

МИНИСТЕРСТВО ОБРАЗОВАНИЯ РЕСПУБЛИКИ БЕЛАРУСЬ  
Белорусский национальный технический университет

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Кафедра английского языка № 2

М. В. Макарич

TECHNICAL TEXTS FOR READING  
AND DISCUSSING

ТЕХНИЧЕСКИЕ ТЕКСТЫ ДЛЯ ЧТЕНИЯ  
И ОБСУЖДЕНИЯ

Пособие по английскому языку для магистрантов  
дневной и заочной формы обучения

*Рекомендовано учебно-методическим объединением  
высших учебных заведений по образованию в области строительства  
и архитектуры, машиностроительного оборудования и технологий*

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Пособие написано в соответствии с типовой программой по иностранным языкам для вузов. Целью пособия является систематизация и совершенствование знаний и умений магистрантов, расширение их словарного запаса, формирование навыков понимания, перевода и реферирования текстов по специальности.

Состоит из семи разделов, построенных по единому принципу. Материалом пособия послужили оригинальные, профессионально ориентированные тексты.

Предназначено для магистрантов дневной и заочной форм обучения специальностей 1-69 01 01 «Архитектура», 1-70 01 01 «Производство строительных изделий и конструкций», 1-70 02 01 «Промышленное и гражданское строительство», 1-70 04 03 «Водоснабжение, водоотведение и охрана водных ресурсов», 1-36 20 01 «Низкотемпературная техника», 1-36 20 04 «Вакуумная и компрессорная техника», 1-36 01 02 «Материаловедение в машиностроении», 1-36 80 02 «Транспортное, горное и строительное машиностроение», 1-36 80 03 «Машиностроение и машиноведение», 1-36 80 04 «Обработка конструкционных материалов в машиностроении», а также для желающих самостоятельно повысить свой уровень владения английским языком в области гражданского строительства и архитектуры.

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## ПРЕДИСЛОВИЕ

Учебное пособие имеет профессиональную направленность и предназначено для магистрантов архитектурно-строительных специальностей, имеющих базовую подготовку по английскому языку. Пособие подготовлено в соответствии с требованиями типовой программы по иностранным языкам для высших учебных заведений.

Целью пособия является систематизация и совершенствование знаний и умений студентов, расширение их словарного запаса по предлагаемой тематике, формирование навыков понимания, перевода и реферирования оригинальных текстов на английском языке по специальности.

Учебно-методическое пособие состоит из семи самостоятельных разделов, построенных по единому принципу. Основной структурной единицей является лингвометодический комплекс, который представляет собой тематически завершённый блок (Unit). Каждый раздел пособия включает профессионально ориентированные английские тексты для обучения различным видам чтения и упражнения к ним. Система упражнений способствует усвоению профессиональной лексики и повторению основных грамматических явлений.

Работу с устными темами рекомендуется организовать по усмотрению преподавателя, как с точки зрения методики, так и форм проведения.

Проверка изученного материала осуществляется преподавателем на практических занятиях.

Автор выражает искреннюю благодарность всем тем, кто способствовал созданию и изданию этого пособия.

## UNIT I. CIVIL ENGINEERING AND ARCHITECTURE

See the table “All Tenses Compared”. Study it carefully and then do an entry test.

### All Tenses Compared

Active Voice (действительный залог)				
	Indefinite	Continuous	Perfect	Perfect Continuous
	Констатация факта	Процесс	Завершённость	Процесс в течение некоторого периода времени
Present	<b>V, V-s</b>  <b>I write</b> Я пишу (часто)	<b>am</b> <b>is</b> <b>are</b> } <b>V-ing</b>  <b>I am writing</b> Я пишу (сейчас)	<b>have</b> <b>has</b> } <b>V + ed</b> } <b>V III</b>  <b>I have written</b> Я написал (уже, только что)	<b>have</b> <b>has</b> } <b>been V-ing</b>  <b>I have been writing</b> Я пишу (уже час; с двух часов)
Past	<b>V + ed</b> <b>V II</b> <b>I wrote</b>  Я писал (вчера; два дня тому назад)	<b>was</b> <b>were</b> } <b>V-ing</b>  <b>I was writing</b> Я писал (вчера в два часа; когда он вошёл)	<b>had V + ed</b> <b>had V III</b>  <b>I had written</b> Я написал (вчера к трём часам; до того, как он пришёл)	<b>had been V-ing</b>  <b>I had been writing</b> Я писал (уже два часа, когда он пришёл)
Future	<b>will V</b>  <b>I will write</b>  Я буду писать (завтра)	<b>will be V-ing</b>  <b>I will be writing</b>  Я буду писать (завтра в три часа)	<b>will have V + ed</b> <b>will have V III</b>  <b>I will have written</b>  Я напишу (завтра к трём часам)	<b>will have been V-ing</b>  <b>I will have been writing</b>  Я буду писать (завтра уже три часа, когда он придёт)

Действительный залог показывает, что действие производит подлежащее:

She was reading the book the whole evening yesterday.

Она читала книгу весь вечер вчера.

## *Entry Test*

### **I. Define the tense of the verb.**

1. Civil engineering *deals* with the design and analysis of buildings and large non-building structures.
  - a) Present Indefinite;
  - b) Present Continuous;
  - c) Present Perfect.
2. I *didn't think* that civil engineering often overlaps with architecture.
  - a) Present Indefinite;
  - b) Past Indefinite;
  - c) Future Indefinite.
3. His mother *wants* him to be an architect.
  - a) Present Indefinite;
  - b) Past Indefinite;
  - c) Past Perfect.
4. Cass Gilbert *was* a famous architect of his time.
  - a) Past Indefinite;
  - b) Past Continuous;
  - c) Present Indefinite.
5. He *will receive* good knowledge in our educational establishment.
  - a) Future Indefinite;
  - b) Future Continuous;
  - c) Future Perfect.
6. At present he *is looking* for something unusual.
  - a) Past Continuous;
  - b) Present Perfect;
  - c) Present Continuous.
7. I *knew* all main principles of sustainable architecture.
  - a) Present Indefinite;
  - b) Past Indefinite;
  - c) Past Perfect.
8. Kelly Hart *used* sustainable building materials in 1970s.
  - a) Past Indefinite;
  - b) Past Perfect;
  - c) Past Continuous.
9. By the first of September, they *will have been working* at the construction site for 15 months.

- a) Future Perfect;
- b) Future Continuous;
- c) Future Perfect Continuous.

10. The idea to reinforce the structure *has attracted* attention of some engineers since last innovation.

- a) Present Indefinite;
- b) Present Perfect;
- c) Past Perfect.

## **II. Choose the right translation of the predicate.**

1. They studied many special subjects in BNTU.

- a) изучают;
- b) изучали;
- c) будут изучать.

2. They *are removing* the part of a load-bearing wall without reinforcing the structure.

- a) удаляют;
- b) удалили;
- c) удаляется.

3. Students *have read* much professional literature lately.

- a) читаем сейчас;
- b) прочитали;
- c) будем читать.

4. For many centuries scientist of the world *have been working* to uncover secrets of nature.

- a) работают;
- b) работали;
- c) будут работать.

5. When the student entered the auditorium, the lecturer *had* already *been delivering* a lecture for 10 minutes.

- a) читал;
- b) читает;
- c) будет читать.

6. By the first of December he *will have been working* as a head of construction for fifteen years.

- a) работает;
- b) проработал;
- c) будет работать.

7. A skillful designer *discerns* roof loads to the roof elements in a project.

- a) определяет;
- b) может определить;
- c) определил.

8. They *did not find* necessary bricks and mortar yesterday.

- a) не находят;
- b) не нашли;
- c) не смогли найти.

9. The amount of skyscrapers in the world *are rising* very fast.

- a) увеличивалось;
- b) будет увеличиваться;
- c) увеличиваются.

10. What *will you have done* before I come?

- a) сделал;
- b) будешь делать;
- c) сделаешь.

### Grammar Study

Study grammar again and do the following exercises.

**Ex 1. In every sentence find the predicate and underline it:**

1. A generation of ecologically inspired architects tries to use the sun, wind, water as energy consumption sources.

2. Structural engineering came to existence when the humans first started to construct their own structures.

3. The scientific co-operation between these countries extends to many areas of human activities.

4. I knew the names of the speakers.

5. Louis Sullivan's ideas had a profound influence on the further development of architecture.

6. According to an optimistic scenario presented by Freiburg Institute (Germany), all new houses will be low-energy buildings by energy-saving standards of "passive houses" and only require emergency heating systems.

7. He was a famous scientist of that time.

**Ex 2. In every sentence find the predicate and determine its tense:**

1. He went to Minsk to study in BNTU.

2. Alfiorov is our famous scientist.



3. He spent a lot of time in different libraries to get necessary knowledge.

4. Eco-managers have been working with the wood technologists for many years in order to gain a scientific foundation for their ideas.

5. The new principles of public education have produced new social phenomena in our society.

6. The solar panel on the roof always directly faces the sun and busily supplies electricity.

7. Zeckendorf Co. has agreed to renovate and expand a subway entrance.

**Ex 3. Put the verbs in brackets into the correct form:**

1. The tsarist government did not (to allow) a woman to study and work at the University.

2. For many centuries scientists of the world have been (to work) to uncover secrets of nature.

3. Information Technologies are now (to bring about) a real revolution in science.

4. After a head of construction had (to check) all the calculations of the project he allowed to make its copies.

5. Until we (to begin) to build skyscrapers, churches (to be) always the very largest, tallest buildings of all, except for castles.

6. By the first of August 2012, he will have been (to work) at this Institute for fifteen years.

7. All what our scientists do, they (to do) for his people and our country.

**Test Paper**

**Translate the sentences from English into Russian.**

*Variant I*

1. The purpose of my study is to write my scientific work.

2. He was busy with his scientific work.

3. Regular work in our National library helps me very much in writing this article for the conference,

4. For centuries people had been founding the ways to make their houses more comfortable.

5. Our structural engineers ensured their design satisfied building codes.

## *Variant II*

1. Our science has reached a high stage of development and now does great wonders.

2. Pyramidal piles are a well-known design of piles used in building.

3. If you know theory well, you will have possibility to organize the practical work.

4. For years engineers have accumulated experience of improving structural elements in building industry.

5. By the first of December she will have been working as a chief executive for ten years.

## **Word Study**

### **1. Study your active vocabulary.**

to design – проектировать

an employer – работодатель

sewerage – канализационная система

demolition – снос

to overlap – частично совпадать

calculus – исчисление

to worship – поклоняться

to shelter – приютить

to promote – содействовать

shelter – кров

a staircase – лестничный пролет

a cellar – подвальный этаж

to worship – поклоняться

a skyscraper – небоскреб

civil engineering – гражданское строительство

to maintenance – обеспечивать техническое обслуживание

iron-poor glass – стекло с низким содержанием железа

sun-protection shields – солнцезащитные экраны

«thawing in air» – «растворение в воздухе»

tower lobby – вестибюль здания

silvery birches growing among a moss – серебристые березки среди мха

internal stairways – внутренние лестничные пролеты

**2. Read these international words and try to guess their meaning.**

Lecture, element, role, process, irrigation, discipline, structure, geotechnical, materials, client, symbol, civilization.

**3. Match the phrases:**

- |                   |                              |
|-------------------|------------------------------|
| 1) to raise       | a) from one floor to another |
| 2) to climb       | b) the project               |
| 3) to divide into | c) staying                   |
| 4) to supervise   | d) several parts             |
| 5) to feel like   | e) networks                  |
| 6) complicated    | f) our children              |
| 7) to give        | g) problems                  |
| 8) environmental  | h) security                  |

**4. Fill in the blanks:**

1. We \_\_\_\_\_ mostly for shelter.
2. The biggest churches of all, cathedrals, \_\_\_\_\_ even bigger than most castles.
3. By putting a window in a wall, with or without glass, we \_\_\_\_\_ light inside the building.
4. Big buildings \_\_\_\_\_ power.
5. To work in civil engineering \_\_\_\_\_ training.
6. Construction workers \_\_\_\_\_ at a center and 'on the job' (training while doing the job).
7. Civil engineering often \_\_\_\_\_ with architecture (let, requires, are, symbolize, will train, overlaps, build).

**Reading Practice**

*Text 1*

**1. Read the text to yourself and try to understand what it is about.**

**2. While reading the text find the sentences where the Present Indefinite Active is used.**

**BUILDING**

Building is one of the most ancient human skills. It is part of how we have survived and it is the clearest symbol of every civilization. Although some other animals build simple structures, e.g. birds, ants and bees,

humans have learned to build in a great many different ways, to suit different needs and local conditions. We build mostly for shelter. Buildings can shelter people, or animals, or machinery, or anything. The simplest building is just a roof, to keep the space beneath dry, or shady. Adding walls gives more shelter, from the wind or rain. It also gives security.

By putting a window in a wall, with or without glass, we let light inside the building. We leave a hole somewhere big enough to go in and out, with a door which can be opened and closed. Often the door will have a lock, so the building can be left secure. If a building is to last for a long time, it must have a foundation. This is like the root of a tree, which is sunk in the ground and supports the walls. If the ground is soft, the foundation must be very deep and strong.

If a building is high enough, it can have more than one floor. People can climb from one floor to the next by a staircase, or perhaps by a lift or elevator. This is known as going upstairs, or downstairs. Buildings can also have a floor under the ground. This is usually called a cellar or basement.

So we build shelters: places to live and to raise our young. We also build places to work and to make things, places to store things, places to sell things, places where sick people can go to be treated, places to put people who break our laws. We build to make life easier, or to make money.

But we also design some buildings for a very different reason. We build churches where a large number of people can gather to worship god or listen to what other people have to say. Until we began to build skyscrapers, churches were always the very largest, tallest buildings of all, except for castles. The biggest churches of all, cathedrals, are even bigger than most castles.

Big buildings have always symbolised power. They are built to impress and to give a focus to our cities. They are designed to make us feel small and to make those who own them appear big. Banks and governments like to build tall, impressive buildings for the same reason.

