高等学校试用教材

建筑类专业英语

建筑工程 （第二册）

English in Architecture and Construction

乔梦铎 王久愉 主编

中国建筑工业出版社

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（京）新登字 035 号

本书即《建筑类专业英语　工业与民用建筑》第二册，系根据国家教委印发的《大学英语专业阅读阶段教学基本要求》编写的专业阅读课教材，按照建筑类院校共同设置的五个较大专业对口编写。本册包括设计规范与规程、钢筋混凝土的弯曲性能、梁的弯曲分析及设计、长期挠度、板的屈服理论、粘接和锚固等方面内容。全书安排16个单元，每单元除正课外，还有两篇阅读材料，均配有必要的注释。正课文还配有词汇表和练习，书后附有总词汇表、参考译文和练习答案。语言难度大于第一册，本册还对科技英语翻译技巧作了简要说明，并增加例句和翻译练习题。供本专业学生三年级上半学期使用。

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中国建筑工业出版社出版（北京西郊百万庄）

新华书店总店科技发行所发行

北京市顺义县板桥印刷厂印刷

*

开本：787×1092 毫米　1/16　印张：12½　字数：304 千字

1997 年 6 月第一版　1997 年 6 月第一次印刷

印数：1—6,700 册　定价：10.40 元

ISBN7-112-03030-7

TU・2320（8146）

《建筑类专业英语》编审委员会

前　言

经过几十年的探索，外语教学界许多人认为，工科院校外语教学的主要目的，应该是："使学生能够利用外语这个工具，通过阅读去获取国外的与本专业有关的科技信息。"这既是我们建设有中国特色的社会主义的客观需要，也是在当前条件下工科院校外语教学可能完成的最高目标。事实上，教学大纲规定要使学生具有"较强"的阅读能力，而对其他方面的能力只有"一般"要求，就是这个意思。

大学本科的一、二年级，为外语教学的基础阶段。就英语来说，这个阶段要求掌握的词汇量为2400个（去掉遗忘，平均每个课时10个单词）。加上中学阶段已经学会的1600个单词，基础阶段结束时应掌握的词汇量为4000个。仅仅掌握4000个单词，能否看懂专业英文书刊呢？还不能。据统计，掌握4000个单词，阅读一般的英文科技文献，生词量仍将有6%左右，即平均每百词有六个生词，还不能自由阅读。国外的外语教学专家认为，生词量在3%以下，才能不借助词典，自由阅读。此时可以通过上下文的联系，把不认识的生词猜出来。那么，怎么样才能把6%的生词量降低到3%以下呢？自然，需要让学生增加一部分词汇积累。问题是，要增加多少单词？要增加哪一些单词？统计资料表明，在每一个专业的科技文献中，本专业最常用的科技术语大约只有几百个，而且它们在文献中重复出现的频率很高。因此，在已经掌握4000单词的基础上，在专业阅读阶段中，有针对性地通过大量阅读，扩充大约1000个与本专业密切有关的科技词汇，便可以逐步达到自由阅读本专业科技文献的目的。

早在八十年代中期，建设部系统院校外语教学研究会就组织编写了一套《土木建筑系列英语》，分八个专业，共12册。每个专业可选读其中的三、四册。那套教材在有关院校相应的专业使用多年，学生和任课教师反映良好。但是，根据当时的情况，那套教材定的起点较低（1000词起点），已不适合今天学生的情况。为此，在得到建设部人事教育劳动司的大力支持，并征得五个相关专业指导委员会同意之后，由建设部系统十几所院校一百余名外语教师和专业课教师按照统一的编写规划和要求，编写了这一套《建筑类专业英语》教材。

《建筑类专业英语》是根据国家教委颁发的《大学英语专业阅读阶段教学基本要求》编写的专业阅读教材，按照建筑类院校共同设置的五个较大的专业类别对口编写。五个专业类别为：建筑学与城市规划；建筑工程（即工业与民用建筑）；给水排水与环境保护；暖通、空调与燃气；建筑管理与财务会计。每个专业类别分别编写三册专业英语阅读教材，供该专业类别的学生在修完基础阶段英语后，在第五至第七学期专业阅读阶段使用，每学期一册。

