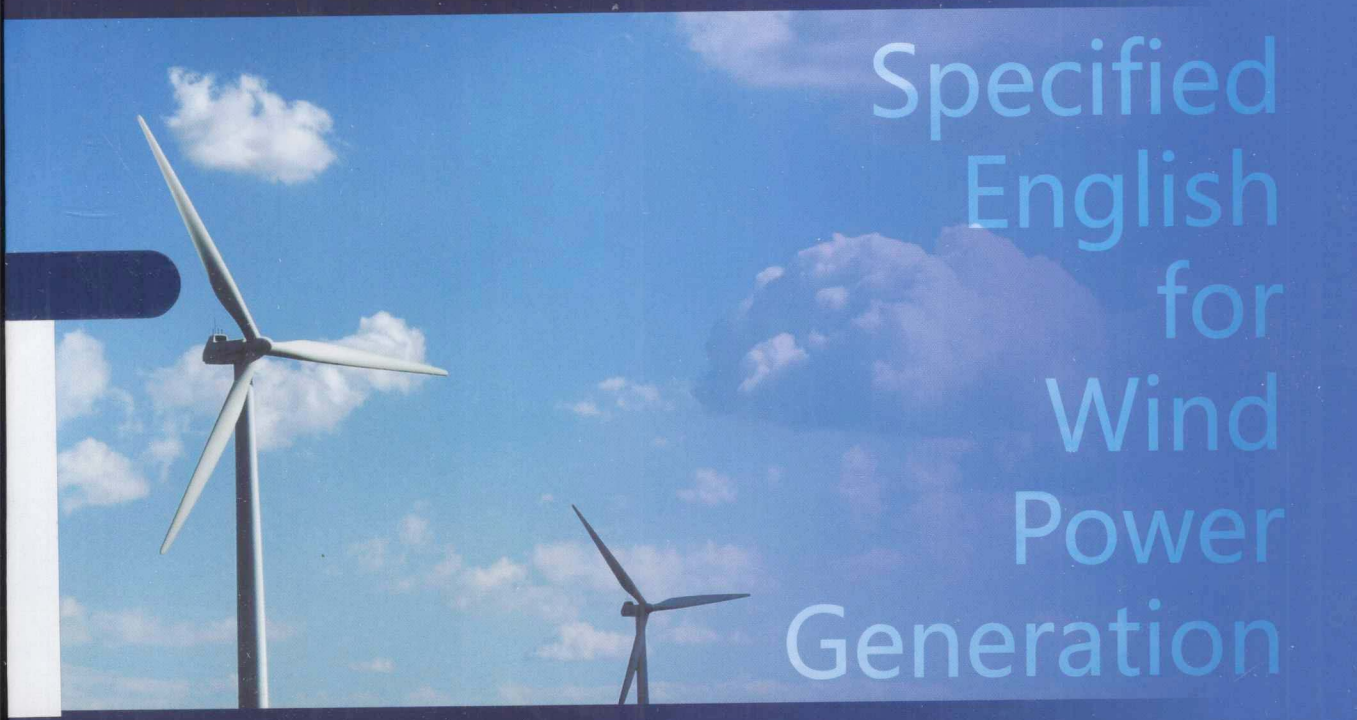
新能源系列

风能与动力技术专业规划教材

风电专业英语教程

周瑾 编



Specified English for Wind Power Generation

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本书包含10个单元，每个单元中包括课文、单词表、难句讲解、科技英语知识以及习题。内容包含基础电路、电力设备和风力发电相关知识，翻译技巧以及风电常用英语术语。课文取材务求切合风电行业实际要求和基础专业知识。课后习题既有针对课文的练习，也有开放性练习或者任务，如简历写作、说明书翻译等。

本书可作为高等院校风电专业的英语教材，风电培训班教材，也可供从业者自学。

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前 言

在国内，风电专业英语教材尚属空白，为新开设的风电相关专业编写教材是很必要的。

目前，国家大力发展新能源，从事风电的人员也越来越多，其中不少人具有丰富的风电专业技术知识，却缺乏英语交流和翻译的能力。新的高校毕业生虽有一定英语基础，但对于科技英语特点不一定十分了解，专业英语阅读、翻译、写作能力都有待加强，所以一本合适的风电专业英语教材是亟需的。

由于风电行业是一新兴行业，实际应用中涉及的英文说明书、英文宣传资料、与时俱进的新技术发展报道等比比皆是，要获取最新信息，掌握、了解引进的技术和设备，或在涉外企业工作，都有赖于专业英语水平的提高。

