MAJLIS PENGETUA SEKOLAH MALAYSIA

(CAWANGAN PULAU PINANG)

MODUL LATIHAN BERFOKUS SPM 2019
4531/2(PP)

FIZIK

Kertas 2

PERATURAN PEMARKAHAN

UNTUK KEGUNAAN PEMERIKSA SAHAJA

Peraturan pemarkahan ini mengandungi 10 halaman bercetak

NO		MARKING SCHEME	MARK	
			SUB	TOTAL
1	(a)	Conductor that can conduct electric current better than insulator not as good as metal conductor	1	1
	(b)	Arsenic / phosphorus / Antimony (any pentavalent atom)	1	1
	(c) (i)	n-type	1	1
	(c)(ii)	doping	1	1
				4
2	(a)	Force that oppose the motion.	1	1
	(b)(i)	F=0 N	1	1
	(b)(ii)	35 N + 85 N 120 N	1 1	2
	(c)	increase	1	1
				5
3	(a)	Energy that transfers from one object to another that are in thermal contact because of a temperature difference.	1	1
	(b)	M1 **Canned drinks release heat** to ice while ice absorbs heat from canned drinks. M2 **The temperature of canne drinks decreases** until thermal equilibrium is achieved. M3 **The nett heat flows between ice and canned drinks is equal to zero** when thermal equilibrium is achieved. **[Maximum 2 marks]**		2
	(c)	0 °C **[Answer with unit]**	1	1
	(d)	$Q_f = mL_f$		

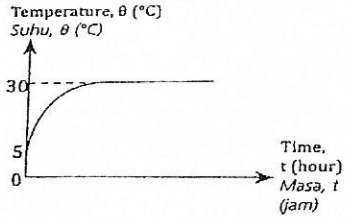
		$318 \times 10^3 = m(3.36 \times 10^5)$ $m = 0.946\ kg$	1 1	2
				6
4	(a)	Current amplifier	1	1
	(b)	Diode	1	1
	(c)	M1 During the dark, the resistance of LDR is high. **The base voltage is high and transistor is switched on.** M2 Base current flows in base circuit causes higher collector current flows in collector circuit. **The electromagnetic switch is switched on.** M3 **Current flows in secondary circuit** and the streetlights are switched on. **[Maximum 2 marks]**	2	2
	(d)	The voltage from the batteries (6V) is not high enough to switch on the streetlights (450V). // The streetlights need 450 V to switch on.	1	1
	(e)	$V_{TU} = \left(\frac{32 \times 10^3}{(8 \times 10^3) + (32 \times 10^3)}\right)(6)$ $= 4.8\ V$	1 1	2
				7
5	(a)	Pascal's Principle	1	1
	(b)	**M1** When the small piston is pressed down, **the pressure is exerted on the liquid and transmits uniformly to the large piston** **M2** **The larger force is produced at large piston** pushes the chair up // **Force is multiplied at large piston** and push the chair up	2	2

	(c)	Some of the force is used to compress air bubbles	1	1
	(d)(i)	$\frac{F}{20} = \frac{500}{100}$ F = 100 N	1 1	2
		Isipadu di mampatkan = Isipadu di gerakkan 20 x 10 = 100 x Y Y = 2 cm	1 1	2
				8
6	(a)	Resistance / Rintangan	1	
	(b)(i)	Diagram 6.2 is more the diagram 6.1	1	
	(ii)	Diagram 6.1 is more than diagram 6.2	1	
	(iii)	Diagram 6.1 is more than diagram 6.2	1	
	(c)(i)	As the potential difference increases, the current increases // V is directly proportionally to I	1	
	(ii)	Ohm's law	1	
	(d)(i)	Decreases	1	
	(ii)	Parallel circuit decreases the effective resistance	1	8
7	(a)	A temporary magnet made by winding a coil of insulated wire round a soft iron core where it becomes magnetized when a current flows.	1	1
	(b) (i)	U-shape Stronger magnetic field strength.	1 1	2
	(ii)	Higher number of turns of the coil Stronger magnetic field strength.	1 1	2

