

Unit 9

TRANSFORMERS

(Máy biến áp)

I. VOCABULARY

wound	: quấn (quanh)
voltage	: điện thế
amplitude	: biên độ
turn	: vòng, quay, xoay
increase	: tăng
decrease	: giảm
winding	: khúc quanh, 1 vòng quay
illustrate	: minh họa
presence	: sự hiện diện, sự có mặt
virtually	: thật sự, thực sự
similar	: tương tự
basically	: cơ bản là
piece	: mảnh, mẩu, viên, khúc, cục
equipment	: trang bị
magnitude	: cường độ, âm lượng
primary	: sơ cấp
input	: đầu vào

secondary	: thứ cấp
output	: đầu ra
obtain	: đạt được, giành được, thu được
insulate	: cô lập, cách ly
former	: cái trước, vấn đề trước
mount	: đặt, sắp đặt, đóng vào
sheet	: lá, tấm, phiến, tờ
lamination	: sự cán mỏng, sự dát mỏng
oxidize	: bị gỉ sét, ôxi hoá
so that	: để, để cho, đặng
reduce	: giảm, giảm bớt, hạ
eddy	: làm xoáy lốc
loss	: sự mất, sự thua, sự thất bại
centre	: trung tâm
limb	: bờ, rìa
own	: của chính mình, của riêng mình
description	: miêu tả
diagram	: sơ đồ
items	: khoản, món, tin tức
component	: thành phần, phân hợp thành
possible	: có thể
draw	: vẽ
a carbon resistor	: điện trở các bon
variable	: có thể thay đổi được, có thể thay biến đổi được
filament bulb	: bóng đèn có dây tóc
choke	: (điện học) cuộn cảm kháng

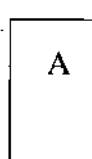
II. GRAMMAR

A transformer basically *consists of two coils* wound on a single iron core.

A transformer may be used *either* to increase *or* decrease an applied voltage *or* to increase *or* decrease a current.

Describing component

The following verbs can be used to break down a piece of equipment into its component parts. Note how they are used:

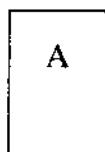
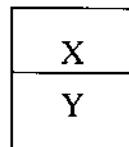


Consists of

Comprises

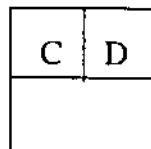
A is composed of X and Y

is made up of



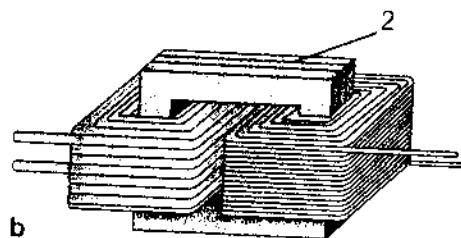
A contains C and D

Includes



III. READING COMPREHENSION

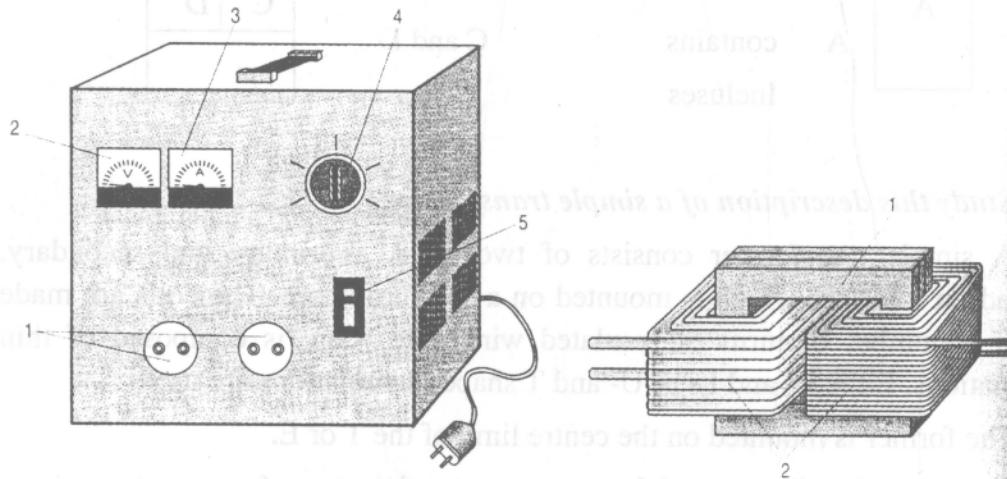
TRANSFORMER



A transformer is a device which changes the magnitude of an ac voltage. The transformer consists of a primary coil to which the input is applied, and a secondary coil from which the output is obtained.

The coils are insulated and wound round a former. The coils have a core of soft iron on which the former is mounted. The core is made from many thin sheets or laminations.

The sheets are oxidized so that the sheets are insulated from each other. Oxidizing the sheets reduces eddy losses.

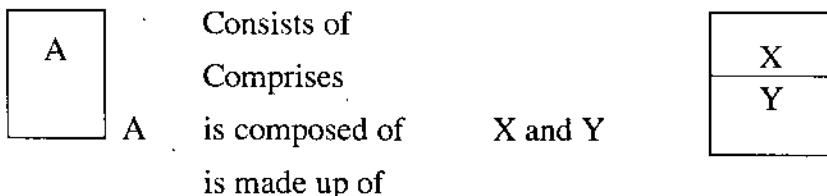


IV. EXERCISES

Exercise 1

Describing component

The following verbs can be used to break down a piece of equipment into its component parts. Note how they are used:

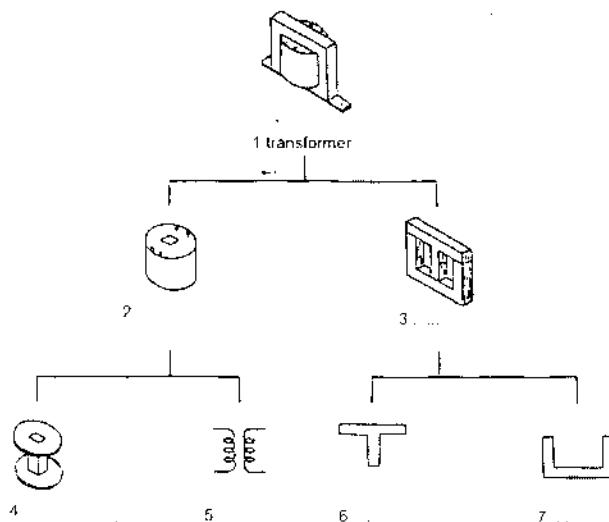


Study this description of a simple transformer

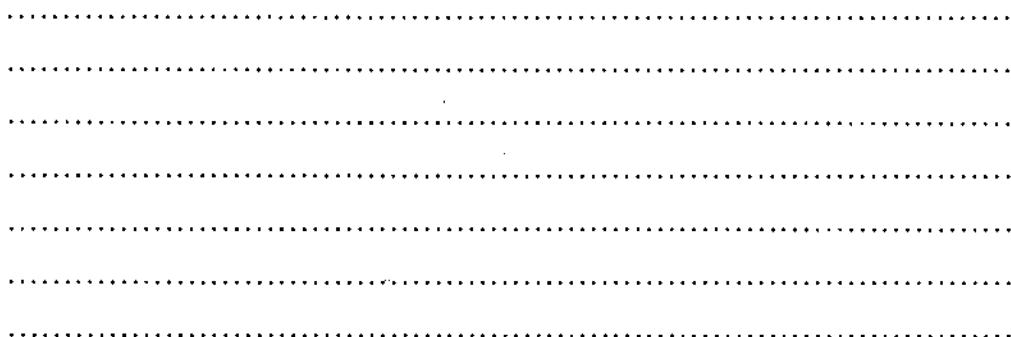
A simple transformer consists of two coils, a primary and secondary, wound on a former which is mounted on a soft- iron core. The coils are made up of a number of turns of insulated wire. The core is composed of thin laminations. Either E- and I- or U- and T shaped laminations are used.

The former is mounted on the centre limb of the T or E.

Complete this diagram of the components of the transformer.



