

10 Rajah 10.1 menunjukkan seekor ikan yang dimasak menggunakan sebuah dapur induksi.
Diagram 10.1 shows a fish is cooked by using an induction cooker.



Rajah 10.1
Diagram 10.1

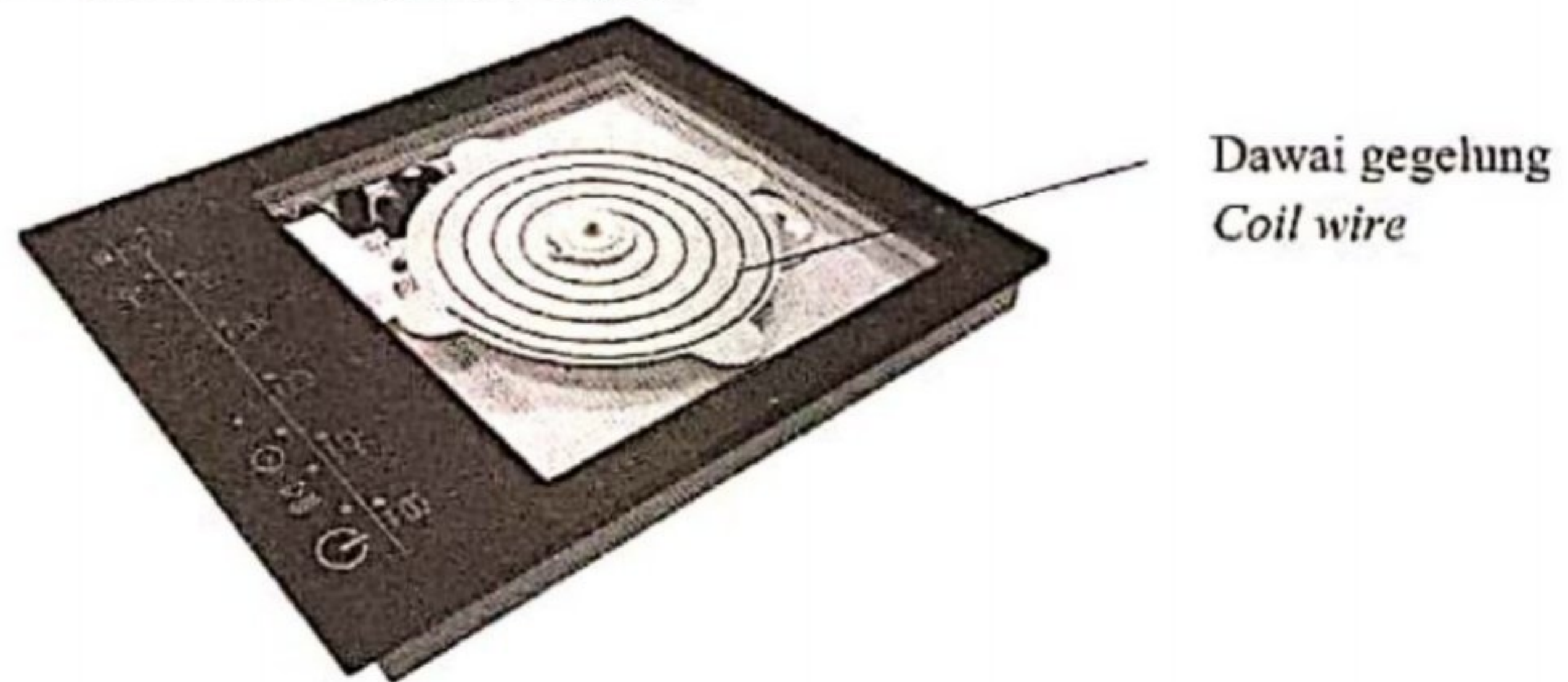
- (a) What is meaning of electromagnetic induction?
Apakah yang dimaksudkan dengan aruhan elektromagnet?

[1 mark]
[1 markah]

- (b) Berpandukan kepada konsep fizik, terangkan bagaimana dapur induksi berfungsi.
Based on the physics concept, explain how an induction cooker works.

[4 markah]
[4 marks]

- (c) Rajah 10.2 menunjukkan bahagian dalam dapur induksi.
Diagram 10.2 shows inside the induction cooker.

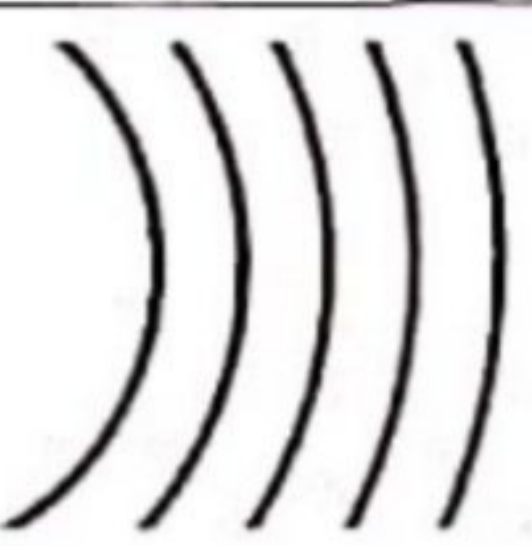


Rajah 10.2
Diagram 10.2

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Jadual 10 menunjukkan spesifikasi J, K, L dan M bagi empat dapur induksi dan periuk yang sesuai yang perlu digunakan untuk memasak makanan.

Table 10 shows the specification J, K, L and M of four that can be used to cook food.

Dapur Stove	J	K	L	M
Bahagian lapik atas <i>Top plate</i>	Seramik <i>Ceramic</i>	Kuprum <i>Copper</i>	Seramik <i>Ceramic</i>	Kuprum <i>Copper</i>
Jenis bahan kuali <i>Material of pan</i>	Tidak magnetik <i>Non-magnetic</i>	Feromagnet <i>Ferromagnetic</i>	Feromagnetik <i>Ferromagnetic</i>	Tidak magnetik <i>Non-magnetic</i>
Dawai gegelung <i>Coil wire</i>	 Wayar berpintal <i>Twisted wire</i>	 Dawai tunggal <i>single wire</i>	 Wayar berpintal <i>Twisted wire</i>	 Wayar berpintal <i>Twisted wire</i>
Jenis Bekalan Kuasa <i>Type of power supply</i>	Arus terus (a.t) <i>Direct current (d.c)</i>	Arus ulang alik (a.u) <i>Alternating current (a.c)</i>	Arus ulang alik (a.u) <i>Alternating current (a.c)</i>	Arus terus (a.t) <i>Direct current (d.c)</i>

Jadual 10

Table 10

Anda dikehendaki untuk mengkaji spesifikasi bagi empat dapur dan tentukan dapur manakah yang paling sesuai digunakan untuk memasak makanan dengan cekap. Beri sebab bagi pilihan anda.

You are required to study the specification of four stove and determine the most suitable to be used for cooking food efficiently. Give reasons for your choice.

[10 markah]

[10 marks]

- (d) Rajah 10.3 menunjukkan simbol bagi sebuah transformer injak turun.
Diagram 10.3 shows a symbol of a step-down transformer.

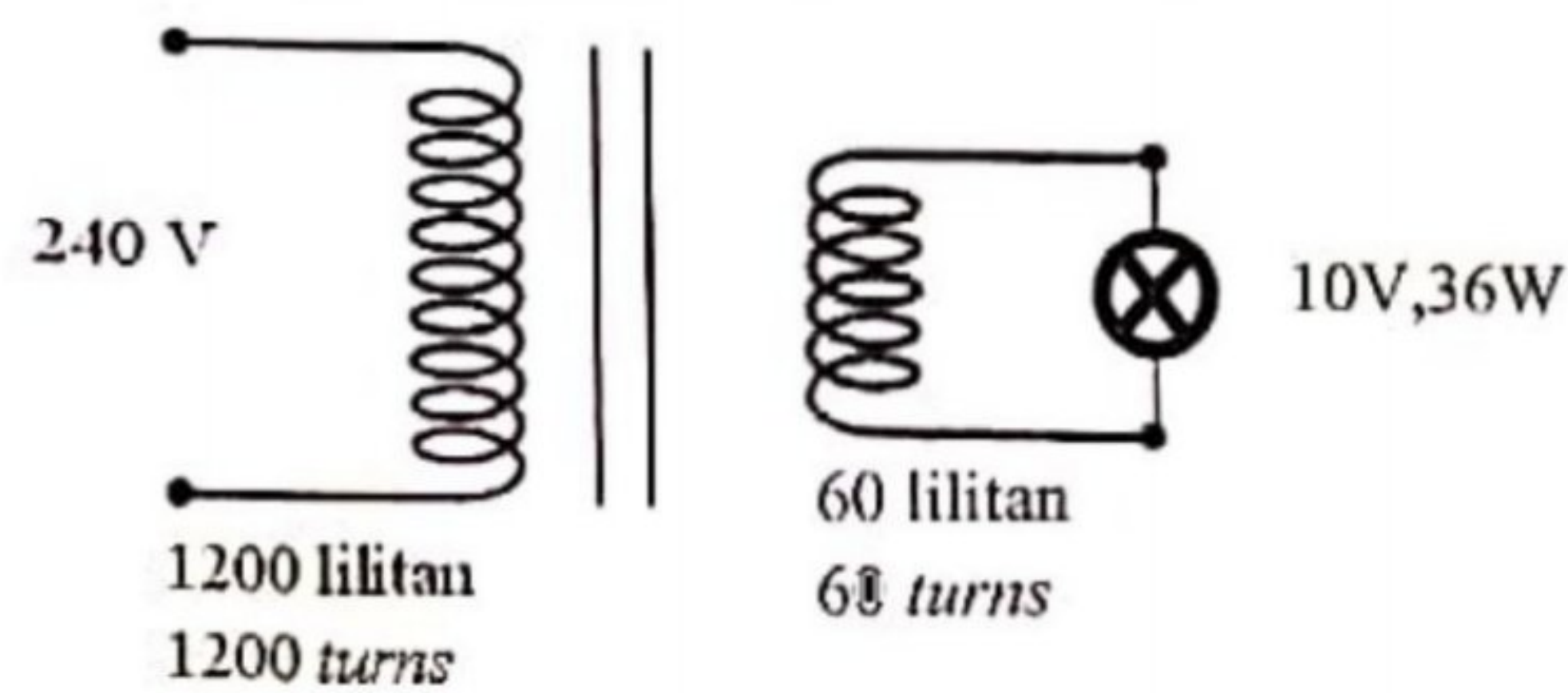


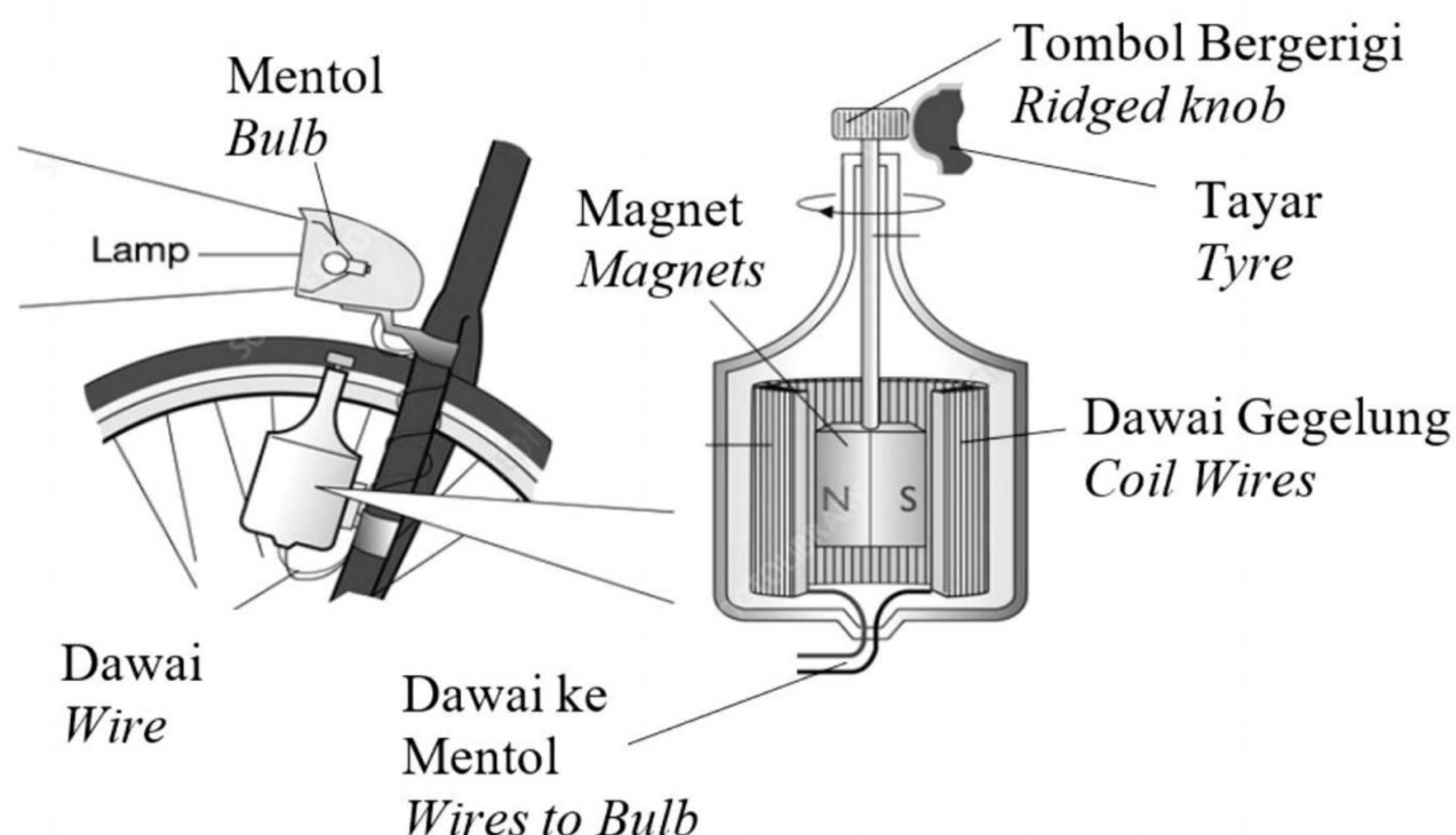
Diagram 10.3
Rajah 10.3

- (i) Hitungkan voltan output. [2 markah]
Calculate the output voltage. [2 marks]
- (ii) Hitungkan kuasa input transformer jika arus yang mengalir di dalam gegelung primer ialah 0.2 A. [1 markah]
Find the input power if current flow in primary coil is 0.2 A. [1 mark]
- (iii) Hitungkan arus output yang mengalir dalam mentol berlabel 10 V, 36 W yang dipasang pada gegelung sekunder. (Anggap transformer ialah unggul) [2 markah]
Calculate the output current flow in a bulb labelled 10 V, 36 W that connected to the secondary coil (Assume the transformer is ideal) [2 marks]

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SULIT

- 10 Rajah 10.1 menunjukkan sebuah dinamo basikal telah menyalakan mentol apabila basikal bergerak. Fenomena ini dikenali sebagai aruhan elektromagnet.

Diagram 10.1 shows a bicycle dynamo lights up a bulb when the bicycle moves. The phenomenon is known as electromagnetic induction.



Rajah 10.1
Diagram 10.1

- (a) Apakah yang dimaksudkan dengan aruhan elektromagnet?
What is the meaning of electromagnetic induction?

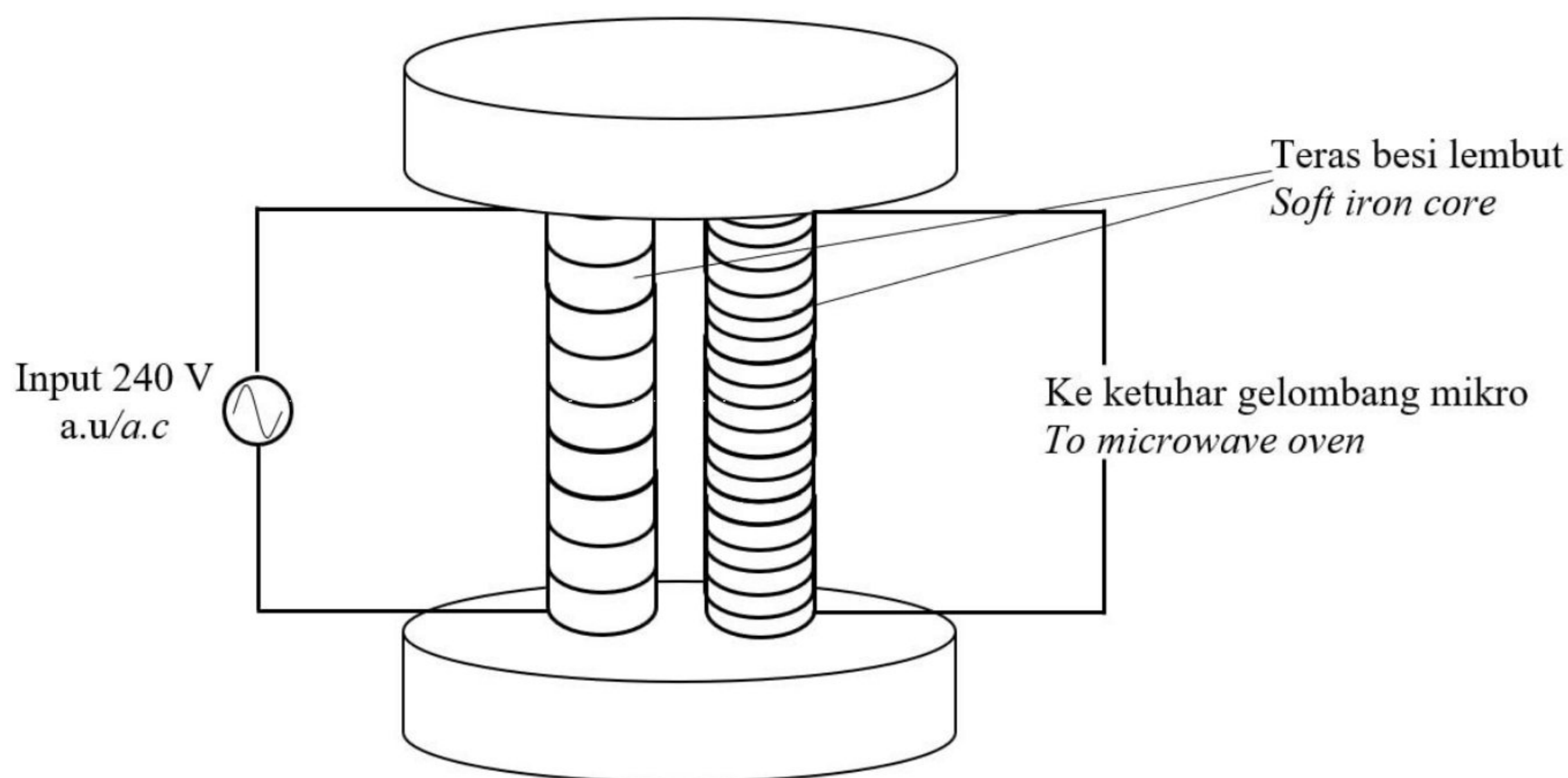
[1 markah / 1 mark]

- (b) Terangkan prinsip kerja dinamo basikal yang telah menyebabkan mentol menyala.
Explain the working principle of a bicycle dynamo that causes a bulb to light up.

[4 markah / 4 marks]

- (c) Rajah 10.2 menunjukkan satu transformer yang digunakan dalam sebuah ketuhar gelombang mikro untuk mengubah voltan.

Diagram 10.2 shows a transformer used in a microwave oven to change the voltage.



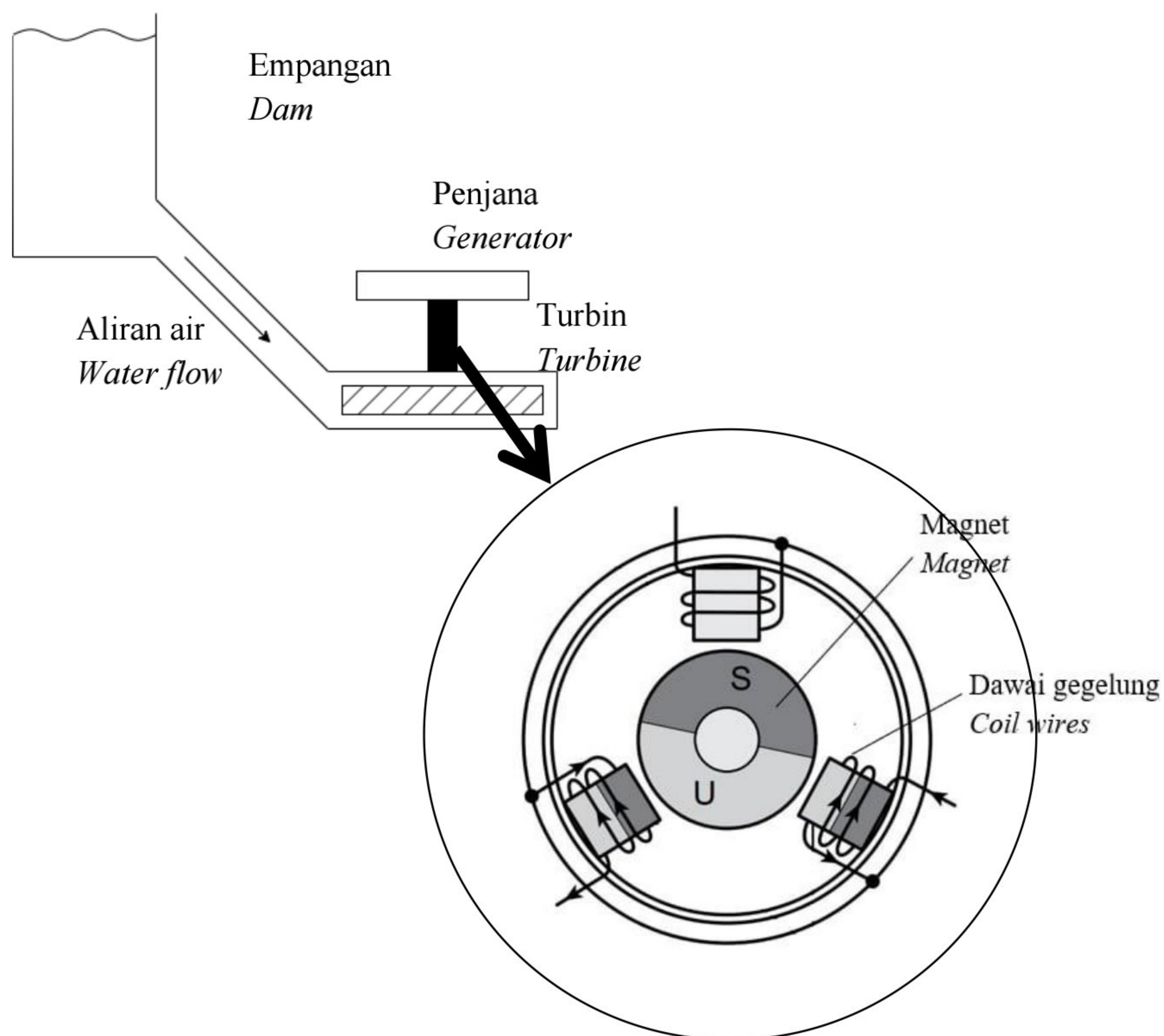
Rajah 10.2
Diagram 10.2

- (i) Bilangan lilitan pada gegelung primer dan gegelung sekunder dalam Rajah 10.2 masing-masing ialah 300 dan 2750. Hitung nilai voltan output, V_o .
The number of turns on the primary coil and the secondary coil in Diagram 10.2 are 300 and 2750 respectively. Calculate the value of the output voltage, V_o .
[2 markah / 2 marks]
- (ii) Kecekapan transformer bagi ketuhar gelombang mikro adalah 82.5%. Hitung arus output jika kuasa input ketuhar gelombang mikro adalah 1200W.
Transformer efficiency for microwave ovens is 82.5%. Calculate the output current if the input power of the microwave oven is 1200W.
[3 markah / 3 marks]

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TERHAD

- (d) Rajah 10.4 menunjukkan sebuah turbin yang digunakan dalam pusat janakuasa hidro.
Diagram 10.4 shows a turbine used in hydro power plant.