上述五种专业英语教材语言规范，题材广泛，覆盖相关专业各自的主要内容：包括专业基础课，专业主干课及主要专业选修课，语言材料的难易度切合学生的实际水平；词汇

以大学英语“通用词汇表”的4000个单词为起点，每个专业类别的三册书将增加1000～1200个阅读本专业必需掌握的词汇。本教材重视语言技能训练，突出对阅读、翻译和写作能力的培养，以求达到《大学英语专业阅读阶段教学基本要求》所提出的教学目标：“通过指导学生阅读有关专业的英语书刊和文献，使他们进一步提高阅读和翻译科技资料的能力，并能以英语为工具获取专业所需的信息。”

《建筑类专业英语》每册16个单元，每个单元一篇正课文(TEXT)，两篇副课文(Reading Material A&B)，每个单元平均2000个词，三册48个单元，总共约有十万个词，相当于原版书三百多页。要培养较强的阅读能力，读十万词的文献，是起码的要求。如果专业课教师在第六和第七学期，在学生通过学习本教材已经掌握了数百个专业科技词汇的基础上，配合专业课程的学习，再指定学生看一部分相应的专业英语科技文献，那将会既促进专业课的学习，又提高英语阅读能力，实为两得之举。

本教材不仅适用于在校学生，对于有志提高专业英语阅读能力的建筑行业广大在职工程技术人员，也是一套适用的自学教材。

建设部人事教育劳动司高教处和中国建设教育协会对这套教材的编写自始至终给予关注和支持；中国建筑工业出版社第五编辑室密切配合，参与从制定编写方案到审稿各个阶段的重要会议，给了我们很多帮助；在编写过程中，各参编学校相关专业的许多专家、教授对材料的选取、译文的审定都提出了许多宝贵意见，谨此致谢。

《建筑类专业英语》是我们编写对口专业阅读教材的又一次尝试，由于编写者水平及经验有限，教材中不妥之处在所难免，敬请广大读者批评指正。

《建筑类专业英语》

编审委员会

Contents

UNIT ONE

Text The Preface of 《Desdign of Concrete Structure》

[1] This edition represents a major revision and expansion, as well as an update, of the previous work. However, it maintains the same basic approach: first to establish a firm understanding of the behavior of reinforced concrete structures, then to develop the methods used in current design practice and to achieve familiarity with the codes and specifications governing practical design.

[2] It is generally recognized that mere training in special design skills and codified procedures is inadequate for successful professional practice. These skills and procedures are subject to frequent and sweeping changes. To understand and keep abreast of these rapid developments, the engineer needs a thorough grounding in the basic performance of concrete and steel as structural materials, and in the behavior of reinforced concrete members and structures. ① On the other hand, the main business of the structural engineer is to design structures safely, economically, and efficiently. Hence, with this basic understanding as a firm foundation, familiarity with current design procedures, and skill in using them, is of the essence. ② This edition, like the preceding ones, serves both these purposes.

[3] Changes in format have been made, based on the author's experience in the classroom, and in response to constructive suggestions by users. Material on mechanics and behavior of reinforced concrete, formerly treated separately in an early chapter, has been integrated into the later chapters treating specific design topics such as flexure and shear, thus providing better continuity and more convenient reference to the fundamental basis of each development, and avoiding some duplication. The twelve chapters of the earlier work, some excessively long, have been subdivided into shorter chapters for easier study and reference.

[4] Enhancement of both breadth and depth of coverage has been achieved in many areas, and entirely new chapters have been added treating slabs on grade, composite construction, retaining walls, and building systems. The chapter on columns has been largely rewritten to improve its clarity and generality. For each chapter of the text, a greatly expanded reference list provides an entry into the literature for those in need of more background in detail. The number of problems for homework assignment has been greatly increased, and problems are placed at the end of each chapter for convenience of the teacher and student.

[5] All design procedures, examples, and problems are consistent with the 1983 Building Code of the American Concrete Institute (ACI) or, in the case of bridges, with the 1983 Specification of the American Association of State Highway and Transportation Officials (AASHTO). Many new design aids have been included. Thus the book should continue to be a valuable desk aid for the practicing engineer, providing him with a source of up-to-

date design information.

[6] The teacher will find the text suitable for either a one- or two-semester course in the design of concrete structures. If the curriculum permits only a single course (probably taught in the fourth undergraduate year), the introduction and treatment of materials found in Chapters 1 and 2 respectively, the material on flexure, shear, and anchorage of Chapters 3, 4, and 5, Chapter 6 on serviceability, and the introduction to one- and two-way slabs of Chapter 8, plus Chapter 12 on columns will provide a good basis. Time will probably not permit classroom coverage of frame analysis and building systems, Chapters 16 and 17, but these could well be assigned as independent reading, concurrent with the earlier work of the course.[3] In the writer's experience, such complementary outside reading tends to enhance student motivation.