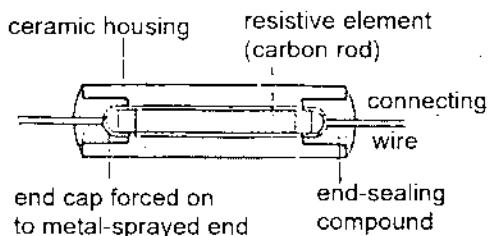
Now write your own description of a transformer using the diagram



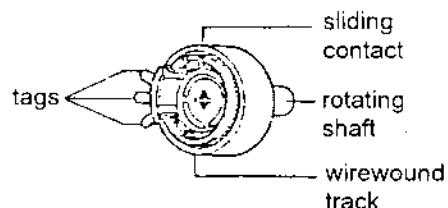
Exercise 2

Describing component

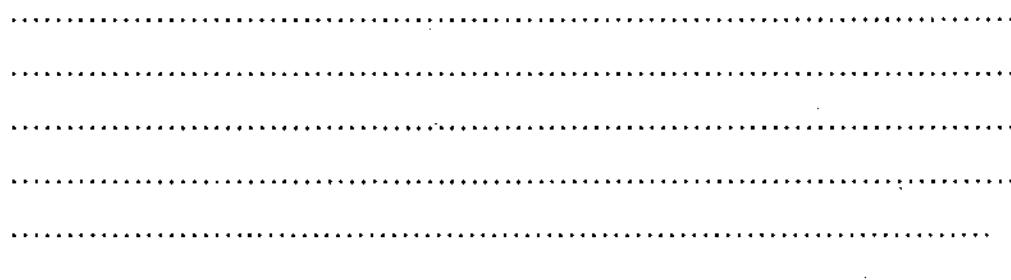
Break down each of these items into its components using the verbs you have learned. Where possible, draw a diagram to illustrate the break down

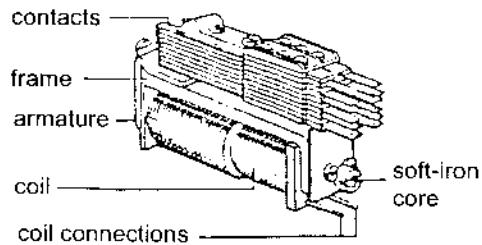
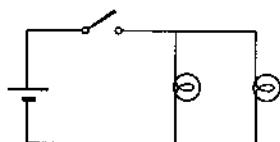


1. a carbon resistor



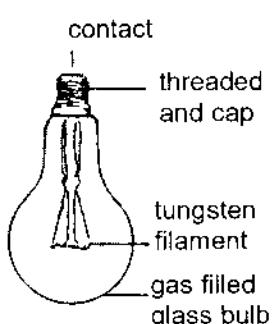
2. a variable wirewound resistor



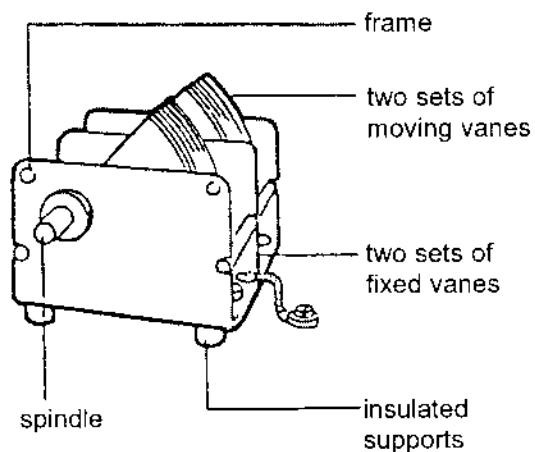


3. a lamp circuit

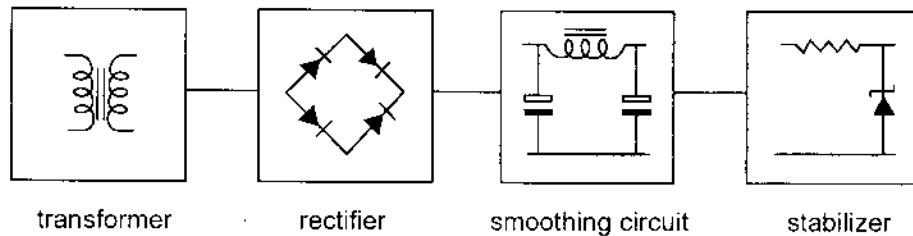
4. a relay



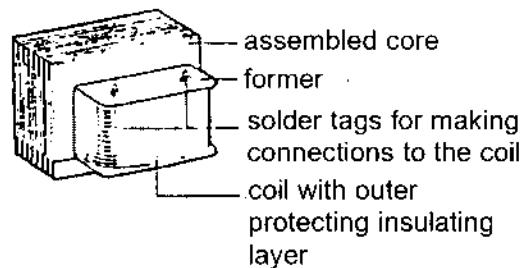
5. a filament bulb



6. a variable capacitor



7. a power supply



8. a choke

Unit 10

INSTALLATION OF LIGHTING SYSTEMS

(Lắp đặt hệ thống đèn chiếu sáng)

I. VOCABULARY

install	: đặt (hệ thống máy móc)
recess	: lỗ thủng, rãnh, chõ lõm
channel	: máng, rãnh
mark	: đánh dấu
plaster	: vữa, vôi vữa
hammer	: búa
chisel.	: đục
brickwork	: việc về gạch
drilling	: khoan
excessive	: quá mức, thừa, quá thể , quá đáng
breaker	: cái ngắt điện , cái công tắc
protection	: vật che chở, vật bảo vệ
accurate	: chính xác
repetitive operation	: hành động lắp lại
solenoid	: sô lê nôit (cuộn dây kim loại trở nên có từ tính khi có dòng điện đi qua cuộn dây đó)
latch	: chốt cửa, then cửa

overcome	: thắng, chiến thắng, tìm cách vượt qua, khắc phục
tension	: sự căng, tình trạng căng
spring	: lò xo
dangerous level	: mức nguy hiểm

II. GRAMMAR

Consider first a very simple plan, *covering* a small 3- room cottage with two circuits, *involving* one ceiling outlet controlled *by a wall switch* for each of the 3- room, with 3 receptacle outlets for a *larger* room and 1 for each of the *smaller* room.

Superative comparision

A fuse is *the simplest and cheapest* protection

Sentence building

Use the following groups of sentences to make ten longer sentences

A zinc case is used as a container for the cell.

The zinc case is used as the negative electrode.

→ A zinc case, WHICH IS USED AS THE NEGATIVE ELECTRODE, is used as a container for the cell.

III. READING COMPREHENSION

PLANNING AN INSTALLATION

TYPICAL PLANS

Consider first a very simple plan, covering a small 3- room cottage with two circuits, involving one ceiling outlet controlled by a wall switch for each of the 3- room, with 3 receptacle outlets for a larger room and 1 for each of the smaller room.

The service entrance is 2 - wire 115- volt only. The plan for this installation is shown in Figure 1-3.

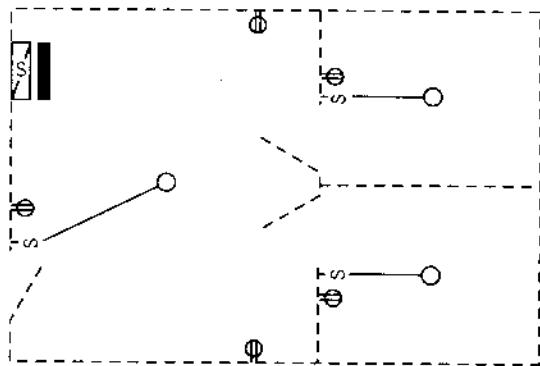


Fig 1-3 Layout a simple 3-room project

Note that this does not provide adequate wiring , nor does it meet all code requirements; it is shown merely as an exercise solving problems.

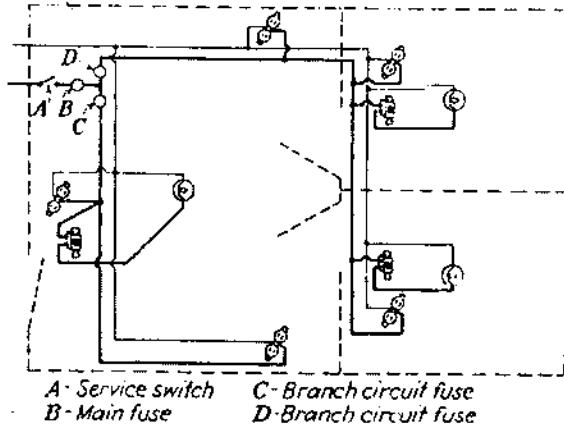


Fig 1-4 The lay-out of Fig 1-3

To make it easier to interpret this plan, Figure 1-4 shows the same lay-out in pictorial fashion, with all the wires shown in detail.

The neutral wire is shown as a light line; the 'hot' wire as heavy lines. Note how the neutral wire runs without interruption from the point where it enters

the building to each device where current is to be used. The black wire run from their fuses direct to each receptacle outlet and to each switch; an additional length runs from each switch to the light it controls, and that completes the wiring.

A represents the main switch. B represents the main fuse. C and D represent the 2 fuses, 1 for each branch circuit. The first branch circuit comprises all the wiring served by the current that flows through fuse C; the second circuit comprises all wiring served by the current that flows through fuse D.

The wiring plans for a larger house are Fig. 1-5 and 1-6. These diagram may at first sight seem rather formidable, but with study they become simple. Such plans are supplemented by detailed written specifications which give such information as size and type of service entrance, number of circuits type of materials to be used, and similar data.

