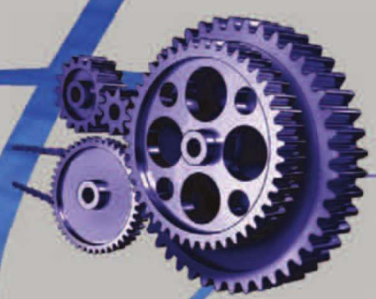
高职高专“十三五”规划教材

机电专业英语

Jidian Zhuanye Yingyu



主编　高鹏燕　张燕燕

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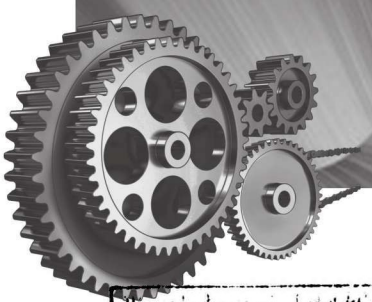

主　编　高鹏燕　张燕燕
副主编　马晓梅　李伟娜　夏金伟
编　委　牟　迪　迟　颖

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内容简介

机电专业英语是机电工程师、技师及从事相关专业工作的人员进行对外交流时所必须使用的国际通用语言。基于从实际应用的角度培养读者的专业英语听、说、读、写水平这一目的,编者结合多年从事专业英语教学的经验和体会,编写了内容难度适中、表述规范的文章作为本书的阅读材料。书中涵盖了机电专业的主要知识点内容,覆盖面广。书中所涉及的专业词汇和句型具有较强的专业特色和代表性,也是了解相关专业领域内容的基础。

机电专业英语

高鹏燕　张燕燕　主编

策划编辑　杨仪玮　郭蜀燕
责任编辑　杨仪玮

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前　言

机电专业英语是机电工程师、技师及从事相关专业工作的人员进行对外交流时所必须使用的国际通用语言。基于从实际应用的角度培养读者的专业英语听、说、读、写水平这一目的，编者结合多年从事专业英语教学的经验和体会，编写了内容难度适中、表述规范的文章作为本书的阅读材料。书中涵盖了机电专业的主要知识点内容，覆盖面广。书中所涉及的专业词汇和句型具有较强的专业特色和代表性，也是了解相关专业领域内容的基础。

本书围绕机械、电气和电器、机电一体化三部分编写。本书内容共十一部分，第一单元是机、电和机电一体化工程介绍；第二单元至第五单元，即电气基本部件、仪表、基本电路、电气设备，主要介绍了电气基本知识；第六单元至第七单元，即制冷系统、机械，主要介绍了机械基本知识；第八单元至第九单元，即微电脑、机电一体化，主要介绍了机电一体化基本知识；第十单元是工程材料；最后是语法部分。

编者认为，学习外语贵在坚持和积累，关键是要模仿和记忆，所以各单元每节课文前设置了与本节课内容相关的对话，对话使用了口语交际中常用的专业词汇、基本句型、常用句子，不仅能够提高读者学习英语的兴趣，还能提高读者的口语交际能力。课文内容新颖、图文并茂、覆盖面宽、词汇量大、可读性好，有助于提高读者的专业英语读写能力。为便于读者更好地利用本书，编者在每节内容后面都附有词汇和详细的课文注释，希望对读者有所帮助。为便于读者检测每单元学习的效果，编者在每节后面附有课后练习题；课后练习题中的问答题属于发散性思维的问题，读者可以通过归纳总结课文内容和查阅资料的方式，回答问题；翻译题和英汉连线题属于词汇题，其中的词汇均属本节的重点词汇，并且是日后工作口语交际中常用的专业词汇；选择题和判断题是针对课文内容设定的，本题能够检测读者对于课文的掌握程度，检测出学生对于专业英语基础知识的掌握程度，同时考验学生的归纳能力和举一反三的能力。本书最后编写了难易程度适宜的语法，并在后面缀上拔高拓展题，希望能对勇于挑战和提高自己英语水平的读者有所帮助。

本书可作为机械类专业的专业英语教材，编者还希望它能成为机械工程技术人员的专业英语读物。

本书在编写过程中参考了大量的文献资料，在此对其作者一一表示感谢。本书的顺利编写也得到各位同事和朋友的帮助，在此特向他们表示衷心的感谢。对于全书中存在的缺点和不当之处，敬请读者批评指正。

目　录

Unit 1

Introduction(介绍)

DIALOGUE

S1: Hi, I am Li Ming. I am from Weifang, Shandong Province.

