

JAWAPAN

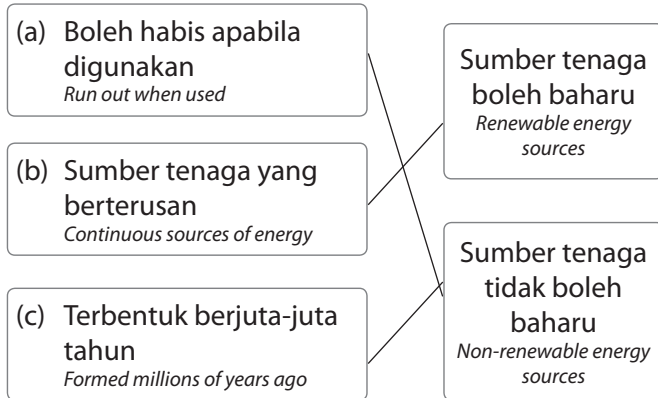
BAB
6

Elektrik dan Kemagnetan Electricity and Magnetism

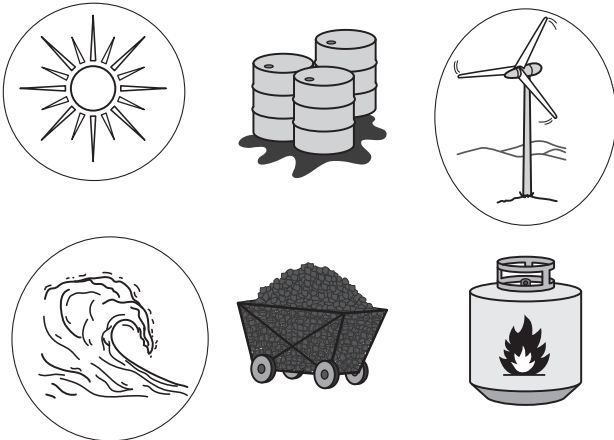
PBD

6.1 Penjanaan Tenaga Elektrik Generation of Electricity

1.



2.



3. (i) Penjana hidroelektrik
Hydroelectric generator
(ii) Penjana turbin gas
Gas turbine generator
(iii) Penjana nuklear
Nuclear generator
(iv) Penjana diesel
Diesel generator

4.

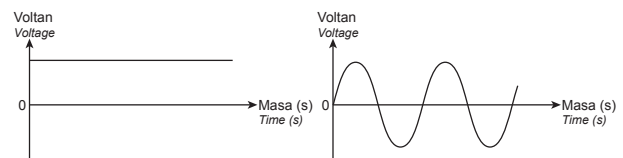
Nama <i>Name</i>	Jenis penjana elektrik <i>Type of generator</i>	Sumber tenaga <i>Source of energy</i>
Penjana elektrik terma <i>Thermal generator</i>	(a)	Petroleum <i>Petroleum</i>
Penjana elektrik turbin gas <i>Gas turbine generator</i>	(b)	Bahan api gas <i>Fuel gas</i>
Penjana hidroelektrik <i>Hydroelectric generator</i>	(c)	Air <i>Water</i>

5.

Langkah <i>Step</i>	Jarum galvanometer <i>Galvanometer needle</i>	Lampu LED <i>LED light</i>
Magnet bar digerakkan ke dalam gegelung <i>Bar magnet moved into the wire coil</i>	Terpesong <i>Deflect</i>	Menyala <i>Light up</i>
Magnet bar digerakkan keluar dari gegelung <i>Bar magnet moved out of the wire coil</i>	Terpesong <i>Deflect</i>	Menyala <i>Light up</i>

- (a) magnet
magnetic
(b) magnet
magnet
aruhan
induction

6. Pemerhatian / *Observation*



Paparan arus terus menunjukkan garis lurus tetapi paparan arus ulang-alik menunjukkan garis lengkung.
The direct current displays a straight line but the alternating current displays a curved line.

7.