Rajah 10.4
Diagram 10.4

Sebagai seorang jurutera, anda diminta mencadangkan satu model turbin yang boleh mengeluarkan kuasa output yang optimum, berdasarkan Jadual 2 yang menunjukkan ciri-ciri bagi setiap penjana T, U, V dan W.

As an engineer, you are asked to suggest a model of turbine that can produce the optimal output power, based on Table 2 which shows the characteristics of each generator T, U, V and W.

Penjana Generator	Kekuatan Magnet <i>Strength of Magnet</i>	Bilangan lilitan gegelung dalam armatur <i>Number of turns of coil in the armature</i>	Bahan bagi dawai gegelung <i>Material of coil wire</i>	Diameter bagi dawai gegelung <i>Diameter of coil wire</i>
T	Kecil <i>Small</i>	300	Aluminium <i>Aluminium</i>	s.w.g. 5
U	Besar <i>Large</i>	750	Kuprum <i>Copper</i>	s.w.g. 6
V	Kecil <i>Small</i>	650	Aluminium <i>Aluminium</i>	s.w.g. 15
W	Besar <i>Large</i>	250	Kuprum <i>Copper</i>	s.w.g. 14

Jadual 2
Table 2

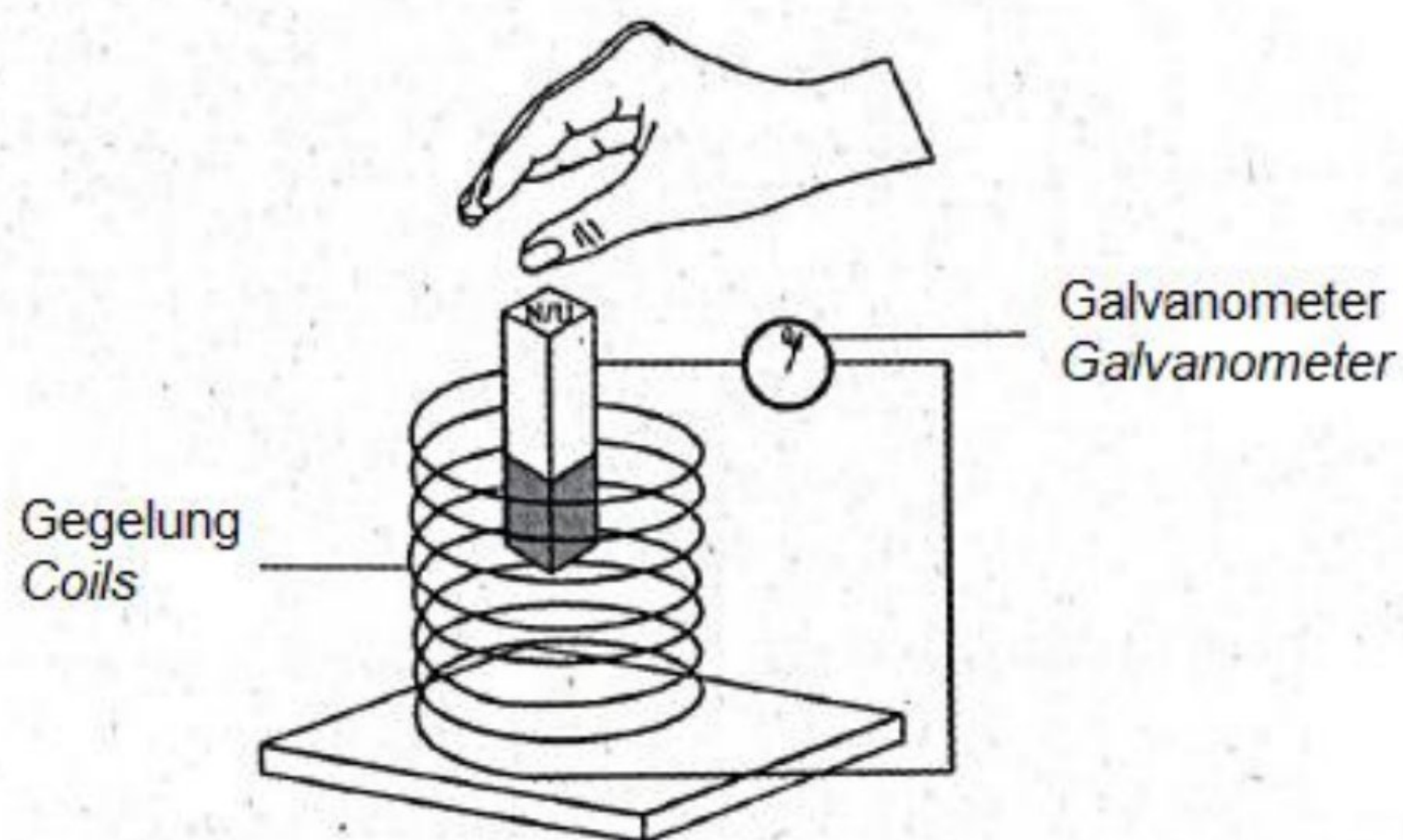
Terangkan kesesuaian bagi setiap ciri dan beri sebab atas pilihan anda.

Explain the suitability of each characteristic and give reasons for your choice.

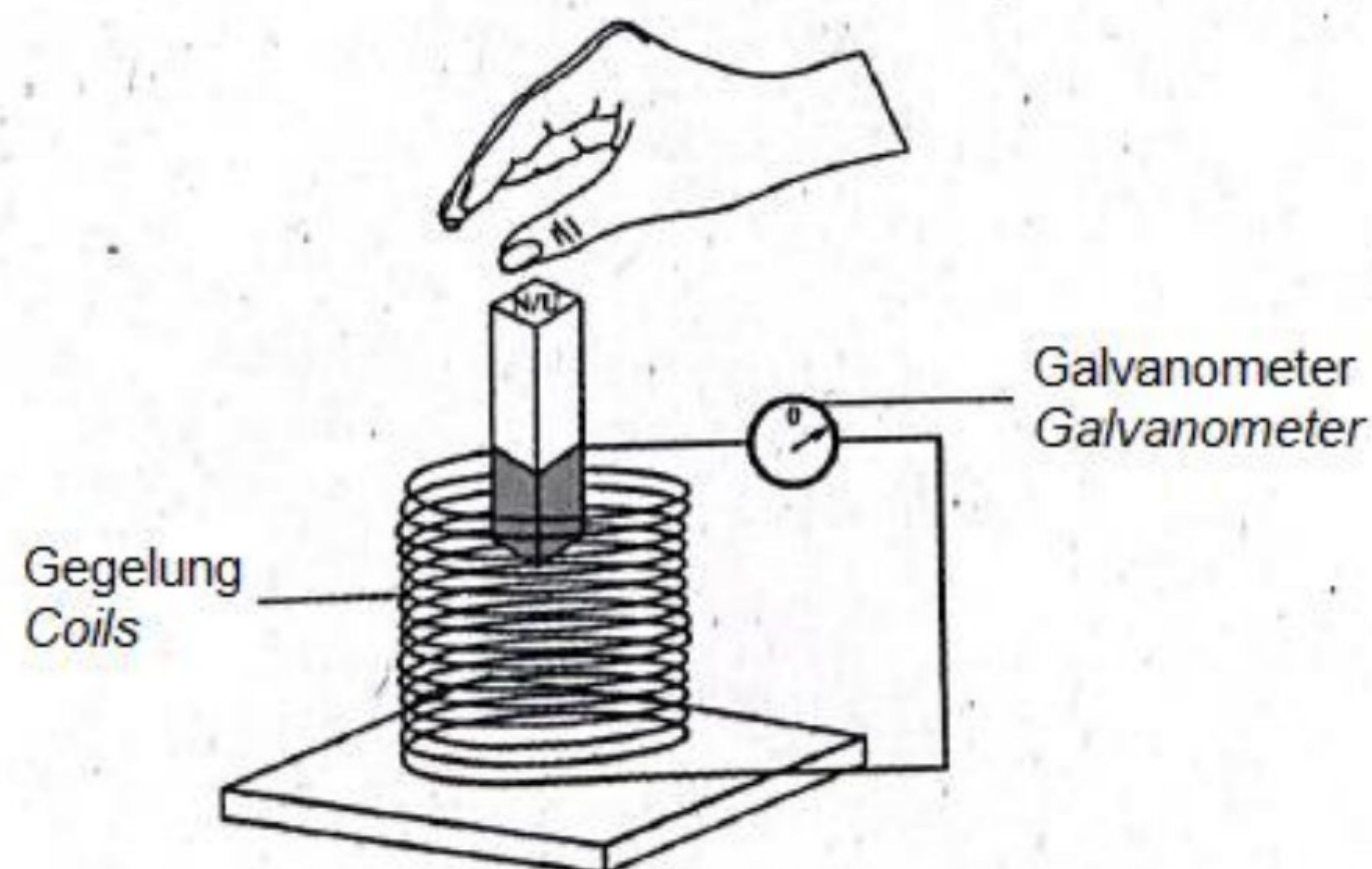
[10 markah / 10 marks]

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TERHAD

6. Rajah 6.1 dan Rajah 6.2 menunjukkan satu magnet bar dijatuhkan ke dalam dua gegelung yang berbeza dari ketinggian yang sama.
Diagram 6.1 and Diagram 6.2 show a bar magnet is dropped into two different coils from the same height.



Rajah 6.1
 Diagram 6.1



Rajah 6.2
 Diagram 6.2

- (a) Namakan kuantiti fizik yang diukur oleh galvanometer.
Name the physical quantity measured by galvanometer.

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

- (b) Berdasarkan Rajah 6.1 dan Rajah 6.2, bandingkan
Based on Diagram 6.1 and 6.2, compare

- (i) kekuatan medan magnet bagi magnet bar.
the strength of magnetic field of the bar magnet.

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

- (ii) bilangan lilitan gegelung
the number of turns of the coils

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

- (iii) Saiz pesongan penunjuk galvanometer
Size of deflection of the galvanometer pointer

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

- (c) Berdasarkan jawapan anda di 6(b), nyatakan
Based on your answer in 6(b), state

- (i) hubungan antara bilangan lilitan gegelung dengan saiz pesongan penunjuk galvanometer.
State the relationship between the number of turns of the coil with the size of deflection of the galvanometer.

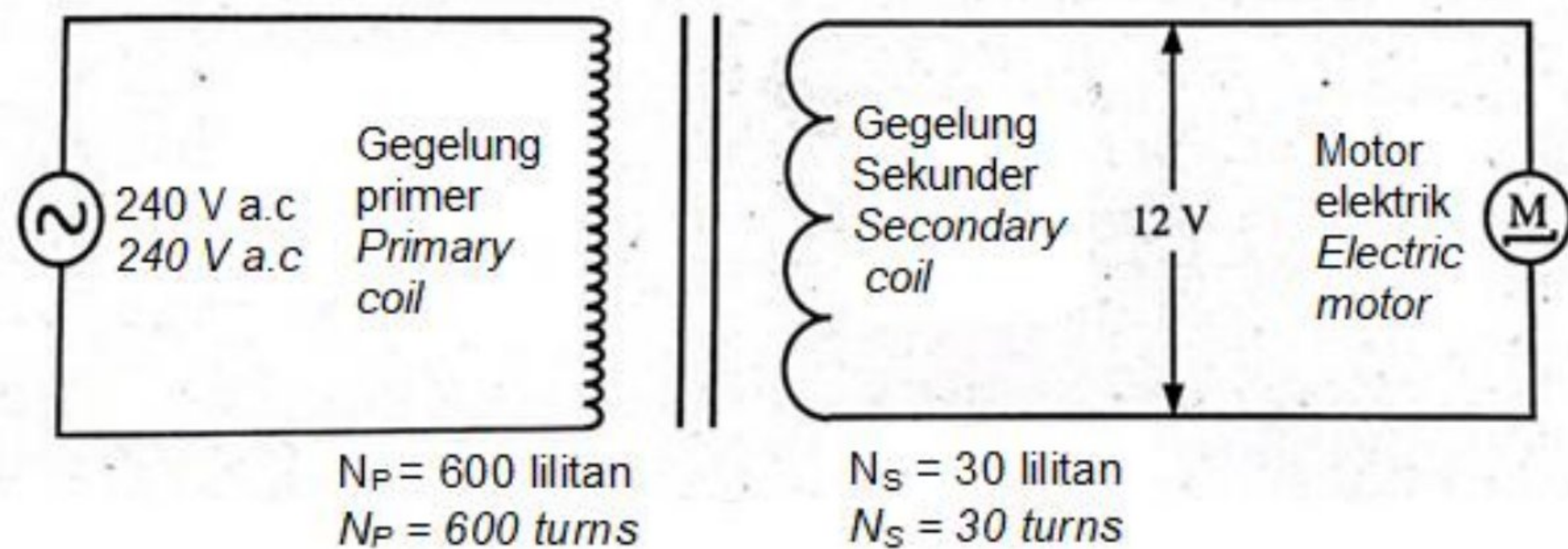
.....
[1 markah]
[1 mark]

- (ii) hubungan antara bilangan lilitan gegelung dengan kadar perubahan fluks magnet.
State the relationship between the number of turns of the coil with rate of change of magnetic flux.

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

- (d) Rajah 6.3 menunjukkan sebuah transformer ringkas yang disambung kepada motor elektrik 12V, 24 W arus ulangalik.

Diagram 6.3 shows a simple transformer which is connected to an alternating current 12V, 24 W electric motor.



Rajah 6.3
Diagram 6.3

- (i) Hitung arus yang mengalir dalam gegelung sekunder itu.
Calculate the current flow in the secondary coil.

[2 markah]
[2 marks]

- (ii) Apakah yang akan berlaku kepada arus dalam gegelung sekunder sekiranya voltan sekunder dikurangkan kepada 6 V?
What will happen to current flows in secondary coil if its voltage being decreased to 6 V?

[1 markah]
[1 mark]

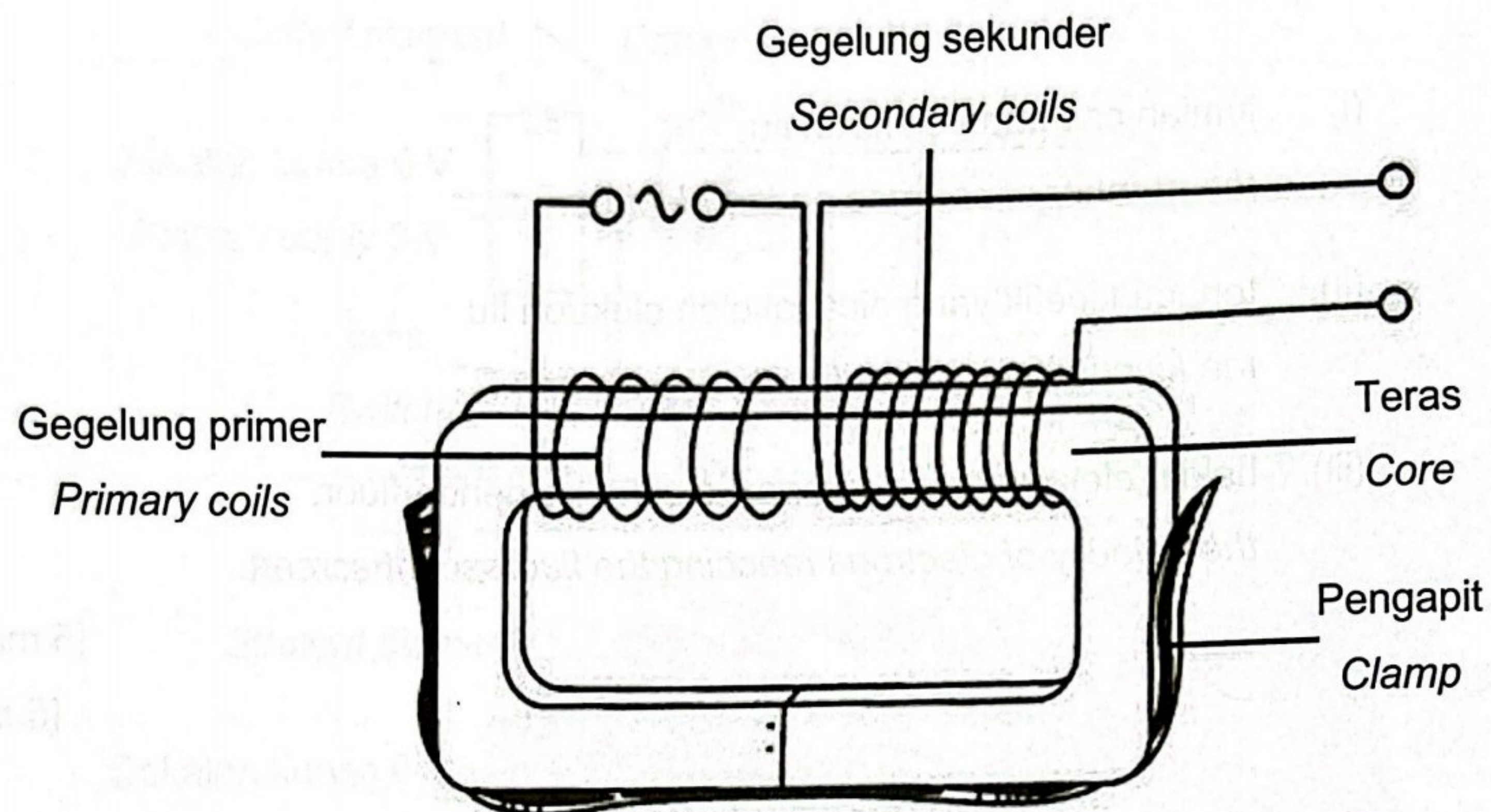
Bahagian C

[20 markah]

Soalan ini mesti dijawab.

- 11 Rajah 11.1 menunjukkan sebuah model transformer ringkas yang dibina oleh seorang pelajar di makmal sekolah.

Diagram 11.1 shows a model of a simple transformer built by a student at school laboratory.



Rajah 11.1

Diagram 11.1

- (a) Berdasarkan Rajah 11.1, nyatakan jenis transformer.

Based on Diagram 11.1, state the type of the transformer.

[1 markah]

[1 mark]

- (b) Merujuk pada Rajah 11.1, terangkan prinsip operasi sebuah transformer.

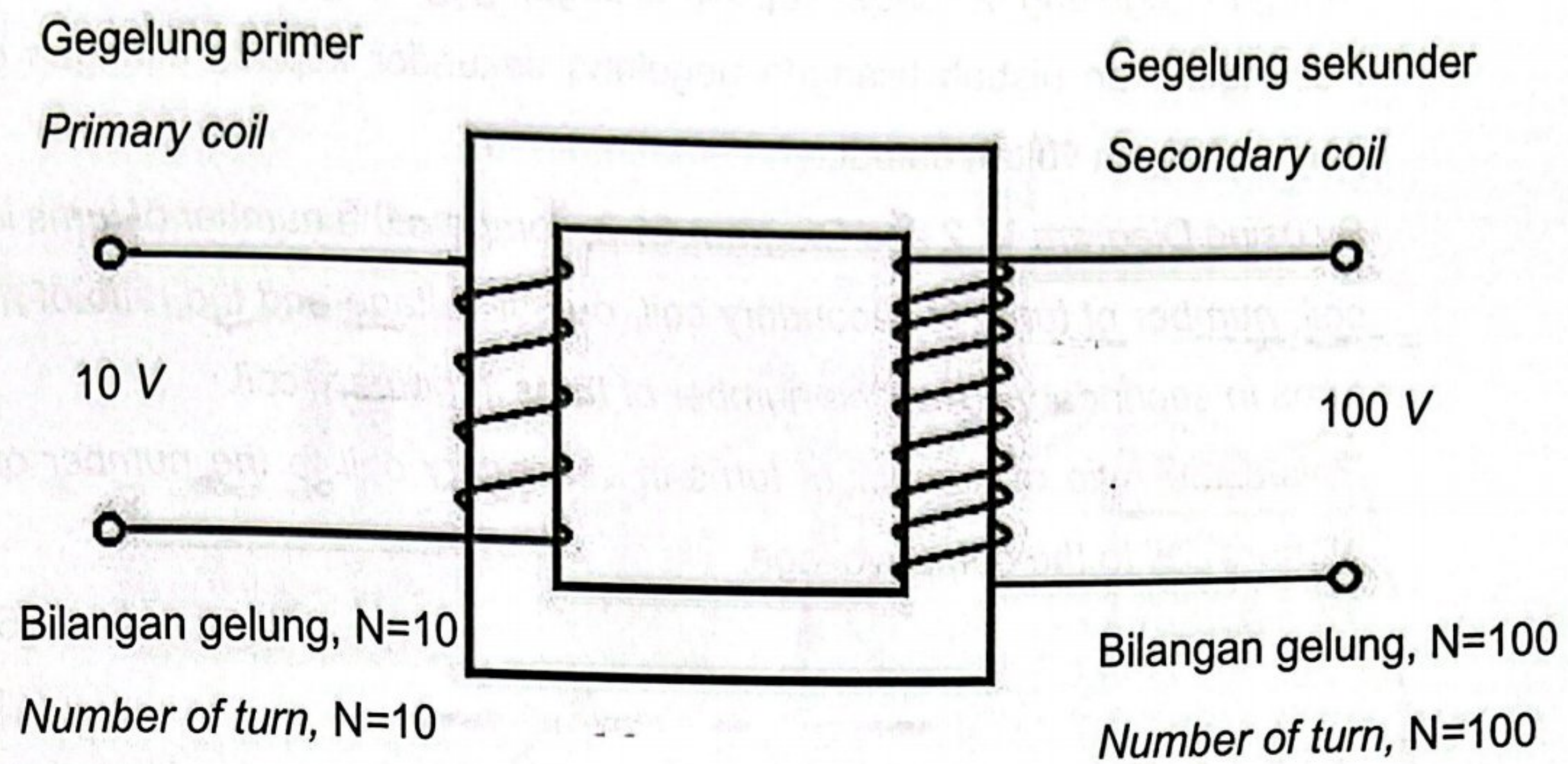
Referring to the Diagram 11.1, explain the operation's principle of a transformer.