Buildings can be beautiful or ugly, exciting or boring. Architects are people trained to design buildings. There have been many good architects and also many bad ones, just as there have been good builders and bad. Architecture can be an art form. Look at the building where you are reading this. Look at the shapes and shadows. Is there enough light? Do some rooms make you feel like staying in them, while others make you want to hurry away? Do they have interesting features? Think about

how you could have made the building better. Almost anybody can become an architect if they want to badly enough, but only a good architect or a good builder can make a beautiful building.

**3. Read the text once more. Find the most informative sentences or parts of the sentences. Put them in order and reproduce the text.**

### *Text 2*

**1. Read the text to yourself and answer the question: What are civil engineers responsible for?**

## CIVIL ENGINEERING

Civil engineering is the term for the work of designing and building infrastructure. It usually means large structures, like bridges, dams, buildings, and tunnels. It also covers complicated networks such as water, irrigation and sewerage networks. It also covers the construction of houses and homes. Civil engineers can be involved in all stages in the life of infrastructure, from planning and construction to maintenance and demolition. Civil engineering often overlaps with architecture.

Civil engineering is made up of many different areas or disciplines. Some important areas are geotechnical, structures, environmental, construction management, hydrology, transportation, and materials. It is important for civil engineers to have an understanding of all these disciplines as projects often involve many of them at the same time.

Civil engineers are responsible for lots of the things that are required for a society to function properly. Safe water supplies, sewage treatment, roads, railways and buildings are all part of civil engineering.

To work in civil engineering requires training. Construction workers will train at a center and 'on the job' (training while doing the job). To be a professional in civil engineering requires study at a university or college. Civil engineers often study subjects like structures, materials, physics and calculus.

The profession of civil engineering is represented by professional bodies in various countries. In the UK the Institution of Civil Engineers promotes civil engineering as a discipline and supports engineers throughout their careers. The American Society of Civil Engineers performs a similar task in the USA.

**2. Make sure you understand the following words and phrases:**

- 1) to suit different needs;
- 2) to be made up of smth.;
- 3) to make money;
- 4) to overlap with smth.;
- 5) to train at a center and 'on the job'.

**3. Read the text again and answer the questions given below:**

1. What does *civil engineering* mean?
2. Does civil engineering often overlap with architecture?
3. What disciplines does civil engineering include?
4. What educational establishments train civil engineers?

*Text 3*

**1. Read the text and be ready to speak about modern technologies in building industry.**

“THE GREY LADY” ON HORIZON

Building of a new tower for «New York Times», under the design of Renzo Piano is finished. The 52-storied skyscraper has called inconsistent reaction of critics: one rank it as one of the best high-rise buildings of Manhattan, others are dissatisfied with modest shape, third it seems too monumental and even similar to a fortress. But all are in agreement in one: «Grey lady» (this is the way New York Times has been called for a long time) has created the new standard of office space smoothly passing into the urban.

Piano has made glass hinged walls of a tower absolutely pellucid, using iron-poor glass. Also he has taken away a maximum of constructive parts from a building surface, so that fascinating views at New York open from within. So that such openness didn't affected the consumption of electric power of the building, the architect has «dressed» the construction outside in sun-protection shields from 186 000 light ceramic tubes. They do not block the view from windows, but detain up to 50 % of the solar rays which are heating up a surface of the skyscraper. Inside they are supported by the automatic system of the jalousie, also allowing to save on air-conditioning (which pits are laid in a floor of

each storey). Each shield rises on altitude of six floors over a tower roof that should create an effect of «thawing in air».

At level of street construction is as much as possible opened and attractive to pedestrians. Ground floor walls also are pellucid, and through a tower lobby it is possible to see an opposite side of the street. Despite the fact that what after events on September, 11th, 2001 demands to safety of high-rise buildings have increased, Piano has refused to transform the building into a concrete bunker.

To visitors of the editorial offices that are located at bottom 28 storey, and the financial and legal firms renting offices above, nevertheless it is necessary to pass through some kind of a check point consisting of red turnstiles and orange-yellow parting walls. Further there's a small atrium where behind the glass you can see harmonious silvery birches growing among a moss. Behind them the Times Center conference hall for 378 places, solved in traditional «theatrical» red colors is located.

Three storey above are occupied by news department and shocking with the silence in spite of the fact that there, in an aero- sphere of permanent haste, the next issue of the newspaper is composed. From here, thanks to high ceilings, views on a city and on trees in an atrium below open, soft illumination supplements the picture. On the majority of floors sound-proof glass rooms-cubes for negotiations are arranged.

Separate floors are connected with the next tiers by internal stairways, also spaces for informal meetings that should promote interacting of separate divisions and employees of the newspaper are arranged everywhere.

Renzo Piano wished to arrange a garden with water area and the viewing platform opened for all comers at the roof of a building, but this element has not been realized for safety reasons.

In a sunny day the 320-metre tower looks light grey, and it's almost illusive, easy volume in a landscape of Manhattan seems a metaphor of existence of the traditional big newspaper during an epoch of prompt development of the informational production engineering. The management «New York Times» optimistically assures, that a skyscraper should become «home» for the newspaper at least till 2107.

## **2. Answer the questions:**

1. Who designed “Grey Lady”?
2. Does it include apartments?

3. What does the building similar to?
4. What kind of glass was chosen for the project?
5. What were 186 000 light ceramic tubes used for?
6. When did the demands to safety of high-rise buildings increase?
7. How many places does the Times Center conference hall include?
8. Why wasn't a garden with water area and the viewing platform been arranged?

**3. Look through the text about the 52-storied skyscraper and try to list all the innovations of this building project. Be ready to discuss their advantages with your partner.**

### *Conversational Practice*

**1. Remember some of the words and expressions to read the dialogue:**

- to argue – спорить;
- an arguing question – спорный вопрос;
- an undergraduate – магистрант;
- sustainability – устойчивое развитие.

**2. Read the dialogue “Ecological problems in building industry”:**

- A. I'd like to know if the information given in the text “The Grey Lady” on Horizon” is new for you?
- B. I think, yes. I haven't heard about this project and frankly speaking I know little about modern technologies in building industry.
- A. So do I. But I think that it is necessary for engineering students know more about it.
- B. Of course I can agree with you on this point.. But I think that human society can damage environment by developing modern technologies in all spheres of our life.
- A. Right you are. I also worry about it. But as far as I know the main construction credo of eco-architects is sustainability.
- B. Really? Could you explain me how sustainability is connected to ecological problems?
- A. Yes, sure. Sustainable development in building industry means designing energy efficient and socially responsible buildings.



- B. It is an arguing question. I don't know eco-architects' concepts perfectly well because I am not a specialist in this branch. But I consider sustainability as an only word that has become fashionable over last decade.
- A. Sorry, but I can't agree with you. Sustainability is not a matter of fashion, but survival. It means finding pioneering design solutions for buildings and using eco-material in construction.
- B. For sure. It is very pity that we have not enough information about designing energy efficient, socially responsible buildings. This aspect is very important in building industry.
- A. It is a good chance for us to look for the information in the library or in the Internet. It also could help us to write our scientific work.
- B. Right you are. See you soon in the library.

### **3. Answer the questions.**

1. What does sustainability mean?
2. How is sustainability connected to ecological problems?
3. What building materials do eco-architects use in their projects?
4. What is the linking element of the past, present and future in building?
5. Can you explain what it means "designing energy efficient and socially responsible buildings"?

### **4. Role-play the dialogue with your partner on analogy.**

**5. Tell about ecological problems in building industry with particular emphasis on the problem of using eco-materials.**

**6. Be ready to discuss the topic: "Green" building". Use set expressions and phrases given below:**

- a) frankly speaking;
- b) as far as I know;
- c) for sure;
- d) right you are.

## *Progress Test 1*

### **1. Open the brackets and put the right form of the verb.**

1. The contacts of our engineers with their colleges in other countries steadily (to grow).

2. Our scientists (to investigate) this important problem for five years now.
3. I didn't think to use expensive materials in modern projects (to be) a good idea.
4. We (to read) much literature about the work of eco-architects.
5. Very often civil engineers (to apply) new professional software for their work.
6. Builders (to construct) the new building of BNTU by the end of next year.
7. This scientist's works and his ideas (to become) the basis of our theoretical investigation.
8. When heated to the boiling point water (to evaporate).
9. Kelly Hart (to advise) method of green building in architecture.
10. Students (to do) their English test at 2 o'clock yesterday.
11. They (to learn) these words for twenty minutes.
12. Our head of construction (to hold) a meeting.
13. He already (to do) this work.
14. We (to depart) tomorrow.
15. The student writing on the blackboard (to be) from BNTU.
16. You ever (to be) to London?
17. He (to write) a letter since morning.
18. This foreigner (to ask) very many questions yesterday.
19. You (to like) your future profession?
20. What you (to do) now?

**2. Choose the right variant of the translation of the following sentences.**

1. *We have read much technical literature lately.*

A. Мы прочитали много технической литературы за последнее время.

B. Мы должны прочитать много технической литературы.

C. Мы читаем много технической литературы.

2. *The contacts of Belarusian scientists with their colleagues in other countries are steadily growing.*

A. Контакты белорусских учёных с коллегами в других странах постоянно растут.

B. В других странах растут контакты между учёными.

C. Контакты между учёными будут расти во всех странах.

3. *I will have written my scientific work by the end of the year.*

- A. Я пишу свою работу уже год.
- B. Я буду писать свою работу в течении года.
- C. Я напишу свою работу к концу года.

4. *I was working in the library the whole day yesterday.*

- A. Я проработал в библиотеке весь день вчера.
- B. Вчера я целый день работал в библиотеке.
- C. Завтра я буду работать в библиотеке весь день.

5. *I shall be writing my paper at 5 o'clock tomorrow.*

- A. Я буду писать реферат завтра в 5 часов.
- B. Я напишу реферат завтра к 5 часам.
- C. Я пишу реферат 5 часов.

**3. Choose the right variant to complete the sentences.**

1. *Building is*

- a) one of the most useful human skills;
- b) one of the most ancient human skills;
- c) one of the most systematical human skills.

2. *Often the door will have a lock, so*

- a) the building can be left secure;
- b) the building can be more quiet;
- c) the building can be the most comfortable.

3. *If the ground is soft, the foundation*

- a) must be very high;
- b) must be very deep and strong;
- c) must be very wide.

4. *Civil engineering is the*

- a) for the work of designing and building infrastructure;
- b) for the work of designing and repairing infrastructure;
- c) for the work of demolishing and building infrastructure.

5. *By putting a window in a wall, with or without glass,*

- a) we lift light inside the building;
- b) we let light inside the building;
- c) we let light outside the building.

6. *Sustainability is not a matter of fashion,*

- a) but commonness;
- b) but arrival;
- c) but survival.

7. *Piano has made glass hinged walls of a tower pellucid*

- a) using iron-poor glass;
- b) using gauzy glass;
- c) using iron-oxide cement.

8. *On the majority of floors sound-proof glass rooms-cubes*

- a) for negotiations are arranged;
- b) for having dinner are arranged;
- c) for negotiations is arranged.

9. *Separate floors are connected with the next tiers*

- a) by external stairways;
- b) by internal ladders;
- c) by internal stairways.

10. *Renzo Piano wished to arrange a garden*

- a) with many beautiful flowers;
- b) with water area and the viewing platform;
- c) with water area and many beautiful flowers.

11. *After events on September, 11th, 2001 demands to safety of high-rise buildings*

- a) have reduced;
- b) have increased;
- c) have changed.

12. *In a sunny day the 320-metre tower*

- a) is similar to grey cloud;
- b) looks light grey;
- c) looks like a marvelous ship.

13. *The 52-storied skyscraper*

- a) hasn't called inconsistent reaction of critics;
- b) has called consistent reaction of critics;
- c) has called inconsistent reaction of critics.

14. *Renzo Piano has designed building of a new tower for*

- a) "USA Today";
- b) "New York Times";
- c) "Financial News".

## UNIT II. ENERGY EFFICIENCY

### Past Indefinite

Образование: **V + ed** или **II форма нестандартного глагола**.

**Past Simple** употребляется, как правило, с обстоятельством (*yesterday, last month (year) a week ago*), а также с датами относящимися к прошлому *in 1960 Before Christ (B.C. – до н.э.)*

He *presented* his papers to a physical journal a week ago.

### Participle II

Образование: **V + ed** или **III форма нестандартного глагола**.

В предложении Participle II может быть:

1. **Определением**. В функции определения Participle II может стоять до и после определяемого слова.

The book *written* by this author are very interesting.

Книга, написанная этим автором, очень интересна.

Обратите особое внимание на перевод предложений, где за подлежащим следует два слова с окончанием *-ed*. Первое из них, обычно, является определением в форме Participle II и при переводе ставится перед определяемым словом, второе является сказуемым в Past Simple.

The device *invented* showed good performance.

Изобретённый прибор показал хорошую работу.

2. **Обстоятельством**. В функции обстоятельства перед Participle II обычно стоят союзы *when, if, unless, as*.

As *seen* from the article these students were the best.

Как видно из статьи эти студенты были лучшими.

3. **Часть сказуемого**. В страдательном залоге и временах группы Perfect.

They have considerably *developed* their work last year.

Они значительно усовершенствовали работу в прошлом году.

### Entry Test

#### I. Define the underlined forms:

1. The coal *bought* last year isn't suite for power plant now.

a) Participle II;

b) Past Indefinite.

2. He *put* his record book before a lecturer.
  - a) Participle II;
  - b) Past Indefinite.
3. Name some words *learned* by you.
  - a) Participle II;
  - b) Past Indefinite.
4. He was doing his test paper *given* by his teacher.
  - a) Participle II;
  - b) Past Indefinite.
5. Yesterday we were at the conference *organized* by our Institute.
  - a) Participle II;
  - b) Past Indefinite.
6. The great majority of examples *included* in this book were typical of spoken English.
  - a) Past Indefinite;
  - b) Participle II.
7. Our lessons *began* at 8 o'clock last year.
  - a) Participle II;
  - b) Past Indefinite.
8. The man *given* you this task was our teacher of English.
  - a) Participle II;
  - b) Past Indefinite.
9. She *advised* him to enter BNTU.
  - a) Participle II;
  - b) Past Indefinite.
10. Tennis is the most popular game in England *played* all the year round.
  - a) Participle II;
  - b) Past Indefinite.