[7] A second course (most likely taught in the first year of graduate study) should include an introduction to the increasingly important topic of torsion, Chapter 7, an in-depth study of slab systems using Chapters 9 through 11, and foundations and retaining walls according to Chapters 14 and 15, as well as composite construction from Chapter 13 and bridge design using Chapter 19. Prestressed concrete is sufficiently important to justify a separate course with its own text. If the curriculum does not permit this, the treatment of Chapter 18 provides an introduction to the most important concepts.

[8] The present volume is the 10th edition of a textbook originated in 1923 by Leonard C. urquhart and Charles E. O'Rourke, both professors of structural engineering at Cornell university at that time. The second, third, and fourth editions firmly established the work as a leading text for both elementary and advanced courses in the subject area. Professor George Winter, also of Cornell, collaborated with Urquhart in preparing the fifth and sixth editions, and Winter and the writer were responsible for the seventh, eighth, and ninth editions. The present volume was prepared subsequent to Professor Winter's passing in 1982.

[9] The wirter gladly acknowledges his indebtedness to the original authors. While it is safe to say that neither Urquhart nor O'Rourke would recognize very much of the detail, the approach to the subject and the educational philosophy that did so much to account for the success of this unique book would be familiar.[4] I acknowledge with particular gratitude the influence of Professor Winter. A long professional and personal relationship with him had a profound effect in developing a point of view that has shaped all work in the chapters that follow.

New Words and Expressions

revision *	[ri'viʒən]	*n.* 校订，修改
update *	[ʌp'deit]	*n.* 最新知识
codify	['kɔdifai]	*v.* 编撰，整理
inadequate *	[in'ædikwit]	*a.* 不充足的，不适当的

sweeping ['swi:piŋ]	*a.*	范围广大的
keep abreast of		保持与…并列
familiarity * [fəˌmili'æriti]	*n.*	精通
format * ['fɔ:mæt]	*n.*	格式，形式
constructive [kən'strʌktiv]	*a.*	建设性的，结构上的
flexure ['flekʃə]	*n.*	弯曲，挠曲
duplication [dju:pli'keiʃən]	*n.*	复制，复制品
subdivide ['sʌbdi'vaid]	*v.*	把……再分，把……细分
be integrated into		被并入……
enhancement * [in'hɑ:nsmənt]	*n.*	提高，增强
coverage * ['kʌvəridʒ]	*n.*	有效范围
retaining walls		挡土墙
clarity * ['klæriti]	*n.*	清晰（度），明确（性）
generality [ˌdʒenə'ræliti]	*n.*	一般（性），普遍（性）
anchorage ['æŋkəridʒ]	*n.*	锚固
complementary * [kɔmpli'mentəri]	*a.*	补充的，互补的
motivation [ˌməuti'veiʃən]	*n.*	动机
concurrent [kən'kʌrənt]	*a.*	同时发生的，并存的
originate * [ə'ridʒineit]	*v.*	开始，创造
collaborate [kə'læbəreit]	*v.*	合作，共同研究
acknowledge * [ək'nɔlidʒ]	*v.*	承认，对……表示感谢
indebtedness [in'detidnis]	*n.*	负债，感激
profound [prə'faund]	*a.*	深远的，深切的

Notes

①...in the basic performance…and in the behavior…作 grounding 的定语。

②with this basic understanding…是独立结构，familiarity 是句子的主语，...is（of essence）是谓语。

③句中 well 意为恰当地。

④while it is safe to say... 作状语，approach…would be…是句子的主要结构，that did so much…是定语修饰 philosophy。

Exercises

Reading Comprehension

Ⅰ. Choose the best answer.

1. What's mainly talked about in the first paragraph?

A. The difference between this edition and the earlier ones.

B. The behavior of reinforced concrete structures.

C. The same basic approach maintained in all these editions.

D. The method used in current design practice.

2. Why do the engineers need a thorough grounding in the basic performance of concrete and steel?

A. In order to keep up with the rapid development of skills and procedures.

B. In order to keep abreast of the frequent and sweeping changes of the structural materials.

C. In order to keep pace with the frequent and sweeping changes of the up-to-date design.

D. In order to keep step with the frequent and sweeping changes of the codes and specifications.

3. Which of the following statements is not true?

A. Material on mechanics and behavior of reinforced concrete, formerly treated separately in the later chapters, has been integrated into an early chapter.