[4 markah]

[4 marks]

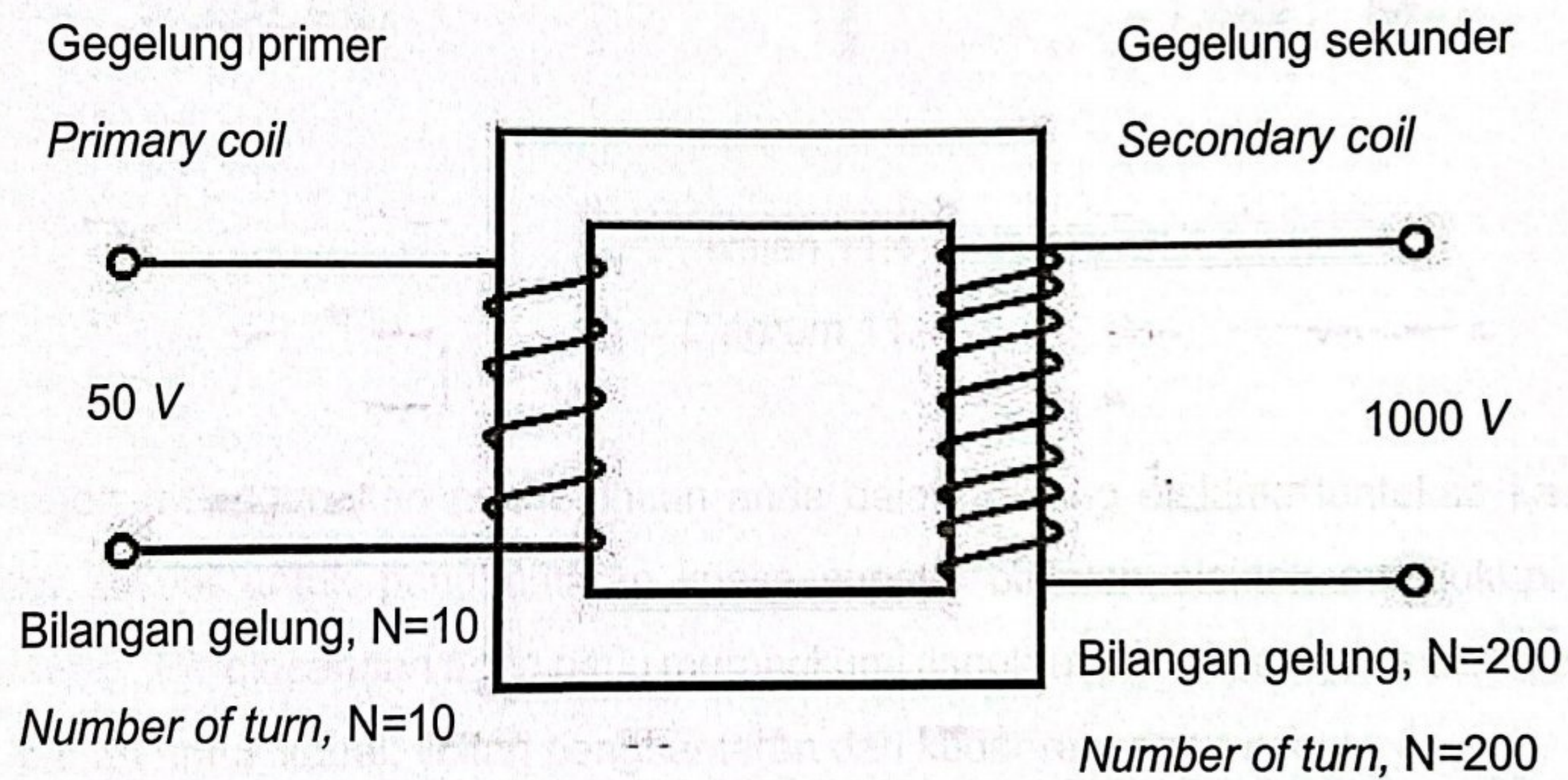
(c) Rajah 11.2 dan Rajah 11.3 menunjukkan dua buah transformer.

Diagram 11.2 and Diagram 11.3 show two transformers.



Rajah 11.2

Diagram 11.2



Rajah 11.3

Diagram 11.3

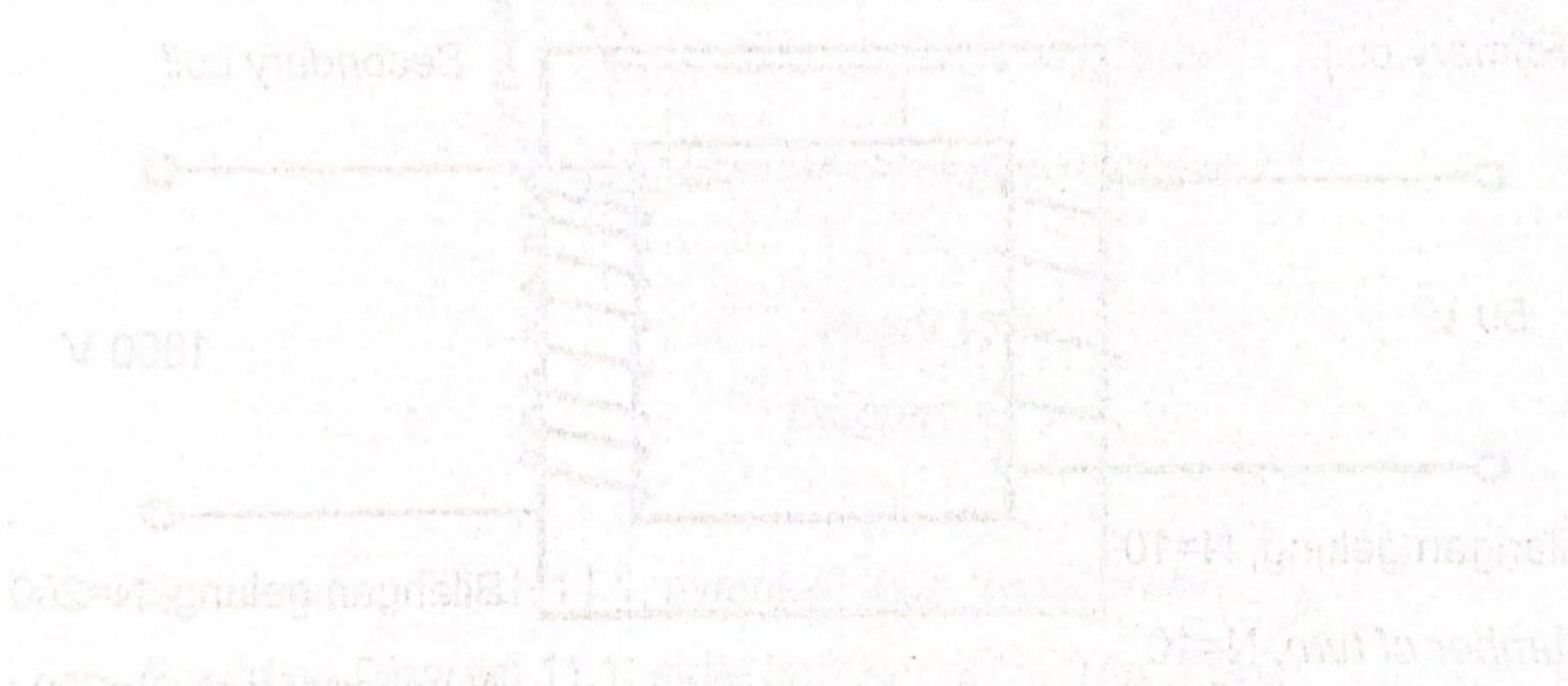
Dengan menggunakan Rajah 11.2 dan Rajah 11.3, bandingkan bilangan lilitan gegelung primer, bilangan lilitan gegelung sekunder, voltan output dan nisbah bilangan gegelung sekunder kepada bilangan gegelung primer. Hubungkan nisbah bilangan gegelung sekunder kepada bilangan gegelung primer dengan voltan output.

By using Diagram 11.2 and Diagram 11.3, compare the number of turns in primary coil, number of turns in secondary coil, output voltage and the ratio of number of turns in secondary coil to the number of turns in primary coil.

Relate the ratio of number of turns in secondary coil to the number of turns in primary coil to the output voltage.

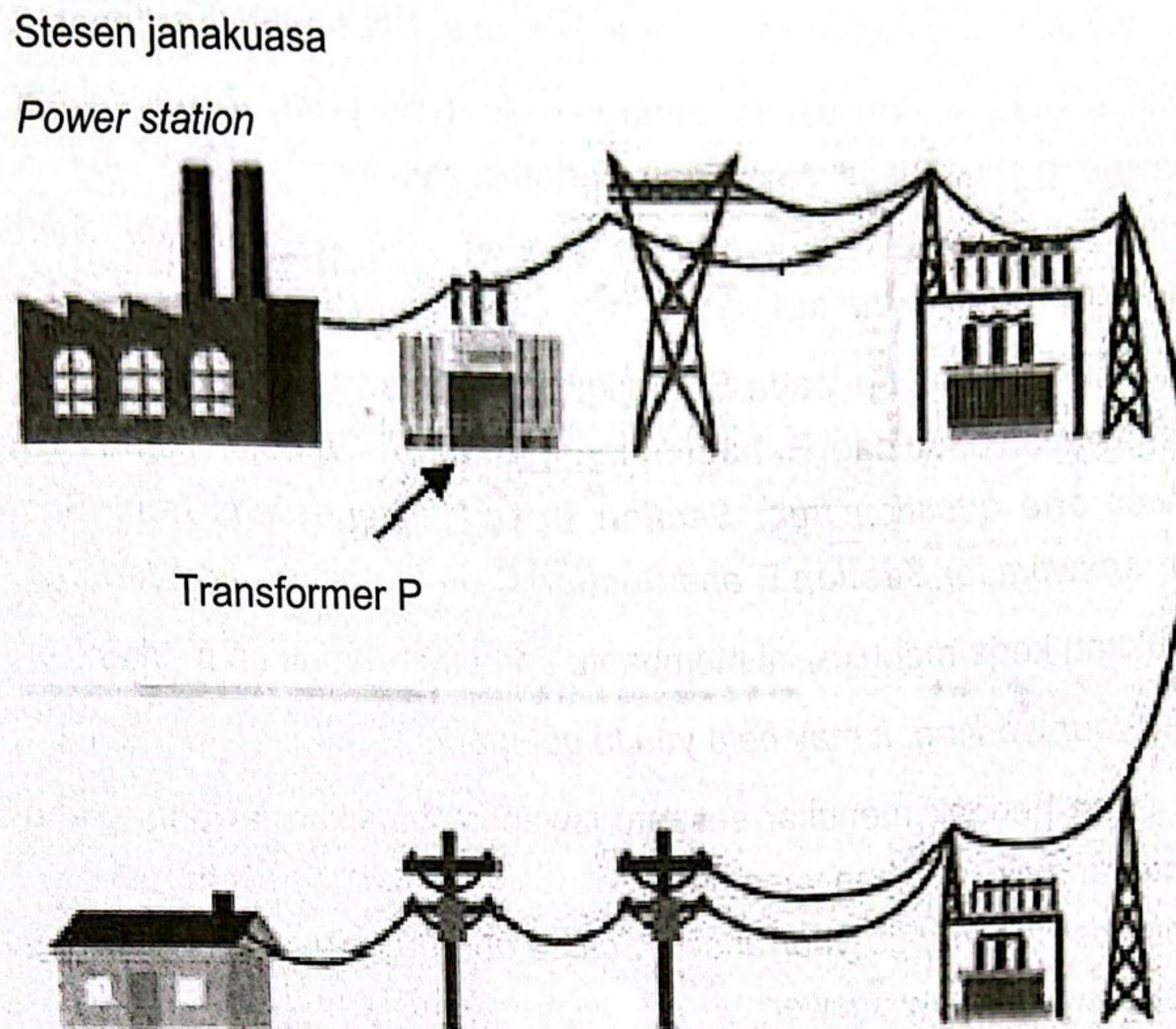
[5 markah]

[5 marks]



- (d) Rajah 11.4 menunjukkan Sistem Rangkaian Grid Nasional yang digunakan untuk menghantar bekalan elektrik ke kawasan perumahan.

Diagram 11.4 shows the National Grid Network System used to supply electricity for residential area.



Rajah 11.4
Diagram 11.4

Dengan menggunakan pengetahuan anda dalam bidang elektrik, tentukan kaedah yang sesuai untuk penghantaran kuasa supaya bekalan elektrik mencukupi dan selamat. Perbincangan anda perlu merangkumi aspek-aspek seperti jenis transformer P, bahan untuk kabel, voltan penghantaran dan kadar regangan kabel.

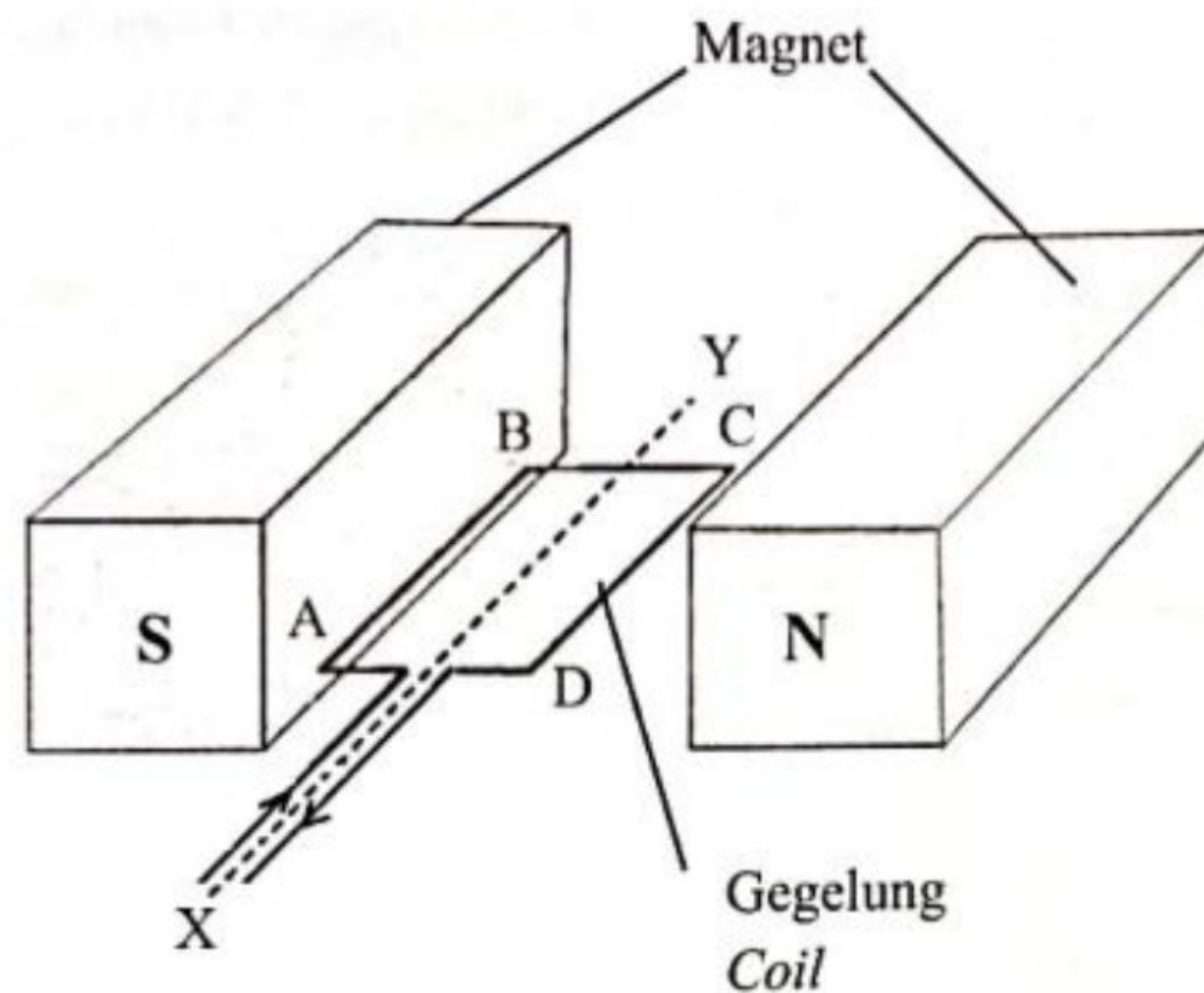
Using your knowledge in electrical, determine the suitable method for power transmission so that electric supply is sufficient and safe. Your suggestion should include the following aspects such as type of transformer P, material of the cable, transmission voltage and rate of expansion of the cable.

[10 markah]

[10 marks]

MODUL TAMAT

- 10 Rajah 10.1 menunjukkan bahagian motor arus terus yang ringkas.
Diagram 10.1 shows part of a simple direct current motor.



Rajah 10.1
Diagram 10.1

- (a) Gegelung ABCD yang berada dalam medan magnet bebas berputar pada paksi XY apabila arus elektrik mengalir melaluinya.

The coil ABCD that is placed in the magnetic field is free to rotate about XY axis when electric current flows through it.

- (i) Nyatakan petua yang digunakan untuk menentukan arah putaran gegelung tersebut.

State the rule used to determine the direction of the coil rotation.

[1 markah]

[1 mark]

- (ii) Terangkan bagaimana gegelung itu boleh berputar.

Explain how the coil can be rotated.

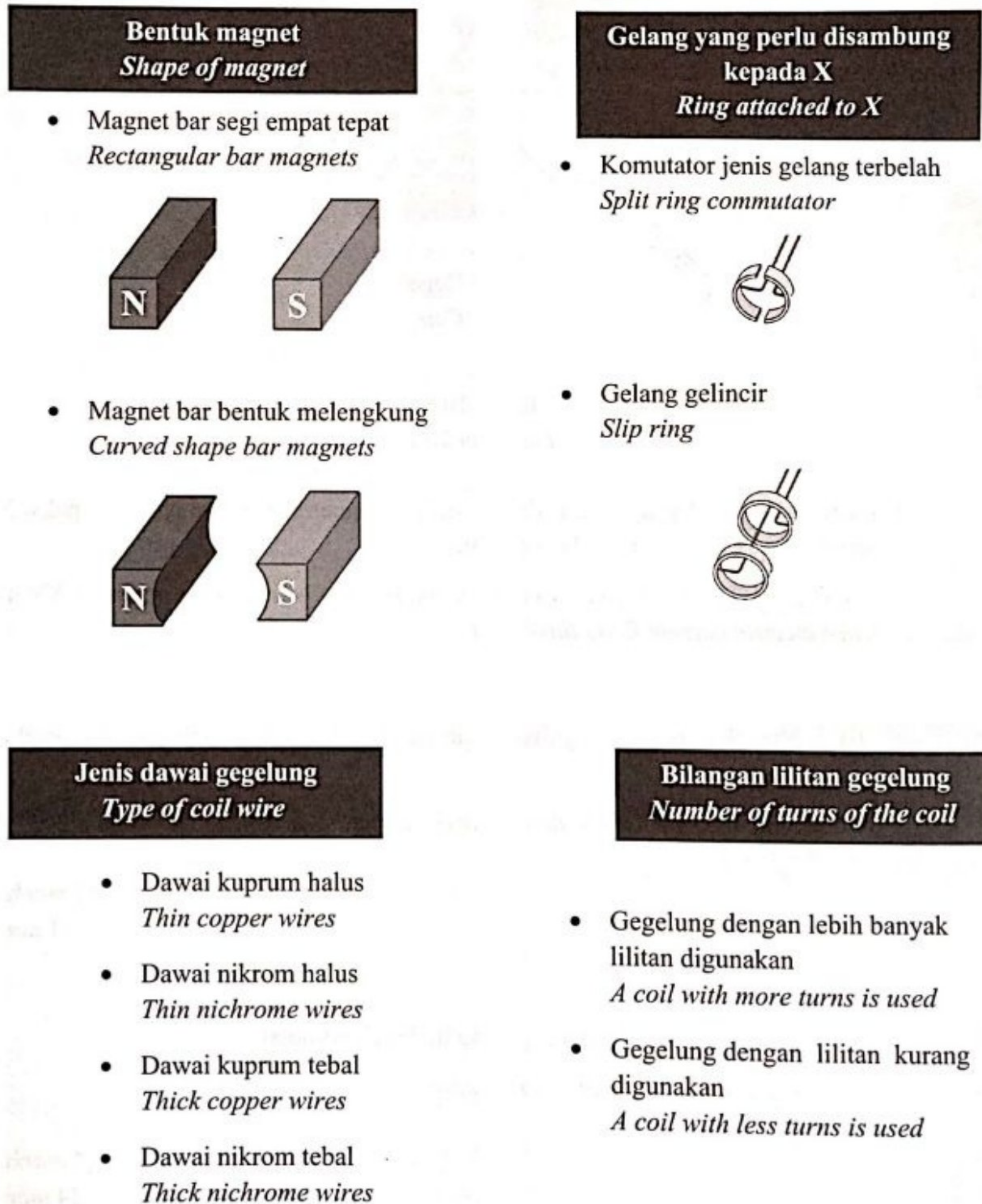
[4 markah]

[4 marks]

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- (b) Bahagian motor arus terus dalam Rajah 10.1 boleh digunakan untuk membina satu prototaip penjana arus ulang alik yang berfungsi dengan baik.

Part of the simple direct current motor in Diagram 10.1 can be used to construct a functional prototype of alternating current generator.



Rajah 10.2
Diagram 10.2

Rajah 10.2 menunjukkan pilihan komponen yang digunakan untuk membina prototaip penjana arus ulang alik tersebut.

Diagram 10.2 shows the choices of component that can be used to build the prototype of the alternating current generator.

- (i) Berdasarkan Rajah 10.1 dan pilihan komponen yang diberikan dalam Rajah 10.2, kenalpasti dan jelaskan kesesuaian setiap komponen. Berikan sebab bagi pilihan anda.

Based on Diagram 10.1 and the choice of components given in Diagram 10.2, identify and explain the suitability of each component.

Give reasons for your choice.

[8 markah]

[8 marks]

- (ii) Prototaip penjana arus ulang alik boleh dibina sebagai penjana tanpa berus atau penjana berberus.

Penjana manakah yang lebih cekap? Berikan sebab bagi pilihan anda.

The prototype of the alternating current generator can be constructed as a brushless generator or a brushed generator.

Which generator is more efficient? Give reason for your choice.

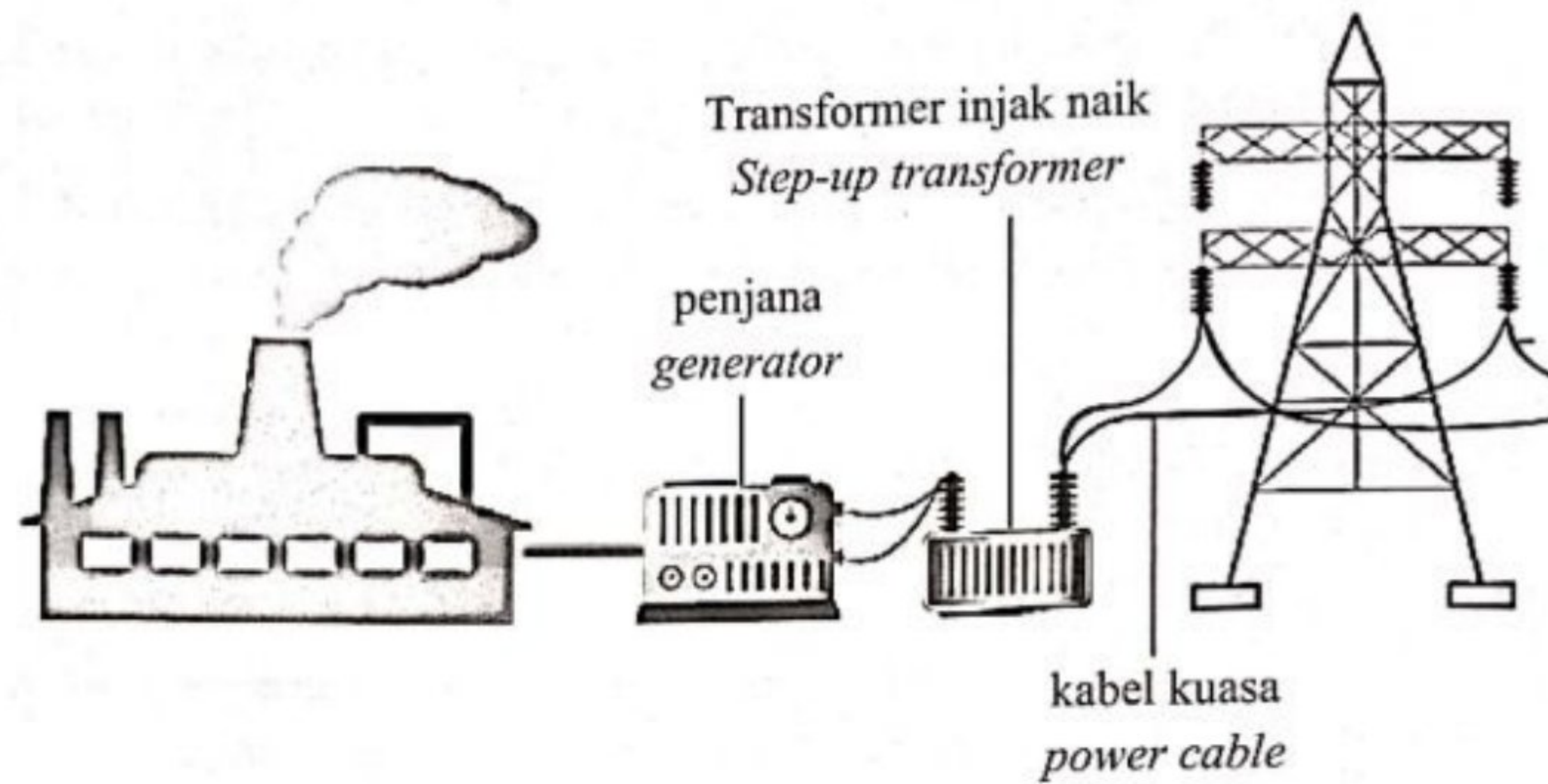
[2 markah]

[2 marks]

- (c) Penjana digunakan dalam stesen jana kuasa untuk menukar tenaga mekanikal kepada tenaga elektrik. Daripada penjana, arus elektrik mengalir ke stesen penghantaran berhampiran di mana voltan dinaikkan menggunakan transformer injak naik seperti dalam Rajah 10.3

Generator is used in the power station to convert mechanical energy into electrical energy. From the generator, the electric current flows to a nearby transmission station where voltage is increased using a step-up transformer as shown in Diagram 10.3.

