

## NO KAD PENGENALAN

ANGKA GILIRAN



## JABATAN PELAJARAN NEGERI JOHOR

# **PEPERIKSAAN PERCUBAAN SIJIL PELAJARAN MALAYSIA 2008**

PHYSICS

Kertas 2

September 2008

2 ½ jam

4531/2

Dua jam tiga puluh minit

**JANGAN BUKA KERTAS SOALANINI SEHINGGA DIBERITAHU**

1. Tuliskan nombor kad pengenalan dan angka giliran anda pada ruang yang disediakan.
  2. Kertas soalan ini adalah dalam dwibahasa.
  3. Soalan dalam Bahasa Inggeris mendahului soalan yang sepadan dalam Bahasa Melayu.
  4. Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam Bahasa Inggeris atau Bahasa Melayu.
  5. Calon dikendaki membaca maklumat di halaman belakang kertas soalan ini.

Kod Pemeriksa			
Bahagian	Soalan	Markah Penuh	Markah Diperoleh
A	1	4	
	2	5	
	3	6	
	4	7	
	5	8	
	6	8	
	7	10	
	8	12	
B	9	20	
	10	20	
C	11	20	
	12	20	
Jumlah			

Kertas soalan ini mengandungi 31 halaman bercetak dan 1 halaman tidak bercetak

**Section A**  
**Bahagian A**

[60 marks]  
[60 markah]

*Answer all question in this section.*  
*Jawab semua soalan dalam bahagian ini.*

- 1 Diagram 1 shows a displacement - time graph of the oscillation of a loaded spring.

*Rajah 1 menunjukkan graf sesaran - masa bagi satu ayunan spring berbeban.*

Displacement / cm  
Sesaran / cm

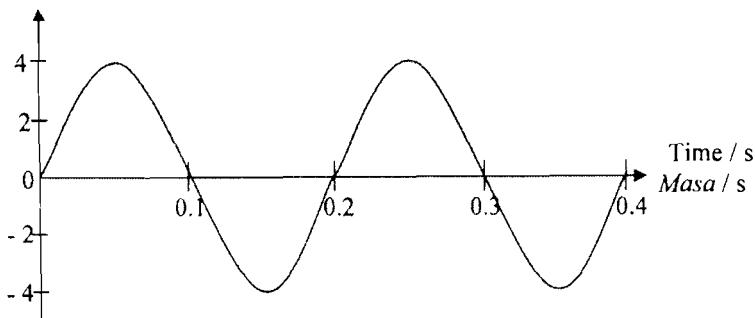


Diagram 1  
Rajah 1

- (a) Base on Diagram 1,

*Berdasarkan Rajah 1,*

- (i) Label the period using the symbol T.

*Labelkan tempoh menggunakan simbol T.*

[1 mark]  
[1 markah]

- (ii) What is the period of the oscillation?

*Berapakah tempoh bagi satu ayunan?*

[1 mark]  
[1 markah]

- (b) What is meant by amplitude?

*Apakah yang dimaksudkan dengan amplitud?*

.....  
[1 mark]  
[1 markah]

- (c) If the spring is undergoing damping, what will happen to the amplitude of the oscillation?

*Jika spring itu mengalami pelembutan, apakah yang akan berlaku kepada amplitudnya?*

.....  
[1 mark]  
[1 markah]

- 2 Diagram 2.1 shows a driver that is driving under a hot sun, sees a pool of water appearing on the road ahead, but the pool of water disappears as the car approaches it.

*Rajah 2.1 menunjukkan seorang pemandu yang sedang memandu pada hari yang panas ternampak tompokan air di hadapan, tetapi tompokan air itu hilang apabila pemandu itu menghampirinya.*

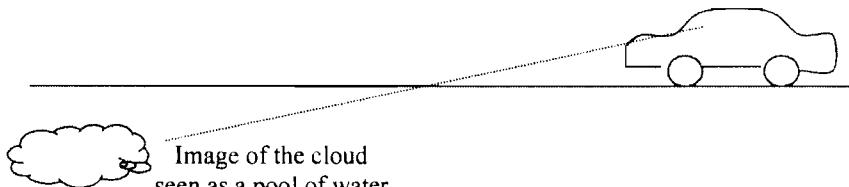


Image of the cloud  
seen as a pool of water

*Imej awan kelihatan  
seperti tompokan air*

Diagram 2.1

*Rajah 2.1*

- (a) Name this natural phenomenon as observed by the driver.

*Namakan fenomena semula jadi ini.*

[1 mark]

[1 markah]

- (b) State the physics concept that is involved in this phenomenon.

*Nyatakan konsep fizik yang terlibat dalam fenomena ini.*

[1 mark]

[1 markah]

- (c) (i) How is the density of the cool air compare to the density of the warm air?

*Bandingkan ketumpatan udara sejuk dengan udara suam.*

[1 mark]

[1 markah]

- (ii) When light rays propagates from a denser medium to a less dense medium, state what happen to the direction of the refracted rays.

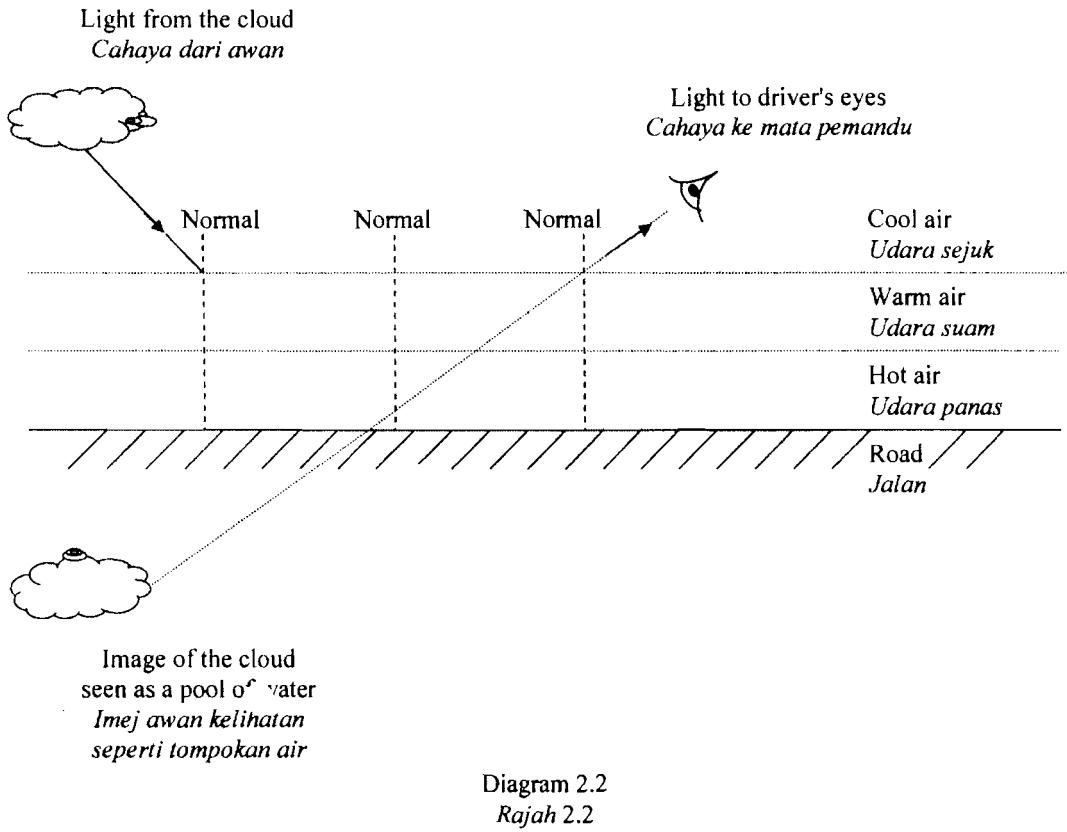
*Apabila cahaya merambat dari medium lebih tumpat ke medium kurang tumpat, apakah yang akan berlaku kepada arah perambatan gelombang cahaya yang terbias.*

[1 mark]

[1 markah]

- (iii) Complete Diagram 2.2 to show the formation of the natural phenomenon as shown in Diagram 2.1.

