20</b>												
10	(a)	Radioactivity is the spontaneous disintegration of unstable nucleus accompanied by the emission of energetic particles or photons	1												
	(b)	1. Initial activity is the same 2. time interval in Diagram 10.1 is longer 3. rate of decay in Diagram 10.1 is lower	1 1 1												
	(c)	(i)	The higher the rate of decay the shorter the time interval	1											
		(ii)	The higher the rate of decay the shorter the half life	1											
	(d)	(i)	${}_{92}^{238}\text{U} \rightarrow {}_{90}^{234}\text{Th} + {}_2^4\text{He}$	2											
		(ii)	1. The number of proton will decreases by 2	1											

			2. The number of neutron will decrease by 2	1																
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11	(a)	(i)	Impulsive force	1																
		(ii)	1 The surface of metal block is hard. 2. The time impact is shorter 3. The impulsive force is bigger	1 1 1																
		(iii)	Drop on a soft surface (idea)	1																
	(b)		<table border="1"> <thead> <tr> <th>characteristics</th> <th>explanation</th> </tr> </thead> <tbody> <tr> <td>Big mass of the load</td> <td>Produce bigger force during impact</td> </tr> <tr> <td>High position of load</td> <td>produce high velocity when strike the pole</td> </tr> </tbody> </table>	characteristics	explanation	Big mass of the load	Produce bigger force during impact	High position of load	produce high velocity when strike the pole	2 2 2										
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			Steel pile	Stronger // stiffer	2
			Sharp base of the pole	produce high pressure // easy to push the pole into the ground	2
			Q is chosen	Because piling system Q has big mass of pile driver , the position of load is high, steel pile and has the sharp base of pole.	
	(c)	(i)	$W = mg$ $= (50) (10) = 500 \text{ N}$		1
		(ii)	$v^2 = u^2 + 2gs$ $= 0 + 2 (10)(20)$ $= /400$ $V = 20 \text{ ms}^{-1}$		1 1
		(iii)	$F = \frac{mv - mu}{t}$ $= \frac{50(0 - 20)}{0.5}$ $= 2000 \text{ N}$		1 1
			<b>Total</b>		<b>20</b>
12.	(a)	(i)	Electromagnetic Induction		1
		(ii)	1. An alternating current flows in the primary coil 2. Producing magnetic flux which always change the direction and magnitude 3. The magnetic flux flows to the secondary coil through the soft iron core 4. Cutting / changing of flux occurs thus producing emf / induced current.		1 1 1 1

	(b)		characteristics	explanation	
			Curved shape	Produce radial magnetic field	2
			Soft iron	Easily to magnetised and demagnetised	2
			Soft spring	Can detect small current // more sensitive // can measured small current	2
			Linear scale	Uniform deflection // force produced directly proportional to current.	2
			T is chosen	Curved shape, Soft iron , soft spring and linear scale	2
	(c)	(i)	$\frac{N_p}{N_s} = \frac{V_p}{V_s}$ $= \frac{240}{60}$ $= 4$		1 1
		(ii)	$I = \frac{P}{V}$ $= \frac{60}{12}$ $= 5 \text{ A}$		1
		(iii)	$80 = \frac{P_o}{P_i} \times 100$ $80 = \frac{60}{I_p (240)} \times 100$ $I_p = 0.3125 \text{ A}$		1 1
				<b>Total</b>	<b>20</b>