S2: Nice to meet you. I am Li Hua. I am from Tengzhou, Shandong Province.

S1: Nice to meet you, too. What is the name of your college?

S2: Shandong Maritime Vocational College.

S1: What is your major?

S2: My major is mechatronics.

S1: What are your favorite parts?

S2: I am interested in machinery and electrical equipment.

TEXT

Introduction of Engineering

Engineering is different from science. Science is about discovering the natural world. Engineering is about creating the artificial world. Scientists try to understand nature. Engineers try to make things that do not exist in nature.

The fields of engineering are very broad. There are 4 main branches of engineering.

Fig. 1.1 Chemical engineering

Chemical engineering—We use physics, chemistry, and biology to finish chemical processes on a commercial scale.


Fig. 1.2 Civil engineering

Civil engineering—The design and construction of public and private works.


Fig. 1.3 Electrical engineering

Electrical engineering—The design, study, and manufacture of all kinds of electrical and electronic systems.

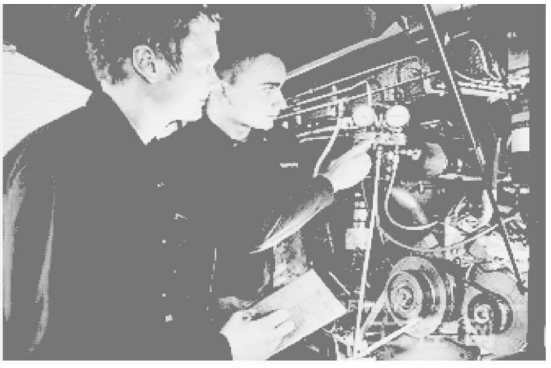



Fig. 1.4 Mechanical engineering

Mechanical engineering—The design and manufacture of physical or mechanical systems.

Introduction of Mechatronics

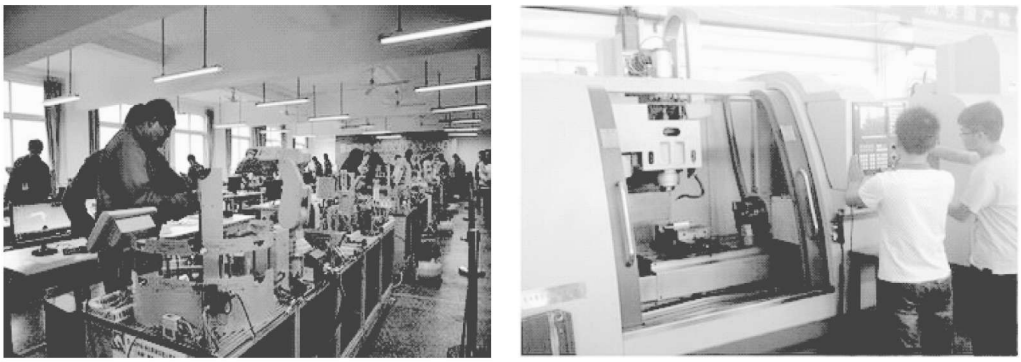


Fig. 1.5 Workers working on machines of mechatronics

Mechatronics is a combination of "macha" from mechanism and "tronics" from electronics. Mechatronics is an integration of mechanical engineering, electronics and intelligent computer control in design and manufacturing of products and processes.

Mechatronics system includes machinery ontology, detecting sensor, electronical control unit, actuator and power.

Machinery ontology includes mechanical rack, mechanical connections and mechanical transmission. It supports other functional units, and transfers motion and power.

Detecting sensor includes sensors and signal detection circuit. It detects the process of mechatronic system and the changes of parameters; it transfers the information to the electronic control unit. Electronic control unit sends the information to the actuator.

The actuator carries out the order of electronic control unit. It is a moving part. Usually electric, pneumatic and hydraulic systems power the actuator.

Power includes electricity, gas energy and hydraulic energy.