风电专业英语是一门培养职业技能的课程。通过本课程的学习，学生应切实提高英语阅读和理解能力，为从事与风电相关职业岗位打好基础和培养拓展能力，在巩固高职英语学习的同时，掌握风电设备的基本原理，具备风电设备制造、风电场监测及维护等岗位所需的实际英语运用能力。以往的专业英语教材选材多以原版英文原理性教材内容为主，存在与职业岗位技能脱节、内容结构不合理、信息更新滞后的缺点。本教材的编写目的是以实用性为主，衔接已有的高等院校英语教育，也可供从业者自学。

本教材的内容包含 10 个单元，每个单元中包括课文、单词表、难句讲解、科技英语知识以及习题。

本书编写过程中得到了胡志华和冯丽萍老师的大力支持，并和宋海辉老师分享了宝贵资料，在此一并表示感谢！

限于编者水平，书中不妥之处在所难免，欢迎广大读者批评指正。

编者

2013 年 5 月

目 录

UNIT 1

Alternating Current

There are two types of currents: direct current (DC) and alternating current (AC). In direct current electricity, electrons flow continuously in one direction from the source of power through a conductor to a load and back to the source of power. In alternating current, the direction of current, or the polarity of voltage, reverses many times a second. Electrons will flow through a conductor from the negative terminal to the positive terminal, first in one direction then another. In most AC utility circuits in the United States, it happens 60 times per second.

In a periodic AC wave, the current or voltage, as a function of time, cycles back and forth. [1] The length of time between a specific point in a cycle and the same point in the next cycle is called the period of the wave (Fig.1-1). There are two axes. The vertical axis represents the direction and amplitude of current or voltage. The horizontal axis represents time. When the waveform is above the time axis, current is flowing in one direction. This is referred to as the positive direction. When the waveform is below the time axis, current is flowing in the opposite direction.

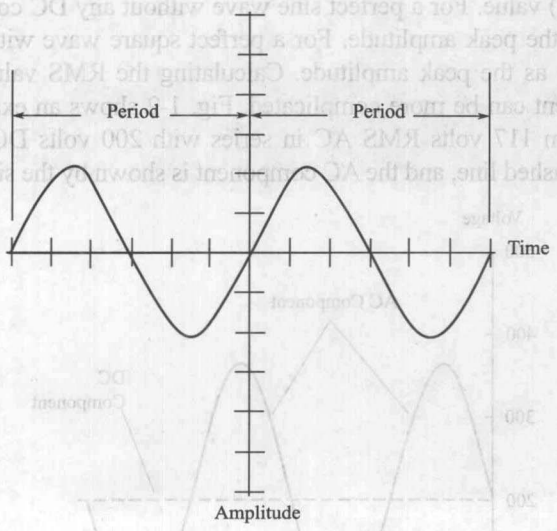

Fig. 1-1 A sine wave

The period of an AC wave, usually defined in seconds, is denoted by the uppercase italicized letter *T*. The frequency, denoted by the lowercase italicized letter *f*, of a wave is the number of cycles per second. Mathematically, we can state the relationship between *T* and *f* as either of the following two equations:

$$f = 1/T$$
$$T = 1/f$$

The standard unit of frequency is the hertz (Hz), which represents one complete AC cycle per second. [2] Higher frequencies are given in kilohertz (kHz), megahertz (MHz) or gigahertz (GHz). The relationships are:

$$1\text{kHz} = 1000\ \text{Hz}$$
$$1\text{MHz} = 1000\ \text{kHz} = 10^6\text{Hz}$$
$$1\text{GHz} = 1000\text{MHz} = 10^9\text{Hz}$$

Sometimes, the frequency of an AC wave is expressed in degrees per second rather than in hertz, kilohertz, or megahertz. [3] Because there are 360° in one cycle, the angular frequency of a wave, in degrees per second, is 360 times the frequency in hertz. [4] Angular frequency can also be expressed in radians per second. There are 2π radians in a complete cycle of 360°, so the angular frequency of a wave, in radians per second, is equal to 2π times the frequency in hertz.

The classical AC wave has a sine-wave, or sinusoidal, shape. The waveform in Fig. 1-1 is a sine wave. Other common AC waves include square waves, triangular waves, sawtooth waves, etc. Any AC wave that consists of a single frequency has a perfect sine-wave shape. In practice, a wave can be so close to a sine wave that it looks exactly like the sine function on an oscilloscope, when in fact it is not. [5] (An oscilloscope shows time on the horizontal axis and amplitude on the vertical axis, and it displays amplitude as a function of time.) Utility AC in the United States has an almost perfect sine-wave shape, but it isn't perfect.