**II. Choose the right translation of the underlined V-ed forms:**

1. The house *built* in our region is very nice.
  - a) строили;
  - b) построенный;
  - c) перестроенный.
2. They *built* this nice house two years ago.
  - a) построенный;
  - b) построили;
  - c) строят.

3. The scientist *opened* this method of investigation is well-known in our country.
- a) открывающий;
  - b) открыл;
  - c) открывший.
7. He *thought* about his examinations.
- a) продуманный;
  - b) задуманный;
  - c) думал.
8. The suggestion *made* by the chairman was very good.
- a) сделавший;
  - b) сделанное;
  - c) сделать.
9. This is my record book *received* two days ago.
- a) получивший;
  - b) получающий;
  - c) полученная.
10. A new method *found* by the architect was very progressive.
- a) находившийся;
  - b) найденный;
  - c) находить.

### Grammar Study

Study grammar again and do the following exercises.

**Ex 1. In every sentence find Participle II and underline it:**

1. Belarusian architects made a great contribution to eco-building industry.
2. “Turning Torso” designed by Spanish architect Santiago Calatrava was the first turning skyscraper in Sweden.
3. Civil engineers decided to build a skyscraper without professional training never manage to do this.
4. When a new control system was installed it operated at peak efficiency.
5. The construction cite equipped with modern apparatus is our proud.
6. A man presented us with flowers was unknown to us.
7. The complaint given to our chief was not true.

**Ex 2. Give Russian equivalents of the following phrases:**

1. The improvements proposed by an architect...
2. The chemicals allowed to use...
3. The innovative project made in BNTU...
4. A decision found by an engineer...
5. A economic recession fixed by the government...
6. An excellent mark given by the lecture...

**Ex 3. Put Participle II instead of infinitive in brackets:**

1. The test (to write) in the classroom was correct.
2. This book (to take) in the library was very interesting.
3. As (to see) from the list this student was sent down.
4. Toxic materials (to add into) the substance was found.
5. The job of a civil engineer (to require) special qualification is a difficult one.
6. The contract (to sign) by two sides is a valuable document.

**Test Paper**

**Translate the sentences from English into Russian.**

*Variant I*

1. His information about this process followed by great surprise.
2. The head of the department, appointed last week, was a very kind man.
3. The model described by this scientist was of great importance for modern science long ago.
4. This brickwork made by the workers were fixed with mortar.
5. Quantitative measurements of building material's efficiency were available to help our engineers in making right decision.

*Variant II*

1. It must be admitted that the choice of building materials can be analyzed from different points of view.
2. His attitude to the question was a problematic one.
3. The postgraduate student awarded Master's Degree was rather clever.



4. The work suggested by the chief of the construction was not an easy one.

5. The lecture attended by all the students was of great importance for them.

## Word Study

### 1. Study your active vocabulary:

energy costs – энергозатраты

environmentally sustainable – не наносящий вреда окружающей среде

energy efficiency – энергоэффективность

luminous efficiency – световая отдача

quantitative measurements – количественные измерения

insulating value – изоляционная способность

recycled materials – переработанное сырье

composite elements – составные элементы

cancer-causing chemicals – химические соединения, являющиеся причиной онкологических заболеваний

sustainable materials – экологически чистые материалы

long-term energy costs – долгосрочные затраты на энергоносители

R-value – расчетный коэффициент термостойкости

operating a building – эксплуатация здания

shading coefficient – коэффициент экранирования

building envelope – внешнее покрытие здания

petrochemical-derived foams – материалы, полученные из продуктов переработки нефти

fenestration – распределение оконных проемов

overhang – консольная часть здания

system efficiency – КПД системы

adhesives – склеивающие строительные материалы

airtight – герметический

plywood – клееная фанера

air scrubbers – воздушные фильтры

“sick building syndrome” – термин, используемый для описания недугов, связанных с нехваткой воздуха

particle board – древесностружечная плита

air exchange (cycling) rates – коэффициент инфильтрации

molds – плесень

## 2. Recognize familiar words:

Secret, mineralogy, physics, chemistry, metallurgy, geology, professor, vertical, corridor, democratic, reform, exposition, cellulose.

## 3. Match the phrases:

- |                               |                               |
|-------------------------------|-------------------------------|
| 1) to take into consideration | a) обращать внимание          |
| 2) to permit                  | b) разрабатывать              |
| 3) to be responsible for      | c) период эксплуатации здания |
| 4) to pay attention to        | d) принимать во внимание      |
| 5) building's life            | e) позволять                  |
| 6) to work out                | f) отвечать за                |

## 4. Fill in the blanks:

1. He had made \_\_\_\_\_ to different branches of engineering knowledge.
2. He discovered \_\_\_\_\_ of silver and copper.
3. Building materials can slow \_\_\_\_\_ of heat through a building's skin.
4. They took an active part in \_\_\_\_\_ but it was \_\_\_\_\_ by the commission of experts
5. Hubert Fritz was the first \_\_\_\_\_ intelligent assembly techniques in architecture (the project, to apply, a great contribution, the transfer, put down, rich deposits).

## Reading Practice

### *Text 1*

1. Read the text to yourself and try to understand what it is about.
2. Scan through the text. Note all the words and phrases you don't know. Look them in the English-Russian dictionary.
3. Find the sentences where Participle II is used.

### ENERGY EFFICIENCY

Energy efficiency is an important feature in making a building material environmentally sustainable. The ultimate goal in using energy-efficient materials is to reduce the amount of generated energy that must be brought to a building site. The long-term energy costs of operating a building are heavily dependent on the materials used in its construction.

Depending on type, the energy-efficiency of building materials can be measured using factors such as R-value, shading coefficient, luminous efficiency or fuel efficiency. Preferred materials slow the transfer of heat through a building's skin, reducing the need for heating or cooling. Quantitative measurements of a building material's efficiency are available to help in the comparison of building materials and determining appropriateness for certain installations.

- **R-Value (insulation):** Building envelopes are generally rated by their insulating value, known as the R-value. Materials with higher R-values are better insulators; materials with lower R-values must be used in thicker layers to achieve the same insulation value. R-values can be measured for individual materials (e.g., insulation, siding, wood paneling, brick) or calculated for composite structural elements (e.g., roofing, walls, floors, windows). Many types of insulation materials are available, from organic cellulose made from recycled paper to petrochemical-derived foams.

- **Shading Coefficient:** Although daylighting is the cheapest and most pleasant form of illumination, the accompanying heat gain from direct solar radiation is not always welcome, particularly in hot climates. The shading coefficient (SC) is a ratio of the solar heat gain of a building's particular fenestration to that of a standard sheet of double-strength glass of the same area. This allows a comparison of the sun-blocking effectiveness of various glass types, shading devices, and glazing patterns. Shading devices can be designed to block solar heat gain at certain times of the day or year: overhangs are often used to block high summer sun but admit direct light during the winter. Certain types of glass or applied films allow selective transmission of the visible radiation (light) while preventing or reducing the transmission of infrared radiation (heat).

- **System Efficiency:** Electrical and mechanical systems are responsible for more than 50% of a building's annual energy costs. Heating, ventilation, and air-conditioning (HVAC) systems should be selected for the greatest efficiency at the most commonly experienced temperatures. A system that offers peak efficiency at an outdoor temperature experienced by the building's climate only 5% of the time will not necessarily be the best choice. Regular maintenance programs are also necessary to keep equipment operating at peak efficiency.

**4. Read the text once more and tell what information was new for you. Give your comments about this information.**

### *Text 2*

**1. Read the text to yourself and answer the question: Why is it so important to calculate air exchange rates?**

#### NON-TOXIC OR LESS-TOXIC MATERIALS IN BUILDING

Non- or less-toxic materials are less hazardous to construction workers and building's occupants. Many materials adversely affect indoor air quality and expose occupants to health hazards. Some building materials, such as adhesives, emit dangerous fumes for only a short time during and after installation; others can contribute to air quality problems throughout a building's life.

The rush to make buildings airtight in the wake of the 1970s oil crises created a new health problem: "sick building syndrome." This occurs when natural or artificial ventilation is inadequate to remove odors and chemicals emitted by certain building materials. These substances may be hazardous, even carcinogenic. The resins in plywood, particle board, and the chemicals used in foam insulation have been implicated in sick building syndrome. Formaldehyde, benzene, ammonia, and other hazardous or cancer-causing chemicals are present in many building materials, furnishings, and cleaning solutions.

Previously, the infiltration rate of outside air through the gaps and cracks in a building's envelope compensated for contamination of the inside air by human respiration, bacteria or molds, and material emissions. The problem of indoor air contamination is magnified by the increasing airtightness of buildings. Superinsulating buildings in attempts to conserve energy has caused reduced air infiltration, meaning occupants are exposed to higher concentrations of toxins for longer time periods. The health effects of these toxins must be considered when selecting materials and calculating air exchange rates. By selecting materials with lower or nonexistent levels of these materials, environmental health problems can be avoided and the need for expensive air scrubbers reduced.

Material toxicity is of increasing concern with the growing number of building products containing petroleum distillates. These chemicals,

known as volatile organic compounds (VOCs) can continue to be emitted into the air long after the materials containing them are installed. The severity of this process, called “outgassing,” is dependent on the chemicals involved, rate emission, concentration in the air, and length of exposure. Many adhesives, paints, sealants, cleaners, and other common products contain VOCs. Often, the substances are only exposed for a short time during and after installation; the outgassing diminishes drastically or completely once the offending materials have cured or been covered by other building materials. Therefore, higher air cycling rates are recommended during installation of these materials and for several months following building occupation.

**2. Read the text again and answer the questions given below:**

1. What building materials can emit dangerous fumes?
2. What new health problem appeared in the wake of the 1970s?
3. Why do architects increase airtightness of buildings nowadays?
4. What are air scrubbers used for?
5. Why should air exchange rates be calculated?
6. How are building products containing petroleum distillates called?
7. What process is called “outgassing”?
8. What products contain VOCs?

**3. Look through the texts again and be ready to speak about “Toxic Materials in Modern Buildings”.**

### *Text 3*

**1. Read the text without the dictionary:**

#### LONGER LIFE

Materials with a longer life relative to other materials designed for the same purpose need to be replaced less often. This reduces the natural resources required for manufacturing and the amount of money spent on installation and the associated labor. Durable materials that require less frequent replacement will require fewer raw materials and will produce less landfill waste over the building’s lifetime.

The *durability* of materials is an important factor in analyzing a building’s life-cycle costs. Materials that last longer will, over a building’s useful

life, be more cost-effective than materials that need to be replaced more often. By looking at durability issues, the selection of initially expensive materials like slate or tile can often be justified by their longer life spans.

*Maintenance consumes* a significant portion of a building's operating budget: over the building's lifetime, maintenance can easily exceed the original construction costs. This includes the cost of labor, cleaning/polishing materials, equipment, and the replacement of some items. This is especially important for surfaces or systems that must be cleaned with petroleum-based solvents.

*Reusability* is a function of the age and durability of a material. Very durable materials may have many useful years of service left when the building in which they are installed is decommissioned, and may be easily extracted and reinstalled in a new site. Windows and doors, plumbing fixtures, and even brick can be successfully reused. Timber from old barns has become fashionable as a reclaimed material for new construction. The historic preservation movement in this country has spawned an entire industry devoted to salvaging architectural elements of buildings scheduled for demolition. These materials are used in the renovation of old buildings as well as in new construction.

*Recyclability* measures a material's capacity to be used as a resource in the creation of new products. Steel is the most commonly recycled building material, in large part because it can be easily separated from construction debris by magnets. Many building materials that cannot be reused in their entirety can be broken down into recyclable components. Often, it is the difficulty of separating rubble from demolition that prevents more materials from being recycled. Once separated, glass is very easy to recycle: post-consumer glass is commonly used as a raw material in making window glass, ceramic tile, and brick. Concrete, unlike steel and glass, cannot be reformed once set, but it can be ground up and used as aggregate in new concrete or as road bedding. Currently, very little concrete and glass from site demolition is recycled because of the difficulty in separating these materials from construction debris.

Plastics alone are easy to recycle but are often integrated into other components which makes separation difficult or impossible. Plastic laminates are generally adhered to plywood or particleboard, making these wood products also hard to recycle. Some foam insulation can be reformed, but the majority cannot. Foam insulation can, like glass, be used as filler in concrete and roadbeds.

## **2. Answer the questions:**

1. What are the properties of building materials?
2. What does the selection of initially expensive materials depend on?
3. What do maintenance consumes include?
4. What parts of demolished buildings can be reusable?
5. Could you explain the difference between *reusability* and *recyclability*?

6. What are the most commonly recycled building materials?

**3. Look through all the texts and then make a short report about modern building materials. Be ready to discuss it with your partner.**

### *Conversational Practice*

**1. Remember some of the words and expressions to read the dialogue:**

rapidly – быстро

to change – меняться, изменять

to make great strides – делать большие успехи

to tell the truth – по правде говоря

to be puzzled with – быть озадаченным

to contribute to – вносить вклад

**2. Read the dialogue “The Role of Engineering Science in the World”:**

A. I'd like to know if you ever thought of the role of engineering science in our rapidly changing world.

B. In popular books and journals we often read that engineering science is making greater strides.

A. And every year scientists are faced with more and more complex engineering problems.

B. To tell the truth I am more puzzled with their special methods of thinking and acting.

A. Naturally they usually direct their attention towards problems facing our society and thus contribute to science.

B. In most cases such problems are called for by industrial or ecological needs.

A. To my mind the role of a scientist is great in our society.

B. Right you are. It is great.

**3. Answer the questions:**

1. Where do we read that science is making great strides?
2. What problems are scientists faced with?
3. What problems do scientists direct their attention to?
4. Are these problems called for industrial needs?
5. Is the role of a scientist great from this point of view?