Persamaan <i>Similarity</i>		
Kedua-duanya boleh digunakan untuk pemanasan dan pencahayaan <i>Both can be used in heating and lighting</i>		
Perbezaan <i>Differences</i>		
Arus terus <i>Direct current</i>	Aspek <i>Aspect</i>	Arus ulang-alik <i>Alternating current</i>
Satu arah <i>One way</i>	Arah aliran elektron <i>The direction of electron flow</i>	Sentiasa berubah <i>Always changes</i>
Tidak boleh <i>Cannot</i>	Kebolehan voltan diubah oleh transformer <i>The ability of the voltage changed by the transformer</i>	Boleh <i>Can</i>
Bateri, sel suria dan penjana arus terus <i>Dry cell, solar cell and direct current generator</i>	Sumber <i>Source</i>	Penjana arus ulang alik <i>Alternating current generator</i>

8. Jawapan murid
Student's answer

PBD 6.2 Transformer
Transformer

- (a) Menaikkan dan menurunkan voltan
To increase and reduce the voltage
- (b) (i) Gegelung primer
Primary coil
(ii) Teras besi lembut
Soft iron core
(iii) Gegelung sekunder
Secondary coil
- (c) (i) Voltan yang dibekalkan oleh sumber
The voltage supplied by the source
(ii) Voltan yang telah diubah oleh transformer
The voltage that had been changed by the transformer
- (a) (i) Transformer injak turun
Step-down transformer
(ii) Transformer injak naik
Step-up transformer
(b) (i) Bilangan lilitan gegelung primer bagi transformer J lebih banyak daripada bilangan lilitan gegelung sekunder manakala bilangan lilitan gegelung primer bagi transformer K kurang daripada bilangan lilitan gegelung sekunder.
The number of the turns of primary coil for transformer J is more than secondary coil while the number of turns of primary coil for transformer K is less than secondary coil.

- (ii) Transformer J menurunkan voltan manakala transformer K menaikkan voltan.

Transformer J decreases the voltage while transformer K increases the voltage.

- (iii) Voltan output transformer K lebih tinggi berbanding transformer J.

Output voltage for transformer K is higher than transformer J.

- (c) Arus ulang-alik
Alternating current

3. Pemerhatian / Observation:

Aktiviti <i>Activity</i>	Bilangan lilitan <i>Number of turns of coil</i>		Jenis transformer <i>Type of transformer</i>	Perbandingan kecerahan mentol A dan B <i>Comparison of the brightness of bulb A and B</i>
	Gegelung primer <i>Primary coil</i>	Gegelung sekunder <i>Secondary coil</i>		
A	30	60	Injak naik <i>Step-up</i>	Cerah <i>Bright</i>
B	60	30	Injak turun <i>Step-down</i>	Malap <i>Dim</i>

1. Menghitung bilangan lilitan gegelung primer dan sekunder
Count the number of turns in primary and secondary coil

2. Semakin banyak bilangan lilitan gegelung sekunder, semakin cerah mentol.
The higher the number of turns of coil in the secondary coil, the brighter the bulb.

3. Menambah bilangan lilitan gegelung sekunder
Increase the number of turns in the secondary coil

4. Transformer hanya berfungsi untuk menaik dan menurunkan arus ulang-alik. Sel kering membekalkan arus terus.

The transformer only works to increase or decrease the alternating current. Dry cells supply direct current.

5. (a) Mengawal voltan yang dibekalkan
Control the supplied voltage

- (b) Voltan yang dibekalkan adalah terlalu besar untuk mentol yang digunakan iaitu 240 V.
The voltage supplied is too big for the bulb used which is 240 V.

6. (a) Akan meletup / terbakar kerana bekalan voltan di Malaysia lebih tinggi iaitu 240 V.
Will explode / burn because the supplied voltage in Malaysia is higher which is 240 V.

- (b) Alatan di Malaysia beroperasi pada voltan 240 V manakala voltan yang dibekalkan di Thailand ialah 110 V. Oleh itu, kipas itu gagal beroperasi dengan baik kerana kurang bekalan voltan.