What Mechatronics Engineers Do

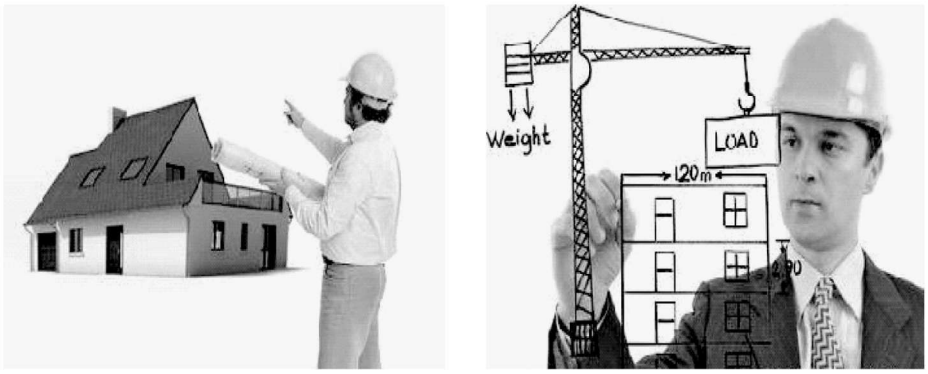


Fig. 1.6 Mechatronics engineers

Mechatronics engineers design products, from cars to televisions to robotic assembly lines, even medical equipment.

When planning a new project, a mechatronics engineer should talk with marketing managers and workers. Then he can make computer models with software. After that, he leads a team of technicians to make the machine. Engineers need to test the machine and make some adjustments.

If a student wants to be a good mechatronics engineer, he must learn mechanical, electrical, and computer knowledge.

VOCABULARY

engineering	[ˌendʒɪˈnɪərɪŋ]	*n.* 工程(学)
science	[ˈsaɪəns]	*n.* 科学;理科
discover	[dɪˈskʌvə]	*vt.* 发现; 碰见
natural	[ˈnætʃrəl]	*adj.* 自然的; 物质的
create	[kriˈeɪt]	*vt.* 创造,创作
artificial	[ˌɑːtɪˈfɪʃl]	*adj.* 人造的; 人工的
nature	[ˈneɪtʃə]	*n.* 自然
exist	[ɪgˈzɪst]	*vi.* 存在; 生存
field	[fiːld]	*n.* (学习或研究的)领域
broad	[brɔːd]	*adj.* 宽阔的; 广泛的
branch	[brɑːntʃ]	*n.* 分支; 部门; 支流
Physics	[ˈfɪzɪks]	*n.* 物理学; 物理现象
physical	[ˈfɪzɪkl]	*adj.* 自然(界)的; 身体的; 物质的
chemistry	[ˈkemɪstrɪ]	*n.* 化学
biology	[baɪˈɒlədʒɪ]	*n.* 生物学
process	[ˈprəʊses]	*n.* 过程;*vt.* 加工; 处理
commercial	[kəˈmɜːʃl]	*adj.* 商业的; 贸易的
scale	[skeɪl]	*n.* 规模; 比例(尺)
civil	[ˈsɪvl]	*adj.* 公民的; 文明的; 民用的
construction	[kənˈstrʌkʃn]	*n.* 建筑物; 建造
public	[ˈpʌblɪk]	*adj.* 公众的,公共的; 公开的; 政府的
private	[ˈpraɪvət]	*adj.* 私有的; 秘密的;平民的,无官职的
electrical	[ɪˈlektrɪkl]	*adj.* 用电的,与电有关的,电学的
electronic	[ɪˌlekˈtrɒnɪk]	*adj.* 电子的; 电子操纵的; 用电子设备生产的
mechanical	[mɪˈkænɪkəl]	*adj.* 机械的,机械学的
mechatronics	[ˌmekəˈtrɔnɪks]	*n.* 机电一体化
combination	[ˌkɒmbɪˈneɪʃn]	*n.* 结合; 联合体
integration	[ˌɪntɪˈgreɪʃn]	*n.* 结合; 整合; 一体化; (不同肤色、种族、