**4. Role-play the dialogue with your partner using the information about building materials.**

**5. Tell about building materials in modern structures with particular emphasis on using eco-materials.**

**6. Be ready to discuss the topic: “Engineering Science in Future”.**

**Use set expressions and phrases given below:**

- a) I'd like to know;
- b) To tell the truth;
- c) Naturally.

*Progress Test 2*

**I. In every sentence find Participle II or the verb in the Past Indefinite. Mark Participle II – p II, Past Indefinite – p.i.:**

1. Many students prepared interesting reports at the lesson got excellent marks.

2. There are different types of scientific investigations offered by different programmes.

3. As seen from the article this was a terrible accident.

4. When heated this material changed some of its components.

5. The architect designed four eco-terraces cascading down one side of the building.

6. As announced over TV it was a real discovery.

7. Our scientists opened this phenomenon last year.

8. The Celsius scale is the scale used in most scientific experiments.

9. The equipment installed modernized our laboratory.

10. As seen from the report the tests have been carried out successfully.

11. Work of the scientists helped the civil engineers to find better ways to use eco-materials.

12. The team of engineers worked at our department finished the project of exterior steel framework.



13. The books written by this famous scientist were translated in many languages.

14. A message written by him was on the table of his chief.

15. Some of the questions put to the professor were very interesting.

16. A word spoken in time may have very important result.

17. The test given to the students looked very easy.

18. Nobody saw the things kept in that box.

**II. Choose the right variant of the translation of the following sentences:**

*1. Architect Brand immigrated to Prague began to work there as a chief of architectural department.*

A. Когда архитектор Бранд приехал в Прагу, он поступил в архитектурный институт.

B. Архитектор Бранд, иммигрировавший в Прагу, начал преподавать там на архитектурном факультете.

C. Архитектор Бранд, иммигрировавший в Прагу, начал свою трудовую деятельность там в качестве заведующего на архитектурном факультете.

*2. Many outstanding people left their native country because of the political situation in the country.*

A. Многие известные люди покидали родную страну, чтобы заниматься политикой.

B. Те известные люди, которые покидали родную страну, начали заниматься политикой.

C. Многие известные люди покидали родную страну из-за политической обстановки там.

*3. The experiment made by the unknown scientist was of great surprise for everybody.*

A. Опыт, проведенный неизвестным ученым, вызвал большое удивление у каждого.

B. Этот удивительный эксперимент провел неизвестный ученый, чем удивил каждого.

C. Опыт, проведенный неизвестным ученым, был использован каждым в работе.

*4. The buildings designed by Langbardt are known in our country.*

A. Здания, которые проектировал Лангбардт, мало известны в нашей стране.

В. Здания, которые проектировал Лангбардт, известны в нашей стране.

С. Лангбардт спроектировал много зданий в нашей стране, все они хорошо известны.

*5. His biography analyzed in some books was of great importance for our investigation.*

А. Его биография, которую мы прочитали в некоторых книгах, была неизвестна нам.

В. Его биография, проанализированная в некоторых книгах, была очень важна для нашего исследования.

С. Его биография, проанализированная в некоторых книгах, мало помогла нам в наших исследованиях.

### **III. Choose the right variant to complete the sentences:**

*1. Energy efficiency is an important feature in making a building material*

- a) environmentally sustainable;
- b) environmentally pure;
- c) thermodynamical.

*2. Preferred materials slow the transfer of heat through a building's skin*

- a) reducing the need for heat or cool;
- b) reducing the need for boiling water;
- c) reducing the need for heating or cooling.

*3. Materials with higher R-values*

- a) are the most durable;
- b) are better insulators;
- c) are more flexible than plastics.

*4. R-values can be measured*

- a) only for individual materials;
- b) only for composite structural elements;
- c) for individual materials or calculated for composite structural elements.

*5. The shading coefficient (SC) is a ratio of the solar heat gain of a building's particular fenestration*

- a) to that of a standard sheet of double-strength glass of the same area;
- b) to that of a standard sheet of double-strength glass of double-area;

- c) to that of a standard sheet of three times strength glass of the same area.
6. *Shading devices can be designed*
- a) to break solar heat gain at certain times of the day or year;
  - b) to blocking solar heat gain at certain times of the day or year;
  - c) to block solar heat gain at certain times of the day or year.
7. *Heating, ventilation, and air-conditioning (HVAC) systems*
- a) should be selected for the greatest efficiency;
  - b) can be selected for the greatest efficiency;
  - c) should select for the greatest efficiency.
8. *Non- or less-toxic materials are less hazardous*
- a) to skilled workers and building's occupants;
  - b) to construction workers and building's occupants;
  - c) to all the workers and the building's occupants.
9. *The rush to make buildings airtight in the wake of the 1970 s oil crises created a new health problem:*
- a) “ syndrome polynomial”;
  - b) “sick building syndrome”;
  - c) “sick toxic syndrome”.
10. *Formaldehyde, benzene, ammonia, and other hazardous or cancer-causing chemicals*
- a) are present in many building materials;
  - b) are specially used in many building materials;
  - c) are applied in many building materials.
11. *Durable materials that require less frequent replacement will require*
- a) much more raw materials;
  - b) fewer raw materials;
  - c) as many raw materials as it may be possible.
12. *Maintenance consumes include the cost of labor, cleaning/polishing materials, equipment*
- a) and the replacement of some items;
  - b) and the repairing of some items;
  - c) and the repainting of some items.
13. *Very durable materials may have many useful years of service left when the building in which they are installed*
- a) is designed;
  - b) is developed;
  - c) is decommissioned.

## UNIT III. POSTGRADUATE EDUCATION

### Passive Voice (Страдательный залог)

Страдательный залог показывает, что действие производится над подлежащим. Наличие страдательного залога определяется по формулам:

**be + V + ed** или **be + V + III ф.**

The texts *were translated* (by the students).

Тексты были переведены (переводились, переводили) *но, если (by the students)*, то – Студенты переводили тексты.

Основные временные формы страдательного залога

		Indefinite	Continuous	Perfect
Present	am } is } V + ed are } V + III	am } is } being V + ed are } being V + III	have } has } been V + ed } been V + III	
	<b>I am instructed</b> Меня <i>инструктируют</i> (каждый год)	<b>I am being instructed</b> Меня <i>инструктируют</i> (сейчас)	<b>I have been instructed</b> Меня <i>проинструктировали</i> (уже)	
Past	was } were } V + ed } V + III	was } were } being V + ed } being V + III	had been + V + ed had been + V + III <b>I had been instructed</b>	
	<b>I was instructed</b> Меня <i>инструктировали</i> (вчера)	<b>I was being instructed</b> Меня <i>инструктировали</i> (когда он вошел)	Меня уже <i>проинструктировали</i> (к тому времени, когда он пришел)	
Future	<b>will be + V + ed</b> <b>will be + V III</b> <b>I will be instructed</b> Меня <i>будут инструктировать</i> (завтра)	Вместо отсутствующей формы употребляется Future Simple	<b>will have been V + ed</b> <b>will have been V + III</b> <b>I will have been instructed</b> Меня <i>уже проинструктируют</i> (к трём часам)	

## *Entry Test*

### **I. Define the tense of the underlined passive constructions:**

1. Our ideas *have undergone* a considerable change.
  - a) Present Indefinite;
  - b) Present Perfect;
  - c) Past Indefinite.
2. I *was told* about this discovery only a few days ago.
  - a) Past Perfect;
  - b) Present Indefinite;
  - c) Past Indefinite.
3. Toxic materials *are controlled* by engineering supervision.
  - a) Past Indefinite;
  - b) Present Indefinite;
  - c) Present Perfect.
4. We *were being instructed* for an hour before writing the test.
  - a) Present Indefinite;
  - b) Past Continuous;
  - c) Present Perfect.
5. All the building materials *will have been checked* by the end of the month.
  - a) Present Perfect;
  - b) Future Continuous;
  - c) Future Perfect.
6. We *have been given* all the instructions to choose the place for a construction site.
  - a) Present Perfect;
  - b) Present Indefinite;
  - c) Past Perfect.
7. The seminar *was attended* by all the students.
  - a) Past Perfect;
  - b) Future Indefinite;
  - c) Past Indefinite.
8. Recently much attention in our institute *has been given* to the scientific work of the postgraduates.
  - a) Present Indefinite;
  - b) Past Perfect;
  - c) Present Perfect.

9. We *shall be encouraged* to take part in the conference if we want to be awarded Master's Degree.

- a) Past Indefinite;
- b) Future Indefinite;
- c) Future Perfect.

10. Some new articles *have been done* me by the supervisor.

- a) Present Perfect;
- b) Future Continuous;
- c) Present Indefinite.

**II. Choose the right translation of the underlined passive constructions:**

1. Eco-materials *are often used* by our architects.

- a) используются;
- b) использовались;
- c) будут использоваться.

2. New building of our Institute *is being built* in our town now.

- a) строится;
- b) будет построен;
- c) уже построен.

3. All the buildings *were divided* into classes based upon the manner of their construction.

- a) будут разделены;
- b) были разделены;
- c) разделяются.

4. These observations *will be made* next year.

- a) делаются;
- b) уже сделаны;
- c) будут сделаны.

5. English, psychology and other subjects *are studied* at our Institute.

- a) изучаются;
- b) изучалась;
- c) будут изучаться.

6. My scientific work *will have been completed* by the end of the year.

- a) уже выполнена;
- b) будет выполнена;
- c) выполняется.

7. The results of my investigation *were compared* with the data obtained earlier.

- a) сравнивают;
- b) сравниваются;
- c) сравнивалась.

8. Many investigations *are being carried out* at BNTU.

- a) проводятся;
- b) проводились;
- c) провели.

9. The laboratory *was modernized* last year.

- a) модернизируется;
- b) будет модернизирован;
- c) был модернизирован.

10. English *has been studied* for 2 years.

- a) изучается;
- b) изучался;
- c) будет изучаться.

### Grammar Study

Study grammar again and do the following exercises.

**Ex 1. In every sentence find passive structure and underline it:**

1. Building codes are being developed by our engineers.

2. Some graduates are awarded diplomas with honor.

3. This crime shall be prevented by our guards.

4. An interesting report in the field of robotics is being done at our Institute.

5. When much scientific material had been looked through and some problems had been solved, my investigation was published.

6. Recently much attention has been done to the investigation of ecological problems.

7. Difficulties are often met with in solving scientific problems.

**Ex 2. Give Russian equivalents of the following passive structures:**

1. He was not offered...

2. We have been given...

3. The speaker will be asked...

4. She was promised...

5. The problem is being discussed...

6. We will have been instructed...

**Ex 3. Translate the sentences into English using the verbs in brackets:**

1. Список научных статей выдавался каждому магистранту (to give).
2. На этой стадии мы столкнулись с новыми трудностями (to face).
3. Этот доклад был заявлен на конференцию (to declare).
4. За разработкой проекта последовал этап выбора подходящего места для стройплощадки (to follow).
5. Эта документация будет разрабатываться позже (to develop).

### **Test Paper**

**Translate the sentences from English into Russian.**

#### *Variant I*

1. The opening session of the Congress was preceded by a meeting of the General Assembly to elect a new president.
2. It must be admitted that the problem of toxic emission can be examined from several viewpoints.
3. There are chemicals which cannot be allowed to use in building.
4. Graduation thesis must be presented in time.
5. Safety rules must be followed carefully.

#### *Variant II*

1. The declaration is demanded by the law.
2. Ancient house were constructed from stone and wood.
3. The author of this project was awarded a prize.
4. The list of defects was given to the head of the construction.
5. The moment granite is delivered the construction site it is used for erecting columns.

### **Word Study**

#### **1. Study your active vocabulary:**

to generate – вырабатывать

to apply – применять



to improve – усовершенствовать  
to obtain – получать  
to provide – обеспечивать  
to confer – присуждать  
to attain – добиваться  
to award – присуждать  
to concern – касаться

## 2. Recognize familiar words:

Academic, qualified, continent, type, business, administration, period, dissertation, contribution, philosophy, methodology.

## 3. Give Russian equivalents of:

- 1) to develop new ideas;
- 2) to predict elements;
- 3) to propose a hypothesis;
- 4) to obtain results;
- 5) to apply methods.

## 4. Match the phrases:

- |                            |                             |
|----------------------------|-----------------------------|
| 1) the result was compared | a) методы описываются       |
| 2) methods are described   | b) применяемое оборудование |
| 3) the applied equipment   | c) результат сравнивался    |
| 4) education is offered    | d) присуждаемые степени     |
| 5) the awarded degrees     | e) образование предлагается |

## 5. Find the synonyms:

To propose, to obtain, to write, to confer, to complete, to attain, to earn, to change, to offer, to receive, to record, to award, to finish, to modify.

## 6. Fill in the blanks:

1. Last year our Institute was \_\_\_\_\_ to apply a new method of knowledge's control.
2. He was \_\_\_\_\_ a scientific degree last summer.
3. His new results has been \_\_\_\_\_ by his hard work.
4. The prize was \_\_\_\_\_ by a group of the scientists.
5. These phrases were \_\_\_\_\_ with great difficulty (earned, conferred, achieved, completed, proposed).

## *Reading Practice*

### *Text 1*

- 1. Read the text to yourself and try to understand what it is about.**
- 2. Scan through the text. Note all the words and phrases you don't know. Look them in the English-Russian dictionary.**
- 3. Find the sentence where the Passive Voice is used.**

### ACADEMIC DEGREES

An academic degree is a title awarded by a college or university for successfully completing a course of study, or for a particular attainment. Earned degrees are bestowed for completion of courses of study; honorary degrees recognize a certain attainment, not necessarily connected with an educational institution.