*Lengkapkan Rajah 2.2 bagi menunjukkan kejadian semula jadi yang ditunjukkan dalam Rajah 2.1.*



[1 mark]  
[1 markah]

- 3 Diagram 3.1 shows a cheetah chasing a deer in a wild world. Given that the mass and velocity of the cheetah and the deer are  $60 \text{ kg}$ ,  $20 \text{ m s}^{-1}$  and  $70 \text{ kg}$ ,  $15 \text{ m s}^{-1}$  respectively. Diagram 3.2 shows the cheetah successfully landed its jaws on the deer and both of them are moving with a same velocity of  $v \text{ m s}^{-1}$ .

*Rajah 3.1 menunjukkan seekor harimau bintang sedang mengejar seekor rusa. Diberi jisim dan halaju bagi harimau bintang dan rusa itu adalah masing-masing  $60 \text{ kg}$ ,  $20 \text{ m s}^{-1}$  dan  $70 \text{ kg}$ ,  $15 \text{ m s}^{-1}$ .*

*Rajah 3.2 menunjukkan harimau bintang itu berjaya menangkap rusa dan kedua-duanya bergerak dengan halaju yang sama,  $v \text{ m s}^{-1}$ .*

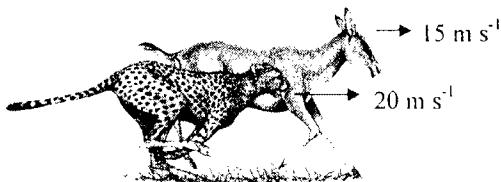


Diagram 3.1

Rajah 3.1

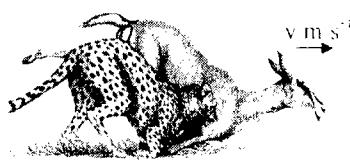


Diagram 3.2

Rajah 3.2

- (a) Name a physics quantity that relates the mass and velocity.

*Namakan satu kuantiti fizik yang mengaitkan jisim dengan halaju.*

[1 mark]

[1 markah]

- (b) State the type of energy that is possessed by the running cheetah.

*Nyatakan jenis tenaga yang dipunyai oleh harimau bintang yang sedang berlari.*

[1 mark]

[1 markah]

- (c) Calculate the final velocity of the cheetah and the deer.

*Hitung halaju sepunya bagi harimau bintang dan rusa.*

[2 marks]

[2 markah]

- (d) (i) Name the Physics principle that is involved in the above hunting.

*Namakan prinsip Fizik yang terlibat dalam pemburuan di atas.*

..... [1 mark]

[1 markah]

- (ii) Define the Physics principle that you mention in (d)(i).

*Takrifkan prinsip Fizik yang anda nyatakan dalam (d)(i).*

..... [1 mark]

[1 markah]

- 4 Diagram 4.1 shows a SONAR waves is sent by transmitter at the lower part of the boat and the echoes are detected by hydrophone.

Diagram 4.2 shows the trace on the screen of oscilloscope.

*Rajah 4.1 menunjukkan gelombang SONAR yang dihantar melalui transmitter ke dasar laut dan gema dikesan oleh hidrofon.*

*Rajah 4.2 menunjukkan surihan gelombang yang dipaparkan oleh skrin osiloskop*

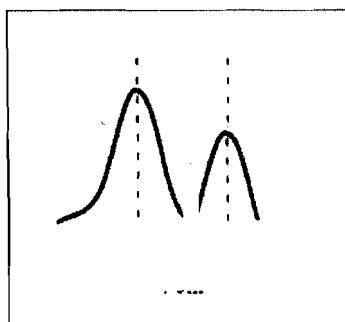
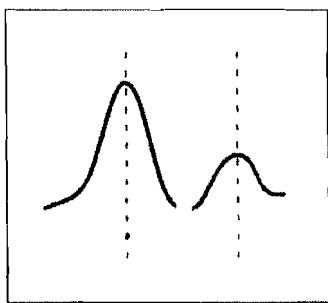
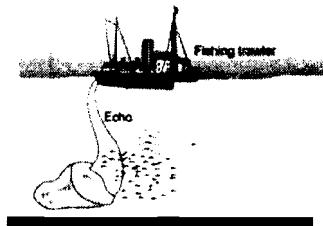
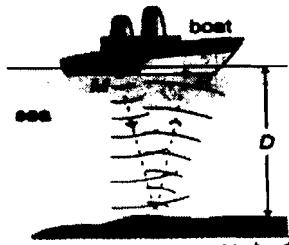


Diagram 4.1  
Rajah 4.1

Diagram 4.2  
Rajah 4.2

- (a) What is meant by wavelength?

*Apakah yang dimaksudkan dengan panjang gelombang?*

[ 1 mark]  
[1 markah]

- (b) Sound waves with frequency of  $5.8 \times 10^5$  Hz are used to determine the depth of the sea. The speed of sound waves in sea water is  $1250 \text{ ms}^{-1}$ . The time-base of the oscilloscope is adjusted at  $50 \text{ ms cm}^{-1}$ . If the time interval between the transmitting and receiving a pulse of waves is 1.2 s. Calculate

*Gelombang bunyi berfrekuensi  $5.8 \times 10^5$  Hz digunakan untuk menentukan kedalaman laut. Laju gelombang air ialah  $1250 \text{ ms}^{-1}$ . Dasar-masa bagi osiloskop dilaraskan pada  $50 \text{ ms cm}^{-1}$ . Jika sela masa di antara denyutan gelombang tuju dan gelombang yang diterima adalah 1.2 s. Hitung*

- (i) the depth of the sea.

*kedalaman laut*

[2 marks]  
[2 markah]

- (ii) the wavelength of the sound wave.

*panjang gelombang bagi gelombang bunyi*

[2 marks]  
[2 markah]

- (c) Observe the Diagram 4.1 and 4.2.

*Perhatikan Rajah 4.1 dan Rajah 4.2*

- (i) Compare the amplitude of the reflection waves.

*Bandingkan amplitudo gelombang pantulan yang dihasilkan*

.....

[1 mark]  
[1 markah]

- (ii) Explain your answer in (c) (i)

*Jelaskan jawapan anda di (c)(i)*

.....

[1 mark]  
[1 markah]

5 Diagram 5.1 shows a load placed on an ice block.

Diagram 5.2 shows an ice block without the load.

Rajah 5.1 menunjukkan beban diletakkan di atas blok ais.

Rajah 5.2 menunjukkan blok ais tanpa beban di atasnya.