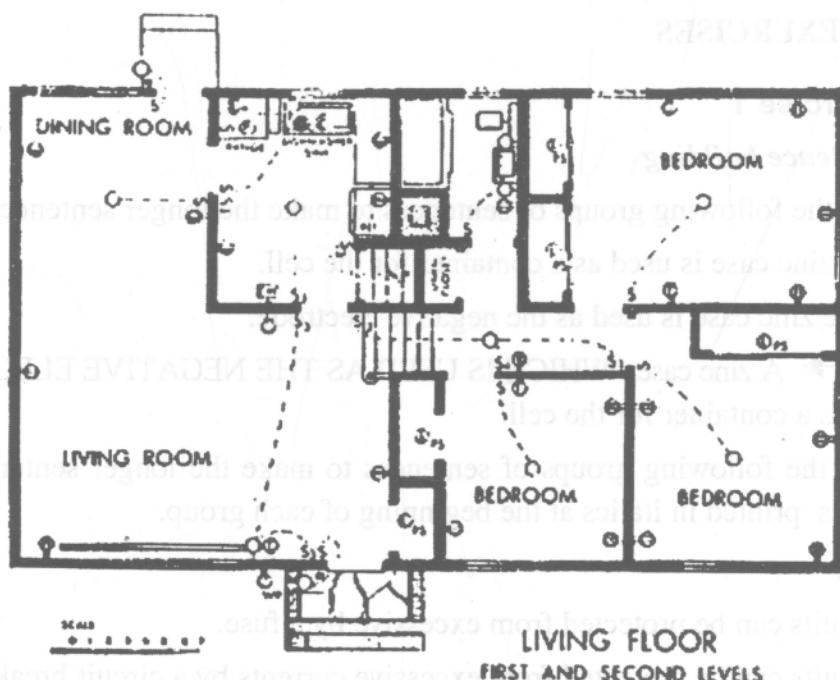


Fig 1-5 Wiring diagram for first and second levels of split-level house

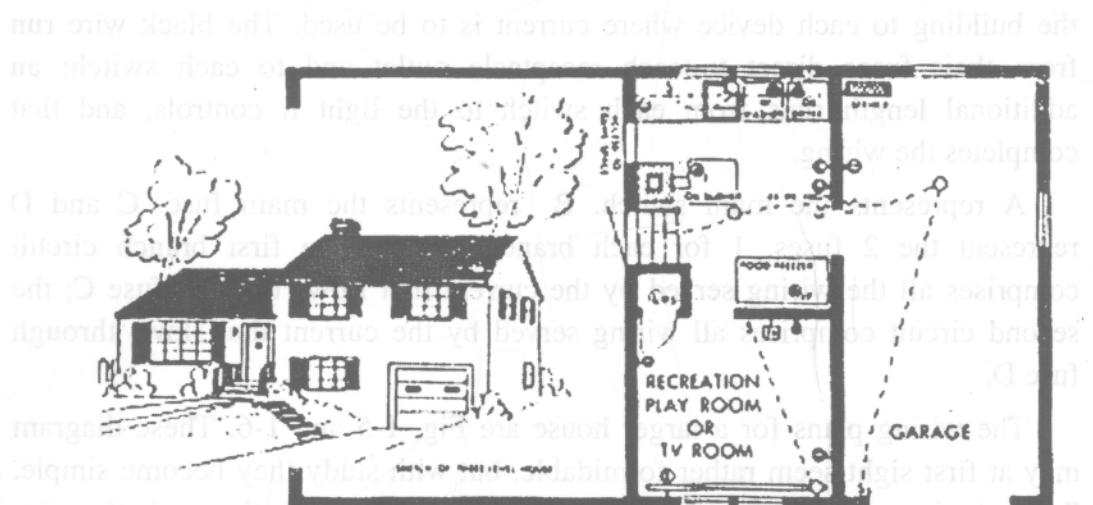


Fig 1-6 Wiring diagram for basement of house shown in Fig 1-5

IV. EXERCISES

Exercise 1

Sentence building

Use the following groups of sentences to make the longer sentences

- A zinc case is used as a container for the cell.
- The zinc case is used as the negative electrode.

→ A zinc case, WHICH IS USED AS THE NEGATIVE ELECTRODE, is used as a container for the cell.

Join the following groups of sentences to make the longer sentences. Use the words printed in italics at the beginning of each group.

1. or

Circuits can be protected from excessive by a fuse.

Circuits can be protected from excessive currents by a circuit breaker

2. however

A fuse is the simplest and cheapest protection

For accurate repetitive operation a circuit breaker is used.

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3. which

The simplest breaker consists of a solenoid and a switch with contacts.

The contacts are held closed by a latch

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4. which , therefore

As normal currents the pull of the solenoid on the latch will not overcome the tension of the spring.

The spring holds the latch in place.

The switch remains closed.

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5. if

The current rises to a dangerous level.

The pull of the solanoide on the latch increases

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6. Which

Dry cells are usually enclosed in a cardboard case.

An additional metal jacket may be added.

The jacket makes the cell leakproof.

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7. Which

Leakproof cells are often preferred.

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The electrolyte cannot leak out.

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The cell ages.

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8. Which

Leaking electrolyte may damage the equipment.

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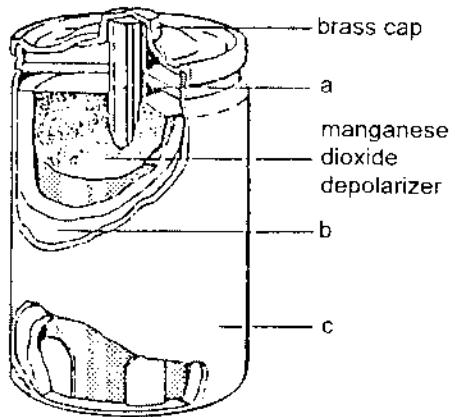
The cells are installed in the equipment.

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Exercise 2

Label this diagram with following words

1. electrolyte
 2. carbon rod
 3. negative electrode
 4. zinc case
 5. positive electrode
-
.....



Unit 11

THE DISTRIBUTION OF POWER

(Phân phối năng lượng)

I. VOCABULARY

process	: quá trình
bend	: cong, bẻ cong
leads	: chỉ
insert	: chèn vào, lồng vào
events	: sự việc, sự kiện, trường hợp
sequence	: sự nối tiếp, sự liên tiếp, sự liên tục
finally	: cuối cùng
respectively	: lần lượt là
explain	: giải thích
withdrawing	: rút lui, rút
arrange	: sắp xếp, sắp đặt, sửa soạn
omit	: bỏ sót, bỏ quên, bỏ qua
include	: bao gồm
suspend.	: treo, treo lên, đình chỉ, hoãn, tạm thời ngưng.
diagram	: sơ đồ, biểu đồ
consumer.	: người tiêu dùng
distribution	: sự phân phối, sự phân bổ, sự phân phát

power stations	: trạm phân phối điện
via	: qua, theo đường
grid	: hệ thống đường dây (điện phân bố trong 1 khu vực)
substation	: ga xếp
is fed	: được cung cấp, cung ứng
phase	: pha
domestic consumer	: tiêu dùng trong gia đình
printed circuit board (pcb):	bảng mạch điện
trim	: cắt, loại bỏ làm nhỏ
dim	: làm mờ
emitter voltage	: điện thế tỏa ra.
mercury relay	: cái ngắt mạch bằng thủy ngân
transmission	: sự truyền
overhead	: ở trên đầu, cao hơn mặt đất
underground cables	: cáp dưới lòng đất
built- up area	: khu vực xây dựng

II. GRAMMAR

Describing the process.

1. Bend the leads and insert them through the correct holes in pcb.

Write the descriptions of this process by rewriting each instruction in the **present passive**.

Example:

1. The leads ***are bent and inserted*** through the correct holes in the pcb.

Describing sequence: sequence words

To make the correct sequence of a number of events clear, we often use sequence words like this:

a. first

b. then

- c. next
 - d. after that
 - e. finally
- a. and e. must come first and last respectively, but the others can be used in any order and can be repeated.

Example:

First the leads are bent and inserted through the correct holes in the pcb.

Writing instructions as explanations

Study these instructions. They explain how to disconnect the supply to the motor in the circuit.

1. Disconnect the supply *by withdrawing the fuses.*
2. *To disconnect* the supply, *withdraw* the fuses.

Short relative clause

We can join these sentences by using a relative clause

1. The lines are arranged in two groups.
2. The lines carry the supply

→ The lines *which carry the supply* are rearranged in two groups.

Relative clauses with certain active verbs can be shortened by omitting the relative word and changing the verbs to its - ing. These verbs include:

Carry	form
Contain	hold
Consist of	measure

We can shorten the relative clause like this:

The lines *carrying the supply* are rearranged in two groups.

Note how these two sentences are joined by a relative clause.

3. The lines are suspended from insulators.
4. The insulators are made of porcelain.

→ The lines are suspended from insulators *which are made of porcelain.*

Relative clauses like this with passive verbs can be shortened by omitting the relative word and the verb *to be*:

→ The lines are suspended from insulators *made of porcelain*.

Reinforcement connectives.

Study these sentences:

1. Steel-core aluminum is used for high voltage lines.
2. Steel- core aluminum lines are cheaper than copper.

Sentence 2 provides a reason for sentence 1. We can link the ideas in these sentences with *because*

→ Steel - core aluminum is used for high - voltage lines *because* it is cheaper than copper.