Degrees of various types and levels are currently conferred by almost 2,500 institutions of higher education in the United States, as well as by the principal universities in foreign countries. During the first two centuries of higher education in the United States (since 1642) few academic degrees were used, but during the last century, and particularly since 1900, they have multiplied along with the expansion of university curricula and specialized fields.

- 4. Say what information was new for you. Comment on it.**

### *Text 2*

- 1. Read the text and answer the question: *Where and when was the first degree conferred?***

### DEVELOPMENT OF DEGREES

Academic degrees have been in use for about 800 years; the first one recorded was the Doctor of Civil Law conferred by the University of Bologna (Italy) in the middle of the 12<sup>th</sup> century. This was followed by the Doctor of Canon Law and Doctor of Divinity and, in the 13<sup>th</sup> century, by

doctorates in medicine, grammar, logic, and philosophy. The use of degrees spread from Bologna to the other European Universities. Originally the doctor's (from Latin doctor, 'teacher,' from docere, 'to teach') and master's degrees were used interchangeably, each indicating that the holders were qualified to teach, and the titles of Master, Doctor, and Professor were synonymous. On the other hand, the bachelor's or baccalaureate degree (from Latin baccalaureus, a bachelor of arts) was used to indicate the entrance upon a course of study preparatory to the doctorate or mastership, and not achievement. Gradually, however, it came to mean successful completion of one level of study preparatory to a higher degree.

The use of academic degrees spread to British Universities from the Continent and was extensively developed, especially at Oxford and Cambridge Universities. It is necessary to mention that Oxford and Cambridge Universities are the most famous and prestigious universities in the world. Students from many countries try to have opportunity to study there because the diplomas are highly qualified everywhere. Even students from our country study in these universities.

**2. Make sure you understand the following words and phrases:**

- 1) academic;
- 2) interchangeably;
- 3) to spread;
- 4) to indicate;
- 5) holder;
- 6) extensively;
- 7) on the other hand.

**3. Read the text again and finish the sentence:**

Gradually the bachelor's degree came to mean successful completion of one level of study preparatory to ... .

**4. Choose the right answer:**

*Degrees spread in the following way:*

- a) British Universities; University of Bologna; European Universities.
- b) American Universities; European Universities; British Universities.
- c) University of Bologna; European Universities; British Universities.

### *Text 3*

#### **1. Memorize the following words and phrases:**

Bachelor's degree – степень бакалавра  
under designation – присваиваемый  
in frequency – по частоте  
business administration – управление бизнесом  
to estimate – устанавливать  
beyond – помимо  
to represent – представлять, означать

#### **2. Read the text without the dictionary:**

### TYPES OF DEGREES

#### **Bachelor's degree**

The bachelor's degree, usually representing completion of a four-year course of study on a collegiate level, is the oldest and best-known academic degree, particularly under the designation of Bachelor of Arts. Some varieties of bachelor's, or baccalaureate degree is currently offered by about 750 institutions, most of which offer a Bachelor of Arts degree. Next in frequency and availability is the Bachelor of Science, of which the most frequent variety is the Bachelor of Science in Education. Other baccalaureate degrees offered by a large number of institutions are Bachelor of Education, Bachelor of Music, Bachelor of Business Administration, Bachelor of Divinity, and Bachelor of Home Economics. Most institutions offer more than one variety of baccalaureates, but about one tenth report use of the Bachelor of Arts only, regardless of the particular curriculum completed.

Currently about 900,000 baccalaureate degrees are awarded annually, about 46 percent to women. It is estimated that more than 12 million degrees have been conferred to date.

#### **Master's Degree**

The earned master's degree in general represents one year of work beyond the baccalaureate, but in a few institutions or in a few fields it requires two years of graduate work. The most frequently awarded master's degrees are Master of Arts, Master of Science, Master of Education, Master of Business Administration, Master of Music, and Master of Fine Arts. The

Master of Philosophy degree is conferred on those who have completed all requirements for the Doctor of Philosophy degree except the doctoral dissertation. About 45 varieties of Master of Arts and 40 varieties of Master of Science degrees are reported. Currently 317,000 individuals receive the master's degree annually, about 47 percent of them women. Nearly 3 million master's degrees were awarded from 1880 to 1972.

### **Doctor's Degree**

The doctor's degree represents the most advanced earned degree conferred by U.S. institutions, or indeed by those of any country. In the academic sense, a doctor is an individual in any faculty or branch of learning who has attained to the highest degree conferred by a university. Doctor's degrees in the United States are of two distinct types professional or practitioner's degrees, and research degrees.

The former represent advanced training for the practice of various professions, chiefly in medicine and law. The principal ones are Doctor of Medicine, Doctor of Dental science of Dental Surgery, Doctor of Veterinary Medicine, Doctor of Pharmacy, and Doctor of Jurisprudence. These degrees carry on implication of advanced research.

Quite different in character are the research doctorates representing prolonged periods of advanced study, usually at least three years beyond the baccalaureate, accompanied by a dissertation designed to be a substantial contribution to the advancement of knowledge. The most important of these is the Doctor of Philosophy (Ph. D.), which no longer implies knowledge of philosophy, but which represents advanced research in any major field of knowledge. In the early 1970's 240 graduate schools offered it. It was first awarded by Yale University in 1861 to three young men. It was modeled on the doctorate conferred by German universities. For more than half a century prior to 1861, young men desiring the most advanced training in scholarship attended the principal German and occasionally other European universities to secure their Ph. D's.

Second in importance and much more recent as a research degree is the Doctor of Education (Ed.D.) currently offered by 108 institutions. It was first awarded by Harvard in 1920, but was preceded by the equivalent Doctor of Pedagogy first conferred by New York University in 1891. The only other earned doctorates of the research type currently conferred by 10 or more institutions are the Doctor of the Science of Law and the Doctor of Business Administration.

At present doctorates of the research type are earned by about 28,000 individuals annually, of which about 14 percent are women. Microfilm copies of about two thirds of the dissertations written for these degrees are available at a modest price.

Abstracts of them are published in the monthly issues of Dissertation Abstracts.

### **3. Answer the questions:**

1. What types of degrees do you know?
2. What do the Bachelor's degree represent?
3. What do Master's degree represent?
4. What do Doctor's degree represent?
5. What is the best-known academic degree?
6. How Bachelor's and Master's degrees are awarded in frequency?
7. What are the two types of Doctor's degrees in the United States?
8. Is there Bachelor's degree in our country?
9. Where can you get Master's degree in our country?
10. How much time is necessary to study to get Master's degree in our country?
11. Is it necessary to write any scientific work during master's course?
12. What degree do you have?
13. What degree are you planning to have?
14. What exams are necessary to pass to enter master's course in your Institute?
15. What subjects are taught at master's course in your Institute?
16. What is Master's degree for you?

### **4. Report on the types of degrees.**

## **Conversational Practice**

### **1. Remember some of the words and expressions to read the dialogue:**

- mechanical engineering – общее машиностроение
- to bring up – воспитывать
- to apply – написать заявление
- to take a course – обучаться по (специальности)
- to undertake – заниматься

## 2. Read the dialogue “Taking a Course”:

- A.* Hi. I am Oleg. I am from Belarus. I study, at BNTU.
- B.* Hi, I am Lindy King. Home Country is Australia. And now I am at City University, London.
- A.* Glad to see you Lindy. What course are you taking?
- B.* I worked as a manager at BNG Industrial Services, then I took a degree in mechanical engineering in Australia and then decided to take a postgraduate course at City University in London. I was attracted by the international reputation of the department of Nothampton Plytechnic Institute at City University.
- A.* It is very interesting. What concerns me, all the time I live in Belarus and now I study again in the Institute which I have graduated but now I take a postgraduate course. I want to take master’s degree.
- B.* So, I guess, you want to be a civil engineer with good knowledge. But you have had this knowledge while you were studying in the University. What will this course give to you?
- A.* An interesting question. The master course is one of the stages of study process which is undertaken after completing the first degree (as I have already said, I have it) which provides the human resource development with fundamental scientific knowledge and research, methodological and managerial skill.
- B.* As for my department, it offers strong knowledge and methodologies and I am sure this is the right place to undertake my doctorate work.
- A.* I want to add that after the MA course the qualification of a master is given in accordance with the appropriate scientific direction.
- B.* It is rather good. But what will be your speciality then?
- A.* We can get the following specialities: Civil engineering, Mechanical engineering, Robotics and Information Technologies, Architecture, Business Administration, Nature Resources and Ecology.
- B.* I haven’t heard about this. It is just new information for me and of course, I want to know about this process as much as possible. But the problem is that I am short of time and I must be in a hurry. Good luck for you.
- A.* Thanks a lot. See you soon.

### **3. Answer the questions:**

1. Where is Lindy from?
2. What is Oleg's home country?
3. What faculty has Oleg graduated?
4. What course is Oleg taking now?
5. What is Linda?
6. What course is Lindy taking?
5. Why did Lindy decide to take a postgraduate course at City University of London?
6. Why does Oleg take a postgraduate course in his native Institute?
7. What master's degree will Oleg get after finishing his postgraduate course?
8. What specialities are there in the University?

### **4. Role-play a dialogue with your partner on the topic "Postgraduate education". Use set expressions and phrases given below:**

1. Glad to see you.
2. Overall.
3. From one side.
4. From the other side.
5. You are mistaken.

### **5. Present your report on the topic "Postgraduate Education in Belarus".**

**6. Discuss in groups the problem of determining equivalence of degrees in various countries. Work out and present your own solution.**

## **Progress Test 3**

### **I. Open the brackets and put the right form of the verb:**

1. He (not to offer) any help last term.
2. The safety rules (to read) by the new engineers?
3. Her curiosity was great when the test (to write) and a lot of mistakes (to find) in it.
4. Recently the place for a construction site (to find).
5. Contributions (to make) to the study of modern building technologies.
6. There is no doubt that in the course of further scientific development all the information (to process) with the help of computers.
7. These problem (to clear) by the chief yesterday.



8. All the students writing the papers (to give) all the necessary information.

9. The institute (to promise) financial support.

10. Every postgraduate usually (to ask) a lot of questions at the exam.

11. The supervisor (to recommend) to show the project for preview.

12. If the building materials are not toxic they (to allow) to use in this project.

13. At that time all the working drawings must (to be, to finish).

14. The meeting (to announce) two hours ago.

15. The laboratory (to open) to three o'clock.

16. Doctor's Degree (to give) to you after some years of hard working.

17. I (to give) my diploma tomorrow.

18. Her lecture (to listen to) with great interest.

19. The postgraduate's project (to examine) for twenty minutes.

20. A conference (to take place) at our University last week.

**II. Choose the right variant of the translation of the following sentences:**

1. *The first graduation of the civil engineers in BNTU was in 1925.*

А. Первый выпуск инженеров-строителей в БНТУ был осуществлен 1925 году.

В. Первые инженеры-строители получили образование в Республике Беларусь в 1925 году.

С. Первые инженеры, получившие высшее образование в БНТУ, удостоились дипломов в 1925 году.

2. *Postgraduate students are annually given an honorable right to represent the University at the International Technical Exhibition.*

А. Студенты ежегодно завоевывают почетное право представлять университет на Международной выставке технических достижений.

В. Магистранты ежегодно завоевывают почетное право представлять университет на Международной выставке технических достижений.

С. Магистранты ежегодно получают почетное право представлять университет на Международной выставке технических достижений.

3. *At the institute the great attention is being paid to the detailed study of engineering science and practical aspects of it.*

А. На достаточно высоком уровне в институте уделяется внимание изучению инженерно-технических дисциплин и производственной практике.

В. На достаточно высоком уровне в институте уделяется внимание изучению инженерно-технических дисциплин и их практическому применению.

С. В институте уделяется огромное внимание изучению инженерно-технических дисциплин и их практическому применению.

4. *They were asked questions formulated by their teacher.*

A. Преподаватель формулировал вопросы для ответа.

В. Им задавали вопросы, сформулированные преподавателем.

С. Они задавали вопросы после того как вопросы были сформулированы преподавателем.

5. *The Institute awarded degrees offered by most other educational establishments.*

A. Институт присваивал степени, которые можно получить и в других учебных заведениях.

В. Учебных заведений предлагали степени и присваивали их.

С. Институт присваивал степени, которые предлагаются и другими учебными заведениями.

### **III. Complete the sentences given below:**

1. *An academic degree is a title awarded by a college or university for*

a) some achievements in the scientific work;

b) successfully completing the scientific work;

c) successfully completing a course of study.

2. *Academic degrees have been in use*

a) from 1845;

b) for about 800 years;

c) for about 700 years.

3. *The Doctor of Civil Law conferred by ... in the middle of the 12<sup>th</sup> century.*

a) the University of New York (America);

b) the University of Cambridge (England);

c) the University of Bologna (Italy).

4. *The titles of ... were synonymous.*

a) Master, Doctor and Professor;

b) Bachelor, Master and Doctor;

c) Master, Professor and Candidate.

5. *The bachelor's or baccalaureate degree was used to indicate ..., and not achievement.*

a) the entrance upon a course of study preparatory to the doctorate or mastership;

b) the entrance upon a course of study in the University;

c) the graduation of a course of study at school.

6. *Most institutions offer more than one variety of baccalaureates, but about one tenth report use of the Bachelor of Arts only,*

a) regardless of the status of these institutions;

b) regardless of the duration of some courses;

c) regardless of the particular curriculum completed.

7. *The earned master's degree in general represents*

a) two years of work beyond the baccalaureate;

b) one year of work beyond the baccalaureate;

c) one or two years of work beyond the baccalaureate.

8. *Nearly 3 million master's degrees*

a) were awarded from 1881 to 1973;

b) were awarded from 1880 to 1972;

c) were awarded from 1890 to 1982.

9. *The doctor's degree represents*

a) the most advanced earned degree;

b) the highest scientific degree;

c) the most advanced knowledge of a men.

10. *In the academic sense, a doctor is an individual in any faculty or branch of learning who*

a) has achieved great results in science;

b) has done an important work at a university;

c) has attained to the highest degree conferred by a university.