	(iii)	Thicker wire Lower resistance, higher current.	1 1	2
	(c)(i)	Step-down transformer	1	1
	(ii)	$\frac{240}{6} = \frac{2000}{N_S}$ $N_S = 50$	1 1	2
				10
8	(a)	Hooke's law	1	1
	(b)(i)	$(2)(10) = k(0.04)$ $k = 500\ \text{N m}^{-1}$	1 1	2
	(ii)	$E = \frac{1}{2}(500)(0.04)^2$ $= 0.4\ \text{J}$	1 1	2
	(c)(i)	Spring arranges in parallel Higher spring constant// Stiffer spring// Withstand larger weight with same extension of spring	1 1	2
	(ii)	Thicker wire Higher spring constant// Stiffer spring// Withstand larger weight with same extension of spring	1 1	2
	(iii)	Smaller diameter of spring coil Higher spring constant// Stiffer spring// Withstand larger weight with same extension of spring	1 1	2
	(d)	T	1	2
				11

9	(a)(i)	Angle between incident ray and normal line	1	**1**
	(a)(ii)	M1 Increase the angle of incidence,i, then angle of refraction,r will also increase M2 Keep on increasing the angle of incidence until angle of refraction is 90° M3 The angle of incidence is called critical angle M4 Increase the angle of of incidence more than the critical angle M5 The ray will be reflected. **[Max : 4marks]**	4	**4**
	(b)	M1 Density diagram 9.2 < density diagram 9.3 M2 Refractive index 9.2 < Refractive index 9.3 M3 Angle of refraction in diagram 9.2 > angle of refraction in diagram 9.3 M4 The higher the density the smaller the angle of refraction M5 The higher the refractive index the smaller the angle of refraction.	5	**5**

<table>
<tr><td></td><td>(c)</td><td>
<table>
<tr><th>Suggestion</th><th>Explanation</th></tr>
<tr><td>Use refractive index of outer layer is less than the refractive index of inner layer</td><td>So that total internal reflection can happen in the fiber optic.</td></tr>
<tr><td>Use high flexibility material</td><td>so that it can be easily bend</td></tr>
<tr><td>Use strong material</td><td>do not break easily</td></tr>
<tr><td>Use thin material</td><td>Lighter // can be used in small area</td></tr>
<tr><td>Low density material</td><td>Lighter // lower mass</td></tr>
</table>
</td><td>1+1
1+1
1+1
1+1
1+1</td><td>10</td></tr>
<tr><td></td><td></td><td></td><td></td><td>20</td></tr>
<tr><td>10</td><td>(a)(i)</td><td>Nuclear fusion is a process of combining two lighter nuclei to form a heavier nucleus.</td><td>1</td><td>1</td></tr>
<tr><td></td><td>(a)(ii)</td><td>M1 The number of neutrons produced is the same in both reactions.
M2 The quantity of energy released in Diagram 10.1> 10.2
M3 The mass defect in Diagram 10.1 > 10.2
M4 Conservation energy
M5 The bigger the mass defect, the larger the quantity of energy released</td><td>5</td><td>5</td></tr>
<tr><td></td><td>(b)(i)</td><td>Nuclear fission</td><td>1</td><td>1</td></tr>
<tr><td></td><td>(b)(ii)</td><td>M1 A neutron bombards a uranium nucleus to produce two neutrons and energy.
M2 The new neutron bombards another new uranium nuclues</td><td>3</td><td></td></tr>
</table>