The Malaysian electrical appliances operate using 240 V while the voltage supplied in Thailand is 110 V. Therefore, the fan cannot function well due to less voltage supply.

$$7. \frac{V_s}{V_p} = \frac{N_s}{N_p}$$

$$V_s = \frac{50 \times 50}{100}$$

$$V_s = 25 \text{ V}$$

$$8. \frac{N_s}{N_p} = \frac{V_s}{V_p}$$

$$\frac{60 \text{ V}}{240 \text{ V}} = \frac{1}{4_p}$$

Nisbah lilitan = 4 : 1
Ratio of the number of turns

PBD 6.3 Penghantaran dan Pengagihan Tenaga Elektrik
Transmission and Distribution of Electricity

1. (a) Kehilangan tenaga elektrik dalam bentuk tenaga haba.
The loss of electrical energy in the form of heat energy.

(b) (ii), (iv)

2. (a) (i) Stesen transformer / *Transformer station*
(ii) Lapangan suis / *Switch zone*
(iii) Pencawang masuk utama / *Main substation*
(iv) Pencawang bahagian / *Branch substation*

(b) P: Transformer injak naik
Step-up transformer

Q: Transformer injak turun
Step-down transformer

R: Transformer injak turun
Step-down transformer

(c) (i) elektrik / *Electrical*
(ii) stesen jana kuasa / *power stations*
(iii) Rangkaian Grid Nasional
National Grid Network
(iv) tenaga haba / *heat energy*
(v) injak naik / *step-up*
(vi) meninggikan / *increase*
(vii) dikurangkan / *reduced*
(viii) injak turun / *step-down*

(d) Keperluan tenaga yang berbeza untuk kawasan perindustrian dan perumahan.
Different energy requirements for industrial areas and residential areas.

(e) (i) ✓
(iv) ✓

Pernyataan Statement	Fasa tunggal Single-phase	Tiga fasa Three-phase
(a)	✓	
(b)		✓
(c)	✓	
(d)		✓

4. (a)

Nama Name	Kod warna antarabangsa International colour code
Dawai hidup <i>Live wire</i>	Perang <i>Brown</i>
Dawai neutral <i>Neutral wire</i>	Biru <i>Blue</i>
Dawai bumi <i>Earth wire</i>	Jalur kuning dan hijau <i>Yellow with green strip</i>

(b) Dawai hidup membekalkan tenaga elektrik ke rumah manakala dawai neutral membawa tenaga elektrik ke luar rumah
Live wire transmits the electrical energy into the house while the neutral wire transmits the electrical energy out of the house.

(c) Memudahkan meter dibaca oleh pembaca meter

To ease the meter to be read by the meter reader

(d)

Komponen Component	Fungsi Function
Fius utama <i>Main fuse</i>	Mengawal jumlah tenaga elektrik yang dibekalkan kepada rumah <i>Controls the amount of electrical energy supplied to house</i>
Meter elektrik <i>Electric meter</i>	Menyukat jumlah tenaga elektrik yang digunakan <i>Measures the amount of electrical energy used</i>
Suis utama <i>Main switch</i>	Mengawal pengaliran arus elektrik bagi semua litar di dalam rumah <i>Controls the flow of electrical current in all circuit in the house</i>
Pemutus litar ELCB <i>Earth Leakage Circuit Breaker</i>	Memutuskan semua litar dalam rumah jika arus yang dibekalkan berlebihan <i>Break all the circuit in the house if current is supplied excessively.</i>
Litar kuasa <i>Power circuit</i>	Membekalkan arus elektrik kepada semua soket <i>Supplies electric current to all sockets</i>
Litar pencahayaan <i>Light circuit</i>	Membekalkan arus elektrik kepada semua lampu <i>Supplies electric current to all lamps</i>
Dawai bumi <i>Earth wire</i>	Membawa arus bocor ke bumi <i>Carries leakage current to the earth</i>
Pemutus litar MCB <i>Miniature Circuit Breaker</i>	Mengasing litar elektrik ke peralatan elektrik yang lain <i>Segregate the electrical circuit to the other electrical appliances</i>

(e) 240 V

(f) Arus ulang-alik
Alternating current

(g) Sistem pendawaian satu fasa
Single-phase wiring system

5. (a) (i) Seterika / *Iron Cerek / Kettle*
 (ii) Pengering rambut / *Hair dryer Pengisar / Blender*
 (b) (i) Dawai hidup / *Live wire*
 (ii) Dawai neutral / *Neutral wire*
 (iii) Dawai bumi / *Earth wire*
 (iv) Fius / *Fuse*

