(iv) The bulb must be in the collector circuit.
Mentol mesti dipasangkan dalam litar pengumpul.

The most suitable circuit is J because LDR is used to alter the resistance. LDR is connected in the base circuit and the arrangement of the transistor is forward biased and the bulb is connected in the collector circuit.
Litar yang paling sesuai ialah J kerana PPC *digunakan untuk mengubah rintangan.* PPC *disambungkan dalam litar tapak dan transistor disambungkan secara pincang ke depan dan mentol disambungkan pada litar pengumpul.*

(c) (i) – The reading of microammeter and milliammeter are zero.
Bacaan mikroammeter dan miliammeter adalah sifar.
Microammeter shows a reading but milliammeter shows zero reading.
Mikroammeter menunjukkan satu bacaan tetapi miliammeter menunjukkan bacaan sifar.

(ii) When the rheostat is adjusted, a varying base current is produced.
The small changes in the base current cause the big changes in the collector current.
Apabila reostat dilaraskan, suatu arus tapak yang berubah-ubah dihasilkan.
Perubahan kecil dalam arus tapak menyebabkan perubahan besar dalam arus pengumpul.

(d) (i) $m = \frac{I_C}{I_b}$

$= \frac{1\text{ mA}}{10\ \mu\text{A}}$

$= \frac{1 \times 10^{-3}\text{ A}}{10 \times 10^{-6}\text{ A}} = 100$

(ii) $I_e = I_B + I_C$
$= 10\ \mu\text{A} + 1\text{ mA}$
$= 0.00101\text{ A}$
$= 1.01 \times 10^{-3}\text{ A}$
$= 1.01\text{ mA}$

PAPER 3

Section A / *Bahagian A*

1 (a) (i) Density of liquid / *Ketumpatan cecair*
(ii) Difference in level of coloured water
Perbezaan aras bagi air berwarna
(iii) Depth of immersion of thistle funnel
Kedalaman rendaman bagi corong tisel

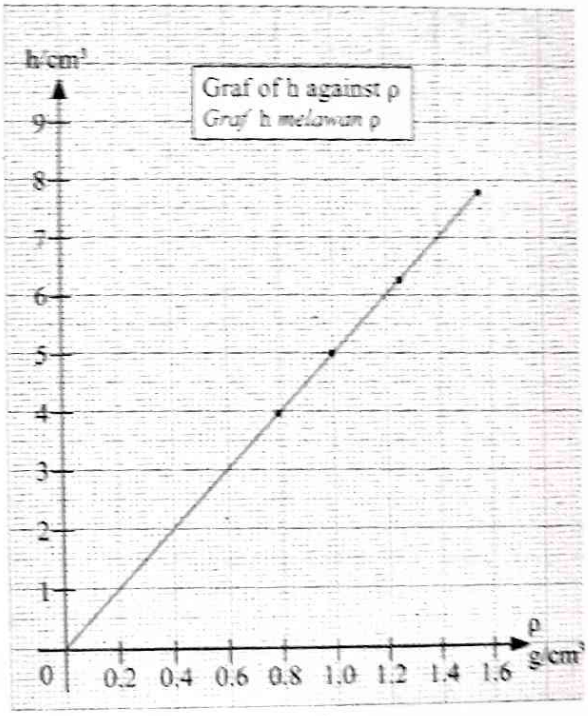
(b) (i), (ii)

Diagram *Rajah*	h_1 (cm)	h_2 (cm)	$h = h_2 - h_1$ (cm)
1.2	21.6	25.6	4.0
1.3	21.7	25.9	4.2
1.4	21.0	26.0	5.0
1.5	20.8	27.1	6.3
1.6	20.1	27.9	7.8

(c)

ρ (g cm^{-3})	h_1 (cm)	h_2 (cm)	h (cm)
0.8	21.6	25.6	4.0
0.915	21.7	25.9	4.2
1.0	21.0	26.0	5.0
1.26	20.8	27.1	6.3
1.55	20.1	27.9	7.8