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Rajah 10.3
Diagram 10.3

Maklumat tentang transformer yang digunakan adalah seperti berikut:
The information of the transformer is as following:

Input dari generator: 400 V, 80 A
Input from generator

Output ke kabel kuasa = 30 000 V
Output to power cables

Kecekapan transformer: 85%
The efficiency of the transformer

Hitung:
Calculate

- (i) Kuasa pada generator
The power of the generator
- (ii) Kehilangan kuasa
The power loss
- (iii) Arus pada kabel kuasa
The current in the supply cables

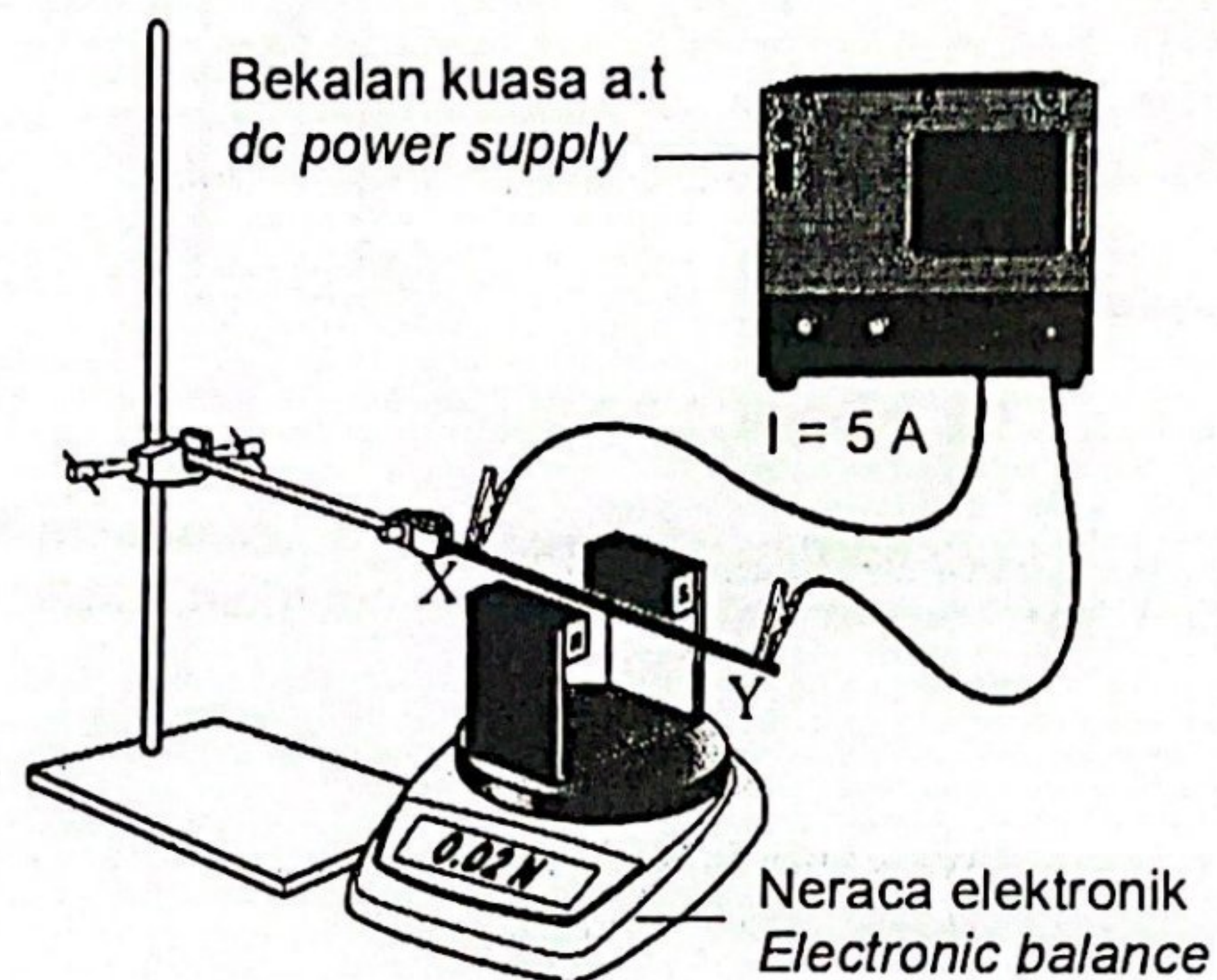
[5 markah]

[5 marks]

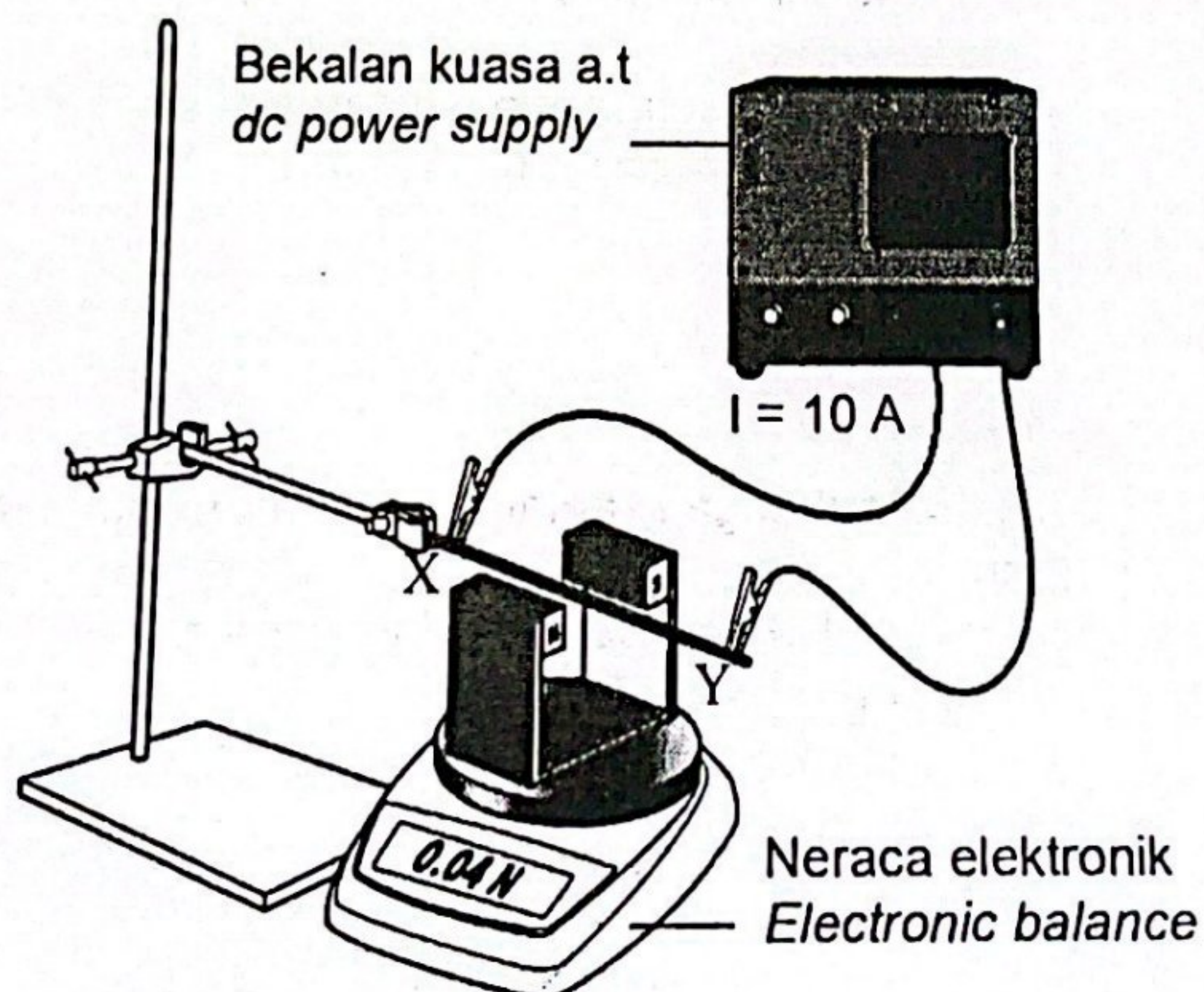
- 5 Rajah 5.1(a) menunjukkan sebuah magnet diletakkan di atas neraca elektronik. Suatu konduktor XY dengan arus 5 A diletakkan di antara kutub magnet tersebut. Rajah 5.1(b) menunjukkan penggunaan radas dan susunan yang serupa dengan nilai arus yang melalui konduktor XY adalah 10 A.

Diagram 5.1(a) shows a magnet placed in an electronic scale. An XY conductor with a current of 5 A is placed between the magnetic poles.

Diagram 5.1(b) shows a similar equipments and arrangement where the value of current passing through the conductor XY is 10 A.



Rajah 5.1(a) / Diagram 5.1(a)



Rajah 5.1(b) / Diagram 5.1(b)

- (a) Namakan hukum yang digunakan untuk menentukan arah daya yang bertindak ke atas konduktor pembawa arus dalam suatu medan magnet.
Name the rule that is used to determine the direction of force acting on a current-carrying conductor in a magnetic field.

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

- (b) Berdasarkan Rajah 5.1(a) dan Rajah 5.1(b), bandingkan
Based on Diagram 5.1(a) and Diagram 5.1(b), compare

- (i) nilai arus yang melalui konduktor XY.
the value of current passing through conductor XY.

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

- (ii) bacaan neraca elektronik.
the reading of electronic balance.

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

- (iii) magnitud daya yang dihasilkan.
the magnitude of force produced.

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

- (c) Berdasarkan jawapan anda di 5(b)(i), 5(b)(ii) dan 5(b)(iii),
Based on your answer in 5(b)(i), 5(b)(ii) dan 5(b)(iii),

- (i) nyatakan hubungan antara nilai arus dengan bacaan neraca elektronik.
state the relationship between the value of current and the reading of electronic balance.

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

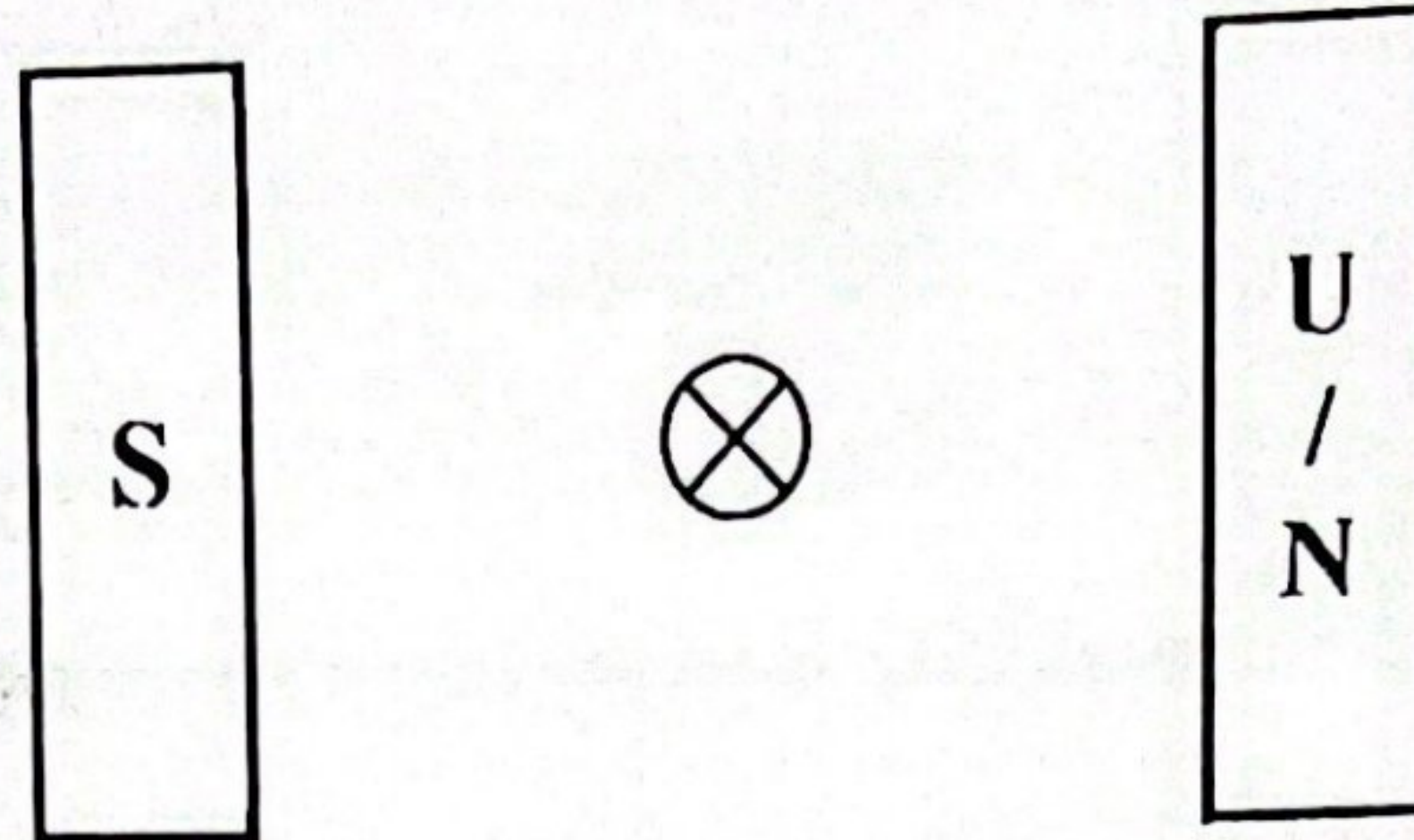
- (ii) deduksikan hubungan antara nilai arus dan magnitud daya yang dihasilkan.
deduce the relationship between the value of current and the magnitude of force produced.

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

- (d) Ramalkan bacaan neraca elektronik dalam Rajah 5.1(a) apabila dawai yang lebih tebal digunakan.
Predict the reading of electronic balance in Diagram 5.1(a) when a thicker wire is used.

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

- (e) Rajah 5.2 menunjukkan keratan rentas bagi konduktor dan dua magnet yang berlainan kutub.
Diagram 5.2 shows a cross-sectional view of the conductor and two magnet of difference poles.



Rajah 5.2 / Diagram 5.2

Lukis corak medan magnet yang terhasil dan arah daya, F pada Rajah 5.2.
Draw the magnetic field pattern and direction of the force, F in Diagram 5.2.

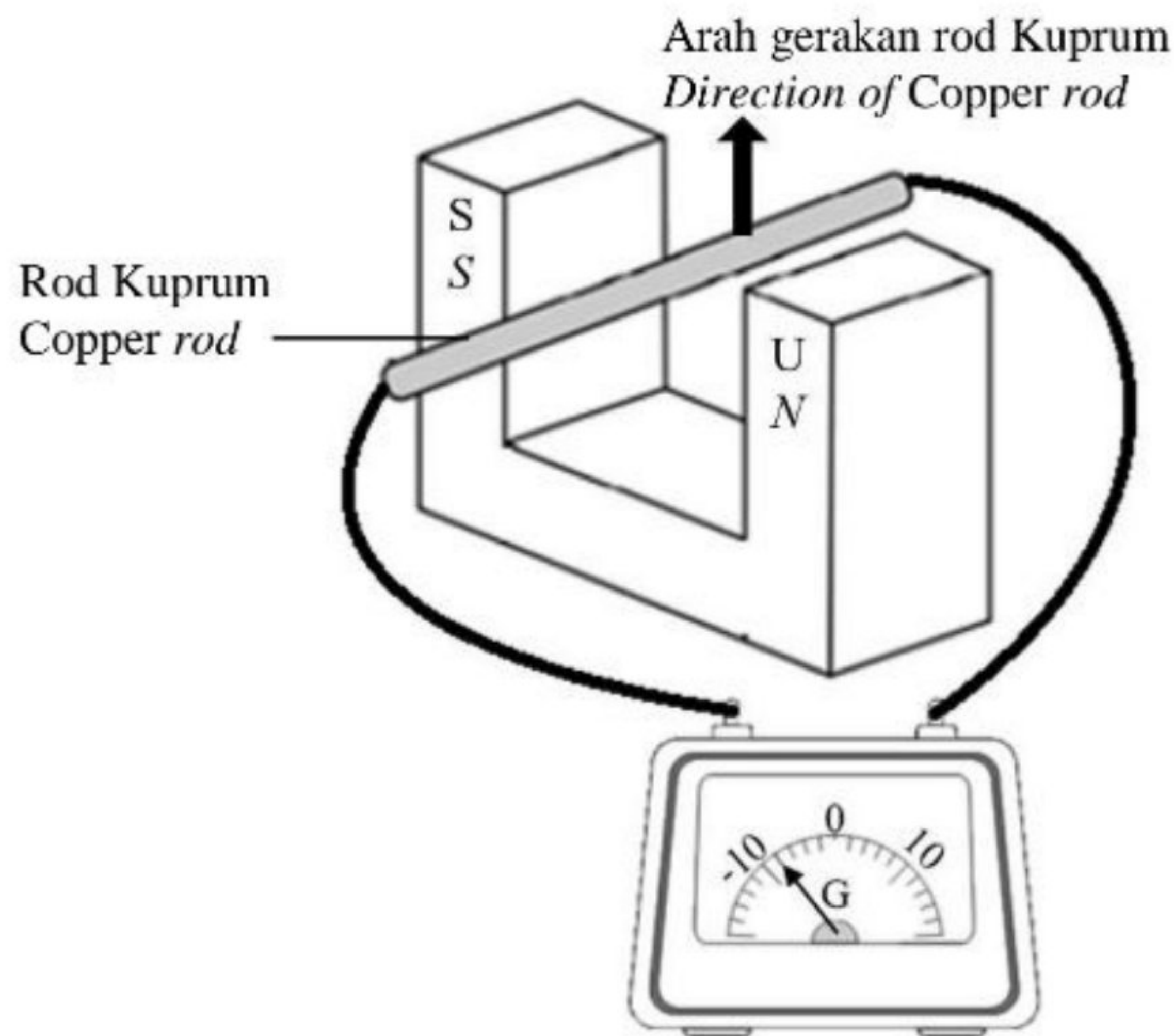
[2 markah / 2 marks]

Total
A5

	9
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- 10 Rajah 10.1 menunjukkan satu rod Kuprum disambungkan kepada galvanometer berpusat sifar. Rod Kuprum digerakkan ke atas di antara dua magnet Magnadur dengan kutub bertentangan.

Diagram 10.1 shows a Copper rod connected to a centre-zero galvanometer. The Copper rod is moved upwards between the two Magnadur magnets that are of opposite poles.

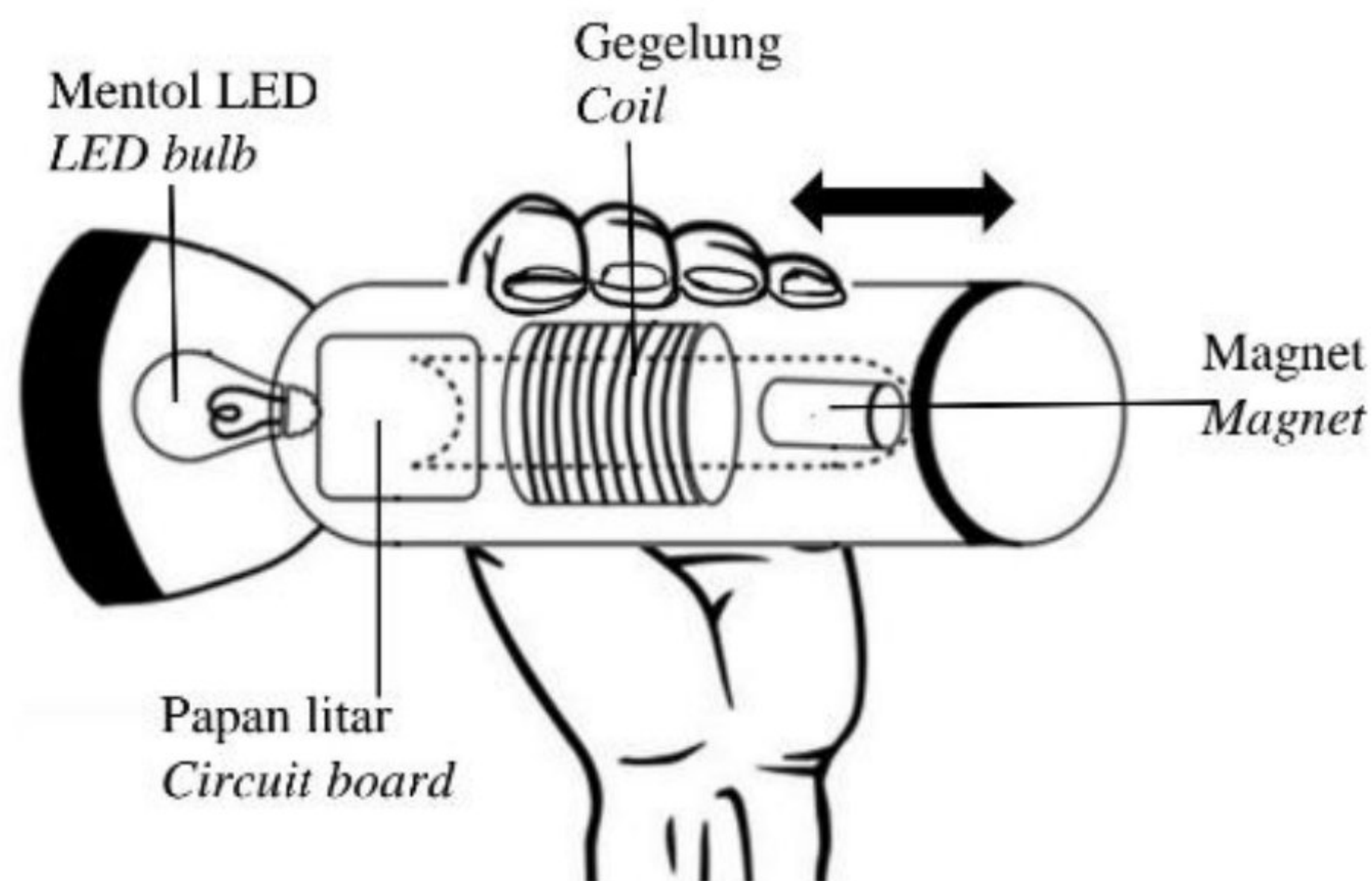


Rajah 10.1
Diagram 10.1

- (a) (i) Namakan konsep fizik yang terlibat dalam Rajah 10.1. [1 markah]
Name the physics concept involved in Diagram 10.1. [1 mark]
- (ii) Nyatakan **satu** faktor yang mempengaruhi pesongan jarum penunjuk galvanometer. [1 markah]
*State **one** factor which affect the deflection of galvanometer pointer. [1 mark]*

- (b) Rajah 10.2 menunjukkan lampu suluh aruhan LED. Mentol LED menyala bila lampu suluh digoncang secara mendatar.