6. Pemerhatian / Observation:

Langkah <i>Step</i>	Pemerhatian <i>Observation</i>	
	Fius <i>Fuse</i>	Mentol <i>Bulb</i>
Sebelum menyambungkan dawai kuprum yang tebal <i>Before connecting the thick copper wire</i>	Tiada perubahan <i>No change</i>	Menyala <i>Lights up</i>
Selepas menyambungkan dawai kuprum yang tebal <i>After connecting the thick copper wire</i>	Fius melebur <i>Fuse melts</i>	Tidak menyala <i>Does not light up</i>

- (a) Untuk mengurangkan rintangan dan merendahkan arus
To reduce the resistance and lower the current
 (b) Litar pintas
Short circuit
 (c) Dawai kuprum yang tebal mempunyai rintangan yang lebih rendah berbanding dengan mentol dan dawai penyambung yang nipis.
The thick copper wire has lower resistance than the bulb and the thin connecting wires.
 (d) Terlalu banyak arus mengalir melalui litar. Hal ini menyebabkan suhu meningkat dan fius melebur.
Too much current flow through the circuit, This causes the temperature to rise and the fuse melts.
 (e) Fius memutuskan litar apabila arus yang terlalu banyak mengalir melalui litar itu.
The fuse breaks the circuit when too much current flows through the circuit.

7. (a) (i) Fius kartrij
Cartridge fuse
 (ii) Fius wayar boleh ganti
Replaceable wire fuse
 (b)

Nilai fius <i>Value of fuse</i>	10 A	2 A	1 A	3 A

8. Jawapan murid/ *Student's answer*
 9. Jawapan murid/ *Student's answer*

PBD 6.4 Pengiraan Kos Penggunaan Elektrik
Calculate the Cost of Electricity Consumption

1. (a) Penggunaan tenaga yang cekap, berhemah dan bijaksana
Efficient, prudent and wise use of energy

- (b) Suruhanjaya Tenaga
Energy Commission
 (c) (i) PALSU / *FALSE*
 (ii) BENAR / *TRUE*
 (iii) PALSU / *FALSE*
 (iv) BENAR / *TRUE*

2. (a) Menjana tenaga menggunakan panel suria
Generate energy using solar panel
 (b) Penggunaan lampu berpendarfluor
The usage of fluorescent lamp
 (c) Penggunaan kereta elektrik
The usage of electric car

3. (a) (i)
$$\begin{aligned} \text{Arus elektrik (A)} &= \frac{\text{Kuasa / Power (W)}}{\text{Voltan / Voltage (V)}} \\ &= \frac{910 \text{ W}}{220 \text{ V}} \\ &= 4.14 \text{ A} \end{aligned}$$

(ii) Tenaga yang digunakan / *Energy used (J)*

$$\begin{aligned} &= \text{Kuasa / Power (W)} \times \text{Masa penggunaan /} \\ &\quad \text{Duration of usage (s)} \\ &= 910 \text{ W} \times 30 \text{ min} \times 60 \text{ s} \\ &= 1\,638 \text{ kJ} \end{aligned}$$

4. Jawapan murid
Student's answer
 (d)

Peralatan <i>Appliance</i>	Langkah-langkah penjimatan <i>Saving steps</i>
Mesin basuh <i>Washing machine</i>	Gunakan dengan muatan penuh <i>Use with full load of laundry</i>
Penyaman udara <i>Air conditioner</i>	Gunakan apabila cuaca betul-betul panas / Jangan laraskan pada suhu paling rendah / Matikan suis apabila tidak diperlukan. <i>Use when the weather is really hot / Do not adjust at lowest temperature / Turn off switch when not needed</i>
Pemanas air <i>Water heater</i>	Matikan aliran air ketika tidak digunakan <i>Stop the water flow when not used</i>

5. (a) Kos penggunaan tenaga elektrik
Cost of electrical usage

$$\begin{aligned} &= \text{Kuasa (kW)} \times \text{Masa penggunaan (j)} \times \text{Kos} \\ &\quad \text{per unit (sen)} \\ &= \text{Power (kW)} \times \text{Time usage (h)} \times \text{Cost per unit (cent)} \\ &= 156 \text{ kWh} \times 0.218 \text{ sen/cent} \\ &= \text{RM } 34.008 \end{aligned}$$