B. All design procedures, examples, and problems are consistent with the 1983 Building Code of the American Concrete Institute.

C. Winter and the writer were responsible for the seventh, eighth and ninth editions.

D. The number of problems for homework assignment has been greatly increased, and problems are placed at the end of each chapter.

4. The reason for rewriting the chapter on columns is _____.

A. the enhancement of both breadth and depth

B. the development of continuity

C. the attachment of advanced skills

D. the improvement of both clarity and generality

5. This edition, like the preceding ones, aims at _____.

A. mastering current procedures and skill in using them

B. designing structures economically and efficiently

C. keeping abreast of the changes and development

D. None of above.

Ⅱ. Fill in the blanks with the information given in the text.

1. What does this edition represent?

It represents _____

_____

_____.

2. What are the changes in format?

Material on _____, formerly _____, has

_____ such _____,
thus _____.

3. The writer gladly acknowledges _____. While it is safe to say that neither Urquhart nor U'Rourke would recognize _____.

Vocabulary

Ⅰ. Choose one word or phrase which is the most similar in meaning to the one underlined in the given sentences.

1. So much is happening in the world of science that it's difficult to <u>keep abreast of</u> all the latest developments.
   A. keep after　　B. keep a close watch on
   C. keep in with　　D. keep pace with
2. The company's new president made <u>sweeping</u> changes in the office.
   A. wide　　B. various
   C. rapid　　D. thorough
3. <u>Subsequent to</u> his phone call, I received a confirmation in the mail.
   A. Following　　B. Prevailing
   C. During　　D. Preceding
4. The new government promised to <u>codify</u> the laws.
   A. change　　B. arrange
   C. revise　　D. digest
5. All <u>acknowledged</u> him to have been very good-humoured and of a kind disposition.
   A. recognize　　B. accept
   C. admit　　D. confess

Ⅱ. Match the words in Column A with their corresponding definitions or explanations in Column B.

A	B
1. anchorage	a. a thick flat usu. 4-sided piece of metal, stone, wood, food, ect.
2. code	b. a course of study offered in a school , college, etc.
3. slab	c. something to which something else is fixed in order to make it firm
4. torsion	d. the size, shape, etc. , in which something, esp. a book is produced
5. format	e. a system of secret words, letters, numbers, etc. used instead of ordinary writing to keep messages secret
	f. the force that moves a rod, wire, etc. back into the correct shape after it has been twisted out of shape
	g. the amount of protection given by insurance

h. any of the parts of a detailed plan or set of descriptions or directions

Translation

词义选择

英汉两种语言都有一词多类（一个词有几个词性），一词多义（一个词有几个不同的意义）的现象，因而翻译时必须在理解原文的基础上，选择和确定句中关键词的词义。如"last"。

例一

He is the last person for such a job.

他最不配干这个工作。

例二

He should be the last (man) to blame.

怎么也不该怪他。

例三

He is the last man to do it.

他决不会干那件事。

Translate the following sentences into Chinese, and pay attention to the words underlined.

1. If the stove isn't made up, it will go out.
2. In this battle he accounted for five of the enemy.
3. Half the roads in the region are still to be made up.
4. She tried her best to right her husband from the charge of robbery.
5. It took Laurence Olivier more than an hour to make up for the part of "Othello".

Reading Material A

Concrete, Reinforced Concrete, and Prestressed Concrete (1)

Concrete is a stonelike material obtained by permitting a carefully proportioned mixture of cement, sand and gravel or other aggregate, and water to harden in forms of the shape and dimensions of the desired structure. The bulk of the material consists of fine and course aggregate. Cement and water interact chemically to bind the aggregate particles into a solid mass. Additional water, over and above that needed for this chemical reaction, is necessary to give the mixture the workability that enables it to fill the forms and surround the embedded reinforcing steel prior to hardening. Concretes in a wide range of strength

properties can be obtained by appropriate adjustment of the proportions of the constituent materials. Special cements (such as high early strength cements), special aggregates (such as various lightweight or heavyweight aggregates), admixtures (such as plasticizers and air-entraining agents), and special curing methods (such as steam-curing) permit an even wider variety of properties to be obtained.[1]

These properties depend to a very substantial degree on the proportions of the mix, on the thoroughness with which the various constituents are intermixed, and on the conditions of humidity and temperature in which the mix is maintained from the moment it is placed in the forms until it is fully hardened. The process of controlling these conditions is known as curing. To protect against the unintentional production of substandard concrete, a high degree of skillful control and supervision is necessary throughout the process, from the proportioning by weight of the individual components, through mixing and placing, until the completion of curing.