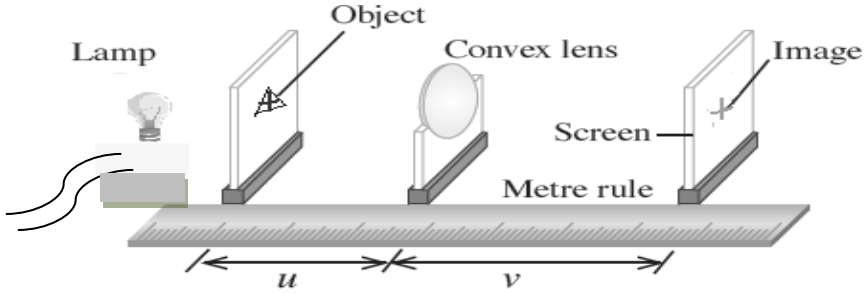
# MARKING SCHEME TRIAL SPM PAPER 3 2011

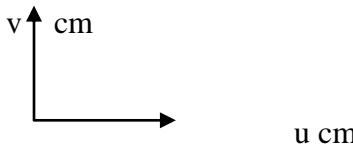
## SECTION A

NO.	ANSWER	MARK																		
1(a)	(i) mass	1																		
	(ii) Volume of air, V	1																		
	(iii) mass of air // temperature	1																		
(b)	<p><b>Tabulate m, V and <math>\frac{1}{V}</math> correctly in the table.</b></p> <p><b>A</b> Shows a table m, V and <math>\frac{1}{V}</math>.</p> <p><b>B</b> State the correct unit of m, V and <math>\frac{1}{V}</math>.</p> <p><b>C</b> 3 values of V are correct</p> <p><b>D</b> All values of V are correct</p> <p><b>E</b> All calculations values of <math>\frac{1}{V}</math> are correct</p> <p><b>F</b> State V consisten 1 d.p.</p> <p><b>G</b> State <math>\frac{1}{V}</math> consistent 2 or 3 d.p</p> <table border="1" style="margin: 10px auto; border-collapse: collapse; text-align: center;"> <thead> <tr style="background-color: #cccccc;"> <th style="padding: 5px;">Mass, m/kg</th> <th style="padding: 5px;">Volume of air, V/cm<sup>3</sup></th> <th style="padding: 5px;"><math>\frac{1}{V} / \text{cm}^{-3}</math></th> </tr> </thead> <tbody> <tr><td style="padding: 5px;">0.5</td><td style="padding: 5px;">9.0</td><td style="padding: 5px;">0.111</td></tr> <tr><td style="padding: 5px;">1.0</td><td style="padding: 5px;">4.8</td><td style="padding: 5px;">0.210</td></tr> <tr><td style="padding: 5px;">1.5</td><td style="padding: 5px;">3.3</td><td style="padding: 5px;">0.303</td></tr> <tr><td style="padding: 5px;">2.0</td><td style="padding: 5px;">2.5</td><td style="padding: 5px;">0.400</td></tr> <tr><td style="padding: 5px;">2.5</td><td style="padding: 5px;">2.0</td><td style="padding: 5px;">0.500</td></tr> </tbody> </table>	Mass, m/kg	Volume of air, V/cm <sup>3</sup>	$\frac{1}{V} / \text{cm}^{-3}$	0.5	9.0	0.111	1.0	4.8	0.210	1.5	3.3	0.303	2.0	2.5	0.400	2.5	2.0	0.500	7
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(c)	<p><b>Draw the graph of <math>\frac{1}{V}</math> against m .</b></p> <p><b>A</b> - Label y-axis and x-axis correctly</p> <p><b>B</b> - State the unit at the axis correctly</p> <p><b>C</b> - Both axes with the even and uniform scale:</p> <p><b>D</b> - 5 points correctly plotted:</p> <p><b>E</b> - a smooth best straight line</p> <p><b>F</b> - minimum size of the graph is 5 x 4 squares of 2 x 2 cm.</p> <table border="1" style="margin: 10px auto; border-collapse: collapse; text-align: center;"> <thead> <tr style="background-color: #cccccc;"> <th style="padding: 5px;">No of ticks</th> <th style="padding: 5px;">Score</th> </tr> </thead> <tbody> <tr><td style="padding: 5px;">6</td><td style="padding: 5px;">5</td></tr> <tr><td style="padding: 5px;">5</td><td style="padding: 5px;">4</td></tr> <tr><td style="padding: 5px;">3-4</td><td style="padding: 5px;">3</td></tr> <tr><td style="padding: 5px;">2</td><td style="padding: 5px;">2</td></tr> <tr><td style="padding: 5px;">1</td><td style="padding: 5px;">1</td></tr> </tbody> </table>	No of ticks	Score	6	5	5	4	3-4	3	2	2	1	1	5						
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5	4																			
3-4	3																			
2	2																			
1	1																			