The amplitude of an AC wave can be expressed in amperes (for current) or volts (for voltage). The peak amplitude is the maximum value of a sine wave. The peak value of a sine wave occurs twice each cycle, once at the positive maximum value and once at the negative maximum value. In some AC waves, the positive and negative peak amplitudes are the same, but sometimes they differ.

Alternating current and voltage are constantly changing values. Sometimes it is necessary to express the effective amplitude of an AC wave. This is the current or voltage that a DC source would be required to produce for the same general effect. [6] The most common specification is the root-mean-square (RMS) value. For a perfect sine wave without any DC component, the RMS value is equal to 0.707 times the peak amplitude. For a perfect square wave with no DC component, the RMS value is the same as the peak amplitude. Calculating the RMS value for irregular waves or composite AC/DC current can be more complicated. Fig. 1-2 shows an example composite AC/DC sine wave resulting from 117 volts RMS AC in series with 200 volts DC. The DC component is shown by the straight, dashed line, and the AC component is shown by the sine wave.

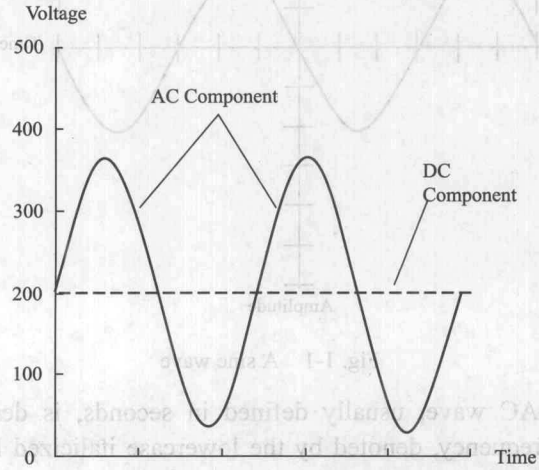

Fig. 1-2 A composite AC/DC sine wave

New Words and Phrases

current	['kʌrənt]	*n.* （气，水，电）流 *adj.* 当前的；流行的
alternating current (AC)		交流电
direct current (DC)		直流电
electron	[i'lektrɔn]	*n.* 电子
continuously	[kən'tinjuəsli]	*adv.* 连续不断地
source	[sɔ:s]	*n.* 源，电源
power	['pauə]	*n.* 电源，功率，电力
conductor	[kən'dʌktə]	*n.* 导体
load	[ləud]	*n.* 负载，负荷；工作量；装载量 *vi.* 加载；装载；装货 *vt.* 使担负；装填
polarity	[pəu'lærəti]	*n.* 极性
reverse	[ri'və:s]	*vt.* 倒转
negative	['negətiv]	*adj.* 负的
terminal	['tə:min(ə)l]	*n.* 终端
positive	['pɔzitiv]	*adj.* 正的
utility	[ju:'tiliti]	*n.* 公用事业
sine wave		正弦波
periodic	[ˌpiəri'ɔdik]	*adj.* 周期的；定期的
function	['fʌŋkʃən]	*n.* 功能；函数
back and forth		来回地，反复地
axis	['æksis]	*n.* 轴【复数 *axes*】
vertical	['vɜ:tik(ə)l]	*adj.* 垂直的
amplitude	['æmplitju:d]	*n.* （交流电的）幅度；振幅
horizontal	['hɔri'zɔntəl]	*adj.* 水平的
waveform	['weivfɔ:m]	*n.* 波形
refer to as		把…称作…
denote	[di'nəut]	*vt.* 表示
uppercase	['ʌpə'keis]	*adj.* 大写字母的
italicize	[i'tælisaiz]	*vt.* 把…排成斜体
frequency	['fri:kw(ə)nsi]	*n.* 频率
lowercase	[ˌləuə'keis]	*adj.* 小写字母的
state	[steit]	*vt.* 陈述；规定；声明 *n.* 国家；州；状态
hertz (Hz)	[hə:ts]	*n.* 赫兹
kilohertz (kHz)	['kiləhə:ts]	*n.* 千赫
megahertz (MHz)	['megə,hə:ts]	*n.* 兆赫
gigahertz (GHz)	['dʒigə,hə:ts]	*n.* 千兆赫
angular	['æŋgjulə]	*adj.* 角的