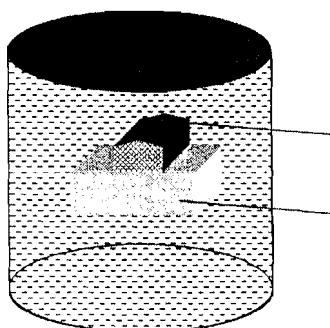


Diagram 5.1

Rajah 5.1

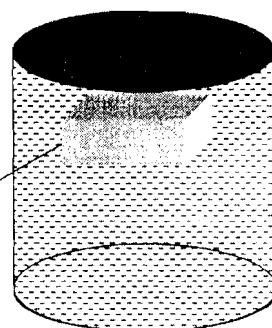


Diagram 5.2

Rajah 5.2

- (a) What is meant by density?

*Apakah yang dimaksudkan dengan ketumpatan?*

[1 mark]

[1 markah]

- (b) Explain why the ice block float in water.

*Jelaskan mengapa blok ais terapung dalam air.*

[1 mark]

[1 markah]

- (c) What are the forces acting on the ice block?

*Apakah daya-daya yang bertindak ke atas blok ais?*

[1 mark]

[1 markah]

- (d) Base on Diagram 5.1 and Diagram 5.2,  
*Berdasarkan Rajah 5.1 dan Rajah 5.2.*

- (i) compare the volume of water displaced.

*bandingkan isipadu air yang tersesar.*

.....  
[1 mark]  
[1 markah]

- (ii) compare the weight of water displaced.

*bandingkan berat air yang tersesar.*

.....  
[1 mark]  
[1 markah]

- (iii) Compare the buoyant force.

*bandingkan daya julangan.*

.....  
[1 mark]  
[1 markah]

- (iv) State the relationship between buoyant force and the weight of water displaced.

*Nyatakan hubungan diantara daya julangan dan berat air yang tersesar.*

.....  
[1 mark]  
[1 markah]

- (v) Name the principle of physics involve.

*Namakan prinsip fizik yang terlibat.*

.....  
[1 mark]  
[1 markah]

- 6 Diagram 6 shows a series of observation and record made by a student on a melting ice cube that is put in a metal plate.

Rajah 6 menunjukkan satu siri pemerhatian dan catatan yang dibuat oleh seorang pelajar tentang peleburan sekutu ais di dalam satu bekas logam.

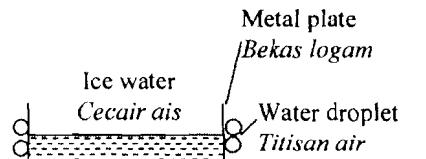
<b>The ice starts to melt</b>	<b>All the ice has</b>
	
Mass of ice = 20 g <i>Jisim ais = 20 g</i>	Mass of ice water = 20 g <i>Jisim cecair ais = 20 g</i>
Temperature of ice = $0^{\circ}\text{C}$ <i>Suhu ais = <math>0^{\circ}\text{C}</math></i>	Temperature of ice water = $0^{\circ}\text{C}$ <i>Suhu cecair ais = <math>0^{\circ}\text{C}</math></i>
Time = 0 s <i>Masa = 0 s</i>	Time = 60 s <i>Masa = 60 s</i>
Temperature of the metal plate = $20^{\circ}\text{C}$ <i>Suhu bekas logam = <math>20^{\circ}\text{C}</math></i>	Water droplets form on the metal plate <i>Titisan air terbentuk di bekas logam</i>

Diagram 6  
Rajah 6

- (a) Name two sources where the ice cube obtained the heat to change into ice water.

Namakan dua punca di mana ketulan ais itu mendapat haba untuk menukar menjadi cecair ais.

.....  
[2 marks]  
[2 markah]

- (b) State the change in physical state when the ice cube is melted into ice water.

Nyatakan perubahan keadaan fizik apabila ketulan ais itu melebur menjadi cecair ais.

.....  
[1 mark]  
[1 markah]

- (c) (i) Name the physics quantity that is involved when ice cube change to water at constant temperature.

*Namakan kuantiti fizik yang terlibat apabila ais bertukar menjadi air pada suhu tetap.*

.....  
[1 mark]  
[1 markah]

- (ii) Why the temperature is remain constant when ice melts to water?

*Mengapa suhu kekal tidak berubah apabila ais bertukar menjadi air?*

.....  
[1 mark]  
[1 markah]

- (d) If the amount of heat absorbed by the ice cube is  $6.72 \times 10^3$  J, calculate the specific latent heat of fusion.

*Jika jumlah haba yang diserap oleh ketulan ais itu ialah  $6.72 \times 10^3$  J, hitung haba pendam tentu pelakuran.*

[2 marks]  
[2 markah]

- (e) Why water droplets are formed on the outer surface of the metal plate?

*Mengapa titisan air terbentuk di permukaan luar bekas logam itu?*

.....  
[1 mark]  
[1 markah]

7 Diagram 7.1 shows a semiconductor transistor.

Rajah 7.1 menunjukkan sebuah transistor semikonduktor.

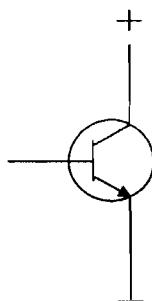


Diagram 7.1

Rajah 7.1

- (a) (i) Name the type of the transistor.

Namakan jenis transistor itu.

[1 mark]

[1 markah]

- (ii) Transistor has three terminals connected to the emitter, base and collector. Label the emitter, base and collector in Diagram 7.1

Transistor mempunyai tiga kaki yang disambungkan kepada pengeluar, tapak dan pengumpul. Labelkan pengeluar, tapak dan pengumpul pada Rajah 7.1

[1 mark]

[1 markah]

- (b) Diagram 7.2 shows a transistor circuit.

Rajah 7.2 menunjukkan sebuah litar transistor.

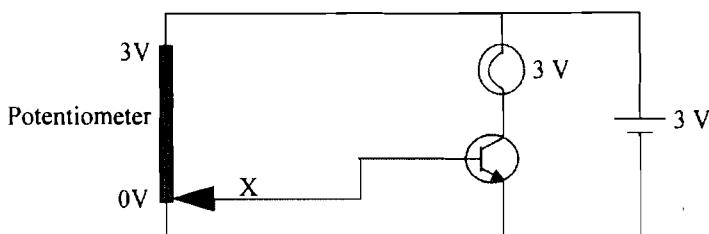


Diagram 7.2

Rajah 7.2

When the sliding contact X is at the 0 V end of the potentiometer,

*Apabila sesentuh X berada pada 0 V di hujung potentimeter.*

- (i) is there any current flow through the base and emitter circuit?

*adakah arus akan mengalir melalui litar tapak dan pengeluar?*

.....

.....

[1 mark]

[1 markah]

- (ii) what happened to the transistor and the bulb? Tick in the box.

*apakah yang berlaku kepada transistor dan mentol? Tandakan pada petak.*

Transistor

On  
Buka

Off  
Tutup

Bulb / Mentol

On  
Menyala

Off  
Padam

[1 mark]

[1 markah]

- (iii) If the sliding contact X were raised from 0 V end to the 3 V end of the potentiometer, what happened to the bulb? Explain your answer

*Jika sesentuh X ditambah daripada 0 V kepada 3 V di hujung potentialmeter, apakah yang berlaku kepada mentol? Terangkan jawapan anda*

.....

.....

.....

[2 marks]

[2 markah]

- (c) Diagram 7.3 shows a transistor is used to light up during the day.

Rajah 7.3 menunjukkan transistor yang digunakan untuk menyala mentol pada waktu siang.