Now consider this sentence:

3. Steel -core aluminum lines are 50% stronger than copper.

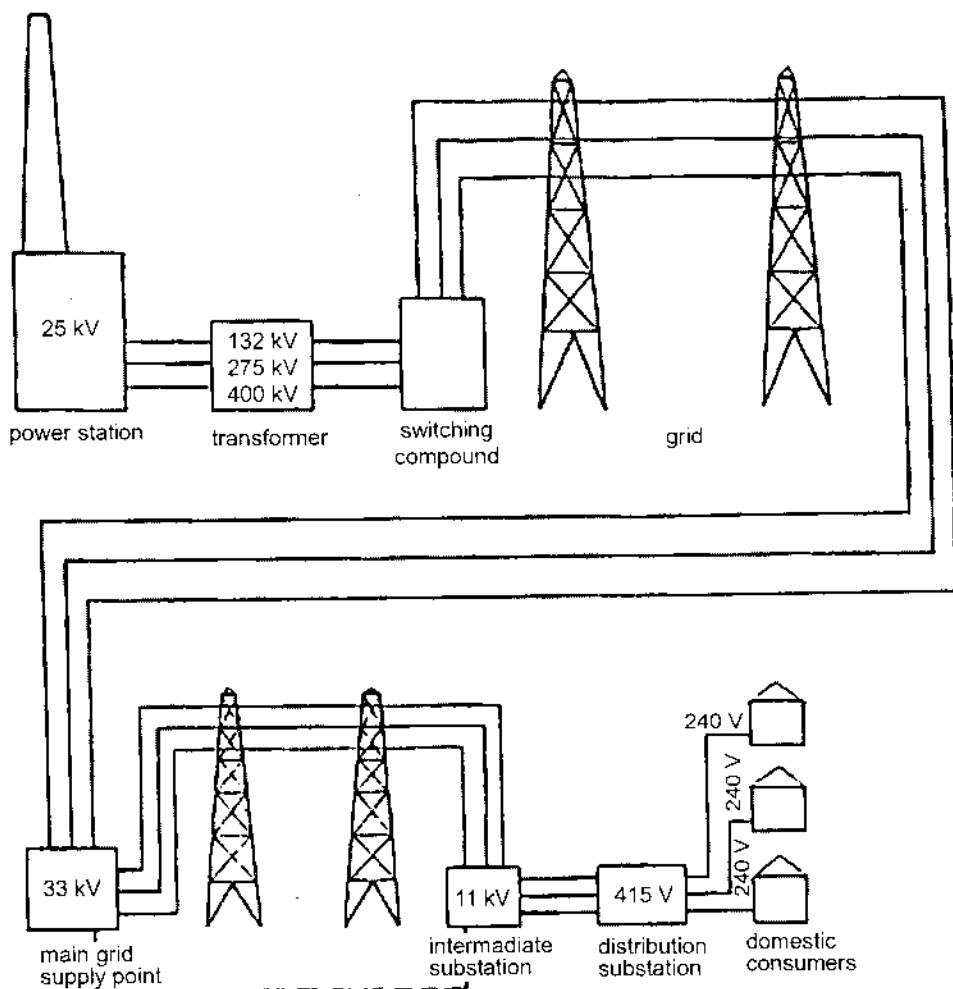
Sentence 3 provides an additional reason for sentence 1. It reinforces sentence 2. We can link a reinforcing idea using *in addition, moreover or furthermore*.

→ Steel- cored aluminum is used for high - voltage lines *because* it is cheaper than copper. *In addition*, steel - cored aluminum lines are 50% stronger than copper.

III. READING COMPREHENSION

Describing the distribution of power

The following diagram shows the distribution of power from the power station to the consumer.



The sentences which follow it describe this distribution

1. In the UK, electrical energy is generated at power stations at 25 kV
2. It is stepped by a transformer to 132,275 or 400 kV for long - distance distribution
3. It passes via the switching compound to the grid.
4. It is distributed via the grid system to main grid supply points where it is stepped down to 33 kV for distribution to heavy industry.

5. It is distributed via overhead or underground cables to intermediate substations where it is further reduced to 11 kV for light industry.
6. It is fed to distribution substations where it is reduced to 450 V, 3 phase and 240 V, 1 phase
7. It is distributed to the domestic consumer.

IV. EXERCISES

Exercise 1

Describing the process.

Study these instructions for soldering a resistor into a printed circuit board (pcb):

1. Bend the leads and insert them through the correct holes in pcb.
2. Pull the resistor flat against the board and bend back the leads
3. Heat the first lead with a soldering iron and apply solder to the heated lead.
4. Heat and apply solder to the second lead.
5. Allow the soldered joints to cool.
6. Trim the leads using wire clippers.

Write the descriptions of this process by rewriting each instruction in the *present passive*.

Example:

1. The leads are bent and inserted through the correct holes in the pcb
2.
3.
4.
5.
6.

Exercise 2

Describing sequence: sequence words

To make the correct sequence of a number of events clear, we often use sequence words like this:

- a. first
- b. then
- c. next
- d. after that
- e. finally

a and e must come first and last respectively, but the others can be used in any order and can be repeated.

Now replace each number in your description of soldering a resistor into a pcb with a sequence word to make the order of events clear.

Example:

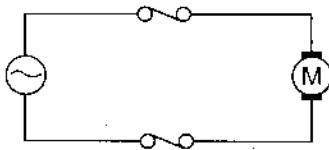
First the leads are bent and inserted through the correct holes in the pcb.

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Exercise 3

Writing instructions as explanations

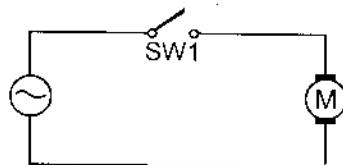
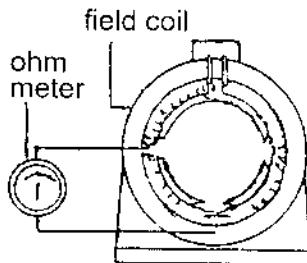
Study these instructions. They explain how to disconnect the supply to the motor in the circuit.



1. Disconnect the supply BY WITHDRAWING THE FUSES.

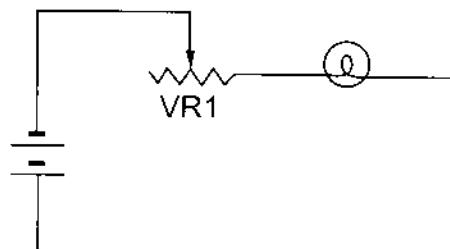
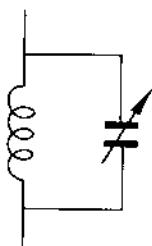
2. TO DISCONNECT the supply, withdraw the fuses

Now write instructions like the examples above to explain how to do the following:



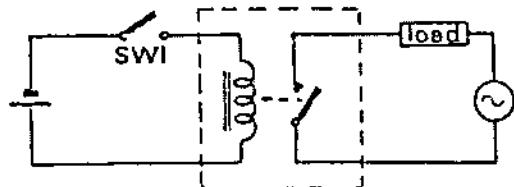
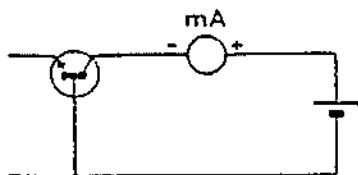
1. Check the field coils

2. Start the motor



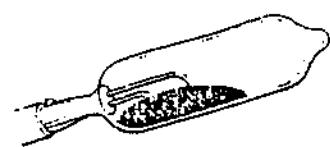
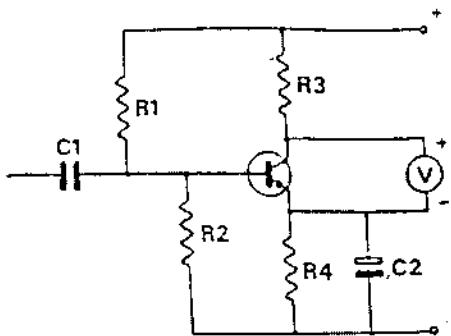
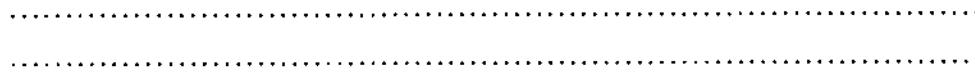
3. Change the frequency of the tuned circuit

4. Dim the light



5. Measure the collector current.

6. Supply power to the load.



Measure the collector- emitter voltage.

8. Operate the mercury relay.



Exercise 4

Short relative clause

We can join these sentences by using a relative clause

1. The lines are arranged in two groups.
2. The lines carry the supply

→ The lines WHICH CARRY THE SUPPLY are rearranged in two groups.

Relative clauses with certain active verbs can be shortened by omitting the relative word and changing the verbs to its - ing . These verbs include:

Carry	form
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Consist of	measure

We can shorten the relative clause like this:

The lines CARRYING THE SUPPLY are rearranged in two groups.

Note how these two sentences are joined by a relative clause.

3. The lines are suspended from insulators.
4. The insulators are made of porcelain.

→ The lines are suspended from insulators WHICH ARE MADE OF PORCELAIN.

Relative clauses like this with passive verbs can be shortened by omitting the relative word and the verb to be:

The lines are suspended from insulators MADE OF PORCELAIN.

Now link each group of sentences into one sentence. Using short relative clause where possible. Number 2 cannot be shortened.

