



**KOLEJ YAYASAN PELAJARAN JOHOR
ONLINE FINAL EXAMINATION**

COURSE NAME : INDUSTRIAL ELECTRONICS
COURSE CODE : DKE 3043
SESSION : DECEMBER 2021
DURATION : 2 HOURS 30 MINUTES

**INSTRUCTION TO CANDIDATES /
ARAHAN KEPADA CALON**

1. This examination paper consists of **TWO (2)** part: / PART A (20 Marks) /
PART B (80 Marks) /
*Kertas soalan ini mengandungi **DUA (2)** bahagian:* *BAHAGIAN A (20 Markah)
BAHAGIAN B (80 Markah)*
2. Students are allowed to refer to resources such as lecture notes, books, internet or any other relevant resources. /
Pelajar dibenarkan merujuk kepada sumber seperti nota kuliah, buku, internet atau mana-mana sumber yang berkaitan.
3. Answer **ALL** questions in the answer sheet which is **A4** size paper (or other paper with the consent of the relevant lecturer). /
*Jawab **SEMUA** soalan di dalam kertas jawapan iaitu kertas bersaiz **A4** (atau lain-lain kertas dengan persetujuan pensyarah berkaitan).*
4. Write your details as follows in the upper left conner for each answer sheet: /
Tulis butiran anda sepertimana berikut di penjuru atas kiri bagi setiap kertas jawapan:
 - i. Student Full Name / *Nama Penuh Pelajar*
 - ii. Identification Card (I/C) No. / *No. Kad Pengenalan*
 - iii. Class Section / *Seksyen Kelas*
 - iv. Course Code / *Kod Kursus*
 - v. Course Name / *Nama Kursus*
 - vi. Lecturer Name / *Nama Pensyarah*
5. Each answer sheet must have a page number written at the bottom right corner. /
Setiap helai kertas jawapan mesti ditulis nombor muka surat di penjuru bawah kanan.
6. Answers should be handwritten, neat and clear. /
Jawapan hendaklah ditulis tangan, kemas dan jelas.

**DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO /
JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU**

This examination paper consists of **11** printed pages including front page
*Kertas soalan ini mengandungi **11** halaman bercetak termasuk muka hadapan*

PART A / BAHAGIAN A

This part consists of **FOUR (4)** questions. Answer **ALL** the questions in an answering booklet.

Bahagian ini mengandungi EMPAT (4) soalan. Jawab SEMUA soalan dalam buku jawapan.

QUESTION 1 / SOALAN 1

Referring to **Figure 1** shows a block diagram of an integrated circuit regulator. Explain the function of each block in the given diagram.

(5 marks / markah)

*Merujuk pada **Rajah 1** menunjukkan satu rajah blok pengatur litar bersepadu. Terangkan fungsi setiap blok di dalam rajah yang diberikan tersebut.*