		宗教信仰等的人的)混合
intelligent	[ɪn'telɪdʒənt]	*adj.* 聪明的; 有智力的; [计]智能的
product	['prɒdʌkt]	*n.* 产品
include	[ɪn'kluːd]	*vt.* 包括; 包含
machinery	[mə'ʃiːnərɪ]	*n.* (总称)机器
ontology	[ɒn'tɒlədʒɪ]	*n.* 本体论,实体论
detect	[dɪ'tekt]	*vt.* 查明,发现
sensor	['sensə]	*n.* 传感器,灵敏元件
actuator	['æktʃʊeɪtə]	*n.* [电脑]执行机构; [机]促动器
power	['paʊə]	*n.* [机]动力,功率; 力量;权力
rack	[ræk]	机架
connection	[kə'nekʃn]	连接
transmission	[trænz'mɪʃn]	传动
support	[sə'pɔːt]	*vt.* 支持; 帮助; 支撑; 维持
functional	['fʌŋkʃənl]	*adj.* 功能的; [数]函数的
transfer	[træns'fə]	*vt.* 使转移; 使调动; 转让(权利等)
motion	['məʊʃn]	*n.* 运动; 手势
signal	['sɪgnəl]	*n.* 信号,暗号; 预兆; 导火线
parameter	[pə'ræmɪtə]	*n.* [数]参数;[物][数]参量
information	[ˌɪnfə'meɪʃn]	*n.* 信息,数据
pneumatic	[njuː'mætɪk]	*adj.* 充气的; 气动的
hydraulic	[haɪ'drɔːlɪk]	*adj.* 水力的;水压的
assembly line	[ə'semblɪ laɪn]	*n.* (工厂产品的)装配线; 流水线

NOTES

❶ Chemical engineering — We use physics, chemistry, and biology to carry out chemical processes on a commercial scale.

化学工程——我们使用物理、化学和生物知识,在商业范围内进行化学过程。

❷ Civil engineering — The design and construction of public and private works.

土木工程——设计和建造公共和私人的设施。例如飞机场、铁路、水的供应和处理、桥梁、水坝和建筑物等。

❸ Electrical engineering — The design, study, and manufacture of all kinds of electrical and electronic systems.

电气工程——设计、研究和建造所有种类的电气的和电子的系统。

❹ Mechanical engineering — The design and manufacture of physical or mechanical systems, such as aircraft products, weapon systems, transportation products, engines, compressors, vacuum technology, manufacturing, and mechatronics.

机械工程——设计和制造物理或者机械的系统。例如飞机产品、武器系统、交通产品、引擎、压缩机、真空技术、制造和机电一体化。

❺ Mechatronics system consists of machinery ontology, detecting sensor, electronical control unit, actuator and power source.

机电一体化系统包括:机械本体、检测传感器、电子控制单元、执行机构和动力源。

❻ Machinery ontology includes mechanical rack, mechanical connections and mechanical transmission.

机械本体包括:机架、机械连接和机械传动等。

EXERCISES

1. Questions

① What is engineering?
② How many parts does engineering include? What are they?
③ List the examples of the branches of engineering.
④ List the examples of mechatronics.

2. Translate the following words or phrases into Chinese

① chemical engineering
② civil engineering
③ electrical engineering
④ mechanical engineering
⑤ mechatronics
⑥ machinery
⑦ intelligent computer
⑧ motion

3. Multiple choice

① Science is about _____ the natural world. Engineering is about _____ the artificial world.

A. discovering; creating　　B. discovering; finding
C. discovering; seeing　　D. finding; seeing

② _____ — We use physics, chemistry, and biology to finish chemical processes on a commercial scale.

A. Chemical engineering　　B. Civil engineering
C. Electrical engineering　　D. Mechanical engineering

③ _____—The design and construction of public and private works.

A. Chemical engineering B. Civil engineering

C. Electrical engineering D. Mechanical engineering

④ _____—The design, study, and manufacture of all kinds of electrical and electronic systems.

A. Chemical engineering B. Civil engineering

C. Electrical engineering D. Mechanical engineering

⑤ _____—The design and manufacture of physical or mechanical systems.

A. Chemical engineering B. Civil engineering

C. Electrical engineering D. Mechanical engineering

⑥ _____ is an integration of mechanical engineering, electronics and intelligent computer control in design and manufacturing of products and processes.

A. Chemical engineering B. Civil engineering

C. Electrical engineering D. Mechatronics

⑦ _____ includes machinery ontology, detecting sensor, electronical control unit, actuator and power.

A. Chemical engineering B. Civil engineering

C. Electrical engineering D. Mechatronics system

⑧ _____ includes mechanical rack, mechanical connections and mechanical transmission. It supports other functional units, and transfers motion and power.

A. Machinery ontology B. Detecting sensor

C. Electronical control unit D. Actuator

⑨ _____ includes sensors and signal detection circuit.

A. Ontology B. Detecting sensor

C. Electronical control unit D. Actuator

⑩ _____ carries out the order of electronic control unit. It is a moving part.