radian	['reidiən]	*n.* 弧度
sinusoidal	[ˌsainə'sɔidəl]	*adj.* 正弦曲线的
square wave		方波
triangular wave		三角波
sawtooth wave		锯齿波
consist of		由……组成
exactly	[ig'zæktli]	*adv.* 恰好地；正是；精确地；正确地
oscilloscope	[ɔ'siləuskəup]	*n.* 示波器
ampere	['æmpɛə]	*n.* 安培
volt	[vəult]	*n.* 伏特
voltage	['vəulteidʒ]	*n.* 电压
peak	[pi:k]	*adj.* 最高的；最大值的
		n. 峰值
occur	[ə'kə:]	*vi.* 发生；出现；存在
maximum	['mæksiməm]	*n.* 最大值
		adj. 最大的；最高的
differ	['difə]	*vi.* 相异
component	[kəm'pəunənt]	*n.* 成分；组件；元件
composite	['kɔmpəzit]	*adj.* 复合的；合成的
effective	[i'fektiv]	*adj.* 有效的
specification	[ˌspesifi'keiʃən]	*n.* 技术规格
root-mean-square (RMS)		均方根
be equal to		等于
calculate	['kælkjuleit]	*vi.* 计算；以为；作打算
		vt. 计算；预测；认为；打算
irregular	[i'regjulə]	*adj.* 不规则的
in series		串联
dashed line		短划线

Notes

[1] In a periodic AC wave, the current or voltage, as a function of time, cycles back and forth.

在周期性的交流电波形中，电流或电压，作为时间的函数，循环往复。

◆ 本句中应注意根据上下文确定词性和词义。as a function of time 状语，译为“作为时间的函数”。cycle 动词“循环”。

[2] The standard unit of frequency is the hertz (Hz), which represents one complete AC cycle per second.

频率的标准单位是赫兹（Hz）。1 赫兹表示每秒一个完整的交流电周期。

◆ which represents one complete AC cycle per second 非限定性定语从句，修饰 the hertz (Hz)。考虑到汉语习惯，翻译时，补充“1 赫兹”。

[3] Sometimes, the frequency of an AC wave is expressed in degrees per second rather than

in hertz, kilohertz, or megahertz.

有时，交流电波形的频率用“度/秒”表示，而不是赫兹、千赫或兆赫。

◆ …rather than… 常见句型，译为“……而不是……”。

[4] Because there are 360° in one cycle, the angular frequency of a wave, in degrees per second, is 360 times the frequency in hertz.

因为一个周期相当于360°，所以波形的角频率（度/秒）等于360乘以频率（赫兹）。

◆ 本句的主语是 the angular frequency of a wave，in degrees per second 是定语。360 times the frequency in hertz 中的 times 是名词复数“倍数，乘”，参见“科技英语专题——常用数学词汇和表达式的英语表达”一节。

[5] In practice, a wave can be so close to a sine wave that it looks exactly like the sine function on an oscilloscope, when in fact it is not.

实际上，波形如果和正弦波很接近，在示波器中就会看起来和正弦函数完全一样，即使它并不是正弦波。

◆ so … that … 常用句型，意思是“如此……以致……”。翻译时根据原句内容重新选择了连词。

[6] Sometimes it is necessary to express the effective amplitude of an AC wave. This is the current or voltage that a DC source would be required to produce for the same general effect.

有时有必要表示交流电波形的有效值，也就是能得到相同功率的直流电源的电流或电压。

◆ It is necessary…常见句型，可以译为“必须，有必要……，……是必要的”。第二句中的 This 代指前一句的 the effective amplitude of an AC wave，that a DC source would be required to produce for the same general effect 是定语从句，修饰 the voltage or current。for the same general effect 做目的状语。

科技英语专题——科技英语的语言特色

风电专业英语属于科技英语的范畴，以表达科技概念、理论和事实为主，注重客观事实和逻辑性，只不过风电专业英语和风电专业内容结合更紧密。而科技英语与大学英语教授的内容之间也存在一些差别，例如：科技英语中基本不含口语、俚语单词，全部是结构完整的句子。了解科技英语的语言特色有助于人们学习和使用科技英语。

一、大量使用名词化结构

《当代英语语法》（A Grammar of Contemporary）在论述科技英语时提出，大量使用名词化结构（Nominalization）是科技英语的特点之一。因为科技文体要求行文简洁、表达客观、内容确切、信息量大，强调存在的事实而非某一行为。