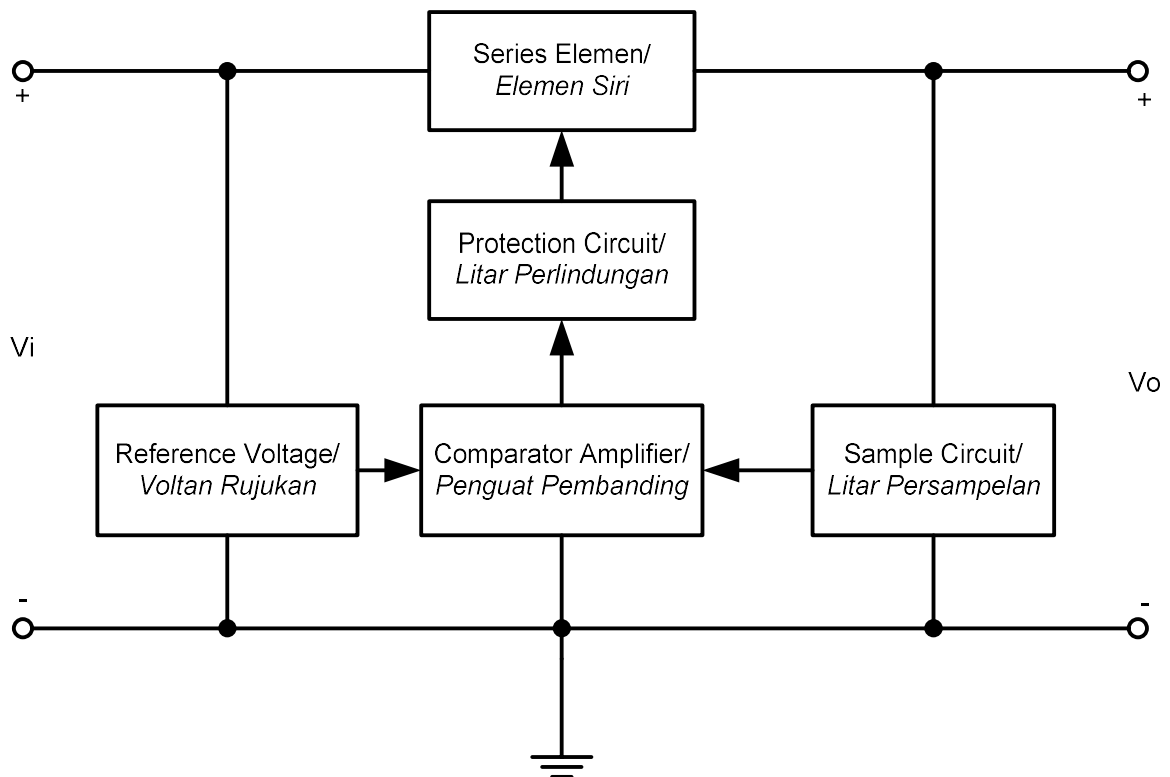


Figure 1 / Rajah 1

QUESTION 2 / SOALAN 2

Refer to **Figure 2**. Give the conditions that must be met to allow a feedback system oscillates.

(5 marks / markah)

Merujuk pada **Rajah 2**. Berikan syarat yang mesti dipenuhi untuk membolehkan satu system suapbalik berayun.

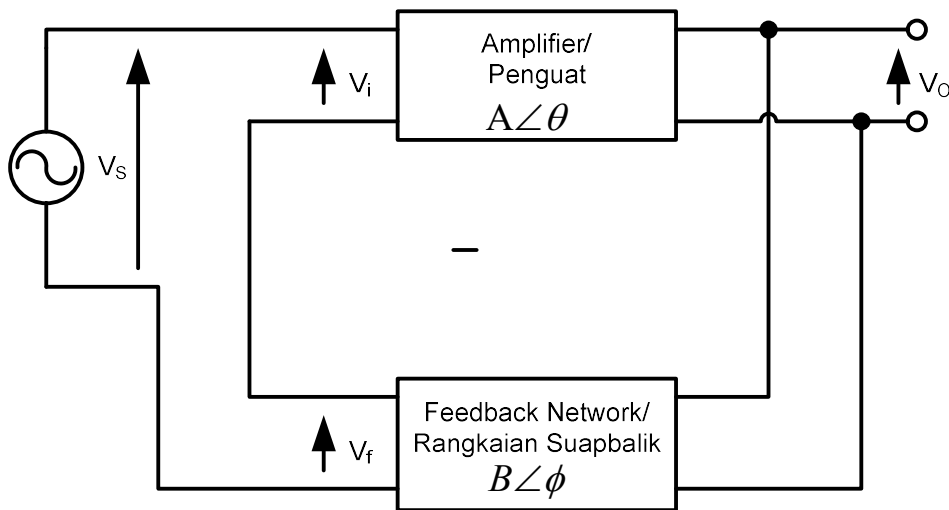


Figure 2 / Rajah 2

QUESTION 3 / SOALAN 3

Explain the method of determining UJT terminals using digital multimeter.