 (b) (i) 42 258.3 kWj
 (ii) 42 558.2 kWj
 (iii) 299.9 kWj

6. Kos penggunaan tenaga elektrik
Cost of electrical usage

$$\begin{aligned} &= \text{Kuasa (kW)} \times \text{Masa penggunaan (j)} \times \text{Kos per} \\ &\quad \text{unit (sen)} \\ &= \text{Power (kW)} \times \text{Time usage (h)} \times \text{Cost per unit (cent)} \\ &= 2 \text{ kW} \times 5 \text{ jam / hour} \times 20 \text{ sen / cent} \\ &= \text{RM}2.00 \end{aligned}$$

7. Kos penggunaan tenaga elektrik
Cost of electrical usage
 = Kuasa (kW) × Masa penggunaan (j) × Kos per unit (sen)
Power (kW) × Time usage (h) × Cost per unit (cent)
 = 0.5 kW × 2 jam / hour × 30 hari / day × RM 0.20
 = RM6.00
8. Jawapan murid/ *Student's answer*

Power PT3

Bahagian A

1. B 2. D 3. A 4. D 5. B
 6. A 7. B 8. B

Bahagian B

1. (a)

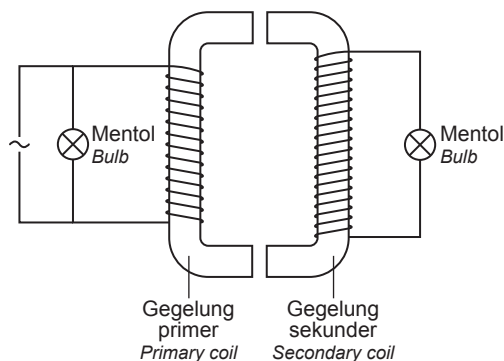
Gas asli <i>Natural gas</i>	✓
Arang batu <i>Coal</i>	✓
- (b) (i) Matahari / *Sun*
 (ii) Petroleum / *Petroleum*
2. (a) (i) PALSU / *FALSE*
 (ii) BENAR / *TRUE*
- (b)

Fius kartrij <i>Cartridge fuse</i>
Fius wayar boleh ganti <i>Replaceable wire fuse</i>
3. (a) (i), (iii)
 (b)

Palam 3-pin <i>3-pin plug</i>
Palam 2-pin <i>2-pin plug</i>

Bahagian C

4. (a) Transformer mengubah voltan arus ulang alik. Dalam rajah menggunakan bateri. Yang menghasilkan arus terus.
Transformer converts the voltage of alternate current. In the diagram are dry cells. Which produce direct current.
- (b) (i)



- (iii) Persamaan/ Similarity
 Kedua-dua gegelung terletak di dalam litar
Both coils are located inside the circuit
 Perbezaan / Difference
 Gegelung primer bersambung dengan sumber voltan input manakala gegelung sekunder bersambung dengan voltan output.
The primary coil is connected to the input voltage whereas the secondary coil is connected to the output voltage.

- (c) Konduktor kilat. Membumikan cas elektrik yang di bawa oleh kilat. Mengelakkan kebakaran / kerosakan; rumah / barangan elektrik.
Lightning conductor. Earthing the electrical charge brought by the lightning. Prevent fire / damage; house / electrical appliances.

Power KBAT

1. (a) Palam 3-pin. Palam 3 pin mempunyai wayar bumi yang dapat mencegah penggunaannya daripada terkena renjatan elektrik dengan membawa arus berlebihan ke bumi tanpa melalui badan pengguna tersebut.
3-pin plug. It has earth wire to prevent the user from getting an electric shock by carrying excess current to the earth without passing through the person's body.
- (b) Radio tidak disambungkan dengan wayar bumi kerana bingkai radio kebiasaannya diperbuat daripada penebat seperti plastik. Jika wayar hidup menyentuh bingkai plastik radio, arus tidak dapat dialirkan pada badan seseorang apabila menyentuhnya.
Radio is not connected with the earth wire because the radio frames are usually made of insulator such as plastic. If the live wire touches the plastic frame of the radio, the current would not pass through the body when she touches.