1. In Britain electrical energy is fed to the National Grid.

The energy is generated in power stations.

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2. The energy passes through a transformer.

The transformer steps up the voltage to 132, 275, or 400 kV.

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3. The transmission lines are usually arranged in groups of three overhead conductors.

The lines carry the supply.

The overhead conductors are suspended from porcelain insulators.

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4. Energy from stations may be fed to the Grid by underground cables.

The power stations are located in built-up area.

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5. For voltages up to 400 kV cables are used.

These cables contain oil under low pressure.

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Exercise 5

Do the following sentences the same. Using *because*, *in addition*, *moreover*, *furthermore* to connect them.

1. a. Semiconductors are cheaper than valves.
b. Semiconductors are much smaller and lighter
c. Semiconductors are used in preference to valves
-
-
-

2. a. Dc motors permit powerful dynamic braking
b. Dc motors are preferred for cranes.
c. Dc motors allow a wide range of speed variation.
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.....

3. a. Dielectric heating is even.
b. Dielectric heating is faster and cheaper.
c. Dielectric heating rather than conduction heat in is used in plywood production.
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4. a. Fluorescent lamps are better than filament lamps
b. The light is closer to daylight.
c. The heat from fluorescent lamps is much less than from filament lamps
-
.....
.....

Unit 12

EFFECT OF ELECTRIC CURRENT

(Tác dụng của dòng điện)

I. VOCABULARY

effects	: kết quả, hiệu lực, hiệu quả, tác dụng
thermal	: nhiệt, nóng
luminous	: tỏa sáng trong bóng tối, dạ quang
chemical	: thuộc hóa học
magnetic	: nam châm, có từ tính
undesirable	: có thể gây rắc rối, gây phiền phức
be reduced	: được giảm
however	: tuy nhiên
domestic appliances	: ứng dụng trong gia đình
such as	: ví dụ như
electric cookers	: bếp điện
industrial processes	: quá trình sản xuất công nghiệp
depend on	: phụ thuộc vào
passage	: đoạn trích, đoạn văn
produce light	: sản xuất ánh sáng
generate	: phát điện
incandescent	: nóng sáng, sáng chói, sáng rực

emit(v)	: tỏa ra, phát ra
intense	: mạnh, có cường độ lớn
ionize	: i ôn hoá
according to	: dựa theo
mercury	: thủy ngân
vapour	: bốc hơi, bốc hơi nước
compound into	: pha trộn
components	: hợp thành , cấu thành
electrolysis	: sự điện phân, hiện tượng điện phân
chlorine	: (hóa học) clo
pure water	: nước tinh khiết
take place	: chiếm vị trí
create	: sáng tạo, tạo ra
magnetic field	: từ trường
magnetize	: từ hóa
attract	: cuốn hút, thu hút, lôi cuốn, hấp dẫn, hút
principle	: nguyên tắc
electromotive force	: lực điện động
induce	: xui khiến, xui, thuyết phục
for instance	: ví dụ như
exert	: dùng, sử dụng (sức mạnh, ảnh hưởng)
zinc	: kẽm, tráng kẽm
container	: công ten nơ, thùng đựng hàng
negative electrode	: cực âm
carbon rod	: thanh kéo, tay đòn
form	: dạng, dạng thức
positive electrode.	: cực dương
paste	: dán, làm ma- két

ammonium	: (hóa học) A mo ni
chloride	: clo
liquid.	: chất lỏng
manganese dioxide	: di ô xít măng gan
prevent	: ngăn ngừa, ngăn cản
seat	: chỗ ngồi
cap	: chòm, chóp, đỉnh
enclose	: bọc quanh
additional	: thêm vào
leak	: lọt ra, rỉ ra, rò ra
proof	: chống lại được
damage	: mối hại , điều bất lợi
equipment	: sự trang bị, thiết bị

II. GRAMMAR

When a current flows though a conductor it may heat the conductor.

The heat **generated by** the current may be so great that the conductor becomes incandescent.

Chlorine **is generated by the electrolysis** of salt water.

Because pure water does not conduct well, sulphuric acid **has to be added** before the electrolysis takes place.

Sentence building

Use the following groups of sentences to make ten longer sentences

A zinc case is used as a container for the cell.

The zinc case is used as the negative electrode.

→ A zinc case, WHICH IS USED AS THE NEGATIVE ELECTRODE, is used as a container for the cell.

III. READING COMPREHENSION

The effects of an electric current are thermal, luminous, chemical and magnetic. When a current flows through a conductor it may heat the conductor. This heat is sometimes undesirable and has to be reduced. For this reason many electric motors and generators contain a fan. However, domestic appliances, such as electric cookers , and many industrial processes depend on the heating effect of an electric current.

The passage of a current may produce light. This can happen in a number of ways. The heat generated by the current may be so great that the conductor becomes incandescent. For example , the filament of a light bulb emits intense white light when heated by a current. Light is also produced when a current ionizes a gas. The colour of the light will vary according to the gas used. Mercury vapour lamps give a greenish- blue light.

An electric current can separate a chemical compound into its components. This is called electrolysis. Chlorine is generated by the electrolysis of salt water. Electrolysis can also be used to break down water into hydrogen and oxygen. Because pure water does not conduct well, sulphuric acid has to be added before the electrolysis takes place.

A current flowing through a conductor creates a magnetic field around it. This field has three applications. It can magnetize magnetic materials and attract them to the conductor. The electric relay works on this principle. If the magnetic field is cut by another conductor, an electromotive force will be induced in that conductor. For instance, the change in current flowing through the primary of a transformer will induce a current in the secondary. This principle is also used in generators. Thirdly, if a current - carrying conductor is placed in the magnetic field, a force will be exerted on it. This effect is utilized in the electric motor.

IV. EXERCISE

Exercise 1

Now study the passage carefully and complete this framework of notes:

Effects of an electric current:

1. thermal

- 2
- 3
- 4 magnetic
- 1 heat can be
- a. undesirable e.g motor
 - b.e.g cooker
2. light
- a. from incandescent conductor e.g.
 - b. from e.g. vapour lamp
3. = break down of chemical compound e.g salt water into chlorine
4. current flowing in conductor → round it. Magnetic field has 3 applications:
- a. e.g relay
 - b. induce emf in another conductor e.g
 - c e.g motor

Exercise 2

Sentence building

Use the following groups of sentences to make ten longer sentences

- A zinc case is used as a container for the cell.
- The zinc case is used as the negative electrode.

→ A zinc case, WHICH IS USED AS THE NEGATIVE ELECTRODE, is used as a container for the cell.

Use the following groups of sentences to make the longer sentences

- A zinc case is used as a container for the cell.
- The zinc case is used as the negative electrode.

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2. A carbon rod forms the positive electrode.

The carbon rod is in the centre of the cell.

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3. The space between the zinc case and the carbon rod is filled with a paste of ammonium chloride.

The paste is used as an electrolyte

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4. The electrolyte is a paste and not a liquid.

This type of cell is called a dry cell.

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5. The paste also contains manganese dioxide.

The manganese dioxide prevents gas being formed.

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6. The cell is seated with a cap.

The cap is made of metal or plastic.

The cap is to prevent the paste coming out.

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7. A small space is left below the cap.

Gas formed by the cell can collect in the space.

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Unit 13

GENERAL INSTRUCTION OF PROGRAMMABLE LOGIC CONTROL (PLC)

(Giới thiệu chung về bộ điều khiển lập trình điện)

I. VOCABULARY

program	: chương trình
compiled	: biên soạn, sưu tập tài liệu
manager	: người quản lý, giám đốc, người chỉ đạo
version	: phiên bản
model	: kiểu, mẫu, mô hình
modify	: sửa đổi, thay đổi
accordingly	: phù hợp với điều đã được nhắc đến
via	: qua, theo đường (gì)
paralleled	: (diện học) được mắc song song
driver	: (kỹ thuật) bánh xe phát động
real	: thực, thực tế, có thực
assembly	: (kỹ thuật) sự lắp ráp, bộ phận lắp ráp
present	: có mặt, hiện diện, hiện tại
ensure	: bảo đảm
induction	: (diện học) sự cảm ứng, cảm ứng
squirrel - cage	: cái lồng có trục trụ tròn quay, rôto lồng sóc

horsepower	: (kỹ thuật) sức ngựa, mã lực
indicate	: 1. chỉ, cho biết, 2. biểu lộ, biểu thị
contrast	: sự tương phản, sự trái ngược
whereas	: nhưng ngược lại, trong khi
comparative	: 1. so sánh; 2. tương đối
difference	: sự khác nhau
valves	: (kỹ thuật) van

II. GRAMMAR

Reading motor rating plates

Study these rating plates from two electric motors:

Motor A is an induction motor of the squirrel - cage type.

HP 1/6		VOLTS 240	PH 1	HZ 50
RPM 2850	E	AMPS 0.5	RATING	Continuous
INS CLASS	E			

Motor B is a dc motor which is compounds - wound

HP 15		VOLTS 240	cycle	dc
RPM 1400	E	AMPS 12	RATING	Continuous
INS CLASS	E			

Making comparision and contrasts

We can compare two similar features using *both*

Example

- **Both** motors are insulation class E.