1. The rotation of the earth on its own axis causes the change from day to night.

地球绕轴自转，引起昼夜的变化。

◆ 本句中采用名词化结构 the rotation of the earth on its own axis 使复合句简化成简单句，而且使表达的概念更加确切严密。

2. Television is the transmission and reception of images of moving objects by radio waves.

电视通过无线电波发射和接收活动物体的图像。

◆ 本句中的名词化结构 the transmission and reception of images of moving objects by radio waves 强调客观事实，而谓语动词则着重其发射和接收的能力。

二、广泛使用被动语句

根据统计，科技英语中的谓语至少三分之一是被动态。这是因为科技文章侧重叙事推理，强调客观准确。第一、第二人称使用过多，会造成主观臆断的印象。因此尽量使用第三人称叙述，采用被动语态。此外，科技英语多将主要信息前置，放在主语部分，这也是广泛使用被动态的主要原因。

3. Attention must be paid to the working temperature of the machine.

应当注意机器的工作温度。

◆ 而很少说：You must pay attention to the working temperature of the machine .你们必须注意机器的工作温度。

4. Electrical energy can be stored in two metal plates separated by an insulating medium. Such a device is called a capacitor, or a condenser, and its ability to store electrical energy capacitance. It is measured in farads.

电能可储存在由一绝缘介质隔开的两块金属极板内。这样的装置称之为电容器，其储存电能的能力称为电容。电容的测量单位是法拉。

◆ 这一段短文中各句的主语分别为：Electrical energy，such a device，its ability to store electrical energy，It (A capacitor)。它们都包含了较多的信息，并且处于句首的位置，非常醒目。四个主语完全不同，避免了单调重复，前后连贯，自然流畅。足见被动结构可收简洁客观之效。

三、非限定动词

科技文章要求行文简练，结构紧凑，为此，往往使用分词短语代替定语从句或状语从句；使用不定式短语代替各种从句；介词+动名词短语代替定语从句或状语从句。这样可缩短句子，又比较醒目。例如：

5. A direct current is a current flowing always in the same direction.

直流电是一种总是沿同一方向流动的电流。

6. Radiating from the earth, heat causes air currents to rise.

热量由地球辐射出来时，使得气流上升。

7. Vibrating objects produce sound waves, each vibration producing one sound wave.

物体振动产生声波，每一次振动产生一个声波。

8. In communications, the problem of electronics is how to convey information from one place to another.

在通讯系统中，电子学要解决的问题是如何把信息从一个地方传递到另一个地方。

四、后置定语

大量使用后置定语也是科技文章的特点之一。常见的结构不少于五种：介词短语后置、形容词及形容词短语后置、副词后置、分词后置、定语从句后置。

9. A call for paper is now being issued.

征集论文的通知现正陆续发出。

10. In this factory the only fuel available is coal.

该厂唯一可用的燃料是煤。

11. The force upward equals the force downward so that the balloon stays at the level.

向上的力与向下的力相等，所以气球就保持在这一高度。

12. The heat produced is equal to the electrical energy wasted.

产生的热量等于浪费了的电能。

13. During construction, problems often arise which require design changes.

在施工过程中，常会出现需要改变设计的问题。

14. The molecules exert forces upon each other, which depend upon the distance between them.

分子相互间都存在着力的作用，该力的大小取决于它们之间的距离。

五、常用句型

科技文章中经常使用若干特定的句型，从而形成科技文体区别于其他文体的标志。例如 It...that...结构句型，被动态结构句型，分词短语结构句型，省略句结构句型，祈使句等。举例如下：