Diagram 10.2 shows an induction LED torch light. The LED bulb lights up when the torch light is shaken horizontally.



Rajah 10.2
Diagram 10.2

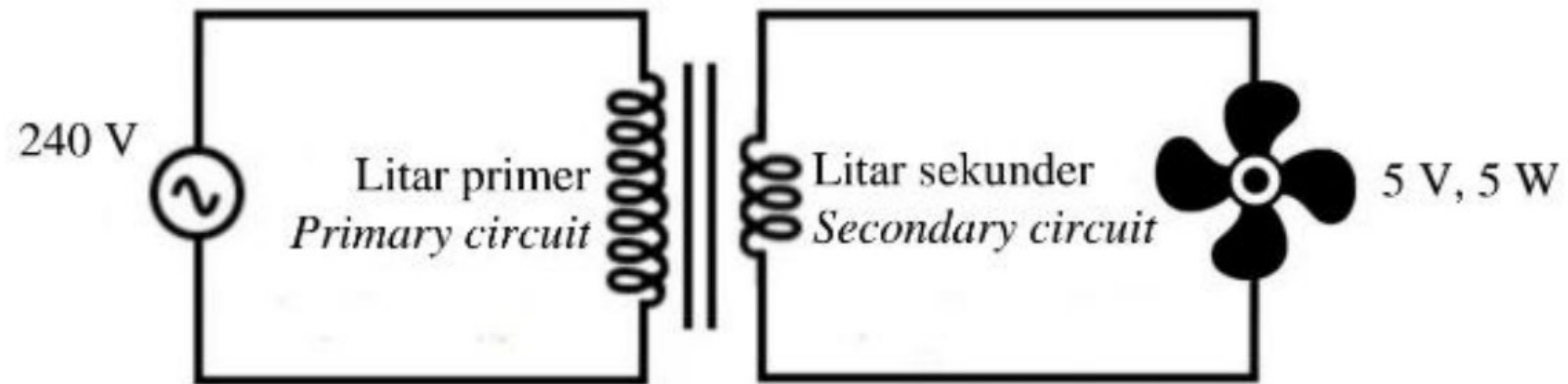
Terangkan bagaimana mentol LED menyala dengan lebih lama. [3 markah]

Explain how the LED bulb lights up for a longer time. [3 marks]

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- (c) Rajah 10.3 menunjukkan litar suatu transformer yang digunakan untuk mengecas sebuah kipas mudah alih.

Diagram 10.3 shows a circuit of transformer used to charge a portable fan.



Rajah 10.3
Diagram 10.3

- (i) Berapakah nisbah bilangan lilitan primer, N_p kepada bilangan lilitan sekunder, N_s ? [2 markah]

What is the ratio of number of turns of primary coil, N_p to number of turns of secondary coil, N_s ? [2 marks]

- (ii) Hitung arus sekunder. [2 markah]

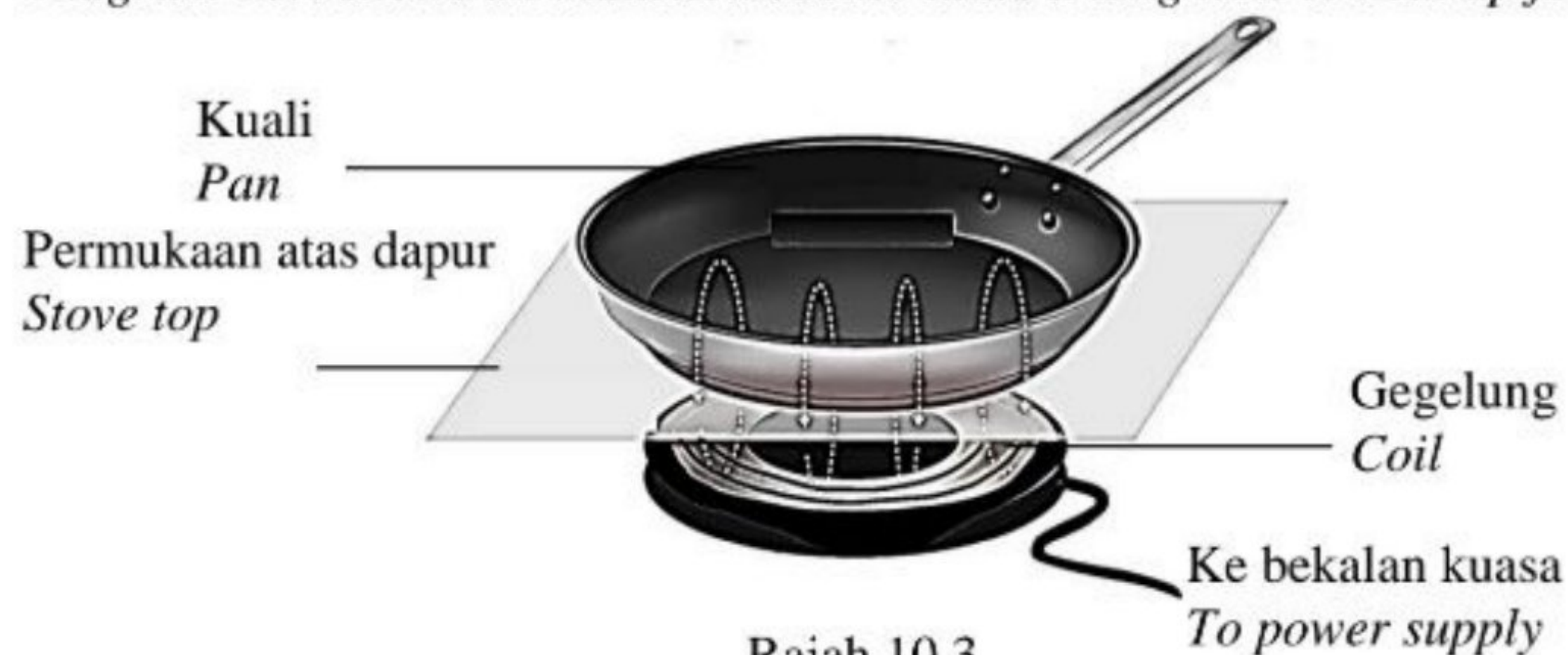
Calculate the secondary current. [2 marks]

- (iii) Jika transformer ini adalah unggul, berapakah nilai kuasa input? [1 markah]

If the transformer is an ideal transformer, what is the value of the input power? [1 mark]

- (d) Rajah 10.4 menunjukkan dapur aruhan yang mengambil masa yang lama untuk memanaskan makanan.

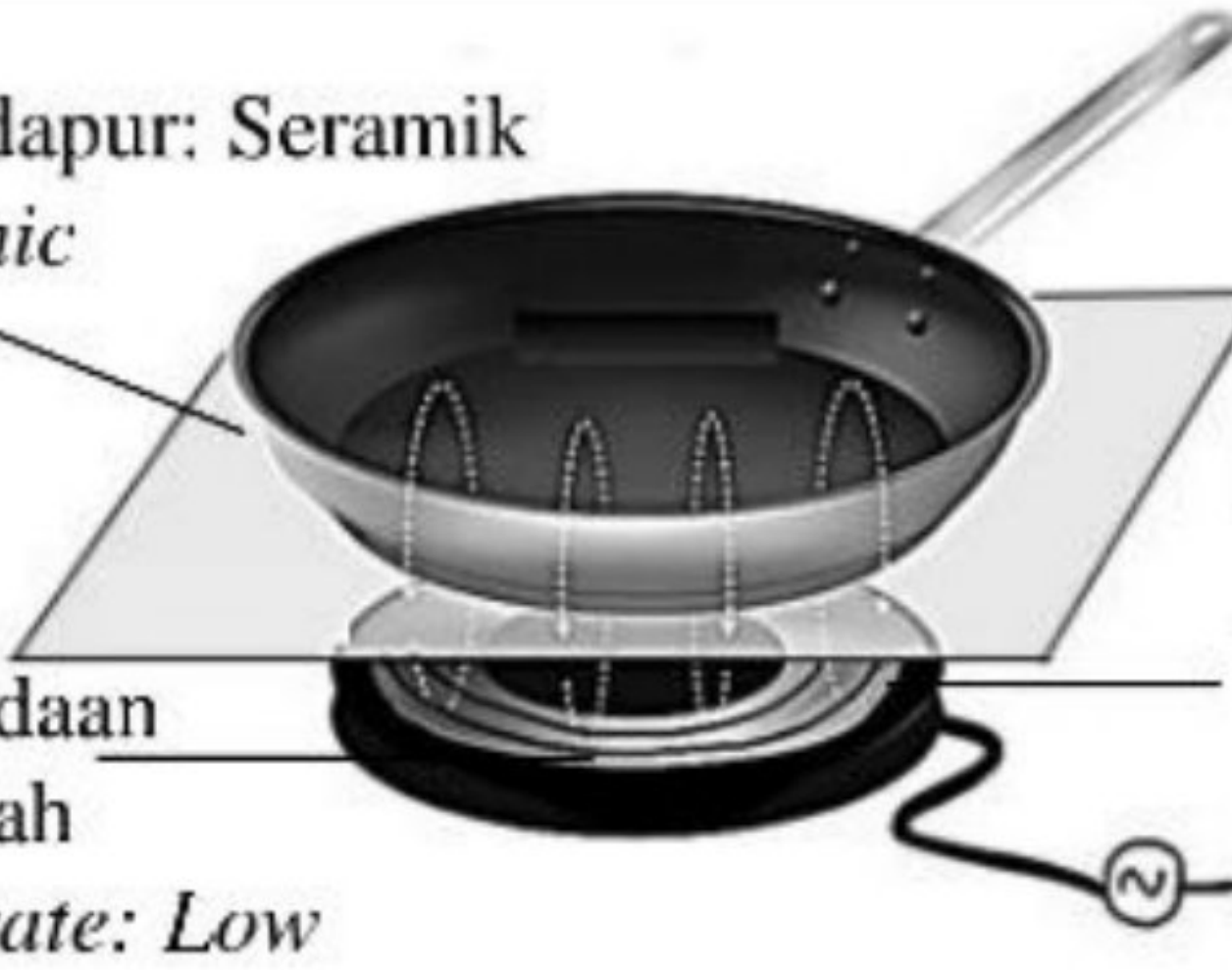
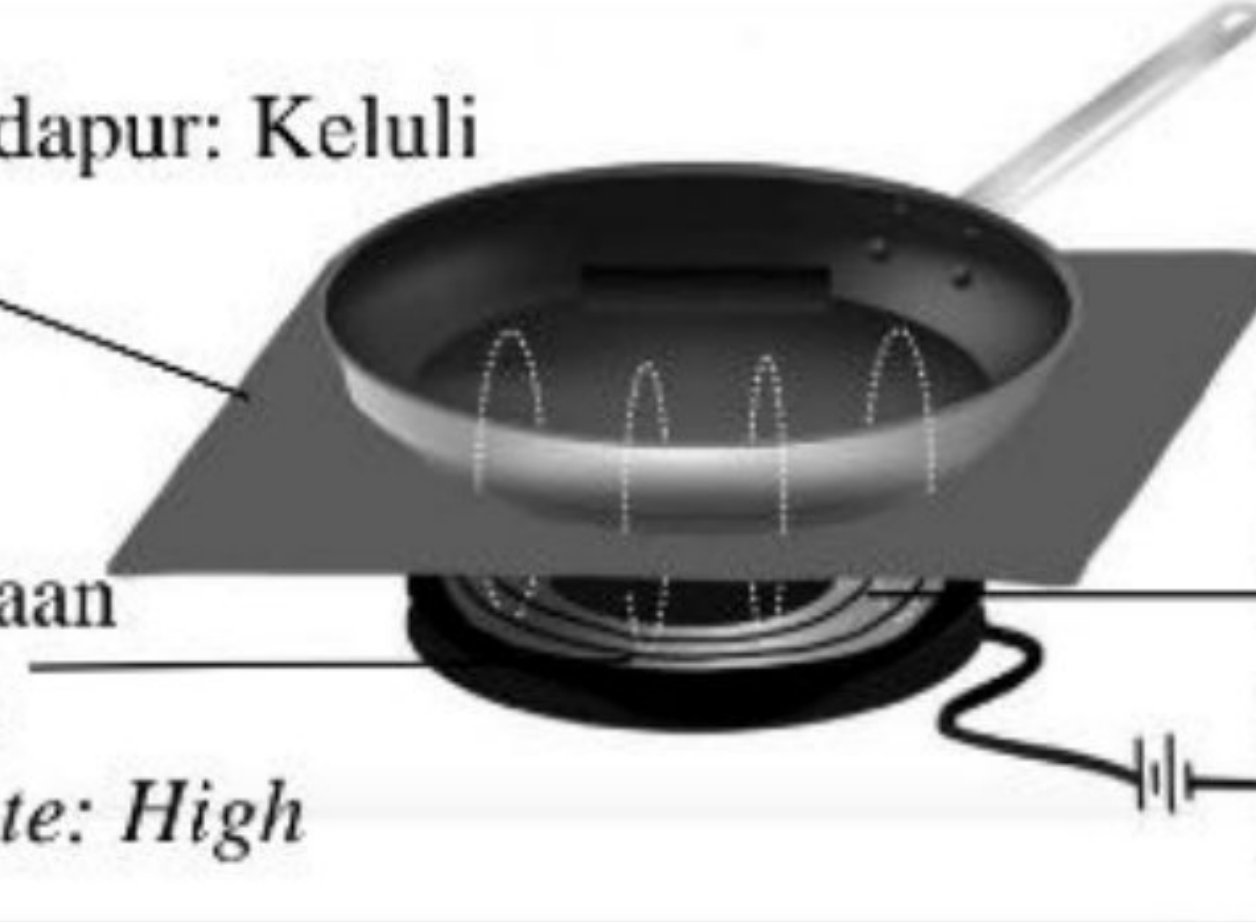
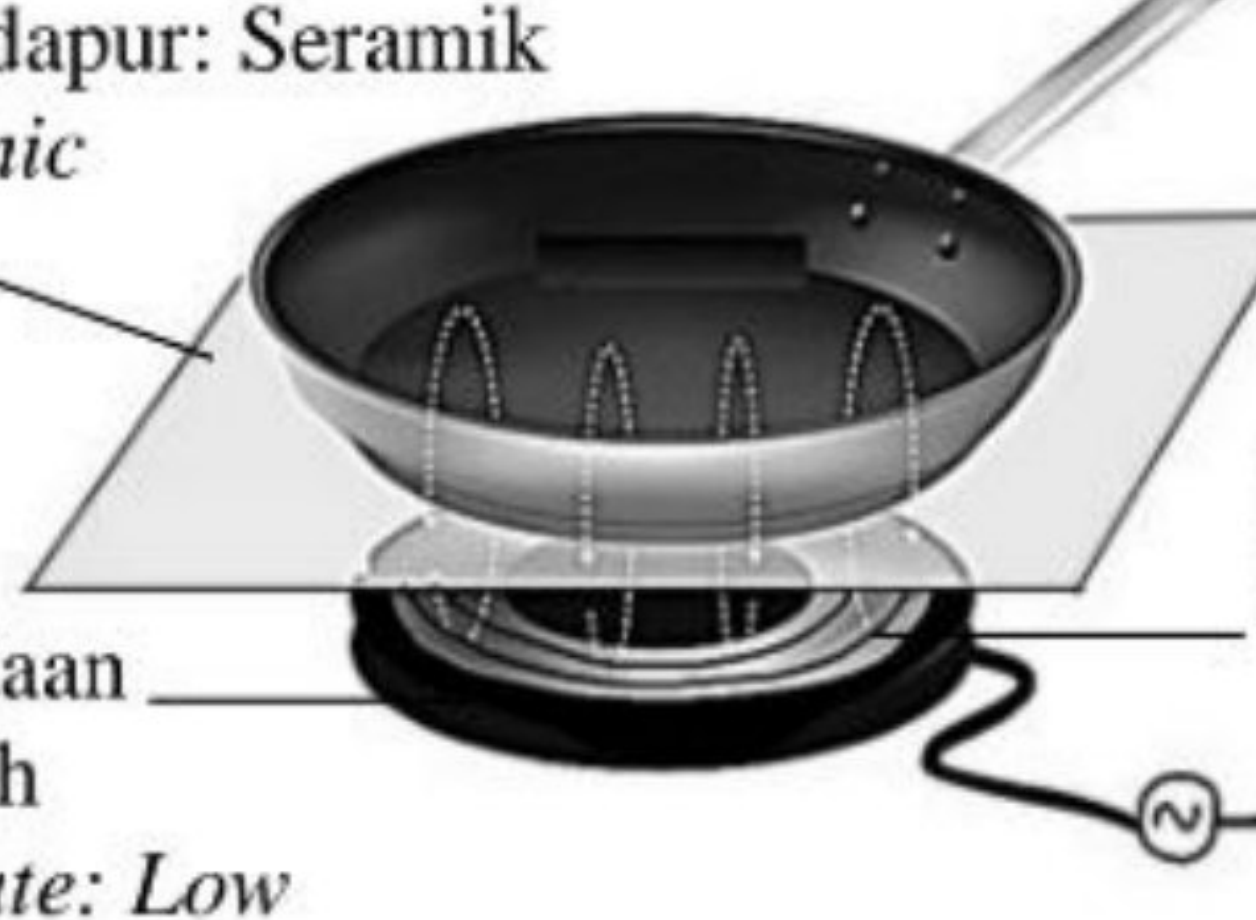
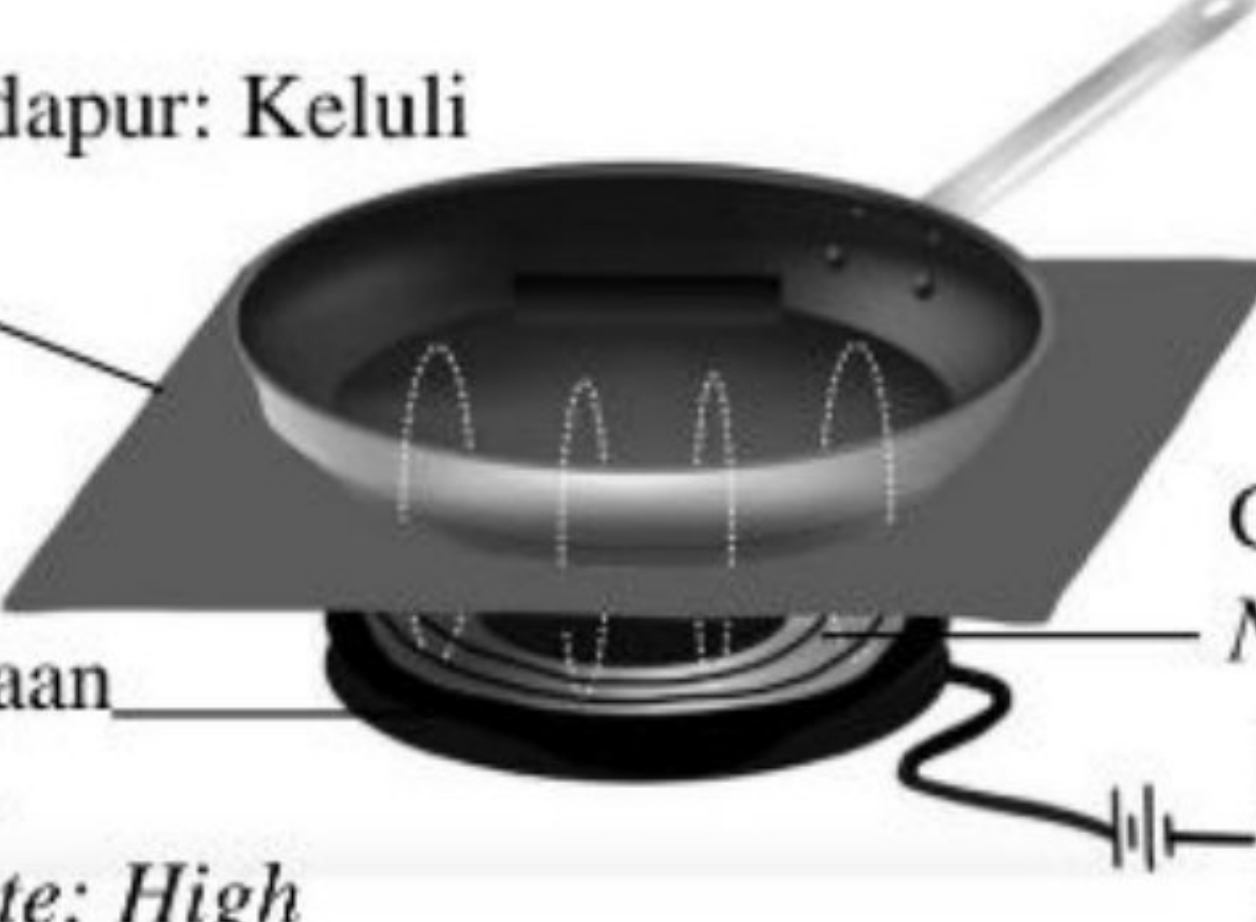
Diagram 10.4 shows an induction cooker takes a long time to heat up food.



Rajah 10.3
Diagram 10.3

Jadual 2 menunjukkan empat jenis dapur aruhan K, L, M dan N.

Table 2 shows the characteristics of four induction cooker K, L, M and N.

K	Permukaan atas dapur: Seramik <i>Stove top: Ceramic</i>  Gegelung Nikrom <i>Nichrome coil</i> Kadar pengoksidaan gegelung: Rendah <i>Coil oxidation rate: Low</i> Bekalan kuasa <i>Power supply</i>
L	Permukaan atas dapur: Keluli <i>Stove top: Steel</i>  Gegelung Kuprum <i>Copper coil</i> Kadar pengoksidaan gegelung: Tinggi <i>Coil oxidation rate: High</i> Bekalan kuasa <i>Power supply</i>
M	Permukaan atas dapur: Seramik <i>Stove top: Ceramic</i>  Gegelung Kuprum <i>Copper coil</i> Kadar pengoksidaan gegelung: Rendah <i>Coil oxidation rate: Low</i> Bekalan kuasa <i>Power supply</i>
N	Permukaan atas dapur: Keluli <i>Stove top: Steel</i>  Gegelung Nikrom <i>Nichrome coil</i> Kadar pengoksidaan gegelung: Tinggi <i>Coil oxidation rate: High</i> Bekalan kuasa <i>Power supply</i>

Jadual 2
Table 2

[Lihat halaman sebelah

Anda dikehendaki menentukan dapur aruhan yang paling sesuai untuk memanaskan makanan dengan cepat daripada aspek yang berikut:

You are required to determine the most suitable induction cooker to heat up the food faster from the following aspects:

- Bahan permukaan atas dapur
Material of stove top
- Bahan gegelung
Material of coil
- Kadar pengoksidaan gegelung
Coil oxidation rate
- Bekalan kuasa
Power supply

Terangkan kesesuaian aspek-aspek itu dan tentukan dapur aruhan yang paling sesuai. Beri sebab untuk pilihan anda.