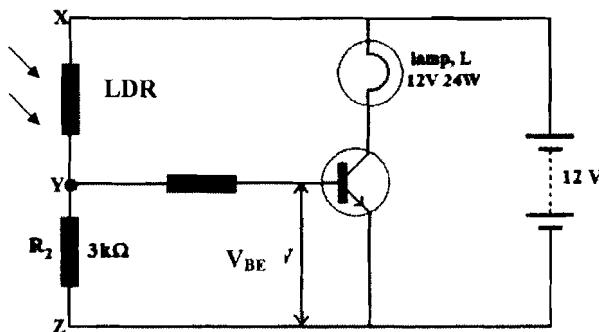


Diagram 7.3  
Rajah 7.3

- (i) Suggest a modification to light up the lamp at night.

Cadangkan satu pengubahsuai pada litar di atas supaya ia boleh berfungsi pada waktu malam.

.....  
.....

[1 mark]  
[1 markah]

- (ii) A student replaced lamp L with a lamp labelled 240 V 24 W in Diagram 7.3. The bulb is not light up.

Seorang murid mengantikan mentol L dengan sebuah mentol yang berlebihan 240 V, 24 W pada Rajah 7.3. Didapati mentol tidak menyala

- (a) Why the lamp is not light up?

Mengapa mentol tidak menyala?

.....

[1 mark]  
[1 markah]

- (b) An electrical component is connected to the output transistor so that the lamp is light up.

Name the electrical component and state the functions.

*Satu komponen elektrik disambung kepada output transistor supaya mentol itu boleh menyala.*

*Namakan komponen elektrik dan nyatakan fungsinya*

.....  
[2 marks]  
[2 markah]

8 Diagram 8 shows an electromagnet for a crane. It is used to lift iron scrap in a factory.

Rajah 8 menunjukkan satu elektromagnet untuk sebuah kren. Ia digunakan untuk mengumpul kepingan besi terbuang dalam sebuah kilang.

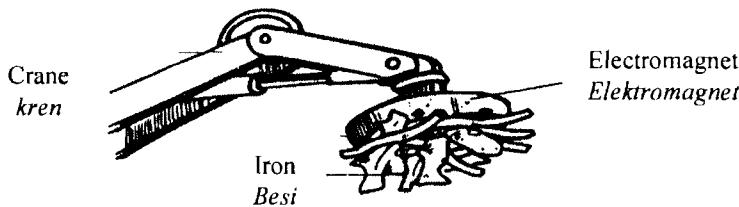


Diagram 8  
Rajah 8

Table 8 shows four cranes with their respective properties.

Jadual 8 menunjukkan empat jenis kren dengan sifat masing-masing

Type of crane	Current /A	Type of core	Number of turn
J	1.0	Soft-Iron	8
K	2.0	Steel	10
L	3.0	Soft-Iron	12
M	4.0	Steel	14

Table 8 / Jadual 8

- (a) What is meant by electromagnet?

Apakah yang dimaksudkan dengan elektromagnet?

..... [1 mark]  
..... [1 markah]

- (b) Base on Table 8, state the suitable properties of the crane to lift iron scrap more effectively. Give reason for the suitability of the properties.

Berdasarkan Jadual 8, nyatakan sifat-sifat kren untuk mengumpul kepingan besi terbuang dengan lebih berkesan. Beri sebab mengapa sifat-sifat itu sesuai.

- (i) Current / Arus

.....  
Reason / sebab

..... [2 marks]  
..... [2 markah]

- (ii) Type of core / jenis teras

.....

Reason / sebab

.....

[2 marks]  
[2 markah]

- (iii) Number of turns / Bilangan lilitan geglung

.....

Reason / sebab

.....

[2 marks]  
[2 markah]

- (c) Based on your answers in 8(b), determine the most suitable crane in Table 8 to lift iron scrap in a factory.

*Berdasarkan jawapan di 8(b), tentukan kren dalam Jadual 8 yang paling sesuai untuk mengumpul kepingan besi terbuang dalam sebuah kilang.*

.....  
.....

[1 mark]  
[1 markah]

- (d) Base on your choice in 8(c), state the change in the quantity of the iron scrap that can be lifted when the cylindrical soft iron core is replaced with a U-shaped iron core. Explain your answer

*Berdasarkan pilihan anda dalam 8(c), nyatakan perubahan kuantiti kepingan besi terbuang yang boleh diangkat jika teras besi lembut berbentuk silinder digantikan dengan teras besi berbentuk U. Terangkan jawapan anda*

.....  
.....

[2 marks]  
[2 markah]

- (e) A crane P is used to lift 250 kg of iron scrap to a height of 4m in 5 s. Determine the output power of the crane P.

*Sebuah kren P dapat menaikkan 250 kg kepingan besi terbuang setinggi 4 m dalam masa 5 s. Kira kuasa output kren P itu.*

MOZ@C [2 marks]  
[2 markah]

**Section B**  
**Bahagian B**

[20 marks]  
[20 markah]

*Answer any one question from this section.*  
*Jawab mana-mana satu soalan daripada bahagian ini.*

- 9 (a) Diagram 9.1 and Diagram 9.2 show a transparent block made of a material with a different refractive index. A light ray travel in both blocks with the same incident angle,  $i$ .

*Rajah 9.1 dan Rajah 9.2 menunjukkan blok lutsinar yang diperbuat daripada bahan yang mempunyai indeks biasan yang berbeza. Sinar cahaya melalui kedua-dua blok pada sudut tuju yang sama,  $i$ .*

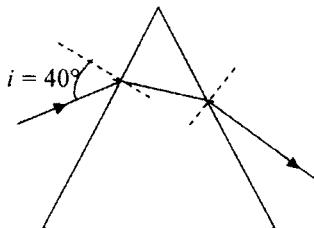


Diagram 9.1  
Rajah 9.1

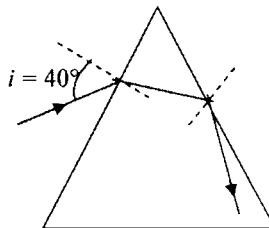


Diagram 9.2  
Rajah 9.2

- (i) What is meant by a refractive index? [1 mark]

*Apakah yang dimaksudkan dengan indeks biasan.*

[1 markah]

- (ii) Using Diagram 9.1 and Diagram 9.2, compare the refractive index, refraction angle and critical angle between the two blocks.

Base on Diagram 9.1 and Diagram 9.2, relate the refractive index with critical angle. [5 marks]

*Menggunakan Rajah 9.1 dan Rajah 9.2, bandingkan indeks biasan, sudut biasan dan sudut genting antara kedua-dua blok.*

*Merujuk kepada Rajah 9.1 dan Rajah 9.2, hubungkaitkan antara indeks biasan dan sudut genting* [5 markah]

- (b) (i) State two conditions under which light ray would undergo total internal reflection. [2 marks]

*Nyatakan 2 syarat sinar cahaya boleh mengalami pantulan dalam penuh.*

[2 markah]

(i) refractive index of the inner and outer glass

*indeks biasan bagi kaca dibahagian dalam dan luar.*

(ii) the properties of material used for optical fibre

*sifat bahan yang digunakan untuk gentian optik*

(iii) the thickness of the glass

*ketebalan kaca*

[10 marks]

[10 markah]

- 10 Diagram 10.1 and Diagram 10.2 show the bulbs connection at the fruit stores. The bulbs and the battery in both the store are identical.

Rajah 10.1 dan 10.2 menunjukkan mentol-mentol yang disambung ke gerai buah-buahan. Mentol-mentol dan bateri pada stor adalah serupa.