(5 marks / markah)

Terangkan kaedah menentukan tamatan UJT dengan menggunakan meter pelbagai digital.

QUESTION 4 / SOALAN 4

List **four (4)** important parameters for an optocoupler and describe **one (1)** of those parameters.

(5 marks / markah)

*Senaraikan **empat (4)** parameter penting bagi sesebuah pengganding opto dan huraikan **satu (1)** daripada parameter tersebut.*

PART B / BAHAGIAN B

This part consists of **FOUR (4)** questions. Answer **ALL** the questions in an answering booklet.

*Bahagian ini mengandungi **EMPAT (4)** soalan. Jawab **SEMUA** soalan dalam buku jawapan.*

QUESTION 5 / SOALAN 5

Referring to **Figure 5** shows a regulator. Given $\beta_1 = 100$, $\beta_2 = 200$, $V_{BE1} = V_{BE2} = 0.7V$, $V_Z = 6.3V$ and $V_i = 25V$. Determine:

- a. the value of regulated output voltage, V_O for the regulator circuit.
(6 marks / markah)

- b. the values of currents I_{R4} , I_{B1} , I_{E1} and I_{C1}
(8 marks / markah)

- c. the maximum power rating for transistor, Q_1 .
(6 marks / markah)

*Merujuk pada **Rajah 5** menunjukkan sebuah pengatur. Diberi $\beta_1 = 100$, $\beta_2 = 200$, $V_{BE1} = V_{BE2} = 0.7V$, $V_Z = 6.3V$ dan $V_i = 25V$. Tentukan:*