		M3 The differences in mass is converted to energy M4 The energy released is given by the equation $E=mc^2$. **[Maximum 3 marks]**		3
	(c)	**Characteristic** / **Reason** Boron control rod / To absorb some of the neutrons.// Control the chain reaction Graphite moderator / To slow down high speed neutrons Heavy water for cooling agent / High specific heat capacity// Can absorb large amount of heat without high temperature increase Heat exchanger pipe is longer/ has more loops / To increase the area where the heat is absorbed by water Thick concrete / To prevent the leakage of radiation// Strong	1+1 1+1 1+1 1+1 1+1	10
				20
11	(a)(i)	Heat absorbed or the heat released at a constant temperature during the change of phase of a substance	1	1
	(a)(ii)	M1 Water has a large specific latent heat of vaporisation M2 Steam comes out from the kettle when the lid is open M3 A large amount of latent heat released to the Surroundings M4 We feel hot because of the large amount of latent heat released to the surroundings	4	4
	(b)(i)	 1 mark – both axis with correct unit 1 mark – graph	2	2

<table>
<tr><td></td><td>(b)(ii)</td><td>Heat absorbed , Q = m c Θ
$= (0.2)(4.2\times10^{3})(30-5)$
$= 2.1\times10^{4}$ J
[Answer with unit]</td><td>1
1
1</td><td>3</td></tr>
<tr><td></td><td>(c)</td><td>
<table>
<tr><th>Characteristic</th><th>Reason</th></tr>
<tr><td>Alcohol</td><td>To prevent liquid freeze at -65°C // Not easy to freeze //Freezing point is low // Suitable record temperature at -65°C</td></tr>
<tr><td>Thin wall</td><td>More sensitive to heat // easy to reach thermal equilibrium</td></tr>
<tr><td>Smaller diameter of capillary tube</td><td>More sensitive to heat</td></tr>
<tr><td>Thick glass-bore stem</td><td>Durable // last longer</td></tr>
<tr><td>E is chosen</td><td>Because it has low freezing point < -65°C, high boiling point > 20°C, thin wall, smaller diameter of capillary tube, thick glass-bore stem</td></tr>
</table>
</td><td>2
2
2
2
2</td><td>10</td></tr>
<tr><td></td><td></td><td></td><td></td><td>20</td></tr>
<tr><td>12</td><td>(a)</td><td>Reflection of wave</td><td>1</td><td>1</td></tr>
<tr><td></td><td>b(i)</td><td>
<table>
<tr><th>Radiowave</th><th>Sound wave</th></tr>
<tr><td>Transverse waves</td><td>Longitudinal waves</td></tr>
<tr><td>Can travel without medium</td><td>Need medium to travel</td></tr>
<tr><td>Long wavelength</td><td>Short wavelength</td></tr>
</table>
[maximum 2 marks]
</td><td>2</td><td>2</td></tr>
<tr><td></td><td>(ii)</td><td>The distance between the water molecules is closer compared to air molecules.
Thus, the sound energy can be transferred faster.</td><td>1
1</td><td>2</td></tr>
<tr><td></td><td>c</td><td>
<table>
<tr><th>Specifications</th><th>Reason</th></tr>
<tr><td>Longitudinal</td><td>Because sonar is a sound waves which is a longitudinal wave // need medium to propagate</td></tr>
<tr><td>High frequency</td><td>Has high energy // Higher penetrating power</td></tr>
<tr><td>High speed</td><td>Can travel faster</td></tr>
<tr><td>High penetrating power</td><td>Can penetrate through medium easily</td></tr>
<tr><td>The most suitable waves is S</td><td>Because the waves is longitudinal, high frequency , high penetrating</td></tr>
</table>
</td><td>10</td><td>10</td></tr>
</table>

		power and has high speed		
	d(i)	$d = \frac{vt}{2}$ $= \frac{1500 \, x \, 1}{2 \, x \, 15}$ = 50 m **[Answer with unit]**	1 1 1	3
	ii	M1 To detect the depth of seabed M2 To detect the position of crude oil or sunken ship M3 To detect the condition of baby in the womb. **[maximum 2 marks]**	2	2
				20