15. It has been proved that induced voltage causes a current to flow in opposition to the force producing it.

已经证明，感应电压使电流的方向与产生电流的磁场力方向相反。

16. It was not until the 19th century that heat was considered as a form of energy.

直到十九世纪人们才认识到热是能量的一种形式。

17. Computers may be classified as analog and digital.

计算机可分为模拟计算机和数字计算机两种。

18. Microcomputers are very small in size, as is shown in Fig. 5.

如图 5 所示，微型计算机体积很小。

19. All substances, whether gaseous, liquid or solid, are made of atoms .

一切物质，不论是气态、液态，还是固态，都由原子组成。

六、长句

为了表述一个复杂概念，使之逻辑严密，结构紧凑，科技文章中往往出现许多长句，一句话里包含三四个甚至五六个分句的。有的长句多达七八十个词，例句略。

七、复合词与缩略词

大量使用复合词与缩略词是科技文章的特点之一，复合词从过去的双词组合发展到多词组合。

feedback 反馈（双词合成名词）

on-and-off-the-road 路面越野两用的（多词合成形容词）

radiophotography 无线电传真（无连字符复合词）

semiconductor 半导体 （派生词）

electromechanical 机电的 （派生词）

常用缩略词：

lab (laboratory) 实验室

ft (foot/feet) 英尺

lb (pound) 磅

rpm, r.p.m (revolutions per minute) 转/分

I/O (input/output) 输入/输出

AC (alternate current) 交流电

DC (direct current) 直流电

emf, e.m.f. (electromotive force) 电动势

GND (ground) 接地点

FAQ (Frequently Asked Questions) 常见问题

CPU (central processor unit)　中央处理器
Fig. (figure)　图
Eq.(equation)　公式，等式
E-mail(Electronic mail)　电子邮件
i.e.　即
e.g. (for example)　例如
etc. …等
vs (versus)　…对…，　与…相比

Exercise

【Ex1.1】 True or False.

_____ 1. In alternating current, the electrons flow continuously in one direction.
_____ 2. Electrons will flow through a conductor from the positive terminal to the positive terminal.
_____ 3. The angular frequency of a sine wave, in degrees per second, is 360 times the frequency in hertz, or in radians per second, is equal to 2p times the frequency in hertz.
_____ 4. Utility AC in U.S. has an almost perfect sine-wave shape.
_____ 5. The horizontal axis in an oscilloscope represents the frequency of an AC wave.
_____ 6. The relationship between period T and frequency f is $f = 1/T$.
_____ 7. The peak value of a sine wave occurs once each cycle.
_____ 8. For a perfect square wave with no DC component, the RMS value is the same as the peak amplitude.

【Ex1.2】 Answer the following questions according to the text.

1. What is alternating current?

2. What is the frequency of alternating current in most utility circuits in China?

3. What does an oscilloscope display?

4. Is it true that all AC waves have a sine-wave, or sinusoidal, shape? Why?

5. What does RMS stand for?

【Ex1.3】 Vocabulary exercise.

1. A positive charge is caused by a/an _____ of electrons.
A. lot of　　B. shortage
C. excess　　D. difference

2. Alternating current is used widely in many commercial, industrial, and _____ applications.

A. utility B. continuous
C. social D. conductor

3. The _____ has measure functions of mean, period, frequency, and RMS etc.
A. load B. wire
C. oscilloscope D. voltage

4. The best product is designed to obtain _____ output with _____ cost.
A. maximum … minimum B. minimum … maximum
C. maximize … minimize D. minimize … maximize

5. Technical English _____ from everyday English.
A. different B. difference
C. differ D. differs

【Ex1.4】 Following questions are based on Fig. 1–3.

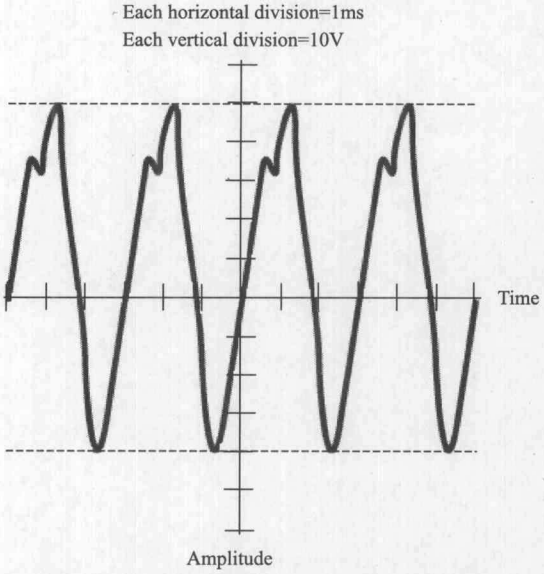

Fig. 1-3 An example voltage wave

On the horizontal scale, each division represents 1 millisencond (1ms), which is 1/1000 of a second (0.001s). On the vertical scale, each division represents 10V.

1. What is the approximate frequency of this wave?

2. What is the approximate period of the wave shown in Fig. 1-3?

3. What is the approximate positive peak voltage of the wave shown in Fig. 1-3?

4. What is the approximate negative peak voltage of the wave shown in Fig. 1-3?

5. What is the approximate RMS voltage of the wave shown in Fig. 1-3?

Task: My Favorite Course

Prepare a 3~5 minutes' speech script about "My Favorite Course" and a 3~5 pages powerpoint document. The speech should contain:

- Topic
- Introduction (The main points)
- Sub points (Reasons, examples, etc.)
- Conclusion