- a. *nilai voltan keluaran teratur, V_O bagi litar pengatur tersebut.*

- b. *nilai arus I_{R4} , I_{B1} , I_{E1} dan I_{C1}*

- c. *kadaran kuasa maksimum bagi transistor, Q_1 .*

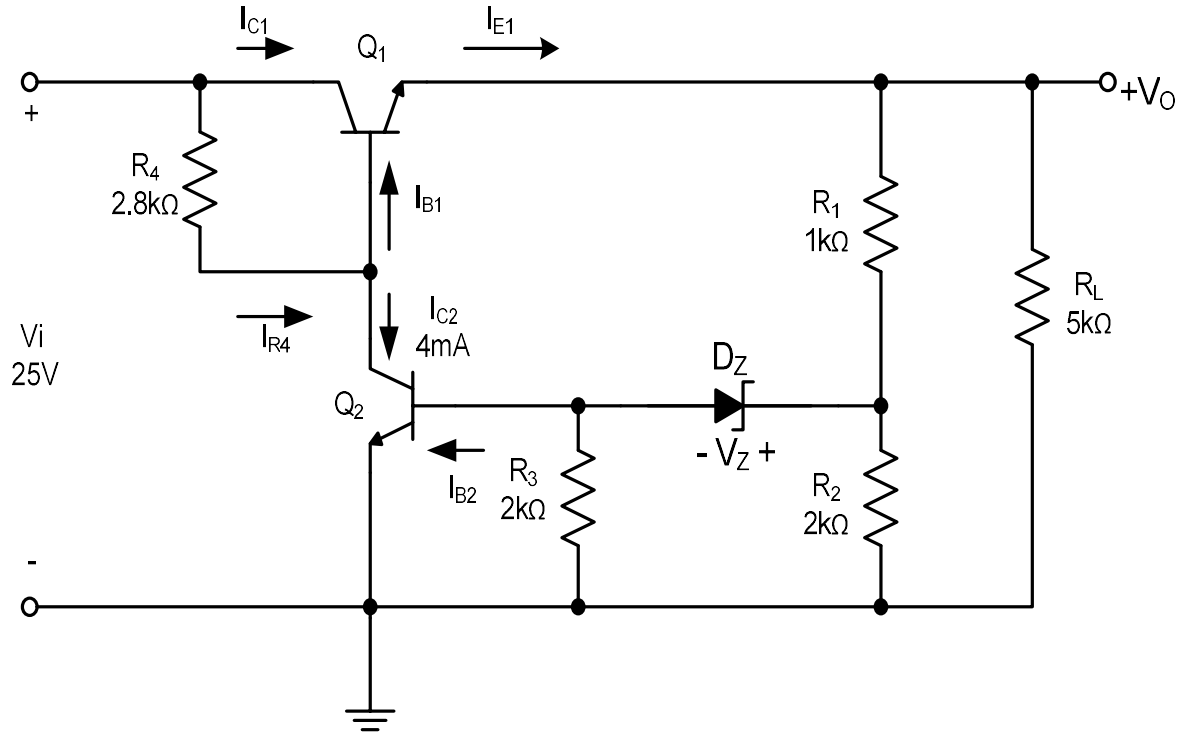


Figure 5 / Rajah 5

QUESTION 6 / SOALAN 6

Referring to **Figure 6**.

- a. Prove the equations for oscillation frequency, $f_o = \frac{1}{2\pi\sqrt{C(L_1+L_2)}}$ and amplifier

gain, $A = \frac{V_o}{V_f} = -\frac{L_2}{L_1}$ when oscillation occurs.

(12 marks / markah)

- b. If the inductor value $L_1 = L_2 = 0.125\text{mH}$ and capacitor $C = 0.01\mu\text{F}$, calculate the oscillation frequency, f_o , the amplifier gain, A and the feedback gain, β during oscillation is maintained.

(8 marks / markah)

Merujuk pada **Rajah 6**.

- a. Buktikan persamaan untuk frekuensi ayunan, $f_o = \frac{1}{2\pi\sqrt{C(L_1 + L_2)}}$ dan gandaan

penguat, $A = \frac{V_o}{V_f} = -\frac{L_2}{L_1}$ apabila pengayunan berlaku.

- b. Jika nilai pengaruh $L_1 = L_2 = 0.125\text{mH}$ dan pemuat $C = 0.01\mu\text{F}$, kira frekuensi ayunan, f_o , gandaan penguat, A dan gandaan suapbalik, β semasa pengayunan dikekalkan.