We can contrast features which are different using *whereas*.

Example:

Motor A has a horse power of 1/6, *whereas* motor B has a horse power of 15.

Other words we can use for contrast are: *while*, *but*, *in contrast*. Often we can use *a comparative form of an adjective to describe a difference*.

Examples

- Motor A rotates *faster than* motor B
- Motor B is *more powerful than* motor A.

III. READING COMPREHENSION

The programming examples for the PLC have been compiled with the help of the LUCAS-NULLE PC-PLC Manager, version 2.0.

The equipment required, is listed in each exercise.

The different types of PLC system are used, then the input and output addresses at the model, must be modified, accordingly. When programming via the LUCAS-NULLE PC-PLC Manager, with a correctly paralleled driver, the addresses given in the typical result can be used. The control driversoftware accepts the programmed addresses and converts these to the real addresses of the control.

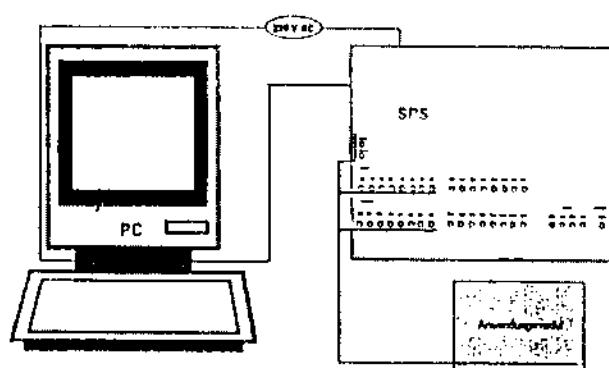
Example:

Program address	Is converted in	To control address
10	S5-95 U	132.0
	S5 - 100	10.0
	S7 - 200	10.0
11	S5-95 U	132.0
	S5 - 100	10.1
	S7 - 200	10.1
110	S5-95 U	133.0
	S5 - 100	11.0
	S7 - 200	11.0
Q 0	S5-95 U	Q 32.0
	S5 - 100	Q 2.0
	S7 - 200	Q 0.0

Q 1	S5-95 U	Q 32.1
	S5 - 100	Q 0.1
	S7 - 200	Q 0.1
Q 10	S5-95 U	Q 33.0
	S5 - 100	Q 3.0
	S7 - 200	Q 1.0

By converting the addresses within the device driver, the same program can be used for different control systems, without modification.

In principle, the following connections apply to all exercises.



PLC exercise assembly.

Danger!

In all exercises with mains power supplies, dangerously high voltage are present. Therefore, use only safety-protected connection cables and ensure that no short-circuits are produced. Carefully check all wiring to the application model

IV. EXERCISES

Exercise 1

Reading motor rating plates

Study these rating plates from two electric motors:

Motor A is an induction motor of the squirrel - cage type.

HP 1/6		VOLTS 240	PH 1	HZ 50
RPM 2850		AMPS 0.5	RATING	Continuous
INS CLASS	E			

Motor B is a dc motor which is compounds - wound

HP 15		VOLTS 240	cycle	dc
RPM 1400		AMPS 12	RATING	Continuous
INS CLASS	E			

Fill in the spaces in this table using the information given on the two motors. In the third column indicate if the features listed are the same or different. Numbers 2 and 8 have been done for you

	Feature	Motor A	Motor B	Same or different
1	Type			
2	Horsepower	1/6	15	Different
3	Volts			
4	Cycle			
5	Amps			
6	Rating			
7	Rpm			
8	Insulation class	E	E	Same

Exercise2

Making comparison and contrasts I

We can compare two similar features using *both*

Example

Both motors are insulation class E.

We can contrast features which are different using *whereas*.

Example:

Motor A has a horsepower of $1/6$, whereas motor B has a horsepower of 15.

Other words we can use for contrast are: *while*, *but*, *in contrast*. Often we can use *a comparative form of an adjective to describe a difference*.

Examples

Motor A rotates faster than motor B

Motor B is more powerful than motor A.

Now write sentences like the examples to compare and contrast the motors

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.....
.....
.....
.....
.....
.....
.....
.....

Exercise 3

Making comparisions and contrast 2

Compare and contrast the following:

- ### 1. Valves and transistors.

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2. alternating and direct current

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3. transmitters and receivers.

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4. filament lamps and fluorescent tubes

.....

5. ideal and practical transformers

.....

Unit 14

APPLICATION OF PLC A WASHING MACHINE (Ứng dụng của PLC: PLC với máy giặt)

I. VOCABULARY

washing machine	: máy giặt
PLC system	: hệ thống điều khiển lập trình điện
model	: kiểu, mẫu
incorporate	: sát nhập, kết hợp chặt chẽ
various	: khác nhau, không giống nhau.
average	: trung bình
domestic	: gia đình, việc nhà, nội trợ
delicate	: nhạy cảm, thính, nhạy
state	: trạng thái
degree	: độ
sensor	: (kỹ thuật) (vật lý) phần tử nhạy, cái cảm biến
activated	: 1. đã hoạt hoá, 2. đã làm phóng xạ
indicate	: 1. chỉ, cho biết, 2. biểu thị, biểu lộ
delay	: sự chậm trễ, sự trì hoãn
undamaged	: không bị hư hại, còn nguyên, còn tốt
armour	: bọc sắt
essential	: 1. bản chất, thực chất; 2. cần thiết, thiết yếu

information	: thông tin
extra	: thêm, phụ, ngoại
decide	: quyết định
correct	: sửa lỗi
combinations	: sự kết hợp, sự phối hợp
non-defining	: không hạn chế nội dung của từ hay ngữ
paragraph	: đoạn văn
utilize	: dùng, sử dụng, tận dụng
solenoid	: (diện học) sôlênoit (cuộn dây kim loại trở nên có từ tính khi có dòng điện đi qua cuộn dây đó)
pivoted	: trực đứng
telecommunications	: viễn thông
hinge	: xoay quanh
platinum	: platin, bạch kim
LED	: đèn phát sáng, phô tô quang

II. GRAMMAR

Relative clause:

Making definitions

Study these two sentences

- The cables were undamaged
- The cables were armoured.

We can link them in two ways using a relative clause:

1. The cables which were armoured were undamaged.
2. The cables, which were armoured, were undamaged.

Sentence 1 means that only the armoured cables were undamaged. Other cables , for example pvc coated cables, were damaged. The relative clause is a defining one. It defines the type of cable which was undamaged. It carries essential information.

Sentence 2 means that all the cables were undamaged and all the cables were armoured. The relative clause is a non-defining one. It adds more extra information to the sentence but it is not essential. We can remove it from the sentence and the sentence still makes good sense. It is separated from rest of the sentence by commas.

III. READING COMPREHENSION:

A washing machine is to be controlled by a PLC system. The model used, incorporates various basic functions found in the average domestic washing machine.

The machine can be switch on and off by a main switch.

A second switch allows the selection of either of two washing programs. The delicate washing (or fine-wash) program is selected when the switch is at a signal state 0; the normal wash program is selected with the signal state of 1.

The temperature of the wash can be set to 30 or 60 degrees.

Two sensors in the machine, H1 and H2, are used to detect the level of water and produce a 1 signal when activated. H2 can only be activated after H1. The switching state of the two sensors, is indicated by two LED's.

Two further outputs from the model, provide signals from the temperature of the wash-water, viz. 30 and 60 degrees. The temperatures are indicated on two LED's.

The heater for the wash - water is controlled by input H; the heater action is indicated by a red LED. When a drive signal is applied to the input, after a fixed time, the 30 degrees output is switched, followed by the 60 degree output after a delay.

IV. EXERCISES

Exercise1

Relative clause:

Making definitions

Study these two sentences

- The cables were undamaged
- The cables were armoured.

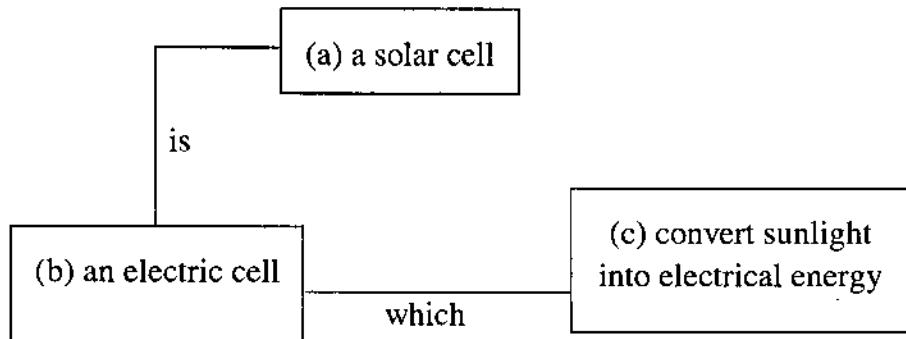
We can link them in two ways using a relative clause:

1. The cables ***which were armoured*** were undamaged.
2. The cables, ***which were armoured***, were undamaged.

Sentence 1 means that only the armoured cables were undamaged. Other cables , for example pvc coated cables, were damaged. The relative clause is a defining one. It defines the type of cable which was undamaged. It carries essential information.