11. *Quite different in character are the research doctorates representing prolonged periods of advanced study, usually*

a) at least four years beyond the baccalaureate,

b) at least three years beyond the baccalaureate;

c) usually at least three years beyond the academic course.

12. *Doctorate ... designed to be a substantial contribution to the advancement of knowledge.*

a) is accompanied by a scientific theses;

b) is accompanied by a scientific annotation of the work;

c) is accompanied by a dissertation.

13. *The first doctor's degree was awarded by*

a) Yale University in 1861 to three young men;

- b) Cambridge University in 1862 to three young men;
- c) Yale University in 1851 to four young men.

*14. Research degree of the Doctor of Education (Ed.D.)*

- a) was first given by Bologna in 1921;
- b) was first awarded by Harvard in 1920;
- c) was first suggested by Harvard in 1820.

*15. This degree was preceded by ... first conferred by New York University in 1891.*

- a) the equivalent Doctor of Pedagogy;
- b) the equivalent Doctor of Art;
- c) the analogue Doctor of Law.

*16. ... written for these degrees are available at a modest price.*

- a) Microfilm copies of about three quarters of the dissertations;
- b) Microfilm copies of about one third of the dissertations;
- c) Microfilm copies of about two thirds of the dissertations.

*17. Abstracts of these dissertations are published*

- a) in the regular issues of Dissertation Abstracts;
- b) in the monthly issues of Dissertation Abstracts;
- c) in local magazines named Dissertation Abstracts.

*18. Modern academic education represents*

- a) 3 stages;
- b) 4 stages;
- c) 5 stages.

*19. An academic degree is a title awarded for*

- a) reading lectures;
- b) practical work in industry;
- c) successfully completed a course of study or for a particular achievements.

*20. The best known academic degree is*

- a) Bachelor's degree;
- b) Master's degree;
- c) Doctor's degree.

## UNIT IV. SCIENCE. GENERAL PROBLEMS

### The Sequence of Tenses (Согласование времён)

В английском языке есть определённая зависимость времени глагола в придаточном предложении от времени глагола в главном предложении.

Если глагол в главном предложении стоит в одном из прошедших времён (обычно Past Indefinite), то в придаточном предложении должно быть прошедшее или будущее время.

1. Я знал, *что он работает в университете.*

I knew *that he worked at the University.*

2. Я знал, *что он будет работать в университете после окончания института.*

I knew that, *he would work at the University after graduating from the Institute.*

Правило согласования времён главным образом относится к придаточным дополнительным предложениям. Но также соблюдается и в придаточных подлежащих и придаточных сказуемых предложениях.

The question was *what theme he would choose for his report.*

Вопрос заключался в том, *какую тему он выберет для доклада.*

### Entry Test 4

**I. Open the brackets, put the necessary forms of the verbs and comment on the usage of the tenses in the sentences given below:**

1. The engineering innovations found in the project (to be, to apply) by construction workers.

2. The students were asked whether they (to translate) the article.

3. He promised that he (to send) a letter to the committee as soon as possible.

4. The professor promised to the student that his paper (to be, to check) in ten minutes.

5. He took his master's degree when he (to be) 30.

6. The production director was sure that a basement (to be, to do) in time and all the engineers (to be, to give) monthly bonus.

7. The lecturer knows who (to want) to attend the lecture.

8. When put into water metal (not to change) its form.

9. Students think that this Institute (to be) the best for getting stable knowledge.

10. Uneducated persons understood that it (to be) useless to try finding well-paid job in Europe.

**II. Choose the right translation of the underlined part of the sentence:**

1. He was asked **if he knew** how to recognize a bearing wall.

- a) будет ли он знать как определить несущую стену;
- b) знает ли он как определить несущую стену;
- c) знает ли он, что это несущая стена.

2. It was proved **that customs had been paid** for everybody.

- a) что пошлины платились всеми;
- b) что пошлины были уплачены всеми;
- c) что пошлины необходимо платить.

3. She didn't say **she would be late**.

- a) что она опоздает;
- b) что она опаздывает;
- c) что она опоздала.

4. He stated **that preventive measures was still the subject of discussion**.

- a) что профилактические меры будут предметом обсуждения;
- b) что профилактические меры были предметом обсуждения;
- c) что профилактические меры всё ещё являются предметом обсуждения.

5. They supposed **that they would take part** in the reconstruction of the plant.

- a) что они принимали участие;
- b) что они принимают участие;
- c) что они будут принимать участие.

### Grammar Study

Study grammar again and do the following exercises. Consult your teacher if necessary.

**Ex 1. In every sentence find the subordinate clause where sequence of tenses is used and underline it. Translate the sentences into Russian:**

1. The professor told to the students that the next lecture would be in Friday.

2. Entering into the building the inspector said that he wanted to look at the documents.

3. Postgraduates expected that they would have finished their trainings by the end of March.

4. We were sure that the method now in use would give the desired results.

5. The foreign partners said that what they had seen at the construction site surpassed their expectations.

6. Careful investigations showed what had happened with the sample of the material when it had been tested for two months.

7. He promised that he would do it as soon as he completes the work he began before.

**Ex 2. Complete the sentences:**

1. He said that (он сделает это вовремя).

2. The professor told us that (следующая лекция будет в среду).

3. I was sure that he (получил степень магистра).

4. We thought that (он знает правила техники безопасности).

5. She stressed that (она знает этот предмет).

6. I heard that they (принимают участие в проверке чертежей).

7. Our chief, in his turn, was right when he said that new software (будет необходимо нам при разработке системы вентиляции здания).

**Ex 3. Translate into English:**

1. Он сказал, что будет принимать участие в новом проекте.

2. Она подчеркнула, что в первый раз видела эти документы.

3. Его спросили, сможет ли он подписать контракт.

4. Мы слышали, что они устанавливают новое оборудование в лаборатории.

5. Они были уверены, что эта работа вместе с главным менеджером на стройплощадке решит проблему.

6. Магистранту сказали, что он поедет в Гродно, чтобы принять участие в конференции.

7. Претендента на вакансию попросили предъявить диплом.

**Test Paper**

**Translate the sentences from English into Russian.**

*Variant I*

1. He explained that a final paper was one of the most important points of getting a degree.

2. The manager said that he would have been working at the company for five years by that time.
3. She promised that she wouldn't be smoking the whole year.
4. When I met him last week, he said he would call on me the next day.
5. He said to his friend that he would take necessary equipment with him.

### *Variant II*

1. The postgraduate knew that he wouldn't take part in the conference if he did not prepare a report in time.
2. It was found that the materials were used to mortar the table for a basement.
3. He called me a few days ago and said he had an important message that day.
4. When the lecturer met his students last month, he said they would take final exams at the end of May.
5. The student promised that he would pass all the exams on the good marks.

### **Word Study**

#### **1. Study your active vocabulary:**

- to attend – присутствовать
- to join – присоединяться
- to watch – наблюдать
- to carry out – выполнять
- to account for – объяснять
- to agree upon – приходить к соглашению
- to call for – требовать
- to refer to – ссылаться
- to refer to as – называть
- to think of – думать
- to think of as – считать

#### **2. Recognize familiar words:**

Idea, electronics, material, interest, computer, programming, phenomenon, problem, financial, recommendation, publication, project, crystal,



machines, local, philosophers, sociologists, test, laboratory, consultation, operation, attack, president, classification, national, synthetic, parameters, temperature, industrial, procedure, congress, forum.

**3. Give Russian equivalents of:**

1. to attend the seminar
2. to approach the problem
3. to promise support
4. to offer help
5. to join efforts

**4. Match the phrases:**

- |  |                               |
|--|-------------------------------|
| 1) Lectures are followed by                  | a) пациенту разрешается       |
| 2) The rate of the reaction is Affected      | b) семинар заменили           |
| 3) The solution of the problem is called for | c) на скорость реакции влияет |
| 4) Seminar has been substituted for          | d) решение проблемы вызвано   |
| 5) Patient is allowed                        | e) за лекциями следует        |

**5. Choose the right translation of the following verbs:**

- |                |               |
|----------------|---------------|
| to refer to    | to call       |
| to refer to as | to call for   |
| to think of    | to agree      |
| to think of as | to agree upon |

(называть, упоминать, соглашаться, договариваться, думать о, считать, требовать, звонить)

**6. Form all possible combinations:**

- |                   |                 |
|-------------------|-----------------|
| 1) to enjoy       | a) the device   |
| 2) to watch       | b) the party    |
| 3) to carry out   | c) the fact     |
| 4) to account for | d) the process  |
| 5) to deal with   | e) measurements |
| 6) to rely upon   | g) substances   |

**7. Fill in the blanks:**

1. Recently much attention has been given to this \_\_\_\_\_.
2. In this paper new experimental observations are presented and \_\_\_\_\_.

3. The measurements have been \_\_\_\_\_ with a conventional apparatus slightly \_\_\_\_\_ by the author.
4. All possible \_\_\_\_\_ of error are taken into account.
5. The results are analyzed and the data \_\_\_\_\_ are compared with those available in literature (phenomenon, discussed, obtained, carried out, modified, sources).

## **Reading Practice**

### *Text 1*

- 1. Read the text to yourself and try to understand what it is about.**
- 2. Scan through the text. Note all the words and phrases you don't know. Look them in the English-Russian dictionary.**

### WHAT SCIENCE IS

It can be said that science is a cumulative body of knowledge about the natural world, obtained by the application of a peculiar method practiced by the scientist. It is known that the word "science" itself is derived from the Latin "scire", to know, to have knowledge of, to experience. Fundamental and applied sciences are commonly distinguished, the former being concerned with fundamental laws of nature, the latter engaged in application of the knowledge obtained. Technology is the fruit of applied science, being the concrete practical expression of research done in the laboratory and applied to manufacturing commodities to meet human needs.

The word "scientist" was introduced only in 1840 by a Cambridge professor of philosophy who wrote: "We need a name for describing a cultivator of science in general. I should be inclined to call him a "scientist". "The cultivators of science before that time were known as "natural philosophers". They were curious, often eccentric, persons who poked inquiring fingers at nature. In the process of doing so they started a technique of inquiry which is now referred to as the "scientific method".

- 3. Read the text carefully once more. Find the most informative sentences or parts of the sentences. Put them in logical order and express your opinion.**

## *Text 2*

**1. Read the text. Identify the topic sentence and the sentences developing its idea.**

### SCIENTIFIC METHOD AND METHODS OF SCIENCE

It is sometimes said that there is no such thing as the so-called “scientific method”; there are only the methods used in science. Nevertheless, it seems clear that there is often a special sequence of procedures which is involved in the establishment of the working principles of science. This sequence is as follows:

- 1) a problem is recognized, and as much information as possible is collected;
- 2) a solution (i.e. a hypothesis) is proposed and the consequences arising out of this solution are deduced;
- 3) these deductions are tested by experiment, and as a result the hypothesis is accepted, modified or discarded.

**2. Make sure you understand the following words and phrases:**

- 1) to recognize a problem;
- 2) to collect information;
- 3) to propose a solution;
- 4) as much as possible;
- 5) to deduce the consequences;
- 6) to accept the hypotheses;
- 7) to modify the hypothesis;
- 8) to discard the hypothesis.

**3. Read the text again and try to remember the sequence of procedures given in the 3d sentence.**

**4. Translate the 3d sentence of the text from English into Russian.**

## *Text 3*

**1. Memorize the following words and phrases:**

- to obtain knowledge – получать знания
- to set up a hypothesis – устанавливать гипотезы
- to substantiate – подтверждать

to account for – объяснять  
to advance to the rank of a theory – дорасти до уровня теории  
evidence – доказательство  
to be governed / to be guided – руководствоваться  
to be swayed – склоняться

## 2. Read the text without the dictionary.

### THE SCIENTIFIC METHOD

As man's knowledge of natural phenomena increased, there came a time when he recognized that his growing knowledge of nature was the result of his application of a particular method of investigation. This rather well defined procedure has come to be known as the Scientific Method. Consequently the emphasis passed from the knowledge itself to the method by which that knowledge was obtained. Let us explore the possibilities and implications of the scientific method. The steps in the procedure may be listed as follows:

First – The recognition of the problem.

Second – Collection of experimental facts or data.

Third – Analysis of data and setting up of a tentative hypothesis.

Fourth – Performance of test experiments.

Fifth – Substantiation, modification, or abandonment of the hypothesis in the light of the results of the test experiments.

If the hypothesis is discarded as the result of the test experiments, a new one will be set up and steps three, four and five will be repeated until an explanation is found which accounts satisfactorily for all the known experimental facts. As the amount of substantiating data becomes larger and larger, the hypothesis advances to the rank of a theory and eventually may be accepted as true.

It should be noted that in general one adopts first the most obvious hypothesis; that is, one that at the moment seems to offer the simplest explanation of the observed facts. This hypothesis may or may not prove to be satisfactory in the light of later evidence.

In coming to a conclusion about any hypothesis, the true scientist is swayed only by experimental evidence. He is not, for instance, governed principally by what he or anyone else wants the results to be, by the reputation of the man who advanced the hypothesis, by what the majority of

people think about it, or by any similar emotional reaction to the problem. He will constantly check his conclusions and hypotheses by experiment and be guided solely by the results thus obtained.

**3. Answer the questions.**

1. What is the scientific method?
2. What steps does the scientific method include?
3. What is done if the hypothesis is discarded?
4. What hypothesis is adopted first?
5. What is the true scientist governed by in coming to a conclusion about any hypothesis?

**4. Read the text again and retell it in English according to the following plan:**

1. The definition of the scientific method.
2. The steps in the scientific method.
3. Scientific approach to the solution of a problem.
4. What hypothesis may be said to be entirely satisfactory.

**5. Give the annotation of the text.**

### Conversational Practice

**1. Remember some of the words and expressions:**

scientific innovation – новое в науке

impact – влияние

inventor – изобретатель

to put forward – выдвигать на первый план

to have the advantage – пользоваться преимуществом

**2. Read the dialogue “Science: Group or Individual Activity”:**

*A.* Do you think that the isolated inventor is still the usual source of innovation?