Explain the suitability of the aspects and determine the most suitable induction cooker. Give reasons for your choice.

[10 markah]
[10 marks]

Bahagian C
[20 markah]

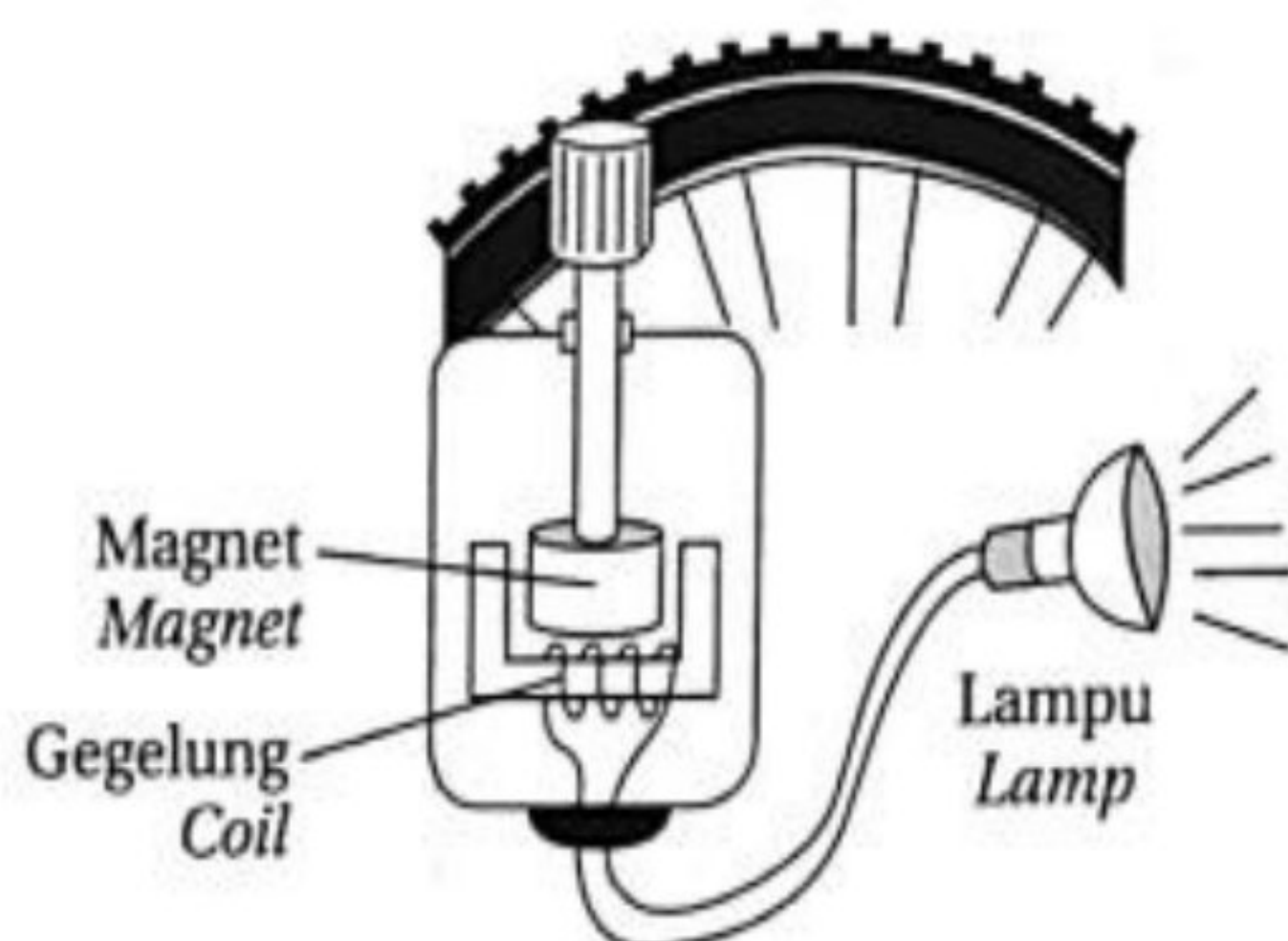
Section C
[20 marks]

Jawab semua soalan daripada bahagian ini. Tulis semua jawapan anda di atas kertas kjang di sediakan dan ikat bersama buku soalan .

Answer all questions from this section. Write all your answer on answer sheet provided and tie it together with the question book.

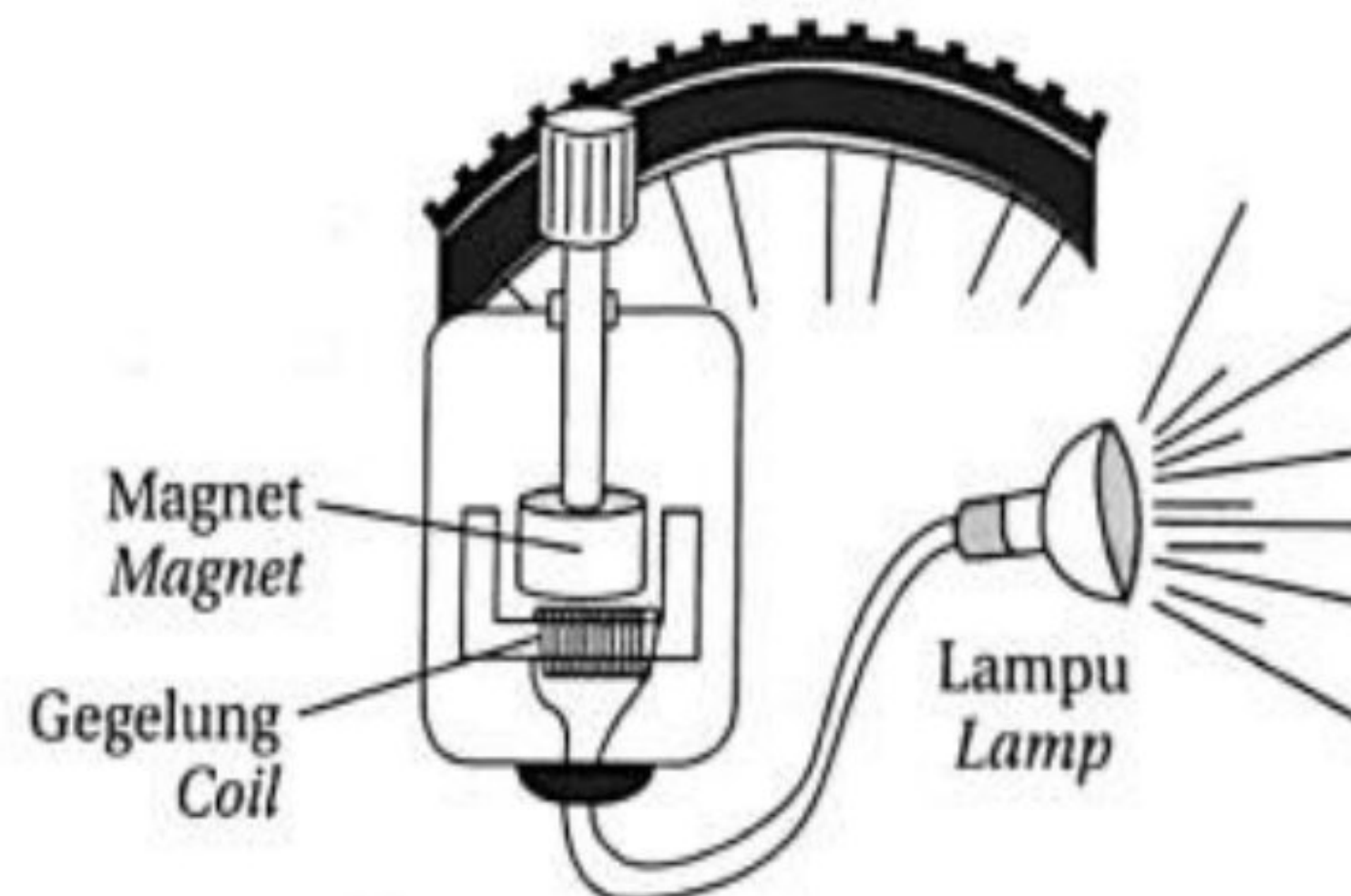
11. Rajah 11.1 dan Rajah 11.2 menunjukkan dua jenis dinamo dengan bilangan lilitan gegelung yang berbeza.

Diagram 11.1 and Diagram 11.2 show two types of dynamos with different numbers of turn of coil.



Rajah 11.1

Diagram 11.1



Rajah 11.2

Diagram 11.2

- (a) Apakah definisi Hukum Faraday?

What is the definition of electromagnetic induction?

[1 markah]

[1 mark]

- (b) Menggunakan Rajah 11.1 dan Rajah 11.2, bandingkan kekuatan magnet, bilangan lilitan gegelung dan kecerahan lampu.
Nyatakan hubungan antara bilangan lilitan gegelung dengan kecerahan lampu.

Nyatakan hubungan antara bilangan lilitan gegelung dengan magnitud arus aruhan yang terhasil.

Using Diagram 11.1 and Diagram 11.2, compare the strength of magnet, the number of turns of coil and the brightness of the lamp.

State the relationship between the number of turns of coil and the brightness of the lamp.

State the relationship between the number of turns of coil and the magnitude induced current produced.

[5 markah]

[5 marks]

- (c) Rajah 11.3 menunjukkan sebuah dapur aruhan yang digunakan untuk memasak makanan di dalam sebuah periuk.

Diagram 11.3 shows an induction cooker that is used to cook food in a pot.



Rajah 11.3

Diagram 11.3

- (i) Terangkan bagaimana dapur aruhan berfungsi.
Explain how the induction cooker functioned.

[4 markah]

[4 marks]

- (ii) Menggunakan konsep fizik yang sesuai, terangkan pengubahsuaian yang perlu dilakukan kepada dapur aruhan dalam Rajah 11.3 agar dapat memanaskan periuk itu dengan lebih cepat.

Nyatakan dan terangkan cadangan anda berdasarkan aspek-aspek seperti ciri-ciri dasar periuk, bilangan lilitan gegelung, magnitud arus yang mengalir dalam gegelung dan jenis arus yang mengalir dalam gegelung.

Using appropriate physics concepts, explain the modifications that need to be done on the induction cooker in Diagram 11.3 to heat up the pot faster.

State and explain your suggestion based on aspects such as the characteristics of the base of the pot, the number of turns of coil, the magnitude of current flows in coils and the types of current flows in the coils.

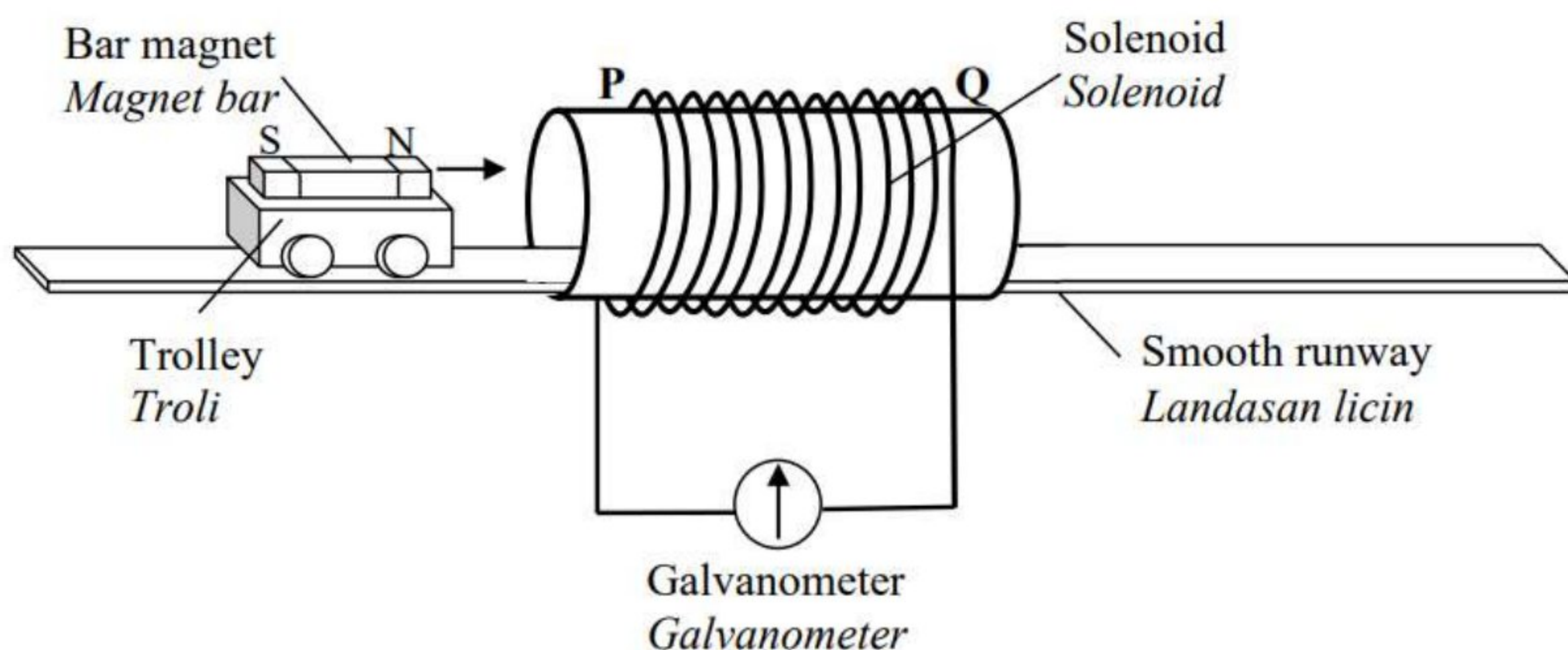
[10 markah]

[10 marks]

**KERTAS SOALAN TAMAT
END OF QUESTION PAPER**

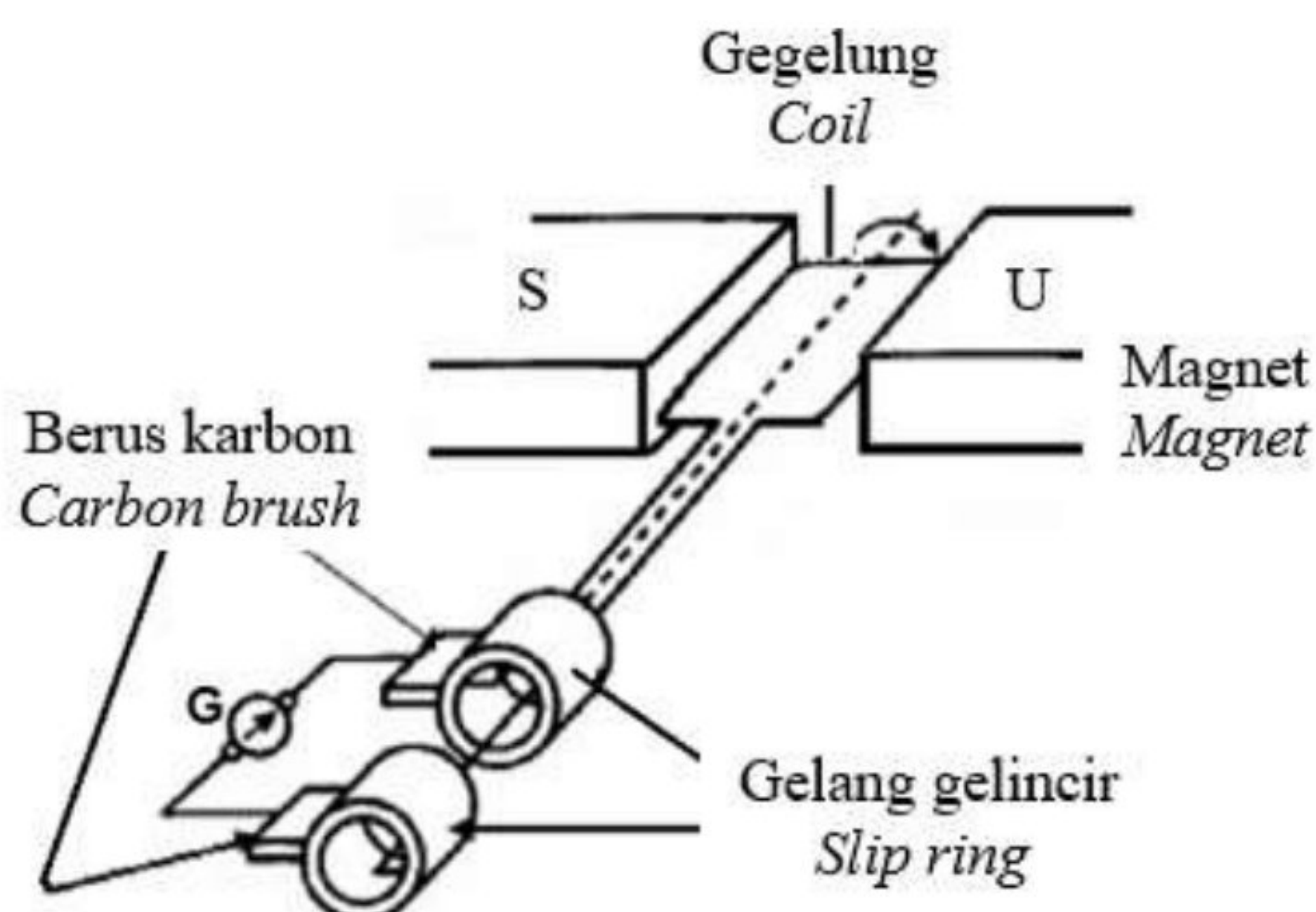
10. Rajah 10.1 menunjukkan satu magnet bar yang diletakkan di atas satu troli. Troli itu bergerak dengan satu halaju malar di atas landasan licin ke dalam satu solenoid yang bersambung kepada galvanometer.

Diagram 10.1 shows a bar magnet attached on a trolley. The trolley moves with a constant velocity on a smooth runway into a solenoid which is connected to a galvanometer.



Rajah 10.1
Diagram 10.1

- (a) Apakah yang dimaksudkan dengan aruhan elektromagnet?
What is the meaning of electromagnetic induction?
- [1 markah/mark]
- (b) Berdasarkan Rajah 10.1, apakah yang berlaku ke atas penunjuk galvanometer apabila troli bergerak ke dalam solenoid? Terangkan jawapan anda.
Based on Diagram 10.1, what happens to the pointer of galvanometer when the trolley moves into the solenoid? Explain your answer.
- [4 markah/marks]
- (c) Rajah 10.2 menunjukkan satu penjana arus ulang alik yang digunakan untuk membekalkan arus ulang alik.
Diagram 10.2 shows an alternating current generator used to supply alternating current.



Rajah 10.2
Diagram 10.2

Jadual 10 menunjukkan ciri-ciri bagi suatu penjana arus ulang alik.

Table 10 shows the characteristics of an alternating current generator.

Penjana Generator	Kekuatan magnet Magnetic strength	Bentuk magnet Magnetic shape	Bilangan lilitan gegelung Number of turns of coil	Diameter dawai pada gegelung Diameter of wire on the coil
Q	Lemah <i>weak</i>	Rata <i>flat</i>	Sedikit <i>less</i>	Kecil <i>small</i>
R	Lemah <i>weak</i>	Cekung <i>concave</i>	Sedikit <i>less</i>	Besar <i>big</i>
S	Kuat <i>strong</i>	Rata <i>flat</i>	Sedikit <i>less</i>	Kecil <i>small</i>
T	Kuat <i>strong</i>	Cekung <i>concave</i>	Banyak <i>more</i>	Besar <i>big</i>
U	Kuat <i>strong</i>	Rata <i>flat</i>	Banyak <i>more</i>	Besar <i>big</i>

Jadual 10

Table 10

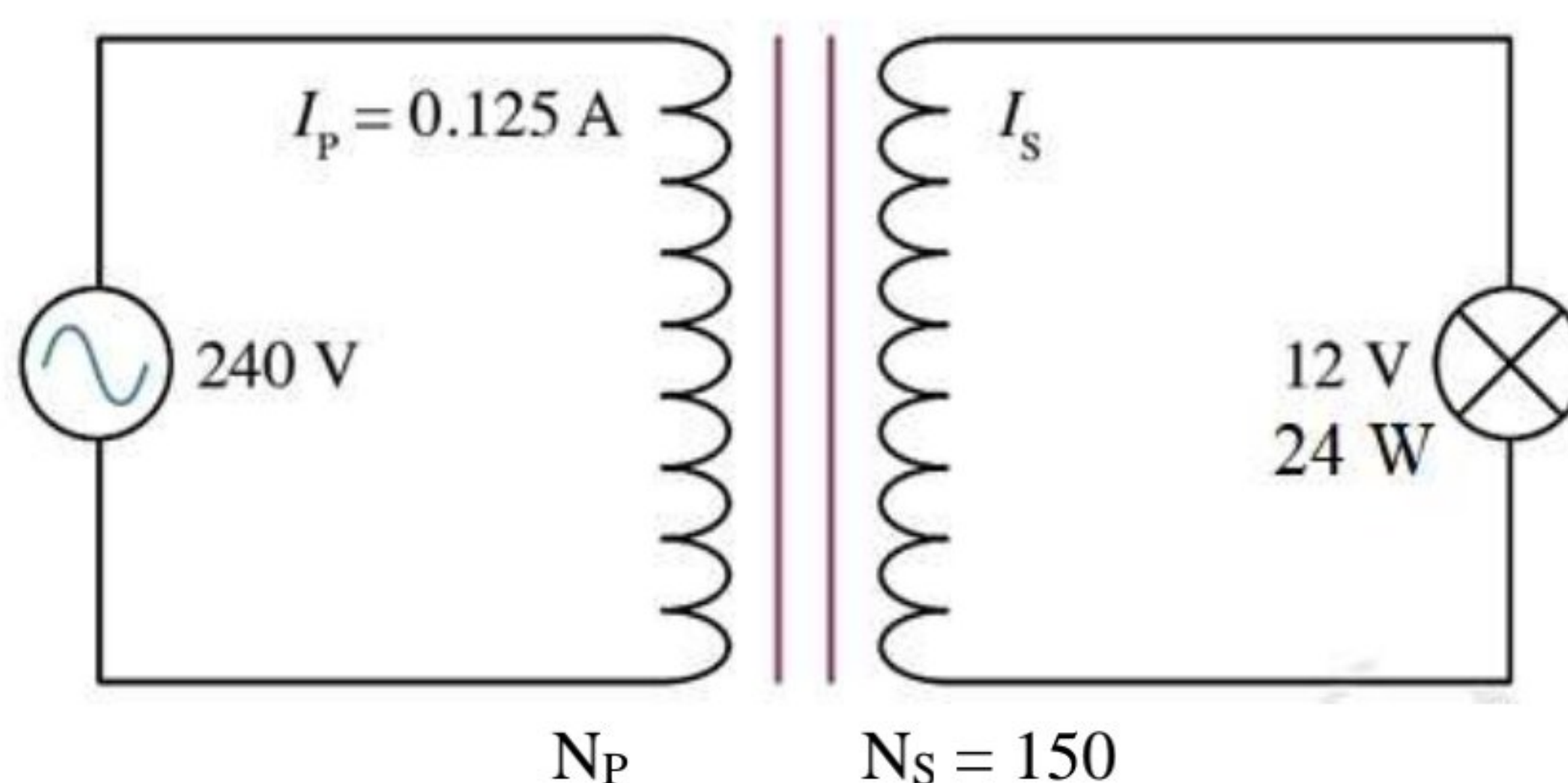
Terangkan kesesuaian setiap ciri-ciri dalam Jadual 10 bagi menghasilkan penjana yang berupaya memberikan arus aruhan yang paling tinggi, dan seterusnya tentukan penjana mana yang paling sesuai untuk digunakan. Beri sebab untuk pilihan anda.