Sentence 2 means that all the cables were undamaged and all the cables were armoured. The relative clause is a non-defining one. It adds more extra information to the sentence but it is not essential. We can remove it from the sentence and the sentence still makes good sense. It is separated from rest of the sentence by commas.

One use of defining relative clause is to make definitions. Study this diagram:



We can make a definition of a solar cell by joining (a), (b) and (c).

- A solar cell is an electric cell which converts sunlight into electrical energy.

Now make eight definitions using the information in this table. You must decide on the correct combinations of (a), (b) and (c).

(a)	(b)	(c)
A generator	A material	Measures light
An insulator	An instrument	Readily releases electrons
An alternating current	A current	Flows first in one direction then in the other
A direct current	A device	Does not readily release electrons
A resistor		Impedes the flow of current in a circuit.
A conductor		Measures current
A light meter		Converts mechanical energy into electrical energy
An ammeter		Flows in one direction on

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Exercise 2

Try to write your own definitions of these:

1. a voltmeter

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2. an electric motor

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3. a receiver

.....

4. a transmitter

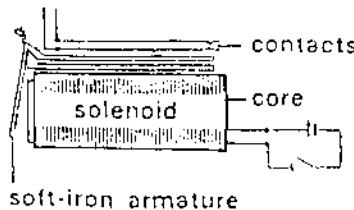
5. an electric cell

Exercise 3

Relative clause

Adding information to a passage

Use non-defining relative clause to add extra information this paragraph about a relay. This extra information is given below the paragraph.



Electric relays (1) utilize the magnetic effect of a current in a solenoid. One of the most common types (2) consists of a solenoid with a soft- iron core. When energized by a suitable dc current, the solenoid attracts an armature (3) The armature is pivoted in such a way that it pushes together or pulls apart a set of contacts (4) These contacts (5) control one or more circuits. Normally these circuits draw a much heavier current than the relay coil itself.

1. Electric relays are widely used in telecommunications.
2. The most common type of relay is known as the hinged armature relay.
3. The armature is also made of soft iron.
4. The sets of contacts are mounted on the body of the relay.
5. The contacts are often made of platinum

Unit 15

WASHING MACHINE CONTROL (Điều khiển máy giặt)

I. VOCABULARY

principle	: nguyên tắc
step	: bước
sequence	: tuần hoàn, sự nối tiếp, sự liên tiếp, liên tục
familiar	: quen thuộc, thân thiết
fill	: lấp đầy, đổ đầy
level	: mức độ
soak	: 1. ngâm, nhúng; 2. làm ướt sũng
CCW(counter- clockwise)	: ngược chiều kim đồng hồ
CW(clockwise)	: theo chiều kim đồng hồ
pump	: bơm
qualification	: phẩm chất , năng lực
dielectric.	: (điện) chất điện môi
standard	: tiêu chuẩn
accuracy	: chính xác
absorb	: hút , thu hút, hấp thụ

II. GRAMMAR

Qualification

Study these sentences:

1. All metals are conductors.
2. Some metals do not conduct well.

Sentence 2 qualifies sentence 1. We can link a statement and a qualification using **however**, **but** or **although**.

Examples:

1. All metals are conductors, **however** some metals do not conduct well.
2. All metals are conductors, **but** some do not conduct well.
3. **Although** all metals are conductors, some do not conduct well.

Giving reasons for qualification

When we qualify a statement, it is common to give a reason for the qualification.

Example

Mica is an excellent dielectric.

Statement

It is not used for making large capacitors

Qualification

The cost would be excessive.

Reason

→ Mica is an excellent dielectric but it is not used for making large capacitors because the cost would be excessive.

Reason and result connectives

How to use **because** and **because of**

Study these sentences :

1. Copper is used for cables.
2. Copper is a good conductor.

Sentence 1 tells us what copper is used for. Sentence 2 tells us why it is used. Sentence 2 provides a reason for sentence 1. We can link a statement and a reason using **because**.

→ 1 + 2 Copper is used for cables BECAUSE it is a good conductor.

When the reason is a noun or a noun phrase, we use *because of*.

Example

The motor overheated *because of* dirt in the air gap.

III. READING COMPREHENSION

WASHING MACHINE CONTROL (NORMAL PROGRAM)

Once the basic principles of the function of step sequence control are familiar. A control sequence can be defined for the control of the washing machine. The sequence should be divided into 4 main groups, as follows:

1. Prewash

- Fill the machine to level H1. (Height 1)
- Wait 5 s for the washing to soak up the water.
- Fill the machine to level H2.
- Wash for 60 s (5 s for CCW (counter- clockwise), 5 s for CW (clockwise), 5 s pause, and so on...)

2. Main wash

- Fill the machine to level
- Heat the washing water to the set temperature.
- Wash for 99 s (5 s for CCW, 5 s pause, 5 s CW, 5s pause, and so on...)
- Pump out water with 5 s run - on after reaching level H1.

3. Rinsing

- Fill the machine to level H2.
- Wash for 60 s (5 s for CCW, 5 s pause, 5 s CW, 5s pause, and so on...)
- Pump out water with 5 s run - on after reaching level H1.

4. Spin-dry

- 20 s spinning and pumping out water.
- 3 s run-on time for the pump, after spinning.

IV. EXERCISES

Exercise 1

Qualification

Study these sentences:

1. All metals are conductors.
2. Some metals do not conduct well.

Sentence 2 qualifies sentence 1. We can link a statement and a qualification using *however*, *but* or *although*.

Examples:

1. All metals are conductors, *however* some metals do not conduct well.
2. All metals are conductors, *but* some do not conduct well.
3. *Although* all metals are conductors, some do not conduct well.

Link each of the statements in the left-hand column with a suitable qualification from the right-hand column.

- | | |
|--|---|
| 1. The unit of capacitance is the farad. | Valves are still used in large transmitters. |
| 2. In an ideal transformer there would be no loss | For professional work a tolerance of 1 or 2 % required. |
| 3. Moving-iron meters can measure ac voltages without a rectifier. | Capacitance is usually measured at microfarads or picofarads. |
| 4. Resistors usually have a tolerance of 5 or 10 % | In practice there is always some loss. |
| 5. Semiconductors have replaced valves in most applications | Moving-coil meters with rectifiers are preferred |

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Exercise 2

Giving reasons for qualification

Reason and result connectives

How to use *because* and *because of*

Study these sentences :

- 1.Copper is used for cables.
2. Copper is a good conductor.

Sentence 1 tells us what copper is used for. Sentence 2 tells us why it is used . Sentence 2 provides a reason for sentence 1. We can link a statement and a reason using *because*.

→ 1+2 Copper is used for cables BECAUSE it is a good conductor.

When the reason is a noun or a noun phrase, we use *because of*.

Example

The motor overheated *because of* dirt in the air gap.

When we qualify a statement , it is common to give a reason for the qualification.

Example

Mica is an excellent dielectric.

Statement

It is not used for making large capacitors

Qualification

The cost would be excessive.

Reason

→ Mica is an excellent dielectric *but* it is not used for making large capacitors *because* the cost would be excessive.

Add an explanation to each of the qualifications you made in exercise 1 using the information below. Use *because* or *because of*.

1. the resistance of the winding.

.....
.....
.....

2. the farad is too large a unit

.....
.....
.....

3. higher standards of accuracy are needed

.....
.....

4. the very high powers required

.....
.....

5. they do not absorb so much power from the circuit

.....
.....
.....

Unit 16

ELECTRICAL LABOR SAFETY

(An toàn điện)

I. VOCABULARY

fatal	: không tránh được
shock	: sốc
necessarily	: cần thiết
amount	: lượng , số lượng, tổng số
determines	: định, đã định, xác định rõ
barely	: công khai, rõ ràng, vừa đủ
perceptible	: có thể nhận biết thấy, có thể cảm thấy
unpleasant	: không dễ chịu, khó chịu, khó ưa
victim	: nạn nhân
lead	: dẫn đến
muscular	: bắp thịt, cơ
freeze	: làm tê liệt
prevent	: ngăn cản, ngăn chặn, ngăn ngừa
circumstances	: hoàn cảnh, trường hợp, tình huống
distinguish	: phân biệt
case	: trường hợp
completely	: hoàn toàn

surface	: bề mặt
syllable	: âm tiết
crane	: cẩu trục
rise	: nâng lên, kéo lên
consequently	: do đó, vì vậy, bởi vậy, cho nên
conventional	: quy ước, thường
prefer	: thích hơn, ưa hơn
convenient	: tiện lợi, thuận lợi, thích hợp
reality	: tính chính xác, tính xác thực
portable	: có thể xách tay
ultrasonic	: siêu âm
distort	: vặn vẹo, làm méo nó, bóp méo
watchmakers	: thợ đồng hồ
advice	: lời khuyên
rule	: nguyên tắc
bare wire	: điện trần, điện sống
sharpen	: mài sắc
chisel	: cái đục
grill	: nướng, thiêu đốt
welding	: hàn
helmet	: mũ bảo hộ
goggles	: kính bảo hộ

II. GRAMMAR

Reason and result connectives 1.