(d)



(e) h is directly proportional to ρ
h berkadar terus dengan ρ

2 (a) (i) R varies linearly as $\frac{1}{I}$
R *berubah secara linear dengan* $\frac{1}{I}$

(ii) When / *Apabila* $I = 0.25$ A
$\frac{1}{I} = \frac{1}{0.25} = 4$
$R = 5.8\ \Omega$

(b) $R = \frac{E}{I} - r$

$R = E\left(\frac{1}{I}\right) - r$

$Y = mX + C$

(i) C = y-intercept / *Pintasan-y*

$C = -r$

$C = -0.2$

$r = 0.2\ \Omega$

(ii) Gradient / *Kecerunan*

$$m = \frac{4.8\ \Omega}{3.2\ A^{-1}}$$

$$= 1.5\ \Omega A$$

(c) Electromotive force
Daya gerak elektrik

(d) After the reading is taken, switch off the circuit immediately to avoid over-heating of wires.
Selepas bacaan telah diambil, matikan litar dengan serta-merta untuk mengelakkan dawai itu terlebih panas.

Section B / *Bahagian* B

3 (a) The extension of the spring increases if the load is heavier.
Pemanjangan spring bertambah jika beban itu lebih berat.

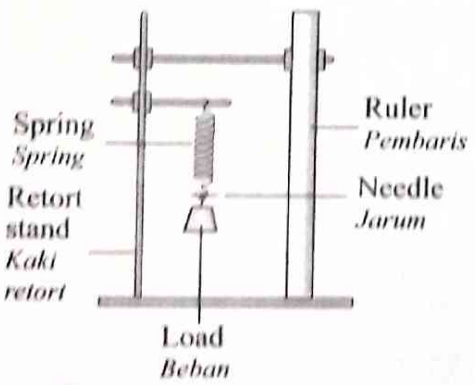
(b) The heavier the weight, the larger the extension of the spring.
Semakin berat beban, semakin besar pemanjangan spring.

(c) (i) To study the relationship between the force applied to a spring and the extension of spring
Untuk mengkaji hubungan di antara daya yang dikenakan kepada suatu spring dan pemanjangan spring

(ii) Manipulated variable
Pembolehubah dimanipulasikan
Weight of load / *Berat beban*
Responding variable
Pembolehubah bergerak balas
Extension of spring
Pemanjangan spring
Fixed variable
Pembolehubah tetap
Types of spring , diameter of spring
Jenis spring, diameter spring

(iii) Spring, loads, retort stand, needle, ruler
Spring, beban, kaki retort, jarum, pembaris

(iv)



(v) 1. The above apparatus is set up.
Radas di atas disediakan.

2. The original length, *a*, of the spring is measured using a ruler.
Panjang asal, a, bagi spring diukur dengan menggunakan pembaris.

3. A weight of 0.1 N (mass 10 g) is hung at the end of the spring.
Suatu beban 0.1 N (*jisim* 10 g) *digantung pada hujung spring itu.*

4. The length, *l*, of the stretched spring is recorded.
Panjang, l, bagi spring teregang itu dicatatkan.

5. Calculate the extension, *x*, of the spring.
Hitung pemanjangan, x, spring itu.

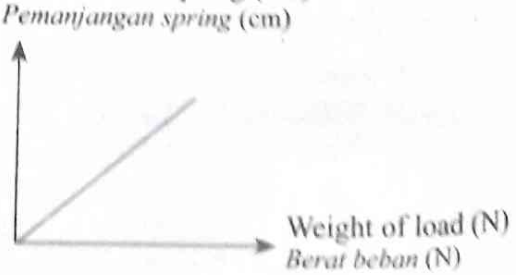
$$x = l - a$$

6. Step 4 and step 5 are repeated using weights of 0.2 N, 0.3 N, 0.4 N and 0.5 N.
Langkah 4 *dan langkah* 5 *diulang dengan menggunakan beban* 0.2 N, 0.3 N, 0.4 N *dan* 0.5 N.