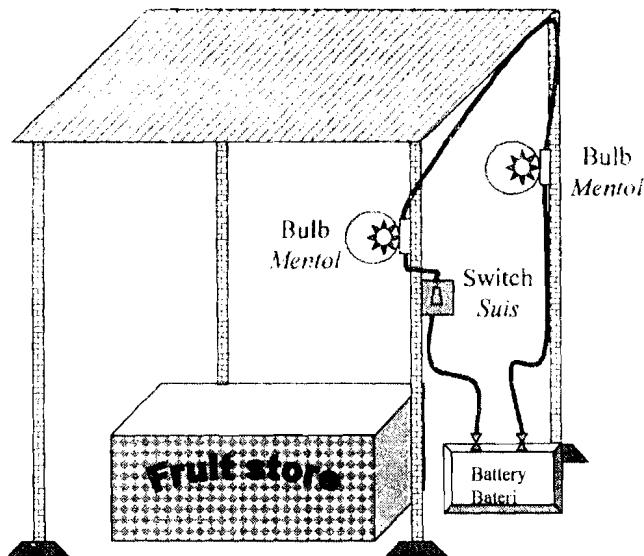


Diagram 10.1

Rajah 10.1

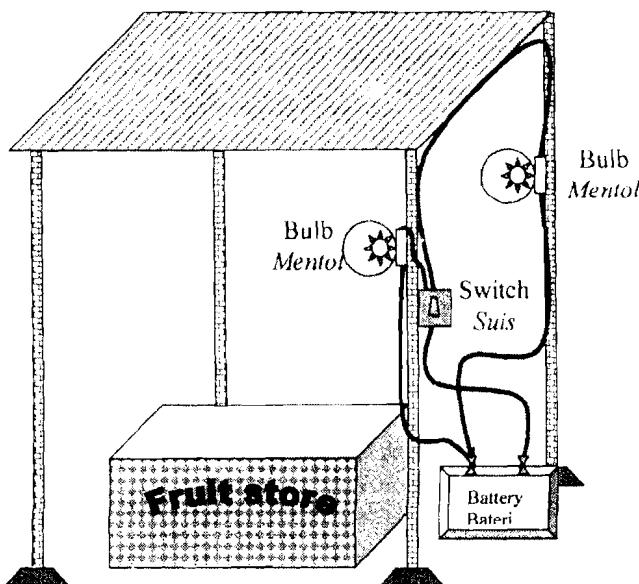


Diagram 10.2

Rajah 10MOZ@C

- (a) (i) What is meant by a potential different? [1 mark]  
*Apakah yang dimaksudkan dengan beza keupayaan?* [1 markah]
- (ii) Draw a circuit diagram for each circuit and label the type of circuit. [4 marks]

*Lukis litar bagi setiap diagram dan labelkan jenis litar tersebut.*

[4 markah]

- (b) Using Diagram 10.1 and 10.2, compare the brightness of the bulbs. Relate the brightness of the bulb, the potential different and the current flow for the bulbs to deduce a relevant physics concept. [5 marks]

*Menggunakan Rajah 10.1 dan 10.2, bandingkan kecerahan mentol-mentol. Hubungkaitkan kecerahan mentol, beza keupayaan dan arus yang mengalir melalui mentol untuk menyimpulkan satu konsep fizik yang relevan.*

[5 markah]

- (c) Diagram 10.3 shows an electric kettle which is a rated at 240 V, 2 000 W and connected by a flexible cable to a three-pin-plug.

*Rajah 10.3 menunjukkan sebuah cerek elektrik berlabel 240 V, 2 000 W dan disambungkan oleh kabel mudah alih ke plag-tiga-pin.*

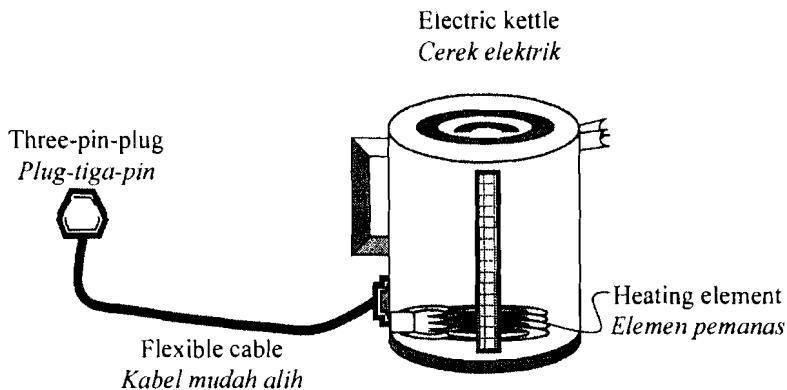


Diagram 10.3  
*Rajah 10.3*

Suggest modifications that can be made to the electric kettle in Diagram 10.3 so that it can boil water faster and has better safety. [10 marks]

*Cadangkan pengubahsuaihan yang boleh dilakukan pada cerek elektrik dalam Rajah 10.3 supaya dapat mendidihkan air dengan lebih cepat dan lebih selamat.*

[10 markah]

**Section C**  
**Bahagian C**

[20 marks]  
[20 markah]

*Answer any one question from this section.  
Jawab mana-mana satu soalan daripada bahagian ini.*

- 11 (a) What is meant by temperature? [1 mark]  
*Apakah yang dimaksudkan dengan suhu?* [1 markah]
- (b) Explain how a new thermometer can be calibrated. [4 marks]  
*Terangkan bagaimana jangkasuhu baru boleh disenggatkan.* [4 markah]
- (c)

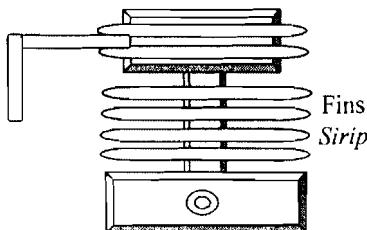


Diagram 11.1

Rajah 11.1

Diagram 11.1 shows a cooling system of a motorcycle engine.

You as a mechanical engineer is given a task to study characteristics of metal shown in the Table 11.2 to be used as effective fins in the cooling system of the motorcycle engine.

*Rajah 11.1 menunjukkan sistem penyejukan enjin motosikal.*

*Anda sebagai jurutera mekanikal diberi tugasan untuk mengkaji ciri-ciri logam yang ditunjukkan dalam Jadual 11.2 untuk digunakan sebagai sirip enjin motosikal yang efektif.*

Types of metal Jenis logam	Specific heat capacity $\text{Jkg}^{-1}\text{C}^{-1}$ <i>Muatan haba tentu <math>\text{Jkg}^{-1}\text{C}^{-1}</math></i>	Melting point $^{\circ}\text{C}$ <i>Takat lebur <math>^{\circ}\text{C}</math></i>	Heat Conductor <i>Konduktor Haba</i>	Rate of expansion <i>Kadar pengembangan</i>
P	300	1020	Good Baik	Moderate Sederhana
Q	360	700	Moderate Sederhana	High Tinggi
R	450	1600	Good Baik	Moderate Sederhana
S	900	720 MOZ@C	Moderate Sederhana	High Tinggi

- (i) State suitable characteristics of metal that is used as fins in the motorcycle engine.

*Nyatakan kesesuaian ciri-ciri logam yang sesuai digunakan sebagai sirip penyejuk dalam enjin motosikal.*

- (ii) Determine the most suitable metal that can be used as fins. Give reasons for your choice.