The factors that make concrete a universal building material are so pronounced that it has been used, in more primitive kinds and ways than at present, for thousands of years, probably beginning in Egyptian antiquity. The facility with which, while plastic, it can be deposited and made to fill forms or molds of almost any practical shape is one of these factors.[2] Its high fire and weather resistance are evident advantages. Most of the constituent materials, with the possible exception of cement, are usually availableat low cost locally or at small distances from the construction site. Its compressive strength, like that of natural stones, is high, which makes it suitable for members primarily subject to compression, such as columns and arches.[3] On the other hand, again as in natural stones, it is a relatively brittle material whose tensile strengh is small compared with its compressive strength. This prevents its economical use in structural members that are subject to tension either entirely (such as in tie rods) or over part of their cross sections (such as in beams or other flexural members).

Notes

①特殊水泥（如高标号早强水泥），特殊骨料（如各种轻骨料，重骨料），外加剂（如塑化剂）和加气剂和特殊的养护方法（如蒸汽养护）（使混凝土）具有更多的性能。

②由于混凝土是可塑的，它具有可被浇注和填入各种实用形状的模具中的便利性，这是使它成为被普遍使用的材料的因素之一。

③就像天然石头一样，它抗压力高，这使它适用于主要受压的构件，如柱和拱。

Reading Material B

Concrete, Reinforced Concrete, and Prestressed Concrete (2)

To offset this limitation, it was found possible, in the second half of the nineteenth century, to use steel with its high tensile strength to reinforce concrete,① chiefly in those places where its small tensile strength would limit the carrying capacity of the member. The reinforcement, usually round steel rods with appropriate surface deformations to provide interlocking, is placed in the forms in advance of the concrete. When completely surrounded by the hardened concrete mass, it forms an integral part of the member. The resulting combination of two materials, known as reinforced concrete, combines many of the advantages of each: the relatively low cost, good weather and fire resistance, good compressive strength, and excellent formability of concrete and the high tensile strength and much greater ductility and toughness of steel. It is this combination that allows the almost unlimited range of uses and possibilities of reinforced concrete in the construction of buildings, bridges, dams, tanks, reservoirs, and a host of other structures.

In more recent times, it has been found possible to produce steels, at relatively low cost, whose yield strength is of the order of 4 times and more that of ordinary reinforcing steels.②Likewise, it is possible to produce concrete 3 to 4 times as strong in compression as the more ordinary concretes. These high strength materials offer many advantages, including smaller member cross sections, reduced dead load, and longer spans. However, there are limits to the strengths of the constituent materials beyond which certain problems arise. To be sure, the strength of such a member would increase roughly in proportion to those of the materials.③ However, the high strains that result from the high stresses that would otherwise be permissible would lead to large deformations and deflections of such members under ordinary loading conditions. Equally important, the large strains is such high strength reinforcing steel would induce large cracks in the surrounding low tensile strength concrete, cracks that would not only be unsightly but which would expose the steel reinforcement to corrosion by moisture and other chemical action. This limits the useful yield strength of reinforcing steel to about 80 ksit (552 MPa) compared with 40 to 60 ksi (276 to 414 MPa) for conventional reinforcing steel.

A special way has been found, however, to use steels and concretes of very high strength in combination. This type of construction is known as prestressed concrete. The steel, usually in the form of wires or strands but sometimes as bars, is embedded in the concrete under high tension that is held in equilibrium by compressive stresses in the concrete after hardening. Because of this precompression, the concrete in a flexural member will crack on the tension side at a much larger load than when not so precom-

pressed. Prestressing greatly reduces both the deflections and the tensile cracks at ordinary loads in such structures, and thereby enables these high strength materials to be used effectively. Prestressed concrete has extended, to a very significant extent, the range of spans of structural concrete and the types of structures for which it is suited.

Notes

①为弥补这一局限性，在19世纪后期人们发现可以使用抗拉的钢筋来强化混凝土。
②近年来人们发现可以以相对较低的造价生产屈服强度为普通增强钢材四倍的钢材。
③诚然这种构件的强度大致与那些材料成比例。