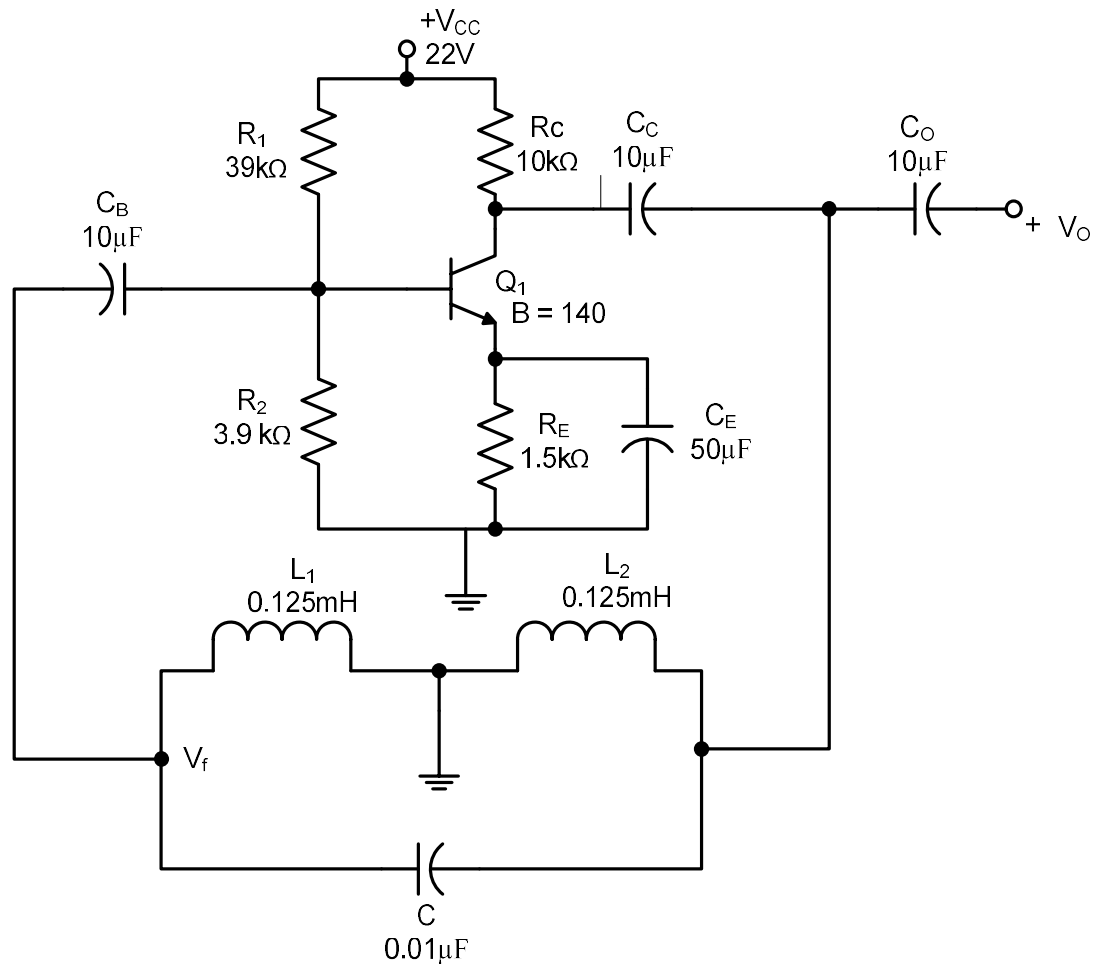


Figure 6 / Rajah 6

QUESTION 7 / SOALAN 7

Referring to **Figure 7** of the UJT relaxation oscillator circuit. Given parameters for UJT are such as $R_{BB} = 5k\Omega$, $\eta = 0.6$, $V_V = 1V$, $I_V = 10mA$, $I_P = 10\mu A$ and $R_{B1} = 100\Omega$ (while capacitor C is charging) .Determine:

- a. peak voltage value to turn on the UJT.

(8 marks / markah)

- b. resistance range of resistor R_1 to turn on and off the UJT properly.

(4 marks / markah)

- c. oscillation frequency, f_O if internal resistance UJT, $R_{B1} = 100\Omega$ while capacitor C is charging.

(8 marks / markah)

*Merujuk pada **Rajah 7** litar pengayun santaian UJT. Parameter yang diberikan untuk UJT adalah seperti $R_{BB} = 5k\Omega$, $\eta = 0.6$, $V_V = 1V$, $I_V = 10mA$, $I_P = 10\mu A$ dan $R_{B1} = 100\Omega$ (semasa pemuat C mengecas). Tentukan:*

- a. *nilai voltan puncak untuk menghidupkan UJT.*

- b. *julat rintangan perintang R_1 untuk menghidupkan dan mematikan UJT dengan betul.*

- c. *frekuensi ayunan, f_O jika rintangan dalaman UJT, $R_{B1} = 100\Omega$ semasa pemuat C sedang mengecas.*