*Tentukan logam yang paling sesuai digunakan untuk sirip penyejuk. Berikan sebab kepada pilihan anda.*

[10 marks]  
[10 markah]

- (d) (i) A piece of fin in the engine of a motorcycle with a mass of 0.5 kg made from metal R. If the temperature increased by  $10^{\circ}\text{C}$  in one hour, how much of energy being absorbed by the fin.

*Sekeping sirip pada enjin motosikal berjisim 0.5 kg dibuat daripada logam R. Jika suhu meningkat sebanyak  $10^{\circ}\text{C}$  dalam satu jam, berapakah tenaga haba telah diserap oleh sirip tersebut?*

[3 marks]  
[3 markah]

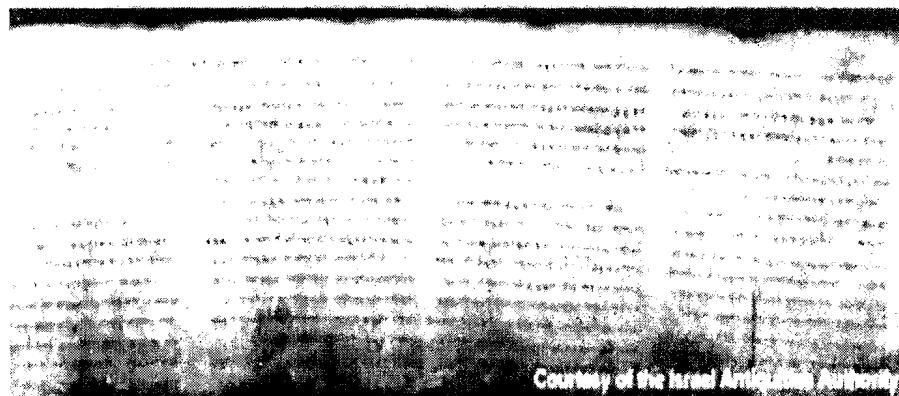
- (ii) If 10 fins identical to the one in (d)(i) are used in the motorcycle engine, how much energy is lost by the engine in one hour?

*Jika terdapat 10 keping sirip-sirip yang serupa seperti (d)(i) pada enjin motosikal, berapakah jumlah tenaga yang hilang oleh engin itu dalam sejam*

[2 marks]  
[2 markah]

- 12 Diagram 12.1 shows the Dead Sea Scrolls aged 1900 years old. An archaeologist used radioisotope to estimate age of the ancient artefact.

Rajah 12.1 menunjukkan 'Dead Sea Scrolls' yang berumur 1900 tahun. Ahli arkeologi menggunakan radioisotop untuk menganggarkan umur barang purba.



- (a) (i) What is meant by radioisotope? [1 mark]

*Apakah yang dimaksudkan dengan radioisotop?* [1 markah]

- (ii) Carbon-14 is a radioisotope. Explain how Carbon-14 can be used to estimate the age of a dead plant which contain carbon. [3 marks]

*Karbon- 14 adalah unsur radioisotop. Terangkan bagaimana Karbon-14 boleh digunakan untuk menganggarkan umur tumbuhan mati yang mengandungi unsur karbon.*

[3 markah]

- (b) (i) Table 12.2 shows the characteristics of the five radioisotopes, P, Q, R, and T, that can be used to detect the brain tumour.

*Jadual 12.2 menunjukkan ciri-ciri lima radioisotop, P, Q, R, S dan T, yang boleh digunakan untuk mengesan ketumbuhan didalam otak.*

Radioisotope <i>Radioisotop</i>	Half-life <i>Separuh-hayat</i>	Ionising power <i>Kuasa pengionan</i>	Radioactive radiation <i>Sinaran radioaktif</i>
P	5.0 minutes 5.0 minit	Low <i>Rendah</i>	Gamma
Q	8 days 8 hari	High <i>Tinggi</i>	Alpha
R	6 hours 6 jam	Low <i>Rendah</i>	Gamma
S	5.27 years 5.27 tahun	Moderate <i>Sederhana</i>	Beta
T	7 hours 7 jam	High <i>Tinggi</i>	Alpha

Table 12.2 / Jadual 12.2

As a medical officer, you are required to determine the most suitable radioisotope that could be used to inject into the blood of a patient to detect the location of a brain tumour. Study the characteristics of all five radioisotopes based on the following aspects:

*Sebagai seorang pegawai perubatan, anda diminta untuk mengenal pasti radioisotop yang paling sesuai untuk disuntik ke dalam darah pesakit bagi mengesan kedudukan ketumbuhan di otak. Kaji ciri kelima-lima radioisotop itu berdasarkan aspek yang berikut:*

- The Half-life  
*Separuh hayat*
- The ionising power  
*Separuh hayat*
- The radioactive radiation  
*Sinaran radioaktif*

Explain the suitability of the aspects.  
Justify your choice.

[8 marks]

*Terangkan kesesuaian aspek-aspek itu  
Beri sebab bagi pilihan anda.*

[8 markah]

- (ii) Name the most suitable detector can be used to detect the radioactive radiation from the body of the patient.  
Give your reason.

[3 marks]

*Namakan alat pengesan yang paling sesuai untuk mengesan sinaran radioaktif yang dipancarkan dari badan pesakit.  
Berikan alasan diatas pemilihan anda.*

[3 markah]

- (c) In a nuclear reactor,  $3.5 \times 10^{-6}$  g of Uranium is change into energy in 1.5 ms. Given that the velocity of light,  $c = 3 \times 10^8 \text{ ms}^{-1}$ .

*Di dalam reaktor nuklear,  $3.5 \times 10^{-6}$  g Uranium telah bertukar menjadi tenaga dalam masa 1.5 ms. Diberi halaju cahaya,  $c = 3 \times 10^8 \text{ ms}^{-1}$ .*

Calculate

Hitung

- (i) the total energy released.

*Jumlah tenaga yang dibebaskan*

- (ii) the power generated by this reaction.

*Kuasa yang dijanakan hasil tindak balas ini.*

[5 marks]  
[5 markah]

**END OF QUESTION PAPER**  
**KERTAS SOALAN TAMAT**

- (ii) Diagram 9.3 shows a light ray is incident on a piece of Crown Glass of critical angle  $42^\circ$ .

Draw the light ray to show how a ray emerging from the Crown Glass

*Rajah 9.3 menunjukkan sinar tuju pada kaca Crown yang mempunyai sudut genting  $42^\circ$ .*

*Lukiskan sinar cahaya untuk menunjukkan bagaimana sinar cahaya merambat keluar dari kaca Crown.*

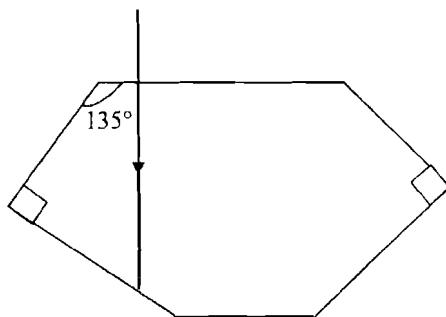


Diagram 9.3

Rajah 9.3

- (c) Diagram 9.4 shows the structure of an optical fibre used in telecommunications.