Explain the suitability of each of the characteristics in Table 10 to produce a generator which can provide the highest induced current, and then determine which generator is most suitable to use. Give reasons for your choice.

[10 markah/marks]

- (d) Rajah 10.3 menunjukkan sebuah transformer dengan sebuah mentol di terminal outputnya. Mentol itu menyala dengan kecerahan normal.

Diagram 10.3 shows a transformer with a bulb at its output terminal. The bulb lights up with normal brightness.



Rajah 10.3

Diagram 10.3

- (i) Hitungkan nilai arus output, I_s
Calculate the value of output current, I_s .
- (ii) Tentukan nilai lilitan gegelung primer, N_p .
Determine the number of turns of the primary coil, N_p
- (iii) Hitung kecekapan transformer itu.
Calculate the efficiency of the transformer.

[5 markah/marks]

- 8 Rajah 8.1 menunjukkan struktur sebuah basikal yang terdiri daripada dinamo dan lampu depan. Apabila tayar basikal berputar, lampu depan menyala disebabkan oleh aruhan elektromagnet.

Diagram 8.1 shows a structure of a bicycle consisting of a dynamo and headlamp. When the bicycle tyre rotates, the headlamp lights up due to electromagnetic induction.



Rajah 8.1
Diagram 8.1

- (a) Apakah yang dimaksudkan dengan aruhan elektromagnet?

What is the meaning of electromagnetic induction?

.....
[1 markah]

[1 mark]

- (b) Lampu depan itu mempunyai kuasa 40 W.

Berapakah tenaga yang terhasil sekiranya tayar basikal itu dibiarkan berputar selama 10 minit?

The headlamp has a power of 40 W.

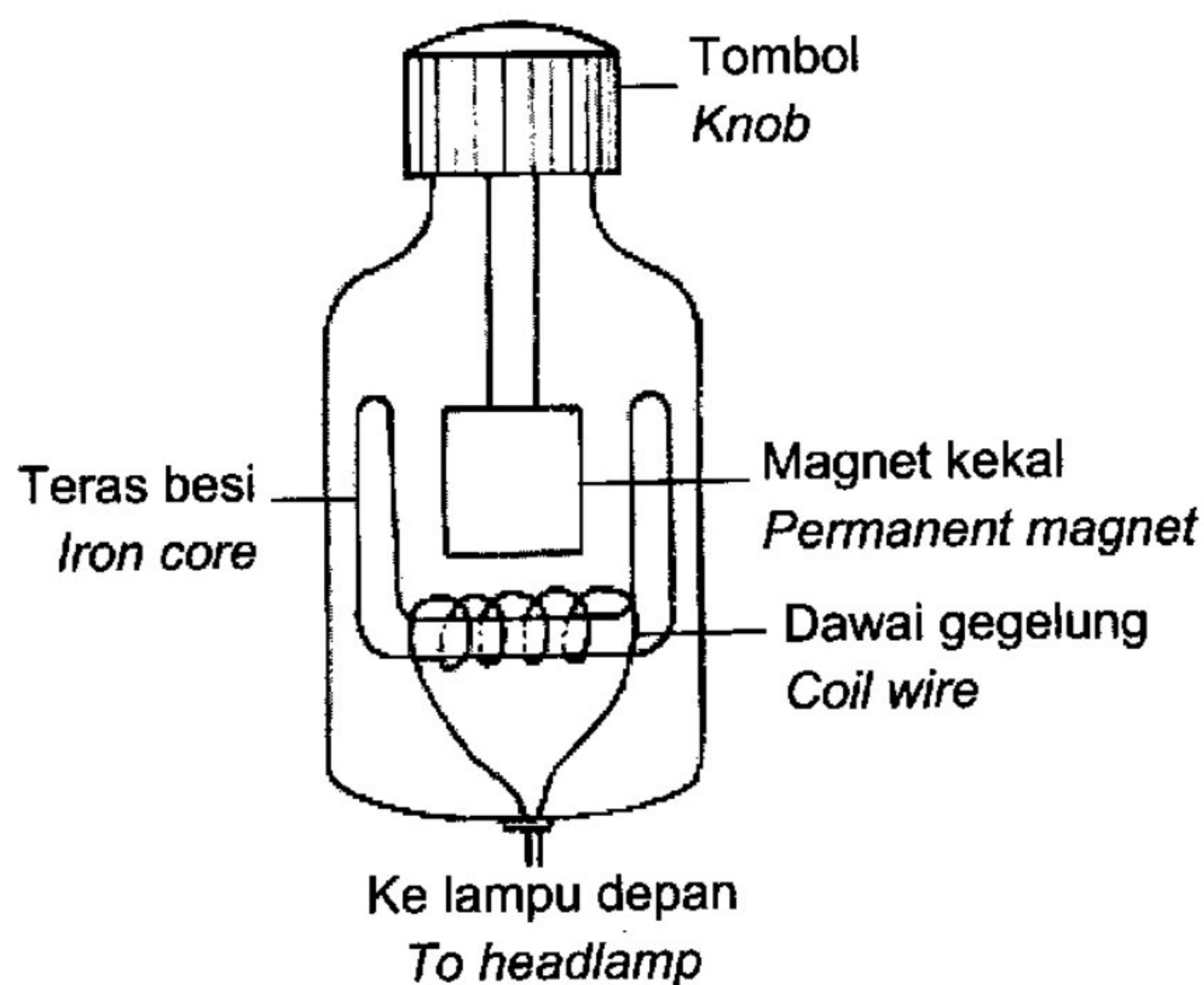
How much energy is produced if the bicycle tyre is left rotating for 10 minutes?

[2 markah]

[2 marks]

(c) Rajah 8.2 menunjukkan keratan rentas dinamo basikal itu.

Diagram 8.2 shows a cross section of the bicycle dynamo.



Rajah 8.2

Diagram 8.2

Sekiranya lampu depan basikal itu menyala malap, nyatakan ciri bagi aspek-aspek berikut bagi menukar dinamo pada Rajah 8.1 supaya lampu menyala lebih terang.

If the headlamp of the bicycle lights up dimly, state the characteristics of the following aspects to change the dynamo in Diagram 8.1 so that the lamp lights up brighter.

(i) Bahan dawai gegelung

Material of the coil wire

.....

Sebab

Reason

.....

[2 markah]

[2 marks]

(ii) Ketebalan dawai gegelung
Thickness of the coil wire

.....

Sebab
Reason

.....

[2 markah]
[2 marks]

(iii) Permukaan tombol
Knob surface

.....

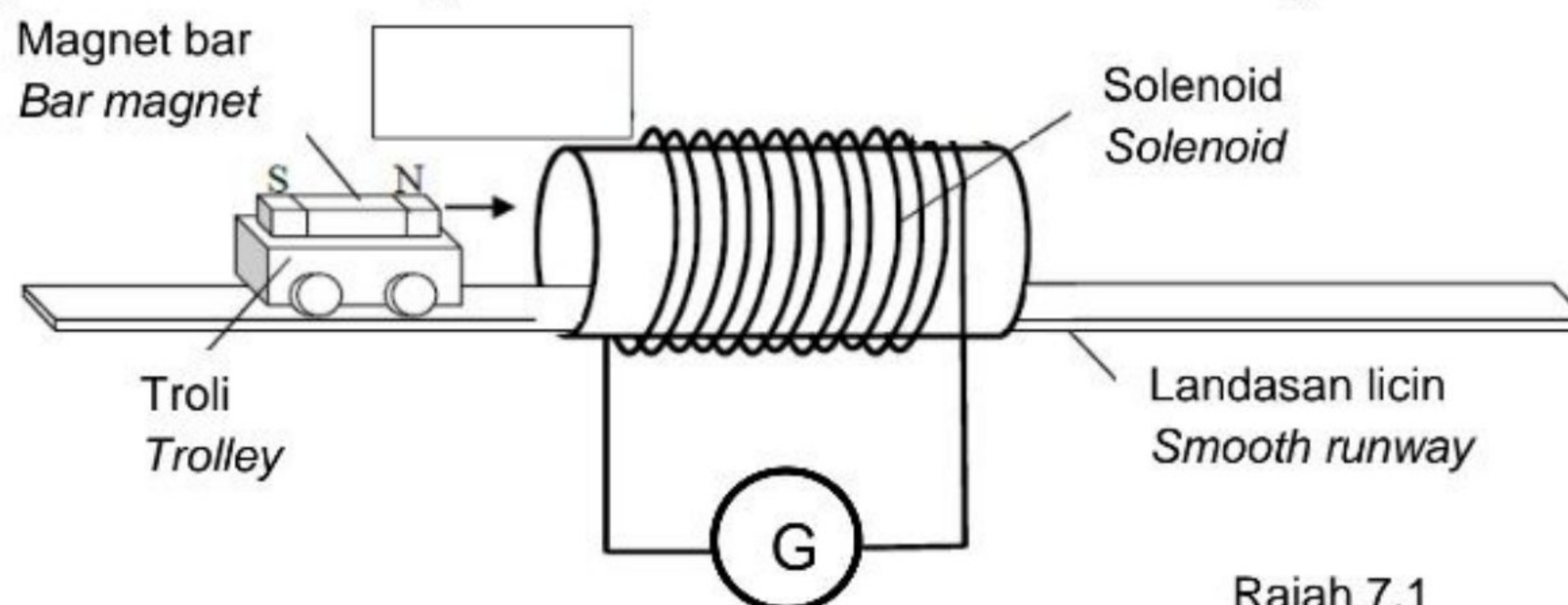
Sebab
Reason

.....

[2 markah]
[2 marks]

- 7 Rajah 7.1 menunjukkan satu magnet bar yang diletakkan di atas satu troli. Troli itu bergerak dengan satu halaju malar di atas landasan licin ke dalam satu solenoid yang bersambung kepada galvanometer.

Diagram 7.1 shows a bar magnet attached on a trolley. The trolley moves with a constant velocity on a smooth runway into a solenoid which is connected to a galvanometer.



Rajah 7.1
Diagram 7.1

- (a) Apakah maksud aruhan elektromagnet?
What is the meaning of electromagnetic induction?

.....
.....

[1 markah]

[1 mark]

- (b) Dalam Rajah 7.1,
In Diagram 7.1,
- label kekutuban hujung solenoid dalam kotak yang disediakan.
label the polarity at the end of the solenoid in the box provided.
 - lukis arah arus aruhan.
draw the direction of induced current.

[2 markah]

[2 marks]

- (c) Namakan hukum fizik yang terlibat dalam 7 (b)(i).
Name the physics law involved in 7 (b)(i).

.....

[1 markah]

[1 mark]

- (d) Stesen jana kuasa menjana voltan dan menghantar tenaga elektrik kepada pengguna menggunakan kabel-kabel penghantaran dan transformer. Suatu penjana di stesen jana kuasa menghasilkan tenaga elektrik menggunakan prinsip aruhan elektromagnet. *A power station generates voltage dan transmit the electrical energy to the consumers using transmission cables dan transformers. A generator in a power station generates electrical energy using the principle of electromagnetic induction.*

Rajah 7.2 menunjukkan struktur asas penjana-penjana P, Q dan R.
Diagram 7.2 shows the basic structure of generators P, Q and R.

Penjana P Generator P	
Penjana Q Generator Q	
Penjana R Generator R	

Rajah 7.2

Diagram 7.2

Berdasarkan Rajah 7.2, nyatakan ciri-ciri penjana yang sesuai untuk menghasilkan arus aruhan yang akan disalurkan ke set transformer dengan cekap.

Based on Diagram 7.2, state the suitable characteristics of a generator to produce an induced current that will be transmitted to a set of transformer efficiently.

- (i) Bentuk magnet kekal.

The shape of permanent magnet.

.....

Sebab

Reason

.....

[2 markah]

[2 marks]

- (ii) Komponen yang dihubungkan pada hujung gegelung.

The component attached to the end of coil.

.....

Sebab

Reason

.....

[2 markah]

[2 marks]

- (e) Berdasarkan jawapan di 7 (d) (i) dan 7 (d) (ii), pilih penjana yang paling sesuai.

Based on the answer in 7 (d) (i) and 7 (d) (ii), choose the most suitable generator.

.....

[1 markah]

[1 mark]

Bahagian C
Section C

[20 markah]

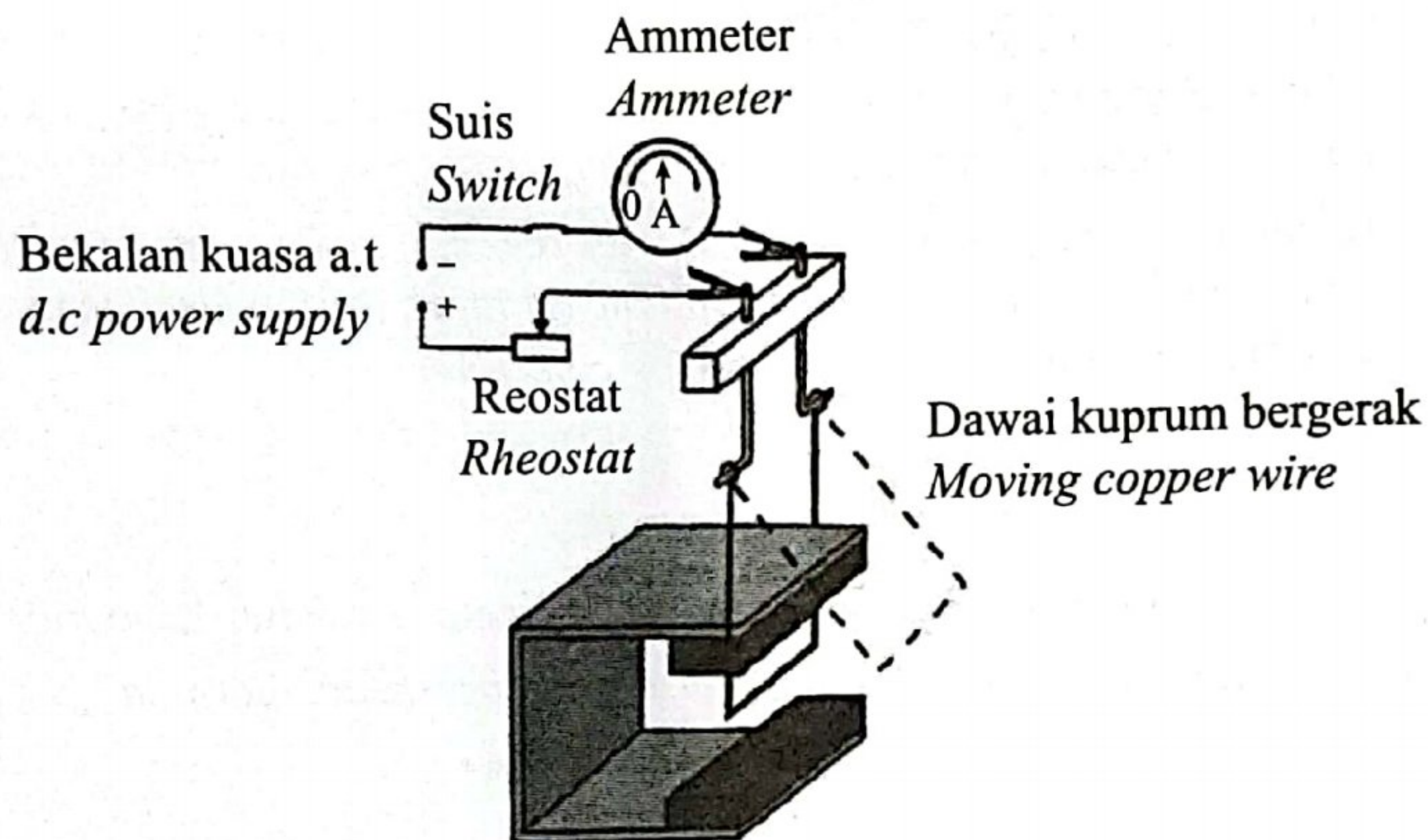
[20 marks]

Jawab **semua** soalan dalam bahagian ini.

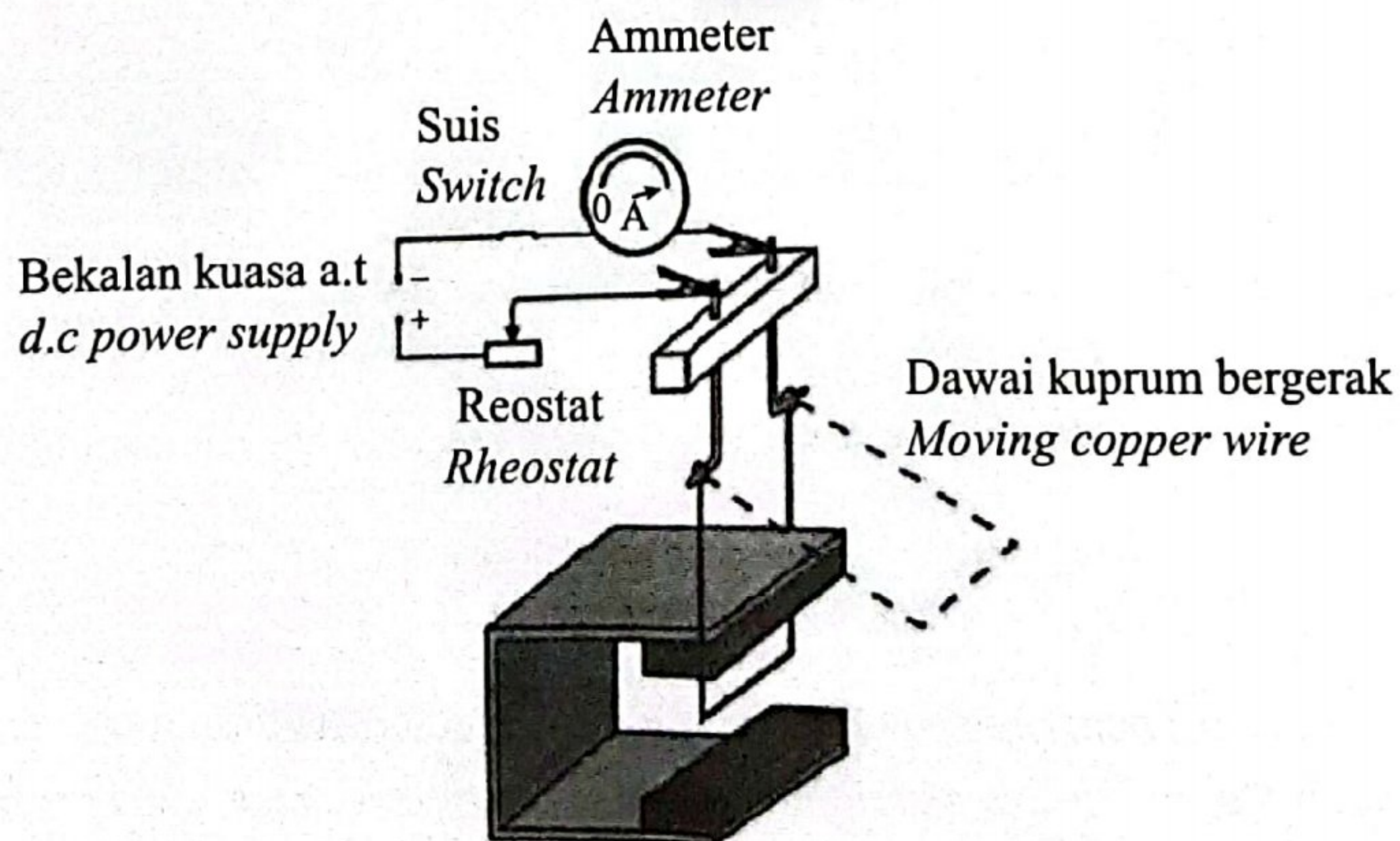
Answer all question in this section.

- 11 Rajah 11.1 dan Rajah 11.2 menunjukkan dawai kuprum bergerak disambungkan kepada ammeter, reostat, suis dan bekalan kuasa. Dawai kuprum itu diletakkan di antara dua magnet Magnadur.

Diagram 11.1 and Diagram 11.2 show a moving copper wire connected to an ammeter, rheostat, switch and power supply. The copper wire is placed between two Magnadur magnets.



Rajah 11.1
Diagram 11.1



Rajah 11.2
Diagram 11.2

- (a) Apakah maksud medan lastik?
What is the meaning of catapult field?

[1 markah]
 [1 mark]

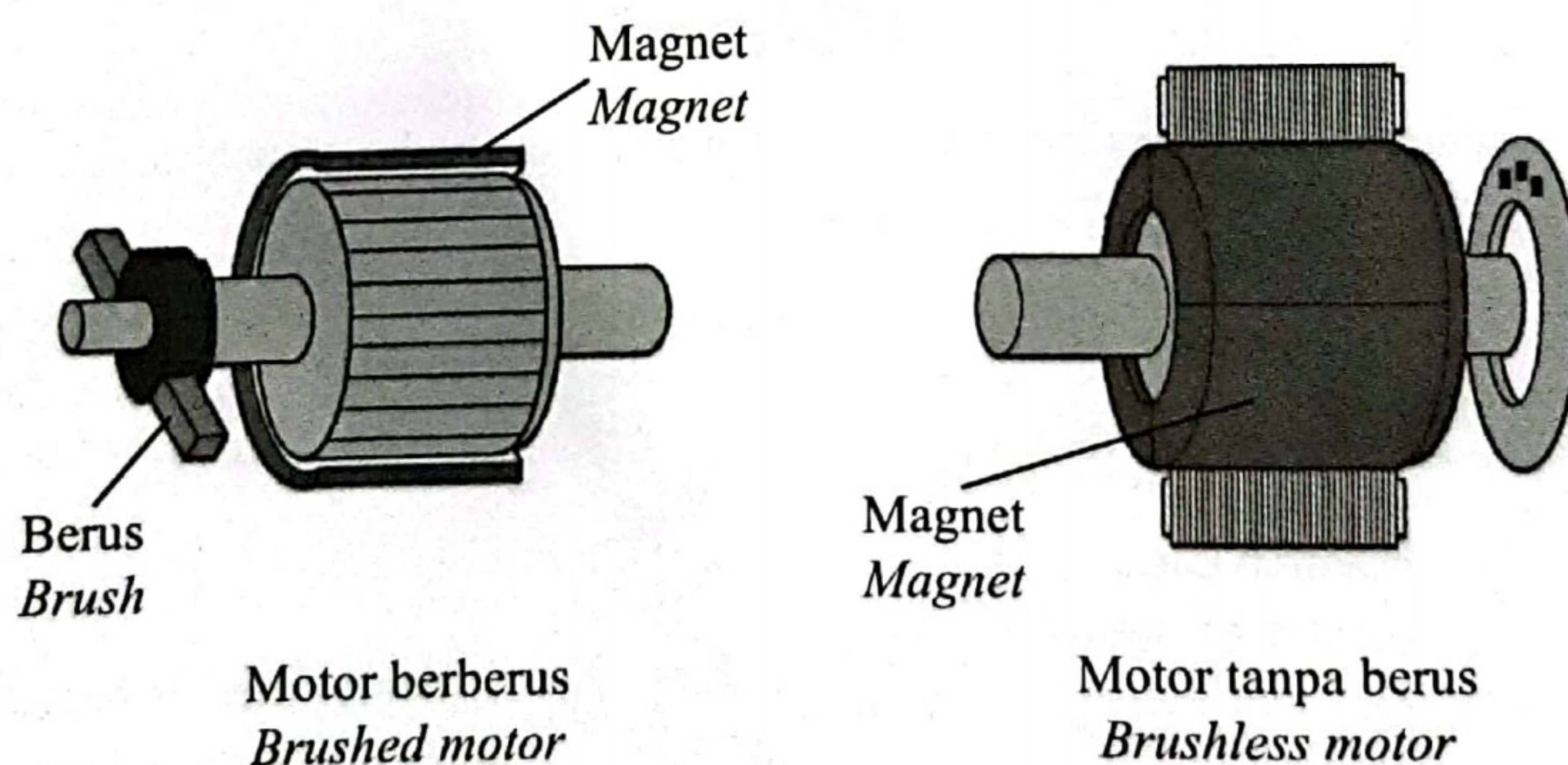
- (b) Berdasarkan Rajah 11.1 dan Rajah 11.2,
Based on Diagram 11.1 and Diagram 11.2,

- (i) bandingkan bacaan ammeter, sudut pesongan dawai kuprum bergerak dan kekuatan medan magnet.
compare the reading of the ammeter, angle of deflection of the moving copper wire and the strength of the magnetic field.