A. Ontology B. Detecting sensor

C. Electronical control unit D. Actuator

Unit 2

Electrical components(电气基本部件)

2.1 Resistor, capacitor, and inductor

(电阻、电容和电感)

DIALOGUE

Topic: Talk about the resistors in daily life.

S1: Sir, can you tell me what a resistor is?

S2: A resistor is an electrical component that resists the flow of electrical current.

S1: And then, what are the functions of resistors?

S2: Firstly, resistors are used to limit current flowing to a device. Secondly, resistors can serve as voltage dividers. Thirdly, resistors can serve as circuit loads.

S1: Can you tell me the types of resistors?

S2: Certainly. Resistors consist of carbon composition, wire-wound, and metal film.

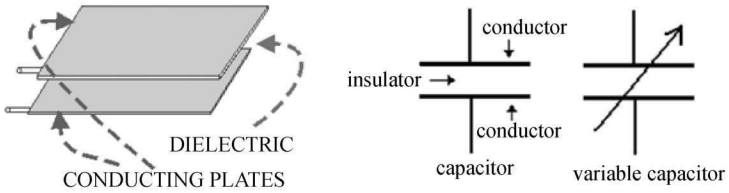
TEXT

A resistor is an electrical component that resists the flow of electrical current. The amount of current (I) flowing in a circuit is directly proportional to the voltage across it and inversely proportional to the resistance of the circuit. This is Ohm Law and can be expressed as a formula: $I = U/R$.

Resistors are used to limit current flow to a device, thereby preventing it from burning out. Resistors function as voltage dividers, transistor biasing circuits, and circuit loads. Generally, resistors consist of carbon composition, wire-wound, and metal film.

Fig. 2.1 Resistors

A capacitor is an electrical device that can temporarily store electrical energy. Basically, a capacitor consists of two conductors (metal plates) separated by a dielectric insulating material, which increases the ability to store a charge.



(a) structure (b) symbols

Fig. 2.2 Capacitor structure symbols

The dielectric can be paper, plastic film, mica, ceramic, air or a vacuum. The plates can be aluminum discs, aluminum foil or a thin film of metal applied to opposite sides of a solid dielectric.

A capacitor will block DC current, but appears to pass AC current by charging and discharging. It develops an AC resistance, known as capacitive reactance, which is affected by the capacitance and AC frequency. The formula for capacitive reactance is $XC = 1/(2pfC)$, with units of ohms.

Capacitors are available in various shapes and sizes. Usually, the value of capacitance and the working DC voltage are marked on them, but some types use a color code similar to resistors.

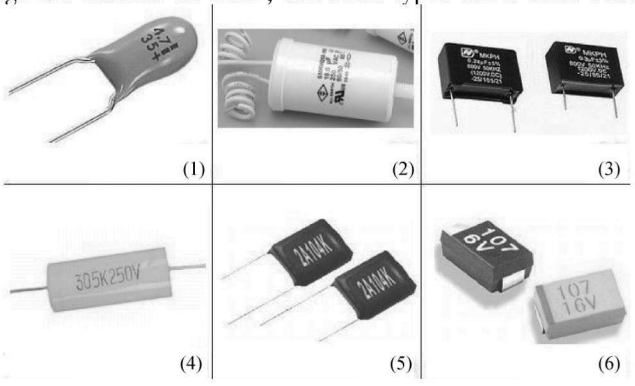


Fig. 2.3 Capacitors

Capacitors are as follows:(a) tubular (paper) (b) color coded (c) mica (d) disk (e) electrolytic (f) turning (air) (g) trimmer (air)

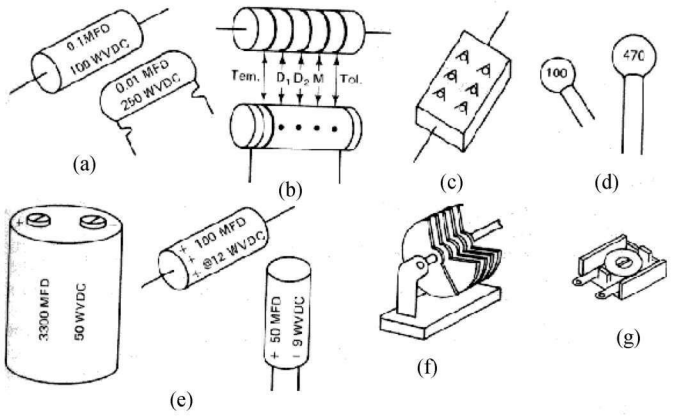


Fig. 2.4 Variable shapes of capacitors

An inductor is an electrical device, which can temporarily store electromagnetic energy in the field about it as long as current is flowing through it. The inductor is a coil of wire that may have an air core or an iron core to increase its inductance.