*Rajah 9.4 menunjukkan struktur gentian optik yang digunakan untuk perhubungan.*

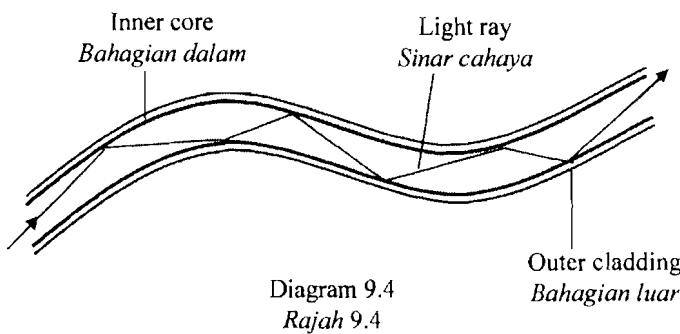


Diagram 9.4

Rajah 9.4

Optical fibres are made of fine strands of glass. Each single glass fibre (inner core) is coated with a thin layer of another type of glass (outer cladding). You are required to give some suggestions in designing an optical fibre which can carry more information.

Explain your suggestions base on the following aspects:

*Gentian optic diperbuat dari kaca. Setiap lapisan gentian kaca (bahagian dalam) dilapis dengan lapisan nipis kaca (bahagian luar). Anda dikehendaki memberi beberapa cadangan untuk mereka bentuk gentian kaca yang boleh membawa banyak maklumat.*

*Terangkan cadangan anda berdasarkan aspek-aspek berikut:*



**JABATAN PELAJARAN NEGERI JOHOR**  
**PEPERIKSAAN PERCUBAAN**  
**SIJIL PELAJARAN MALAYSIA 2008**

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**FIZIK**

Kertas 2

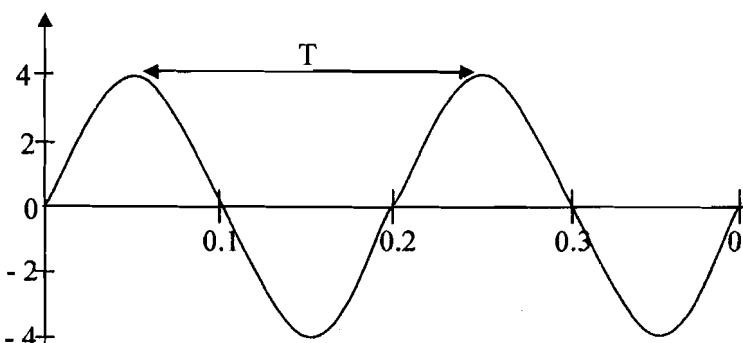
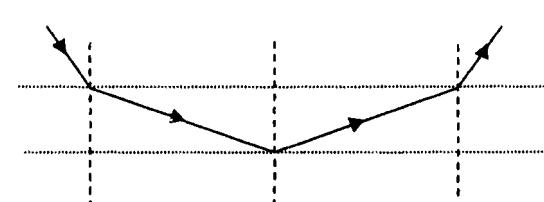
**PERATURAN PEMARKAHAN**

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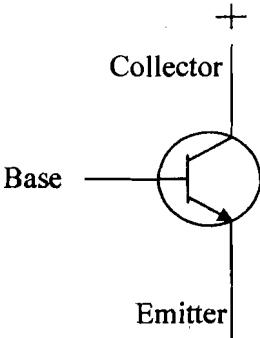
Kertas jawapan ini mengandungi 8 halaman bercetak .

MOZ@C

## SECTION A

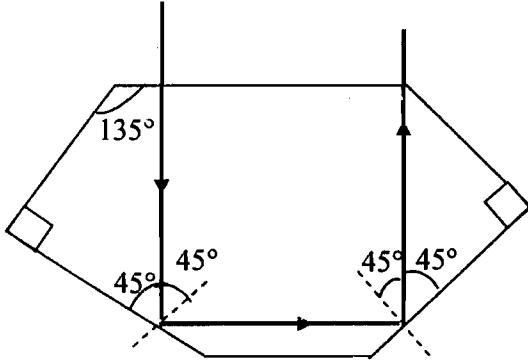
1	(a)(i) Displacement / cm <i>Sesaran / cm</i>		1
	(ii) 0.2 s		1
(b)	Amplitude of a wave is the maximum displacement of a medium particle from its mean (stationary) position.		1
(c)	Decreases with time		1
		<b>Total</b>	<b>4 marks</b>
2	(a)	Mirage	1
	(b)	Total internal reflection	1
	(c)(i)	Density of the cool air is greater than the density of the warm air	1
	(c)(ii)	The light rays will be refracted away from the normal	1
	(c)(iii)		1
		<b>Total</b>	<b>5 marks</b>
3	(a)	Momentum	1
	(b)	Kinetic energy	1
	(c)	$(60)(20) + (70)(20) = (60 + 70)(V)$ $V = 17.31 \text{ m s}^{-1}$	1
	(d)(i)	Principle of Conservation of Momentum	1
	(d)(ii)	In the absence of external forces, the total momentum of a system remains unchanged	1
		<b>Total</b>	<b>6 marks</b>

<b>4</b>	(a)	The distance between two points of the same phase.	<b>1</b>
	(b)	(i) $d = 1250 \times 0.6 = 750.0 \text{ m}$ (ii) $f = 5.8 \times 10^5 \text{ Hz}$ $v = 1250 \text{ ms}^{-1}$ $\lambda = 0.00215 \text{ m} / 2.15 \times 10^{-3} \text{ m}$	2 2
	(c)	(i) The amplitude of the reflection wave in Diagram 4.2 is higher. (ii) When the depth increases, the energy lost increases	1 1
			<b>Total</b> <b>7 marks</b>
<b>5</b>	(a)	Mass per unit volume	1
	(b)	Density of ice block is less than density of water	1
	(c)	Weight and buoyant force	(i) 1
	(d)	(i) The volume of water displaced in Diagram 5.1 is more than in Diagram 5.2. (ii) The weight of water displaced in Diagram 5.1 is more than in Diagram 5.2. (iii) Buoyant force in diagram 5.1 is greater than diagram 5.2 (iv) Buoyant force = weight of water displaced (v) Archimedes' Principle	1 1 1 1 1
			<b>Total</b> <b>8 marks</b>
<b>6</b>	(a)	Heat from the surrounding Heat from the metal plate	1 1
	(b)	Solid to liquid	1
	(c)	(i) Specific latent heat of fusion (ii) Heat absorbed is used to overcome the forces of attraction between the molecules of the ice	1 1
	(d)	$L = \frac{6.72 \times 10^3 \text{ J}}{20 \times 10^{-3} \text{ kg}} = 3.36 \times 10^5 \text{ J kg}^{-1}$	2
	(e)	Condensation of water vapour on cool surface	1
			<b>Total</b> <b>8 marks</b>

7	(a)	(i)	n-p-n	1								
		(ii)	 <p>Collector Base Emitter</p>	1								
	(b)	(i)	Yes	1								
		(ii)	<p style="text-align: center;">Transistor                      Bulb / Mentol</p> <table style="width: 100%; text-align: center;"> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>On <i>Buka</i></td> <td>Off <i>Tutup</i></td> <td>Light up <i>Menyala</i></td> <td>Not light up <i>Padam</i></td> </tr> </table>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	On <i>Buka</i>	Off <i>Tutup</i>	Light up <i>Menyala</i>	Not light up <i>Padam</i>	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>									
On <i>Buka</i>	Off <i>Tutup</i>	Light up <i>Menyala</i>	Not light up <i>Padam</i>									
		(iii)	Bulb does not light up. No current flows in the base and emitter circuit.	1 1								
	(c)		Interchange the position of LDR and R2	1								
	(d)	(i)	Because collector current is too small	1								
		(ii)	Magnetic relay / Relay switch Using small voltage to switch on the second with high voltage	1 1								
				<b>Total</b> <b>10 marks</b>								
8	(a)		An electromagnet is a magnet in which a magnetic field is produced by the flow of electric current.	1								
	(b)	(i)	Increase the current. The strength of an electromagnet increases	1 1								
		(ii)	Soft-Iron core Easily magnetised and demagnetised	1 1								
		(iii)	Increase the number of turns. The strength of an electromagnet increases	1 1								
	(c)	L		1								
	(d)	Increase // More The poles for a U-shaped electromagnet are closer together		1 1								