(d)	<b>State the correct relationship based on the candidate's graph</b> $\frac{1}{V}$ is directly proportional to $m$ // $\frac{1}{V}$ is increasing linearly to $m$	1
<b>TOTAL MARK</b>		<b>16</b>
2 (a)	(i) decreases	1
	(ii) Show a extrapolation line on graph 1.00V	1 1
	(iii) Electromotive force (e.m.f)	1
(b)	(i) Show a big triangle on graph Substitution: $m = \frac{0.50 - 1.00}{0.73 - 0.00}$ $m = -0.685 \Omega @ -0.685 \text{ VA}^{-1} \text{ (Answer with unit)}$	1 1 1
	(ii) $r = 0.685 \Omega @ 0.685 \text{ VA}^{-1}$ (Answer with unit)	1
(c)	(i) Substitution : $1.00 = V + (0.90)(0.685)$ Answer : 0.384 V / 0.38 V (answer with unit)	1 1
	(ii) $\frac{0.38}{0.90}$ // 0.422 $\Omega$	1
(d)	Eyes position must be perpendicular to the scale of ammeter /voltmeter.when taking the measurements// Make sure the connection is tight // Do repeated readings of the potential difference, V for each current flows for three times and find the average value	1
<b>TOTAL MARK</b>		<b>12</b>

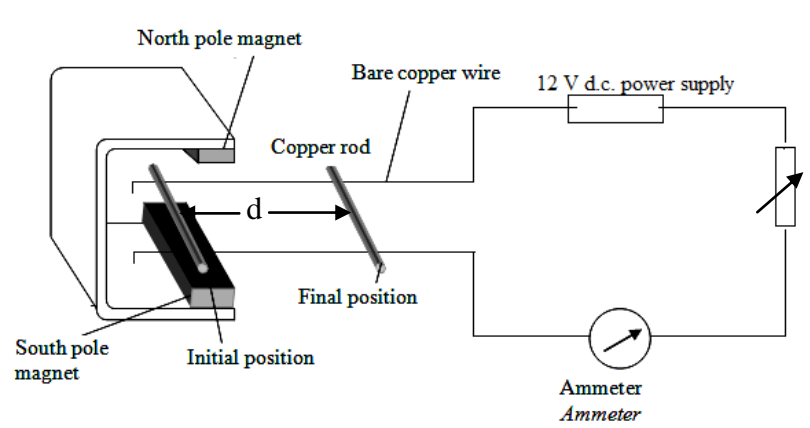
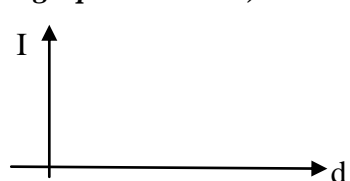
## SECTION B

NO	ANSWER	MARK
3 (a)	<p><b>State the suitable inference</b> The image distance depends on object distance</p>	1
(b)	<p><b>State a relevant hypothesis</b> If the object distance is shorter / decreases, the image distance will be longer / increases</p>	1
(c)	<p><b>State the aim of experiment</b> To investigate the relationship between the object distance, <math>u</math> and image distance, <math>v</math> of the convex lens.</p>	1
	<p><b>State the suitable manipulated variables and responding variable (Quantity that can be measured)</b> Manipulated variable : object distance, <math>u</math> Responding variable : Image distance, <math>v</math></p>	1
	<p><b>State the constant variable</b> Focal length, <math>f</math> of the convex lens <i>Rej :Type of lens</i></p>	1
	<p><b>State the complete list of apparatus and materials</b> Convex lens, bulb with holder, 12 V a.c power supply, white screen, cardboard with triangular hole fixed with cross wire, plasticine and meter rule</p>	1
	<p><b>Draw the functional arrangement of the apparatus</b></p> 	1
	<p><b>State the method to control the manipulated variable</b></p> <p>A convex lens with focal length, <math>f = 10 \text{ cm}</math> is set up as shown in the diagram. The distance between the cross wires and the convex lens, <math>u</math> (object distance) = <math>30.0 \text{ cm}</math> is measured (using metre rule)</p>	1
	<p><b>State the method to measure the responding variable</b></p> <p>The power supply is switched on. The white screen is moved back and forth until a sharp image is formed on the screen . The distance between the screen and lens, <math>v</math> ( image distance <math>v</math>) is measured</p>	1
	<p><a href="http://cikguadura.wordpress.com">http://cikguadura.wordpress.com</a></p>	