- (ii) hubung kaitkan bacaan ammeter dengan sudut pesongan dawai kuprum bergerak untuk membuat deduksi tentang hubungan antara magnitud arus dengan daya ke atas konduktor pembawa arus.
relate the reading of the ammeter with the angle of deflection of the moving copper wire to make a deduction regarding the relationship between the magnitude of current and the force on the current-carrying conductor.

[5 markah]
 [5 marks]

- (c) Rajah 11.3 menunjukkan dua jenis motor iaitu motor berberus dan motor tanpa berus.
Diagram 11.3 shows two types of motor namely brushed motor and brushless motor.



Rajah 11.3
 Diagram 11.3

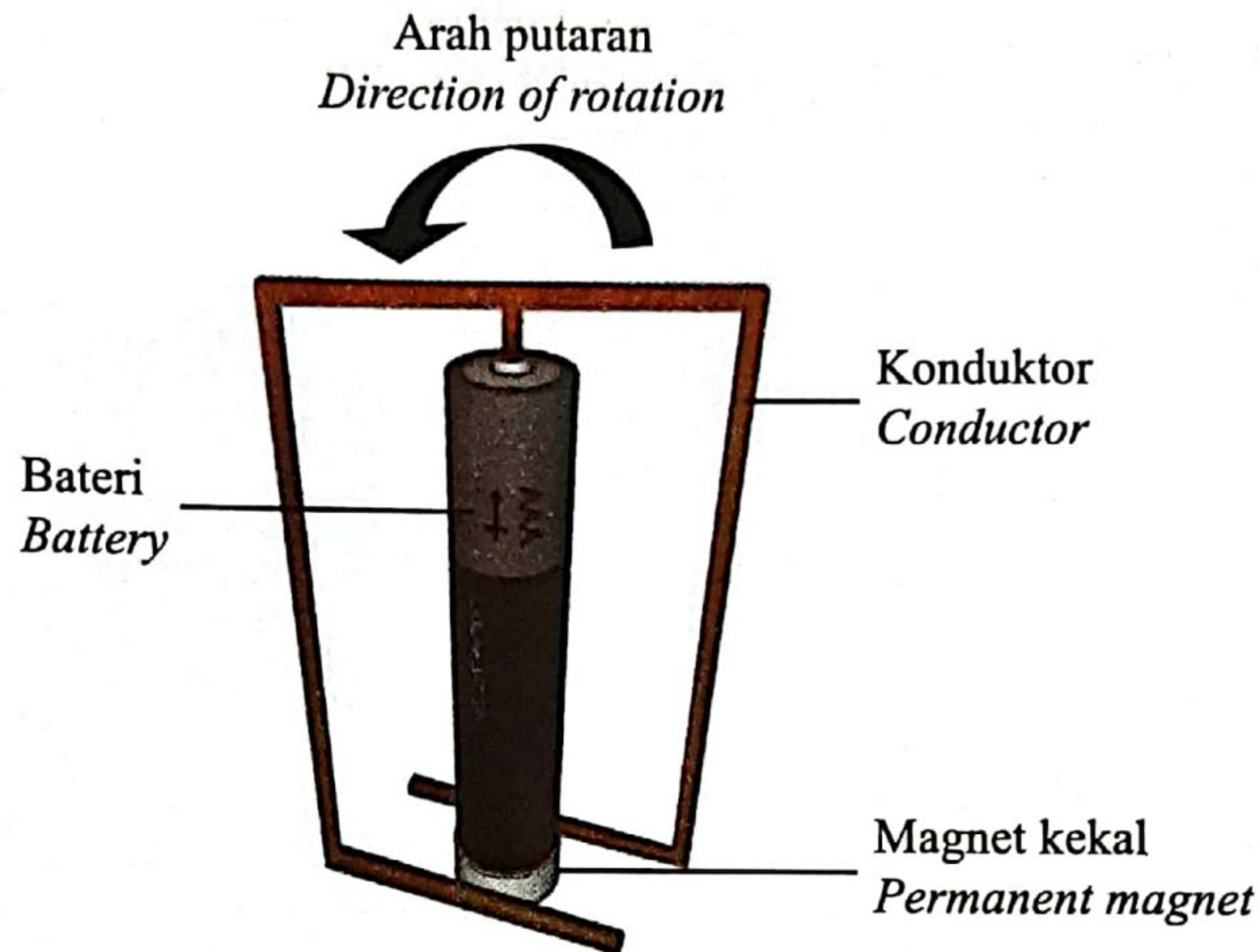
Terangkan persamaan dan perbezaan antara motor berberus dan motor tanpa berus.

Explain the similarities and differences between brushed motor and brushless motor.

[4 markah]
 [4 marks]

- (d) Rajah 11.4 menunjukkan satu motor homopolar ringkas yang terdiri daripada magnet, bateri dan konduktor. Interaksi antara medan magnet daripada arus elektrik dalam konduktor dan medan magnet daripada magnet kekal menghasilkan daya, yang menyebabkan konduktor berputar mengelilingi bateri.

Diagram 11.4 shows a simple homopolar motor consisting of a magnet, a battery and a conductor. The interaction between the magnetic field from the electric current in the conductor and the magnetic field from the permanent magnet produces a force, which causes the conductor to rotate around the battery.



Rajah 11.4
Diagram 11.4

Cadangkan pengubahsuaian yang boleh dilakukan pada motor homopolar dalam Rajah 11.4 supaya konduktor berpusing lebih laju.

Nyata dan beri penerangan tentang pengubahsuaian itu berdasarkan jenis bahan dan ciri-ciri magnet, jenis bahan dan ciri-ciri konduktor dan ciri-ciri bateri.

Suggest modifications that can be made to the homopolar motor in Diagram 11.4, so that the conductor can spin faster.

State and explain the modifications based on the type of material and characteristics of the magnet, type of material and characteristics of the conductor and the characteristics of the battery.

[10 markah]

[10 marks]

KERTAS PEPERIKSAAN TAMAT
END OF QUESTION PAPER

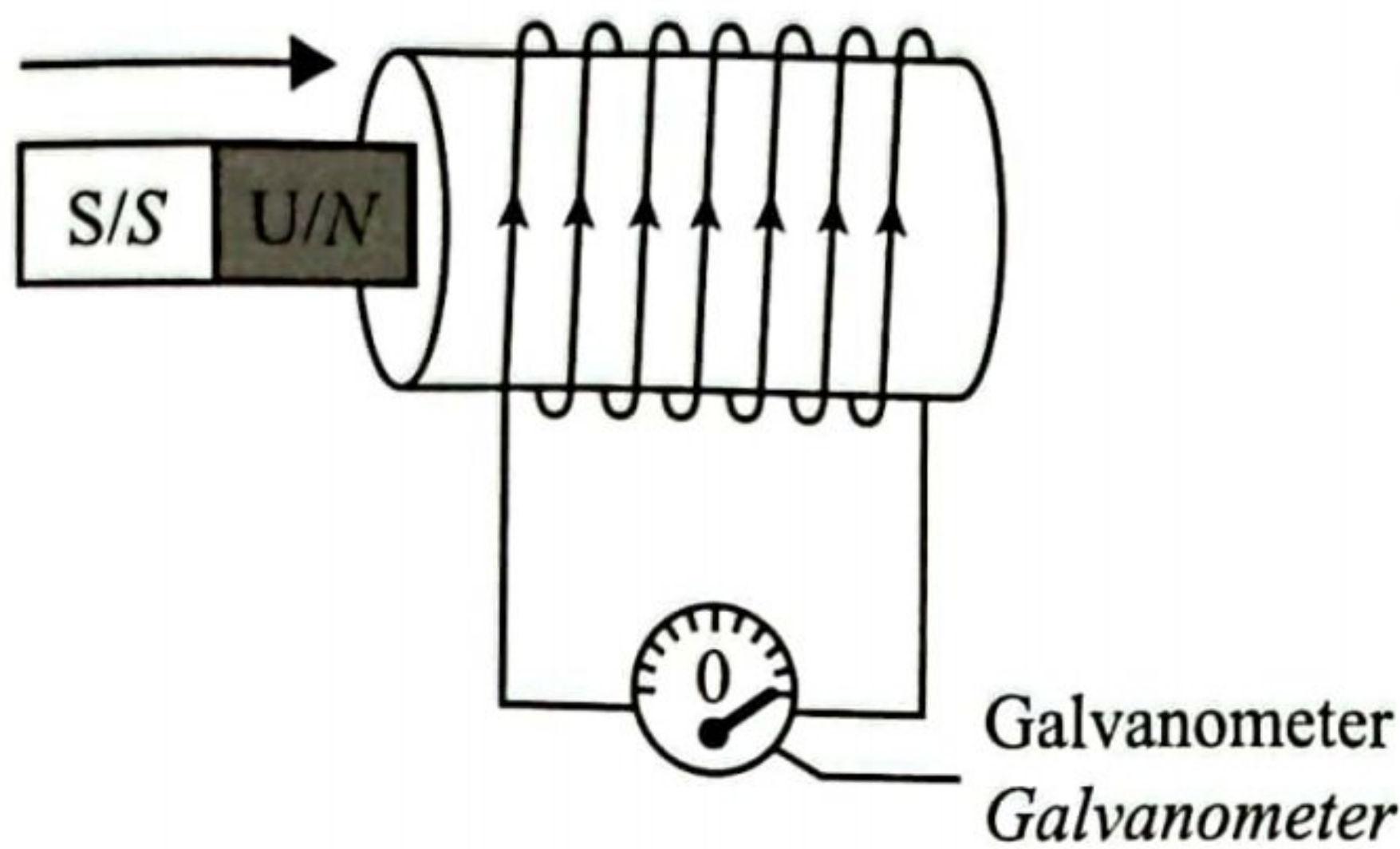
Bahagian C
Section C

[20 markah]
[20 marks]

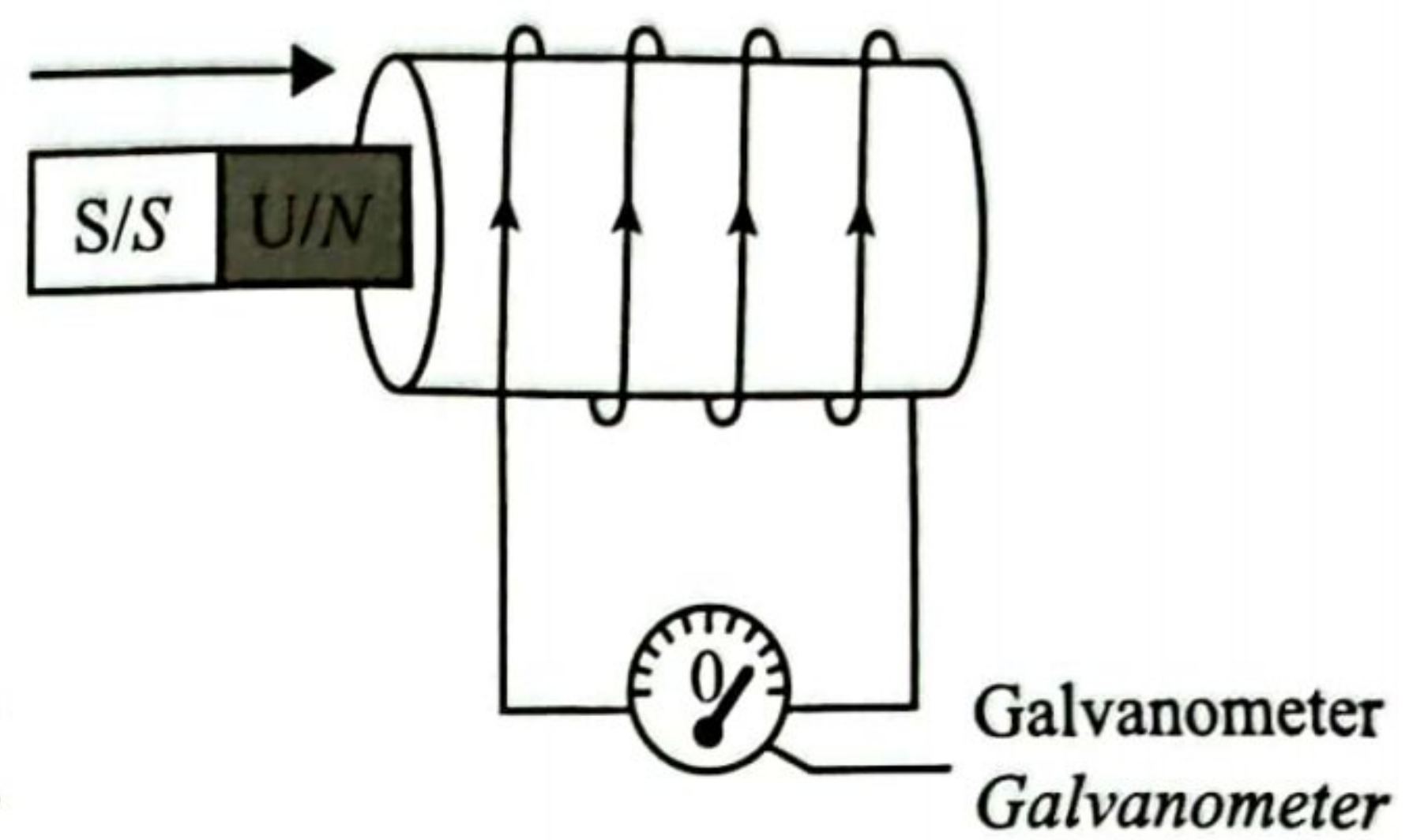
Jawab semua soalan dalam bahagian ini.
Answer all question in this section.

- 11 Rajah 11.1 dan Rajah 11.2 menunjukkan sebatang magnet bar ditolak ke dalam solenoid dengan laju yang sama.

Diagram 11.1 and Diagram 11.2 show a bar magnet is being pushed into a solenoid with the same speed.



Rajah 11.1
Diagram 11.1



Rajah 11.2
Diagram 11.2

- (a) Apakah yang dimaksudkan dengan aruhan elektromagnet?
What is meant by electromagnetic induction?

[1 markah]
[1 mark]

- (b) Berdasarkan Rajah 11.1 dan Rajah 11.2,
Based on Diagram 11.1 and Diagram 11.2,

- (i) bandingkan bilangan lilitan solenoid, saiz pesongan penunjuk galvanometer dan kadar pemotongan fluks magnet.

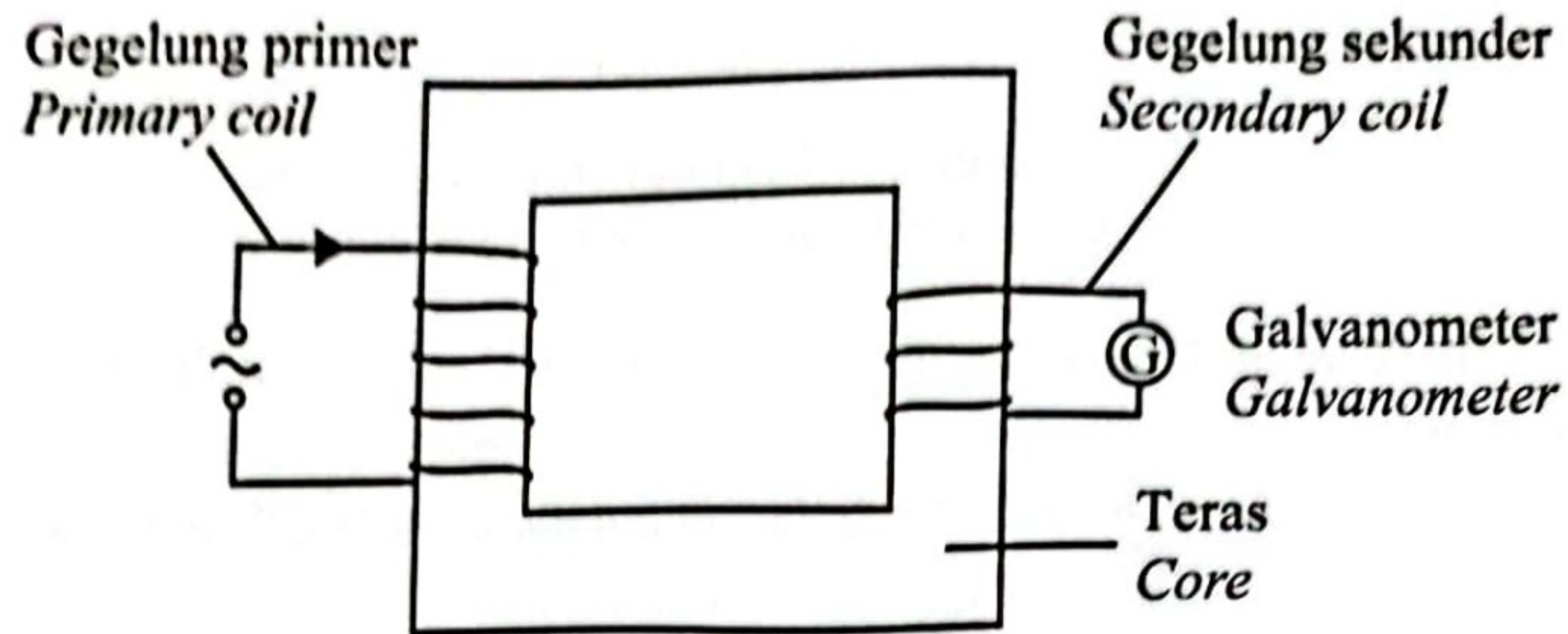
compare the number of turns of the solenoid, the size of deflection of the galvanometer pointer and the rate of cutting of magnetic flux.

- (ii) nyatakan hubungan bilangan lilitan solenoid dengan kadar pemotongan fluks magnet untuk membuat deduksi tentang hubungan antara kadar pemotongan fluks magnet dan magnitud arus aruhan yang dihasilkan.

state the relationship between the number of turns of the solenoid with the rate of cutting of magnetic flux to make a deduction regarding the relationship between the rate of cutting of magnetic flux and magnitude of induced current produced.

[5 markah]
[5 marks]

- (c) Rajah 11.3 menunjukkan satu transformer unggul.
Diagram 11.3 shows an ideal transformer.



Rajah 11.3
Diagram 11.3

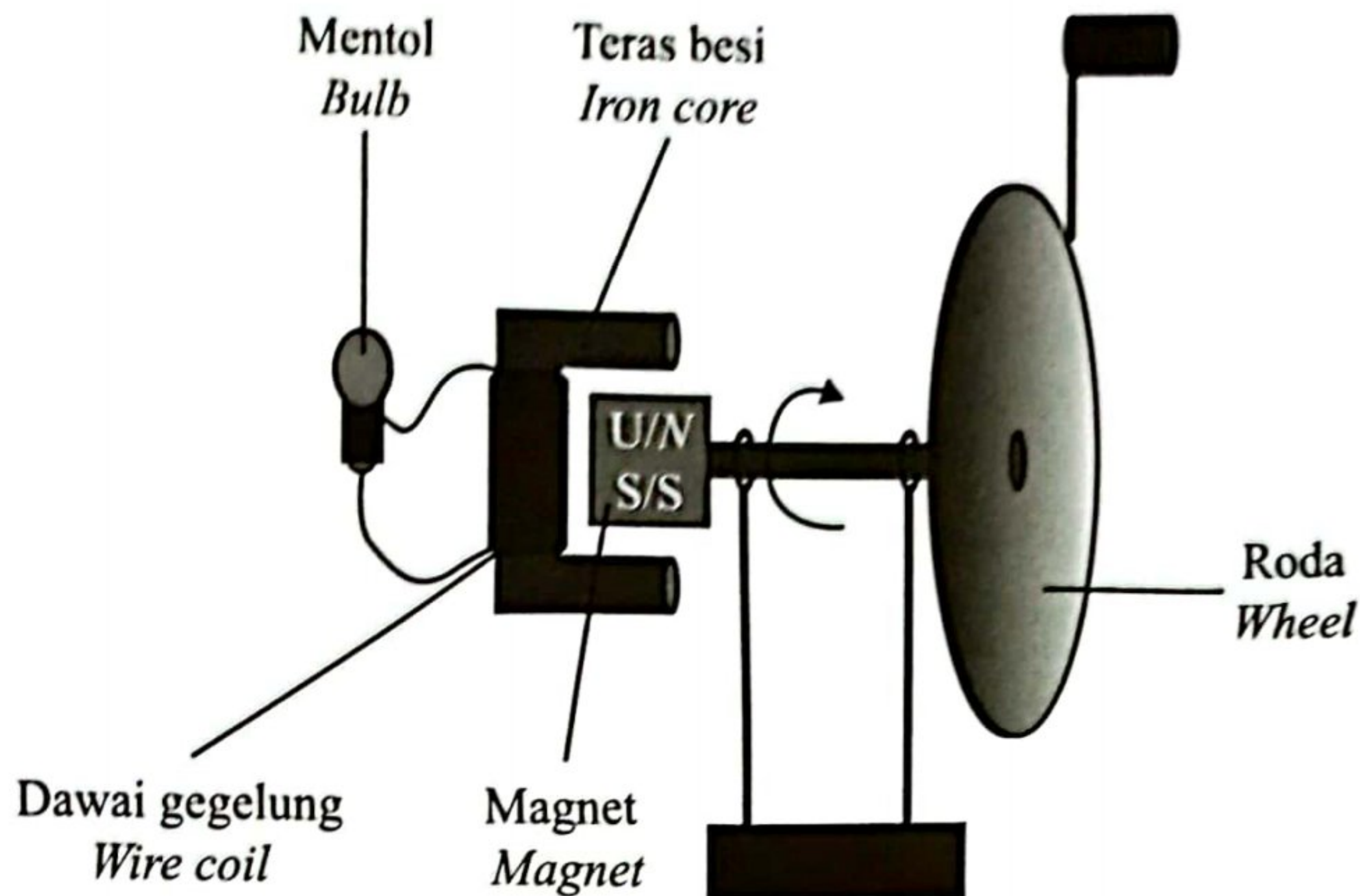
- (i) Namakan jenis transformer ini.
Name this type of transformer.
- (ii) Terangkan bagaimana arus diaruh di dalam gegelung sekunder.
Explain how current is induced in the secondary coil.

[1 markah]
[1 mark]

[3 markah]
[3 marks]

- (d) Rajah 11.4 menunjukkan struktur dinamo arus terus ringkas untuk menyalakan sebiji mentol.

Diagram 11.4 shows a structure of simple direct current dynamo to light up a bulb.



Rajah 11.4
Diagram 11.4

Cadangkan pengubahsuaian yang boleh dilakukan pada dinamo dalam Rajah 11.4 supaya mentol menyala lebih terang.

Nyatakan dan beri penerangan tentang pengubahsuaian itu berdasarkan ciri-ciri magnet, ciri-ciri teras besi, ciri-ciri dawai gegelung, kuasa mentol dan cara-cara untuk menghasilkan cahaya yang lebih terang.

Suggest modifications that can be made to the dynamo in Diagram 11.4, so that the bulb lights up brighter.

State and explain the modifications based on the characteristics of the magnet, characteristics of the iron core, characteristics of the wire coil, power of the bulb and ways to produce brighter light.

[10 markah]

[10 marks]

KERTAS PEPERIKSAAN TAMAT
END OF QUESTION PAPER