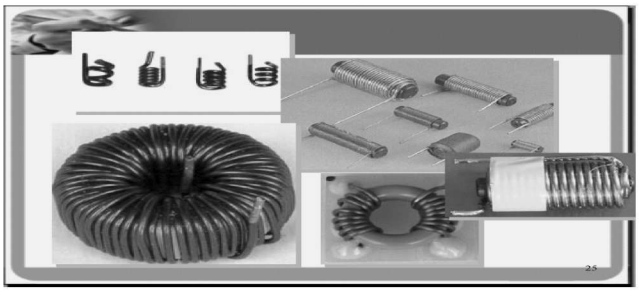


Fig. 2.5 Inductors

An inductor tends to oppose a change in electrical current. It has no resistance to DC current but has an AC resistance to AC current, known as inductive reactance.

Inductors are available in a variety of shapes: air core, iron core (which may look like a transformer, but has only two leads), toroidal (doughnut shaped), small tubular with epoxy, RF choke with separate coils on a cylinder, and tunable RF coil with a screwdriver adjustment.

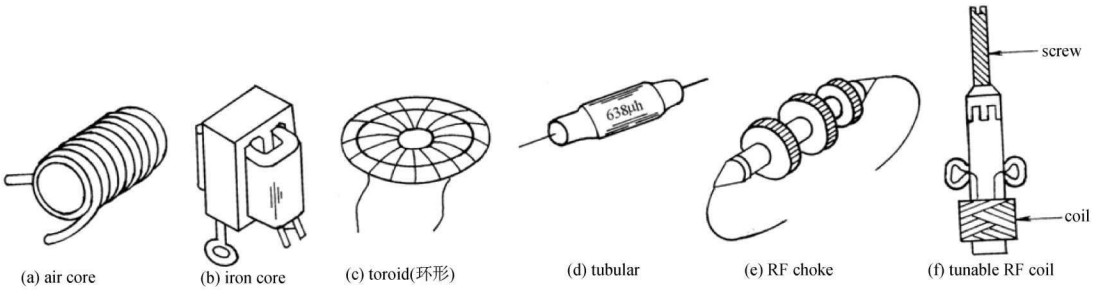


Fig. 2.6 Variable shapes of inductors

VOCABULARY

resistor	[rɪ'zɪstə]	*n.* 电阻器
capacitor	[kə'pæsɪtə]	*n.* 电容器
inductor	[ɪn'dʌktə]	*n.* 电感器
component	[kəm'pəʊnənt]	*n.* 成分;组件;元件
directly	[dɪ'rektlɪ]	*adv.* 直接地
proportional	[prə'pɔːʃ(ə)n(ə)l]	*adj.* 比例的,成比例的
inversely	['ɪnvɜːslɪ]	*adv.* 相反地;倒转地
voltage dividers		[电] 分压器
transistor	[træn'zɪstə]	*n.* 晶体管
carbon	['kɑːb(ə)n]	*n.* [化学] 碳
conductors	[kən'dʌktə]	*n.* 导体
dielectric	[ˌdaɪɪ'lektrɪk]	*adj.* 非传导性的;诱电性的
		n. 电介质;绝缘体
ceramic	[sɪ'ræmɪk]	*adj.* 陶瓷的
aluminum	[ə'luːmɪnəm]	*n.* 铝
formula	['fɔːmjʊlə]	*n.* 公式

NOTES

❶ The dielectric can be paper, plastic film, mica, ceramic, air or a vacuum.

绝缘材料可以是纸、塑料片、云母、陶瓷材料、空气或真空。

❷ The plates can be aluminum discs, aluminum foil or a thin film of metal applied to opposite sides of a solid dielectric.

极板可能是铝薄板、铝箔,或在一片绝缘板的两面各贴上一层金属薄膜。

EXERCISES

1. Questions

① What is a resistor?

② What is a capacitor?

③ What is an inductor?

2. Translate the following words or phrases into Chinese

① resistor