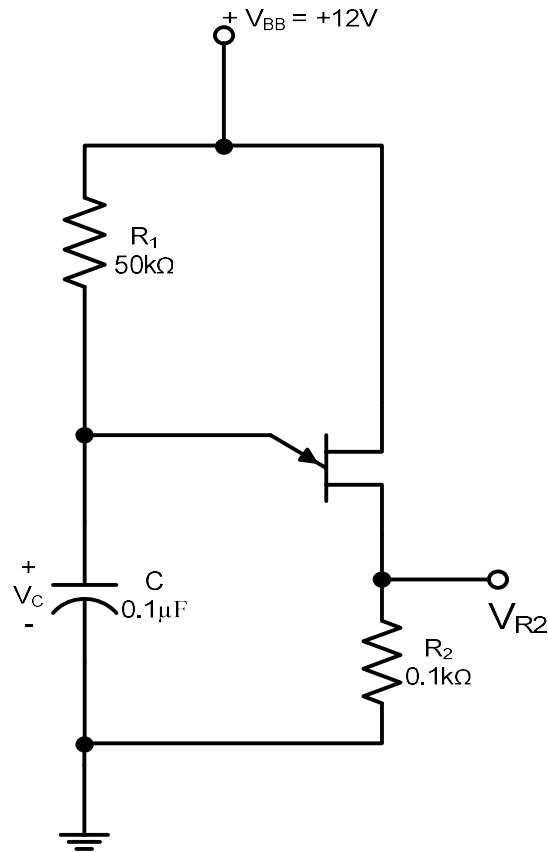


Figure 7 / Rajah 7

QUESTION 8 / SOALAN 8

The circuit in **Figure 8a** is used to calculate the number of students entering the library. The light beam placed across the entrance. The light beam will hit the light dependent resistor, LDR and it will break when there are students through the door.

- a. Determine the voltage value at Y.

(4 marks / markah)

- b. The resistance value of the light dependent resistor, R_{LDR} changes with the brightness of the light as shown in **Figure 8b**.

- i. When the brightness of the light is 50 lm/m^2 , the light beam is cut off. From the graph, show the resistance value of the light dependent resistor, R_{LDR} .

(3 marks / markah)

- ii. When the brightness of the light is 300 lm/m^2 , the light beam is uninterrupted. From the graph, show the resistance value of the light dependent resistor, R_{LDR} .

(3 marks / markah)

- iii. If V_{OUT} is a low voltage value, determine the voltage value at X.

(2 marks / markah)

- iv. Calculate the value of resistance, R_3 if the voltage V_{OUT} is high when the brightness is 100 lm/m^2 .

(8 marks / markah)

*Litar pada **Rajah 8a** digunakan untuk mengira bilangan pelajar yang memasuki perpustakaan. Sinar cahaya diletakkan merintang pintu masuk. Sinar cahaya tersebut akan mengenai perintang peka cahaya, LDR dan ia akan terputus apabila ada pelajar melalui pintu tersebut.*

a. *Tentukan nilai voltan di Y.*

b. *Nilai rintangan perintang peka cahaya, R_{LDR} berubah dengan kecerahan cahaya seperti ditunjukkan dalam **Rajah 8b**.*

- i. *Apabila kecerahan cahaya adalah 50 lm/m^2 , sinaran cahaya terputus. Daripada graf, tunjukkan nilai rintangan perintang peka cahaya, R_{LDR} .*
- ii. *Apabila kecerahan cahaya adalah 300 lm/m^2 , sinaran cahaya tidak terputus. Daripada graf, tunjukkan nilai rintangan perintang peka cahaya, R_{LDR} .*
- iii. *Jika V_{OUT} adalah nilai voltan rendah, tentukan nilai voltan di X.*
- iv. *Kira nilai rintangan, R_3 jika V_{OUT} adalah voltan tinggi ketika kecerahan adalah 100 lm/m^2 .*