	(e)	$P = \frac{mgh}{t}$ = $\frac{250 \times 10 \times 4}{5}$ = 2000 W	1
			1
		Total <b>12 marks</b>	

**SECTION B**

9	(a)	(i)	Ratio sin of incidence angle and sine of refraction angle	1												
		(ii)	Refractive index diagram 9.2 larger than diagram 9.1 Refraction angle diagram 9.2 is smaller than diagram 9.1 Critical angle diagram 9.1 larger than diagram 9.2 When the refractive index is large, the critical angle is small	1 1 1 2												
	(b)	(i)	1. the angle of incidence is greater than critical angle 2. the light travel from medium high density to low density	1 1												
		(ii)		2												
	(c)		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Aspect</th> <th style="text-align: center;">Reason</th> </tr> </thead> <tbody> <tr> <td>1. An inner core of higher refractive index</td> <td>Light ray is reflected more easily through total internal reflection</td> </tr> <tr> <td>2. Outer layer of medium with a lower refractive index</td> <td>Light ray is reflected more easily through total internal reflection</td> </tr> <tr> <td>3. Lower density</td> <td>The optical fibre will be lighter</td> </tr> <tr> <td>4. The thickness of the glass is thin</td> <td>Save space / can be used in narrow space</td> </tr> <tr> <td>5. Strong and flexible</td> <td>Does not break easily and the shape can be adjusted</td> </tr> </tbody> </table>	Aspect	Reason	1. An inner core of higher refractive index	Light ray is reflected more easily through total internal reflection	2. Outer layer of medium with a lower refractive index	Light ray is reflected more easily through total internal reflection	3. Lower density	The optical fibre will be lighter	4. The thickness of the glass is thin	Save space / can be used in narrow space	5. Strong and flexible	Does not break easily and the shape can be adjusted	2 2 2 2 2
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				<b>Total 20 marks</b>												

10	(a)	(i)	Work done in moving one coulomb of charge from one point to another	1												
		(ii)	<p>Diagram 10.1</p> <p>Diagram 10.2</p>	<p>Series circuit</p> <p>Parallel circuit</p>												
	(b)		<ol style="list-style-type: none"> <li>1. The bulb in parallel circuit // Diagram 10.2 is brighter than those in series circuit // Diagram 10.1</li> <li>2. The potential difference across each bulb in the parallel circuit is the same as that of the battery // dry cell.</li> <li>3. The potential difference across each bulb in the series circuit is smaller than that of the battery // dry cell.</li> <li>4. The current flowing through each bulb in the parallel circuit is higher than the current flowing in the series circuit.</li> <li>5. When the potential difference across each bulb is higher, the current flowing through it is also higher and the bulb is brighter.</li> </ol>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>												
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				<b>Total 20 marks</b>												

## SECTION C

11	(a)	Degree of hotness of an object	1										
	(b)	1. Put the thermometer in melting ice , mark the lower part of mercury thread, $l_0$ 2. Place the same thermometer in the boiling water, mark the top part of the mercury thread, $l_{100}$ 3. Divide the length between the two marks into 100 equal divisions 4. Each division is now equal to $1^{\circ}\text{C}$	1 1 1 1										
	(c)	<table border="1"> <thead> <tr> <th>Characteristics</th> <th>Reason</th> </tr> </thead> <tbody> <tr> <td>1. Specific heat capacity is low</td> <td>2. Faster to get hot</td> </tr> <tr> <td>3. Melting point is high</td> <td>4. Does not melt easily</td> </tr> <tr> <td>5. Good conductor of heat</td> <td>6. The heat can be lost easily</td> </tr> <tr> <td>7. Rate of expansion is moderate</td> <td>8. The shape of the fin unchanged</td> </tr> </tbody> </table> <p>The most suitable is P because specific heat capacity is low, melting point is high, conductor heat is good, rate of expansion is moderate</p>	Characteristics	Reason	1. Specific heat capacity is low	2. Faster to get hot	3. Melting point is high	4. Does not melt easily	5. Good conductor of heat	6. The heat can be lost easily	7. Rate of expansion is moderate	8. The shape of the fin unchanged	2 2 2 2 2
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7. Rate of expansion is moderate	8. The shape of the fin unchanged												
	(d)	(i) $\begin{aligned} Q &= mc\theta \\ &= 0.5 \times 450 \times 10 \\ &= 2250 \text{ J} \end{aligned}$	3										
		(ii) Energy lost = $10 \times 2250 = 22500 \text{ J}$	2										
			<b>Total 20 marks</b>										
12	(a)	(i) Radioisotopes are isotopes which have unstable nuclei.	1										
	(ii)	<ul style="list-style-type: none"> <li>- Carbon-14 atom is a radioactive substance which is easily absorbed by living plants.</li> <li>- after the plants dies, the activity of Carbon-14 will decline since no new carbon-14 is absorbed.</li> <li>- by calculating the activity of carbon-14, the age of the fossil/object can be determined</li> </ul>	1 1 1										

(b)	(i)	<table border="1"><thead><tr><th>characteristics</th><th>explaination</th><th></th></tr></thead><tbody><tr><td>Has a short half-life</td><td>can be active in a body for a short period of time</td><td>2</td></tr><tr><td>has moderate ionising power</td><td>causes minimum damage to the tissues in the body</td><td>2</td></tr><tr><td>emits gamma ray</td><td>can be detected outside the body//high penetrating power, so can be detected by the GM tube that is placed near to the head</td><td>2</td></tr></tbody></table>	characteristics	explaination		Has a short half-life	can be active in a body for a short period of time	2	has moderate ionising power	causes minimum damage to the tissues in the body	2	emits gamma ray	can be detected outside the body//high penetrating power, so can be detected by the GM tube that is placed near to the head	2	
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Has a short half-life	can be active in a body for a short period of time	2													
has moderate ionising power	causes minimum damage to the tissues in the body	2													
emits gamma ray	can be detected outside the body//high penetrating power, so can be detected by the GM tube that is placed near to the head	2													
		Sustance R is the most suitable with short half-life, emits gamma ray and has moderate ionising power.	2												
	(ii)	Geiger Muller Tube <ul style="list-style-type: none"><li>Has a small in size, it is handy and can be moved around easily.</li><li>It is a sensitive instrument, so can detect low ionisation</li></ul>	1 1 1												
(c)	(i)	Energy released $E = mc^2$ $= 3.5 \times 10^{-9} \times (3 \times 10^8)^2$ $= 3.15 \times 10^7 \text{ J}$	2 1												
	(ii)	Power obtained $P = E/t$ $= \frac{3.15 \times 10^7}{1.5 \times 10^{-3}}$ $= 2.1 \times 10^{10} \text{ W}$	1 1												
			<b>Total 20 marks</b>												