(vi) Tabulation of data
Penjadualan data

Weight of load ***Berat beban*** **(N)**	**Extension of spring** ***Pemanjangan spring*** **(*x*/cm)**
0.1	
0.2	
0.3	
0.4	
0.5	

(vii) Plot a graph of extension of spring against weight.
Plotkan graf pemanjangan spring melawan berat.



(a) When the current increases, the power also increases.
Apabila arus bertambah, kuasa juga bertambah.

(b) The higher the current, the higher the power produced.
Semakin tinggi arus, semakin tinggi kuasa yang dihasilkan.

(c) (i) To study the relationship between the current and the power.
Untuk mengkaji hubungan di antara arus dan kuasa.

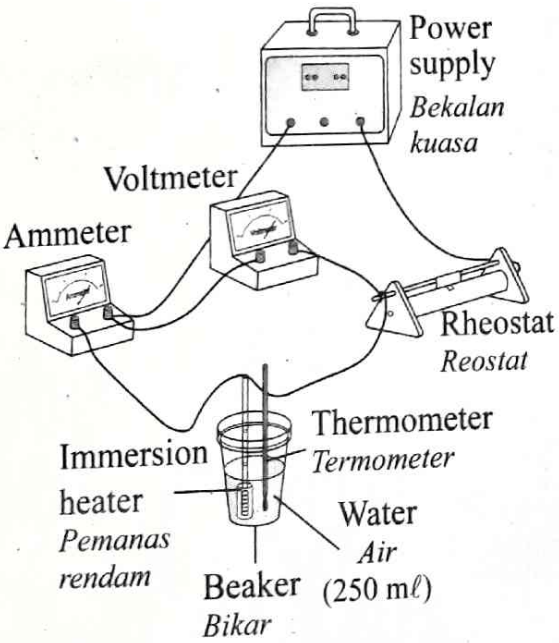
(ii) Manipulated variable
Pemboleh ubah dimanipulasikan
Electric current / *Arus elektrik*

Responding variable
Pemboleh ubah bergerak balas
Electric power / *Kuasa elektrik*

Fixed variable
Pemboleh ubah tetap
Volume of water / *Isi padu air*

(iii) Power supply, rheostat, thermometer, beaker, immersion heater, ammeter, voltmeter, connecting wires, water
Bekalan kuasa, reostat, termometer, bikar, pemanas rendaman, ammeter, voltmeter, wayar penyambung, air

(iv)



(v) 1. The above apparatus is set up.
Radas di atas disediakan.

2. Fill the beaker with 250 mℓ of water at room temperature.
Isi bikar dengan 250 mℓ air pada suhu bilik.

3. The rheostat is adjusted until the ammeter reading is 1.0 A.
Reostat dilaraskan sehingga bacaan ammeter ialah 1.0A.

4. The circuit is switched on for 30 seconds and the highest temperature is recorded. The reading of voltmeter is recorded.
Litar dihidupkan selama 30 saat dan suhu tertinggi dicatatkan. Bacaan voltmeter dicatatkan.

5. The electrical energy supplied to the water can be calculated by using the formula
Tenaga elektrik yang dibekalkan kepada air boleh dihitung dengan menggunakan rumus

$$E = VIt$$

6. Step 2 to step 5 are repeated. The rheostat is adjusted until the readings of ammeter are 2.0 A, 3.0 A, 4.0 A and 5.0 A.
Langkah 2 hingga langkah 5 diulang. Reostat dilaraskan sehingga bacaan ammeter adalah 2.0 A, 3.0 A, 4.0 A dan 5.0 A.

(vi) Prepare a table. / *Sediakan satu jadual.*

I / A	V / V	P / W	E / J
1.0			
2.0			
3.0			
4.0			
5.0			

(vii) Plot a graph of P against E or P against T.
Plotkan satu graf P *melawan* E *atau* P *melawan* T.
(T = temperature / *suhu*)