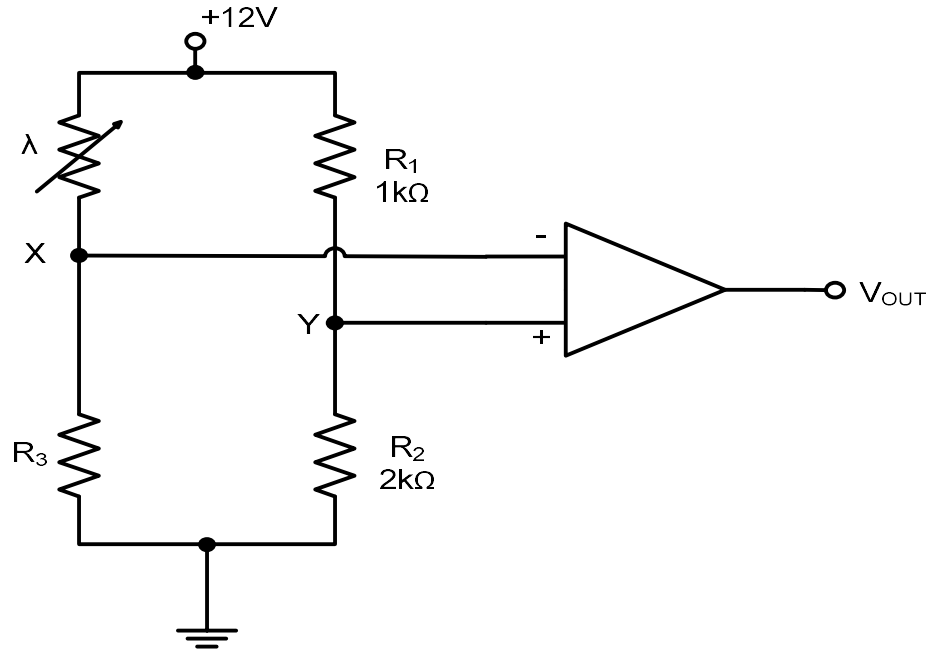


Figure 8a / Rajah 8a

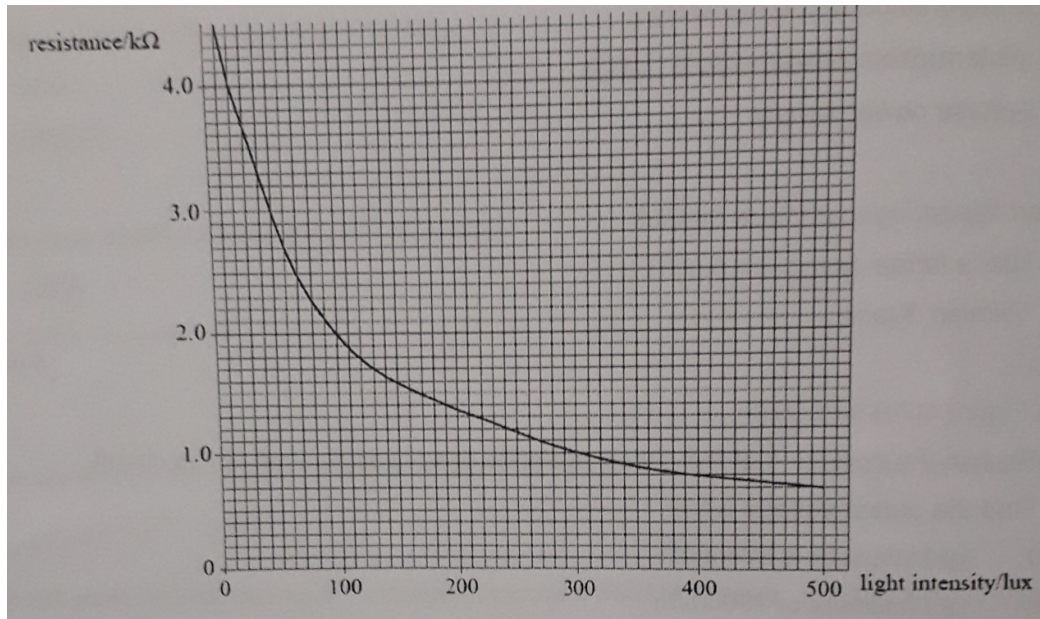


Figure 8b / Rajah 8b

[100 MARKS / 100 MARKAH]

END OF QUESTION PAPER / KERTAS SOALAN TAMAT