Study these sentences :

1. Copper is used for cables.
2. Copper is a good conductor.

Sentence 1 tells us what copper is used for. Sentence 2 tells us why it is used . Sentence 2 provides a reason for sentence 1. We can link a statement and a reason using *because* .

→ 1+2 Copper is used for cables BECAUSE it is a good conductor.

When the reason is a noun or a noun phrase, we use *because of*.

Example

The motor overheated BECAUSE OF dirt in the air gap.

Now study this pair:

3. The flow of electrons through an insulator is very small.
4. The flow can be ignored.

Sentence 4 is the result of sentence 3. We can link a statement and the result using *therefore*.

→ 3 + 4 The flow of electrons through an insulator is very small, THEREFORE it can be ignored.

Note that a comma is used before *therefore*:

Qualification

Study these sentences:

1. All metals are conductors.
2. Some metals do not conduct well.

Sentence 2 qualifies sentence 1. We can link a statement and a qualification using *however, but* or *although*.

Examples:

1. All metals are conductors, *however* some metals do not conduct well.

2. All metals are conductors, *but* some do not conduct well.
3. *Although* all metals are conductors, some do not conduct well.

Reason and result connective 2

You have learned that *because* links a statement and a reason and that *therefore* links a statement and a result. The following connectives can also be used:

Statement + reason

Since

as

for the reason that

Statement + result

hence

consequently

for this reason

If the connective has more than one syllable, use a comma before it.

Example

- DC motors are used for cranes, *for the reason that* their speed can be finely controlled.

Although connectives link ideas, these ideas need not be put into one sentence.

Example

The current rose above the maximum. *Consequently* the circuit-breaker opened.

These ideas are linked by *consequently* but each is a separate sentence.

Reason connectives, however, are almost always used to link ideas into one sentence.

Example

- Copper is often used for cables since it is a good conductor.

III. READING COMPREHENSION

HOW DANGEROUS ARE SHOCKS?

Most people think it is a high voltage that causes fatal shocks. This is not necessarily so. The amount of current flowing through the body determines the effect of a shock. A milliampere is one thousandth of an ampere. A current of one milliampere through the body is just barely perceptible. One to eight milliampere causes mild to strong surprise. Currents from 8 to 15 milliamperes are unpleasant, but usually the victim is able to free himself, to let go of what is causing the shock. Currents over 15 milliamperes are likely to lead to "muscular freeze" which prevent the victim from letting go. Current over 75 milliamperes are likely to be fatal; much depends on the individual involved.

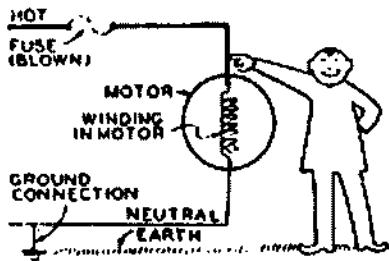


Fig. GR-2A 115-volt motor properly installed except for a grounding wire

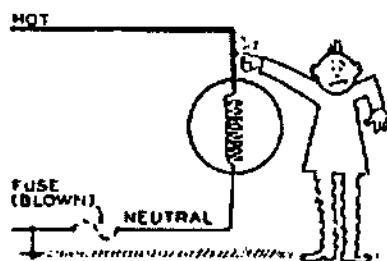


Fig. GR-3A 115-volt motor installed with a fuse in the neutral

Of course the higher the voltage, the higher the number of milliamperes that would flow through the body, under any given set of circumstances. We must distinguish between shock resulting from touching two hot wires, and those resulting from touching one hot wire. In later case, a shock from a relatively high voltage while the victim is standing on a completely dry surface will result in fewer milliamperes than a shock from a much lower voltage while he is standing in water. Many deaths have been caused by shock on circuits considerably below 115 volts; many have survived shock from circuit of 600 volts and more.

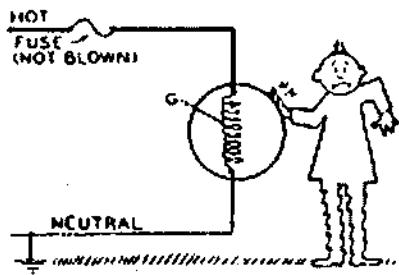
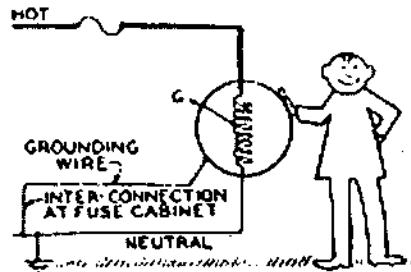


Fig. GR4 The motor of Fig GR-2, but the motor is defective



Gig. GR-5 The motor of Fig GR-4, but grounding wire has been added

IV. EXERCISES

Exercise 1

Reason and result connectives 1.

Study these sentences :

1. Copper is used for cables.
2. Copper is a good conductor.

Sentence 1 tells us what copper is used for. Sentence 2 tells us why it is used. Sentence 2 provides a reason for sentence 1. We can link a statement and a reason using *because*.

→ 1+2 Copper is used for cables BECAUSE it is a good conductor.

When the reason is a noun or a noun phrase, we use *because of*.

Example

The motor overheated *because of* dirt in the air gap.

Now study this pair:

3. The flow of electrons through an insulator is very small.
4. The flow can be ignored.

Sentence 4 is the result of sentence 3. We can link a statement and the result using *therefore*.

→ 3 + 4 The flow of electrons through an insulator is very small, THEREFORE it can be ignored.

Note that a comma is used before *therefore*.

Qualification

Study these sentences:

1. All metals are conductors.
2. Some metals do not conduct well.

Sentence 2 qualifies sentence 1. We can link a statement and a qualification using *however*, *but* or *although*.

Examples:

1. All metals are conductors, *however* some metals do not conduct well.
2. All metals are conductors, *but* some do not conduct well.
3. *Although* all metals are conductors, some do not conduct well.

Reason and result connective 2

You have learned that because links a statement and a reason and that therefore links a statement and a result. The following connectives can also be used:

statement + reason

Since

as

for the reason that

statement + result

hence

consequently

for this reason

If the connective has more than one syllable, use a comma before it.

Example

DC motors are used for cranes, *for the reason that* their speed can be finely controlled.

Although connectives link ideas, these ideas need not be put into one sentence.

Example

- The current rose above the maximum. **Consequently** the circuit-breaker opened.

These ideas are linked by consequently but each is a separate sentence.

Reason connectives, however, are almost always used to link ideas into one sentence.

Example

- Copper is often used for cables since it is a good conductor.

Now link these ideas with either reason, result, or qualification connective.

1. Conventional current flow is from positive to negative.

In fact electrons flow from negative to positive.

.....
.....
.....

2. Alternators are preferred to dynamos for cars.

Alternators give higher output at low speeds.

.....
.....
.....

3. Dirt and dust reduced effective light.

Lamps must be kept clean

.....
.....
.....

4. Squirrel- cage motors are simple, cheap and strong.

Squirrel- cage motors are used for many general duties.

.....
.....
.....

5. It is convenient to describe magnetic lines of force.

In reality magnetic lines of force do not exist.

.....
.....
.....

6. Transistorized equipment is easily portable.

Transistors can operate from battery voltages

.....
.....
.....

7. Ultrasonic welding is better than heat welding.

The materials are not distorted

.....
.....
.....

8. Watchmakers work with very small parts.

Watchmakers require a lot of light.

.....
.....
.....

Exercise 2

You must never smoke near petrol

Study this

Rules (Very important)	Advice (This is not as important as the rules)
1. You must not smoke here	1. You should not use a dirty saw
2. You must never smoke here.	2. You should never use a dirty saw
3. You must switch off	3. You should clean all tools
4. You must always switch off	4. You should always clean your tools

Use ***should*** or ***must***

Example:

1. You ***should*** clean your tools before you use them.

Now you do the same:

1. Here is some advice: clean your tools before you use them.
.....

2. This is a rule: switch off the electricity before you touch a bare wire.
.....

3. Here is a rule: do not smoke near petrol.
.....

4. This is some advice: Always sharpen chisels before you use them.
.....

5. Here is a rule: Always wear goggles when you grill a chisel.
.....

6. This is some advice: never use a screwdriver for opening a tin of paint
.....

7. Here is some advice: Use a narrow brush for painting corners.
.....

8. This is a rule: never do any welding without helmet or goggles
.....

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TRẦN QUANG

Kỹ thuật vi tính:

NGUYỄN HÀNG

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313/CXB ngày 02/3/2007. Số in: 350/4. In xong và nộp lưu chiểu quý III năm 2007.

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8. KỸ THUẬT ĐIỆN
9. ĐIỆN TỬ CÔNG SUẤT
10. MÁY CÔNG CỤ CẮT GỌT
11. ĐỒ GÁ
12. CÔNG NGHỆ CHẾ TẠO MÁY
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17. MÁY ĐIỆN
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34. ĐỒ ÁN CƠ SỞ THIẾT KẾ MÁY (ĐỒ ÁN CHI TIẾT MÁY)
35. CẤU TRÚC DỮ LIỆU VÀ GIẢI THUẬT
36. LÝ THUYẾT TRUYỀN TIN
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