	<p><b>Repeat the experiment at least 4 times with the values</b></p> <p>The experiment is repeated with <math>u = 26.0\text{cm}, 22.0\text{ cm}, 18.0\text{ cm}</math> and <math>14.0\text{cm}</math></p>	1												
	<p><b>State how the data tabulated with the title MV and RV</b></p> <table border="1" data-bbox="300 443 1244 705"> <thead> <tr> <th>Object distance, u( cm)</th> <th>Image distance, v( cm)</th> </tr> </thead> <tbody> <tr><td>30.0</td><td></td></tr> <tr><td>26.0</td><td></td></tr> <tr><td>22.0</td><td></td></tr> <tr><td>18.0</td><td></td></tr> <tr><td>14.0</td><td></td></tr> </tbody> </table>	Object distance, u( cm)	Image distance, v( cm)	30.0		26.0		22.0		18.0		14.0		1
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	<p><b>State how the data is analysed, plot a graph RV against MV</b></p> <div style="text-align: center;">  </div> <p><i>accept graph of <math>\frac{1}{v}</math> against <math>\frac{1}{u}</math></i></p>	1												
<b>TOTAL MARK</b>		<b>12</b>												

**QUESTION 4**

SECTION	MARK	ANSWER
4 (a)	1	<p><b><i>State a suitable inference</i></b></p> <p>Penetration distance depends on potential difference,p.d // Force depends on potential difference,p.d /current</p>
4 (b)	1	<p><b><i>State relevant hypothesis</i></b></p> <p>As the p.d /current increases the penetration distance /force increases</p>
4 c (i)	1	<p><b><i>State the aim of the experiment</i></b></p> <p>To investigate the relationship between the current /voltage and the distance travelled</p>
4c (ii)	1	<p><b><i>State the manipulated variable and the responding variable</i></b></p> <p>Manipulated : electric current/ voltage Responding : distance travelled</p>
	1	<p><b><i>State the constant variable</i></b></p> <p>Constant variable : strength of the magnet // number of magnets</p>

4 c(iii)	1	<p><b>List out the important apparatus and materials</b></p> <p>magnadur magnets , U- shaped iron yoke , copper rod, d.c power supply, ammeter, metre ruler, bare copper wire, rheostat</p>												
4 c(iv)	1	<p><b>State a functional arrangement of the apparatus</b></p> 												
4 c(v)	1	<p><b>State the method of controlling the manipulated variable</b></p> <p>The magnets is set as shown in diagram. The d.c. power supply is switched on. The rheostat is adjusted until the reading of ammeter is <math>I = 0.5 \text{ A}</math></p>												
4 c(vi)	1	<p><b>State the method of measuring the responding variable</b></p> <p>The distance of copper rod moves on the bare copper wire from the initial position to final position, <math>d</math> is measured using a metre ruler</p>												
4c(vii)	1	<p><b>Repeat the experiment at least 4 times with different values</b></p> <p>The experiment is repeated with <math>I = 1.0 \text{ A}</math>, <math>1.5 \text{ A}</math>, <math>2.0 \text{ A}</math>, and <math>2.5 \text{ A}</math></p>												
4c(viii)	1	<p><b>Tabulate the data</b></p> <table border="1" data-bbox="638 1344 1340 1612"> <thead> <tr> <th>Current, <math>I</math> (A)</th> <th>Distance travelled' <math>d</math> (cm)</th> </tr> </thead> <tbody> <tr> <td>0.5</td> <td></td> </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> </tbody> </table>	Current, $I$ (A)	Distance travelled' $d$ (cm)	0.5		1.0		1.5		2.0		2.5	
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1.0														
1.5														
2.0														
2.5														
4c(ix)	1	<p><b>State how data will be analysed (sketch graph/statement)</b></p> <p>Plot a graph <math>d</math> against <math>I</math></p> 												
<b>TOTAL</b>	<b>12</b>													