*B.* It seems to me that alone inventor in most fields has been replaced by the group.

*A.* But more often than we realize the original brilliant idea is still the product of one man’s genius.

*B.* It may be so. But if you live in a group environment and have the advantage of the scientific and intellectual contacts, that come from working with a large group of people, it can only be good for you.

A. You are probably right. As soon as a new idea is put forward, it requires many people's efforts before it can be transformed into a product.

B. Nobody will deny that at this stage innovation becomes a group and not an individual activity.

A. I fully agree with you. But in each group it is necessary to have the chief, so called "generator of the ideas" who can lead the other members of the group.

B. Right you are. Science is a thing that is especially interesting for me. In future I want to connect my life with science.

A. It is convincing. Good luck for you.

B. Thank you. Good bye.

### **3. Answer the questions:**

1. What kind of inventors is discussed in the dialogue? (*Key*: the isolated inventor and the group inventor).

2. What is the potential role of the lone inventor? (*Key*: the original brilliant idea is still the product of one man's genius).

3. When does science become a group and not an individual activity? (*Key*: as soon as the new idea is put forward).

**4. Tell about one of the well-known scientists with particular emphasis on his contribution to a certain branch of science.**

**5. Be ready to discuss the statement: "The original idea is still the product of one man's genius".**

**6. Describe in a short talk the methods by which particular material or object is studied. Use set expressions and phrases given below:**

a) I would like to know ...

b) I would like to add ...

c) I would like to sum up ...

d) It is important to say that it is a basic principle ...

## **Progress Test 4**

**I. Read and translate the sentences paying attention to the sequence of tenses:**

1. After the head of construction had found way out from the situation the engineer understood that it was a great help for him.

2. He underlined in his speech that the work on this scientific problem was rather responsible thing.

3. The curator said that all the students would have a rest on Monday.
4. It was proved that steel framework had remarkable characteristics.
5. If he has good marks in his diploma he could have possibility to choose a place of work himself.
6. Our lecturer didn't say he would be late.
7. If he noticed any inaccuracy in the project he would inform about it our chief.
8. It is necessary that you should take part in our research.

**II. Choose the right variant of the translation of the following sentences:**

1. *We didn't know where our friends went every evening.*

- A. Мы не знали, куда наши друзья ходят каждый вечер.
- B. Мы не могли узнать, куда наши друзья ходят каждый вечер.
- C. Мы не знали, куда наши друзья уходят каждый вечер.

2. *He said he would bring and show us the schedule.*

- A. Он сказал, что принес и покажет нам расписание.
- B. Он говорит, что принес показать нам расписание.
- C. Он сказал, что принесет и покажет нам расписание.

3. *Our teacher says he is sure Mike and Nick will be excellent engineers.*

A. Наш преподаватель говорит, что он уверен, что Майк и Ник стали отличными инженерами.

B. Наш преподаватель говорит, что он уверен, что Майк и Ник будут отличными инженерами.

C. Наш преподаватель сказал нам, что уверен, что Майк и Ник уже становятся хорошими инженерами.

4. *My friend asked me whether I would like to be an engineer.*

- A. Мой друг спрашивает меня хочу ли я стать инженером.
- B. Мой друг спросил меня хотел ли бы я стать инженером.
- C. Мой друг спросит меня хочется ли мне стать инженером.

5. *I was sure that he had done all this.*

- A. Я был уверен, что он сделал это.
- B. Я уверен, что только он мог сделать это.
- C. Я был уверен, что он сделает это.

**III. Complete the sentences given below:**

1. *Science is*

- a) a cumulative body of knowledge about the natural world;
- b) a body of knowledge about man;
- c) a body of knowledge about stars.

2. *The word “scientist” was introduced*

- a) only in 1940 by a Cambridge professor of psychology;
- b) only in 1840 by an Oxford professor of philosophy;
- c) only in 1840 by a Cambridge professor of philosophy.

3. *There is often a special sequence of procedures which is Involved*

- a) in the working up of the main principles of science;
- b) in the solving of the scientific problems;
- c) in the establishment of the working principles of science.

4. *This sequence is as follows:*

a) deductions are tested by experiment, a solution (i. e. a hypothesis) is proposed, a problem is recognized;

b) a problem is recognized, a solution (i. e. a hypothesis) is proposed, deductions are tested by experiment;

c) a problem is recognized, deductions are tested by experiment, a solution (i. e. a hypothesis) is proposed.

5. *The scientific method is the method by which*

- a) nature is investigated;
- b) man is studied;
- c) knowledge is obtained.

6. *The scientific method includes*

- a) 5 steps;
- b) 6 steps;
- c) 4 steps.

7. *Analysis of data and setting up of a tentative hypothesis is*

- a) the second step of the scientific method;
- b) the third step of the scientific method;
- c) the fourth step of the scientific method.

8. *If the hypothesis is discarded as the result of the test experiments*

- a) it is necessary to stop the work;
- b) a new one will be set up;
- c) a new theme will be chosen.

9. *In coming to a conclusion about any hypothesis the true scientist is governed by*

- a) experimental evidence;
- b) what he or anyone wants the results to be;
- c) what the majority of people think about it.

10. *The former science deals with*

- a) fundamental laws of outer space;



- b) the application of knowledge in practice;
- c) fundamental laws of nature.

## UNIT V. HVAC ENGINEERING

### Single Infinitive (Инфинитив)

Инфинитив – неопределённая форма глагола; отвечает на вопрос «что делать?» или «что сделать?». В английском языке показателем инфинитива является частица *to*.

#### Формы

Вид	Active	Passive
Indefinite	to write	to be written
Continuous	to be writing	-
Perfect	to have written	to have been written
Perfect Continuous	to have been writing	-

Инфинитив в предложении может выполнять функции всех членов предложения: стоять на месте подлежащего, быть частью сказуемого, дополнением, определением, обстоятельством.

**To operate** this complex device is rather difficult (подлежащее).

Управлять (управление) этим сложным механизмом довольно трудно.

We hope **to get** new data in a week or two (дополнение).

Мы надеемся получить новые данные через неделю или две.

#### **Перевод:**

- 1) существительным;
- 2) неопределённой формой глагола;
- 3) придаточным предложением.

Следует обратить внимание на перевод инфинитива в функции определения – инфинитив в функции определения всегда стоит после определяемого существительного и переводится:

1. Определительным придаточным предложением, сказуемое которого выражает *долженствование*, *возможность* или *будущее время* (должен, может, будет...):

**The gadget to be used in our work is to be well tested.**

Прибор, который будет (нужно, можно) использовать в нашей работе, должен быть хорошо опробирован.

2. Неопределённой формой глагола, существительным:

**The idea to use this new substance didn't leave us.**

Мысль использовать (об использовании) этого нового вещества не покидала нас.

3. Инфинитив после слов the first, the last и т. д. также является определением и переводится глаголом в том времени, в котором стоит глагол **to be**:

**S. Kovalevskaya was the first among women to become a professor.**

С. Ковалевская первой среди женщин стала профессором.

или

С. Ковалевская была первой среди женщин, кто стал профессором.

Обратите внимание на перевод инфинитива в функции обстоятельства цели: когда он стоит в начале предложения, то переводится на русский язык неопределённой формой глагола с союзом *чтобы*, для *того чтобы* или существительным с предлогом *для*.

**To reinforce a bearing wall our engineers use steel constructions.**

Чтобы (для того чтобы) усилить несущую стену, наши инженеры используют стальные конструкции.

## Entry Test

### **I. Open the brackets, choose the necessary form of Infinitive.**

1. He seems (to read / to be reading) now.
2. She seems (to have read / to read) all the books in the library.
3. I want (to take / to have taken) you to the lecture.
4. I want (to take / to be taken) to the concert by my friend.
5. We expect (to be / to have been) back in two days.
6. He expected (to help / to be helped) by the supervisor.
7. The students are still waiting (to give / to be given) books for their work.
8. Is there anything else (to tell / to have told) her?
9. The girl pretended (to read / to be reading) and (not to hear / not to have heard) the bell.
10. They are supposed (to work / to have been working) on the problem for the last two months.

## II. Translate into Russian:

1. Ann remembered to have been told a lot about all the points of the agreement.
2. I am sorry to have spoiled your mood.
3. I was the first among our students to become a postgraduate.
4. To renovate the hall our engineers use modern aluminum constructions.
5. The data to be used in your article is to be well checked.
6. The idea to develop this technology didn't leave us.
7. To improve your pronunciation you should record yourself and analyse your speech.
8. We hope to get diplomas in a year.
9. I have nothing to read.
10. She is not to blame.

## Grammar Study

Study grammar again and do the following exercises. Consult your teacher if necessary.

### Ex 1. Complete the sentences.

1. He seems (сдает экзамен сейчас).
2. The professor expects (завершить курс лекций к концу семестра).
3. I have nothing (сказать по данному вопросу).
4. (Чтобы получить эту книгу) you should go to the library.
5. She expected (что ей помогут).
6. (Он был последним) to come.
7. I am glad (помочь Вам).

### Ex 2. Translate into English.

1. Чтобы использовать новые технологии, Вы постоянно должны повышать уровень ваших знаний.
2. Проблема слишком сложная, чтобы ее решить.
3. Кажется, профессор принимает экзамен сейчас.
4. Я не помню, чтобы ты говорил мне об этом.
5. Я надеюсь, что меня пригласят участвовать в проекте.
6. Чтобы изучить свойства этого металла мы провели серию опытов в лаборатории.
7. Студент притворился, что не услышал вопроса.

## Word Study

### 1. Study your active vocabulary:

vehicular environmental comfort – комфортная среда внутри транспортного средства  
fluid mechanics – гидромеханика  
heat transfer – процесс теплопередачи  
to be interrelated – быть взаимосвязанным  
installation, operation, and maintenance costs – затраты на монтаж оборудования и эксплуатационные расходы  
room air distribution – воздухораспределение в помещении  
pressurization – герметизация  
contractor – подрядчик  
district heating – теплоцентраль  
district cooling – система охлаждения  
to boost the temperature – поддерживать определенную температуру

### 2. Match the phrases:

- |                               |                                 |
|-------------------------------|---------------------------------|
| 1) installation               | a) производитель                |
| 2) to maintain                | b) приемлемый                   |
| 3) to chill                   | c) проектировщик коммуникаций   |
| 4) a manufacturer             | здания                          |
| 5) building services designer | d) обеспечивать техобслуживание |
| 6) acceptable                 | e) охлаждать                    |
|                               | f) монтаж                       |

## Reading Practice

### *Text 1*

#### 1. Read the text and give it a title.

### HVAC

HVAC (heating, ventilation, and air conditioning) is the technology of indoor and vehicular environmental comfort. HVAC system design is a subdiscipline of mechanical engineering, based on the principles of thermodynamics, fluid mechanics, and heat transfer. Refrigeration is sometimes added to the field's abbreviation as HVAC&R or HVACR.

HVAC is important in the design of medium to large industrial and office buildings such as skyscrapers and in marine environments such as aquariums, where safe and healthy building conditions are regulated with respect to temperature and humidity, using fresh air from outdoors.

Heating, ventilating, and air conditioning is based on inventions and discoveries made by Nikolay Lvov, Michael Faraday, Willis Carrier, Reuben Trane, James Joule, William Rankine, Sadi Carnot, and many others.

The invention of the components of HVAC systems went hand-in-hand with the industrial revolution, and new methods of modernization, higher efficiency, and system control are constantly introduced by companies and inventors worldwide. The three central functions of heating, ventilating, and air-conditioning are interrelated, especially with the need to provide thermal comfort and acceptable indoor air quality within reasonable installation, operation, and maintenance costs. HVAC systems can provide ventilation, reduce air infiltration, and maintain pressure relationships between spaces. The means of air delivery and removal from spaces is known as room air distribution.

The starting point in carrying out an estimate both for cooling and heating depends on the exterior climate and interior specified conditions. However before taking up the heat load calculation, it is necessary to find fresh air requirements for each area in detail, as pressurization is an important consideration.

In modern buildings the design, installation, and control systems of these functions are integrated into one or more HVAC systems. For very small buildings, contractors normally capacity engineer and select HVAC systems and equipment. For larger buildings, building services designers and engineers, such as mechanical, architectural, or building services engineers analyze, design, and specify the HVAC systems.

Although HVAC is executed in individual buildings or other enclosed spaces the equipment involved is in some cases an extension of a larger district heating (DH) or district cooling (DC) network, or a combined DHC network. In such cases, the operating and maintenance aspects are simplified and metering is necessary to bill for the energy that is consumed, and in some cases energy that is returned to the larger system. For example, in a DHC network at a given time a building may be utilizing chilled water for air conditioning, but the warm water it returns may be utilized by another building for heating or the overall DH portion of the DHC network, likely with energy added to boost the temperature.

Basing HVAC on a larger network helps provide an economy of scale that is often not possible for individual buildings, for utilizing renewable energy sources such as solar heat, winter's cold, the cooling potential in some places of lakes or seawater for free cooling, and the enabling function of seasonal thermal energy storage.

The HVAC industry is a worldwide enterprise, with roles including operation and maintenance, system design and construction, equipment manufacturing and sales, and in education and research. The HVAC industry was historically regulated by the manufacturers of HVAC equipment, but regulating and standards organizations such as HARDI, ASHRAE, SMACNA, ACCA, Uniform Mechanical Code, International Mechanical Code, and AMCA have been established to support the industry and encourage high standards and achievement.

**2. Read the text again and answer the questions given below:**

1. What does abbreviation HVAC mean?
2. HVAC system design is a subdiscipline of vacuum technology engineering, isn't it?
3. Whose inventions is this discipline based on?
4. What does "room air distribution" mean?
5. What is the starting point in developing HVAC system?
6. What energy sources are used in HVAC system?
7. In what way can warm water be utilized in HVAC system?
8. Whom was the HVAC industry historically regulated by?

**3. Look through the texts again and be ready to speak about "What knowledge and skills does HVAC engineering involve".**

*Self-Training Work*

*Text 2*

**1. Read the advertisement of "Redmond HVAC Company" to yourself and underline main advantages of their systems.**

**2. Translate the text in written form.**

OUR SYSTEMS

Systems that work for comfort. Redmond HVAC is a GeoExchange (geothermal) heat pump installation and service specialist for New Eng-

land. GeoExchange is the most environmentally responsible heating and cooling alternative available today. Because the systems require only a relatively small amount of electricity, you save on monthly energy bills when compared to other types of heating and cooling systems. The Tranquility™ System Heat Pump is the result of ClimateMaster's years of experience with the Genesis line of heat pumps. It is designed with the homeowner and installer in mind to improve reliability and reduce installed costs. The availability of unit size, configurations, and applications make the Tranquility line the perfect match for nearly every installation. Humidification and air filtration is an important component of any quality HVAC system. Maintaining the proper humidification level in a home or business is essential to retaining comfort, especially during the dry New England winter months. We use Skuttle Indoor Air Quality Products to ensure that humidification is preserved accurately and automatically. Today's super-tight homes require special mechanical ventilators to introduce outside fresh air during both heating and cooling seasons. Redmond uses the top-of-the-line Fantech Heat Recovery Ventilator to not only accomplish this introduction of fresh air, but through a unique heat exchange process, capture and keep this heated or cooled air in your home. Another vital component of a Redmond HVAC system is the use of a high efficiency air filtration system. The installation of a Skuttle® air cleaner is standard for all of our systems. The high efficiency Skuttle® filter media captures the smaller, invisible particles that standard furnace and electrostatic filters miss. This non-woven, pleated filter media traps particles as small as 1 micron, so cleaned air is recirculated into the home. There are many ways to heat domestic hot water and we have been doing this by using the energy from sunlight for years. This free and endless source of energy can be utilized by the use of roof-mounted solar collectors coupled with a storage tank, usually located in the basement. This environmentally friendly method of heating hot water can give you up to 60% free hot water on an annual basis in the New England climate. Alternate Energy Technologies of Jacksonville, Florida is the manufacturer of the solar equipment that we sell and install. We also service hundreds of solar hot water systems, some of which have been in service for over 25 years.

## Conversational Practice

### 1. Remember some of the words and expressions to read the dialogue:

to handle – управлять

staff training – работа с персоналом

parts supplier – поставщик комплектующих изделий

an affiliate – компаньон

to tackle – энергично браться за дело

Quality Assurance – гарантийные обязательства

Accomplishments – достоинства

quality engineer – инженер по качеству

### 2. Read the dialogue “Job Interview”:

*Question:* Can you describe the various responsibilities and roles of a quality engineer in HVAC ?

*Answer:* Discuss here not only quality control and monitoring of various HVAC systems, but also other related tasks that a HVAC engineer might be responsible for: improvement air-conditioning processes, quality-oriented staff training, and quality-related customer services.

*Question:* Describe your previous interactions with customers. How do you handle customer complaints?

*Answer:* Quality engineers can serve as the link between customers and suppliers. When a customer complains about product quality, the engineer must then solve the problem between the customer, the company, and its affiliates, including material and parts suppliers. Briefly describe some interesting problems that you have successfully tackled.

*Question:* Did you ever undertake staff training and instruction on Quality Assurance?

*Answer:* Training and instruction of staff regarding quality issues is sometimes necessary as part of quality control. If you have any experience in this field, describe the specific reason and subject of training. Underscore, without arrogance, your accomplishments with the group.



*Question:* What else, besides quality monitoring, can you suggest to ensure quality of materials and products?

*Answer:* A basic procedure in quality engineering is Continuous Improvement. Describe involvement, method of data collection from observation and monitoring of production processes. Problem-solving skills are the key to success here and you will do well to mention your unique abilities in this area: Problems you solved, corrections you facilitated and improvements you initiated.

*Question:* How effective would you say your team-playing skills are?

*Answer:* Quality Engineers interact with employees at all levels, from minor suppliers to organization management.

Describe a specific assignment where you had to use your communication skills, participate in a group endeavor or manage/lead a team. Discuss your routine communication with all levels of management, quality managers and inspectors, development engineering divisions, operations and QA testing staff.

### **3. Answer the questions:**

1. What duty does a position of quality engineer involve?
2. What data should quality engineer collect?
3. Should a quality engineer interact with employees?
4. Do you want to take this position? Why?

### **4. Role-play a dialogue with your partner on the topic “Job Interview”. Use set expressions and phrases given below:**

1. Glad to see you.
2. Overall.
3. From one side.
4. From the other side.

## UNIT VI. WATER SUPPLY ENGINEERING

### V-ing forms (Формы на -ing)

**Герундий**  
(Gerund)  
*свойства глагола  
и существительного*

**Причастие**  
(Participle I)  
*свойства глагола  
и прилагательного*

### Формы на -ing

<b>Вид</b> Indefinite Perfect	<b>Действительный залог</b> using having used	<b>Страдательный залог</b> being used having been used
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Формы у причастия и герундия совпадают.

#### **Пример:**

1. Writing the dictation, he made only one mistake.

При написании диктанта он сделал только одну ошибку.

2. He went to his work without having breakfast.

Он пошел на работу, не позавтракав.

3. Having compared these two things they found no difference between them.

Сравнив эти две вещи, они не обнаружили разницы между ними.

#### **Перевод:**

1) причастием;

2) деепричастием;

3) существительным;

4) неопределённой формой глагола;

5) придаточным предложением.

*Причастие с относящимися к нему словами образуют оборот*

### **Independent Participle Construction**

(Независимый причастный оборот)

#### **Образуется:**

существительное		
местоимение	+	причастие
числительное		

### Пример:

1. The students wrote their English test paper, **each doing** his variant.

Студенты писали контрольную работу по английскому языку, **причём** каждый делал свой вариант.

2. Some new **materials having been obtained**, the engineers could make more complex investigations.

Когда были получены новые материалы, инженеры могли делать более сложные исследования.

### Перевод:

1. В начале предложения – придаточным предложением с союзами *когда, после того как, поскольку, так как*.

2. В конце предложения – самостоятельным бессоюзным предложением или с союзами *а, и, но, причём*.

При этом существительное, местоимение становится подлежащим предложения, а причастие – сказуемым. Независимый причастный оборот отделяется от основной части предложения запятой.

### Герундий с относящимися к нему словами образует оборот

#### Gerundial Construction

(Герундиальный оборот)

#### Образуется:

притяжательное местоимение

существительное в общем падеже

+ герундий

существительное в притяжательном падеже

### Пример:

1. We know **of Langbard's having designed** many beautiful buildings in Minsk.

Мы знаем, что Лангбард спроектировал много прекрасных зданий в Минске.

2. Scientist's **taking part in the discovery** of a new chemical was of great help to us.

То, что ученые приняли участие в открытии нового химического соединения, очень помогло нам.

### Перевод:

Придаточным предложениям с союзами *что, то, что; о том, что; чтобы; в том, что*.

## Entry Test

### I. Open the brackets, choose the necessary form of Participle

1. (to design) this project, he was thinking hard.
2. (to design) this project, he went for a business trip
3. (to look) through some magazines, I came across an interesting article about new technology in irrigation.
4. (to talk) to her groupmate, she didn't notice how the lecture began.
5. (to read) the article, he closed the magazine and put it into the bag.
6. (to cross) the street, one should first look to the left and then to the right.
7. (to write) his first test, the student could not help worrying about the reaction of the teacher.
8. (not to wish) to discuss that difficult problem, they changed the subject.

### II. Open the brackets using Gerund in Active or Passive form.

1. Why do you avoid (to speak) to me?
2. She tried to avoid (to speak) to.
3. The supervisor insisted on (to send) student's work to the conference.
4. Do you mind the project (to examine) by an experienced engineer?
5. She showed no sign of (to surprise).
6. He had a strange habit of (to interfere) in other people's business.
7. The lecturer was angry at (to interrupt) every other moment.
8. The results of the experiment must be checked and rechecked before (to publish).

## Grammar Study

Study grammar again and do the following exercises.

### Ex 1. Paraphrase the sentences using Independent Participle Construction.

Example: *As our work was finished*, we went home.

*Our work being finished*, we went home.

1. *If the message is posted now*, the news will reach them in a minute.
2. *When the working day was over*, she went straight home.
3. *When the drawings had been done*, the girl left for the class.
4. *As the last month was a very busy one*, she could not go to the cinema.

5. *If time permits*, we shall come a few days earlier.
6. *When the bell had gone*, the lecture was over.
7. *As the subject was very difficult*, the student did not pass the exam.
8. *There was in fact nothing to wait for*, and we got down to work.

**Ex 2. Translate into Russian paying attention to Gerund/**

1. I avoided speaking to them about that matter.
2. They burst out laughing.
3. Excuse my leaving you at such a moment.
4. Please forgive my interfering.
5. They went on talking.
6. He keeps insisting on my taking part in the competition.
7. Do you mind my asking you a difficult question?
8. I cannot put off preparing for the exam.

**Word Study**

**1. Study your active vocabulary:**

- treatment of water – обработка воды
- water supply engineering – водоснабжение
- unconfined stratum – безнапорный пласт
- fractured rocks – трещины в горной породе
- aquifer – водоносный слой
- large-capacity dug wells – колодцы большой емкости
- water-bearing stratum – водоносный пласт
- permeability – проницаемость
- well casing – обсадка скважины
- direct suction lift – подача воды из скважины под давлением
- impounding reservoirs – пополняющиеся водные бассейны
- crib – несущая конструкция
- an intake – всасывающее устройство
- a feeder – механизм подачи
- an aqueduct – водопровод

**Ex 2. Match the phrases:**

- |                   |                               |
|-------------------|-------------------------------|
| 1) installation   | a) производитель              |
| 2) to maintain    | b) приемлемый                 |
| 3) to chill       | c) проектировщик коммуникаций |
| 4) a manufacturer | здания                        |

- |                               |                                    |
|-------------------------------|------------------------------------|
| 5) building services designer | d) обеспечивать техобслуживание    |
| 6) acceptable                 | e) охлаждать                       |
| 7) yield                      | f) количество добытого ископаемого |
| 8) shut off                   | g) изолировать                     |
|                               | e) монтаж                          |

## Reading Practice

### *Text 1*

**1. Scan through the text. Note all the words and phrases you don't know. Look them in the English-Russian dictionary.**

### WATER SUPPLY ENGINEERING

A branch of civil engineering concerned with the development of sources of supply, transmission, distribution, and treatment of water. The term is used most frequently in regard to municipal water works, but applies also to water systems for industry, irrigation, and other purposes.

Water obtained from subsurface sources, such as sands and gravels and porous or fractured rocks, is called ground water. Ground water flows toward points of discharge in river valleys and, in some areas, along the seacoast. The flow takes place in water-bearing strata known as aquifers. In an unconfined stratum the water table is the top or surface of the ground water. It may be within a few inches of the ground surface or hundreds of feet below. See also Aquifer; Ground-water hydrology; Water table.

Wells are vertical openings, excavated or drilled, from the ground surface to a water-bearing stratum or aquifer. Pumping a well lowers the water level in it, which in turn forces water to flow from the aquifer. Thick, permeable aquifers may yield several million gallons daily with a drawdown of only a few feet. Thin aquifers, or impermeable aquifers, may require several times as much drawdown for the same yields, and frequently yield only small supplies.

Dug wells, several feet in diameter, are frequently used to reach shallow aquifers, particularly for small domestic and farm supplies. They furnish small quantities of water, even if the soils penetrated are relatively impervious. Large-capacity dug wells in coarse sand and gravel, are

used frequently for municipal supplies. Drilled wells are sometimes several thousand feet deep.

The distance between wells must be sufficient to avoid harmful interference when the wells are pumped. In general, economical well spacing varies directly with the quantity of water to be pumped, and inversely with the permeability and thickness of the aquifer. It may range from a few feet to a mile or more.

Specially designed pumps, of small diameter to fit inside well casings, are used in all well installations, except in flowing artesian wells or where the water level in the well is high enough for direct suction lift by a pump on the surface (about 15 ft or 5 m maximum). Well pumps are set some distance below the water level, so that they are submerged even after the drawdown is established.

Natural sources, such as rivers and lakes, and impounding reservoirs are sources of surface water. Water is withdrawn from rivers, lakes, and reservoirs through intakes. The simplest intakes are pipes extending from the shore into deep water, with or without a simple crib and screen over the outer end. Intakes for large municipal supplies may consist of large conduits or tunnels extending to elaborate cribs of wood or masonry containing screens, gates, and operating mechanisms. Intakes in reservoirs are frequently built as integral parts of the dam and may have multiple ports at several levels to permit selection of the best water. See also Dam; Reservoir; Surface water.

The water from the source must be transmitted to the community or area to be served and distributed to the individual customers. The major supply conduits, or feeders, from the source to the distribution system are called mains or aqueducts. The oldest and simplest type of aqueducts, especially for transmitting large quantities of water, are canals. Canals are used where they can be built economically to follow the hydraulic gradient or slope of the flowing water. If the soil is suitable, the canals are excavated with sloping sides and are not lined. Otherwise, concrete or asphalt linings are used. Gravity canals are carried across streams or other low places by wooden or steel flumes, or under the streams by pressure pipes known as inverted siphons. Tunnels are used to transmit water through ridges or hills; tunnels may follow the hydraulic grade line and flow by gravity or may be built below the grade line to operate under considerable pressure. Pipelines are a common type of transmission main, especially for moderate supplies not requiring large aqueducts or canals.

Included in the distribution system are the network of smaller mains branching off from the transmission mains, the house services and meters, the fire hydrants, and the distribution storage reservoirs. The network is composed of transmission or feeder mains, usually 12 in. (30 cm) or more in diameter, and lateral mains along each street, or in some cities along alleys between the streets. The mains are installed in grids so that lateral mains can be fed from both ends where possible. Valves at intersections of mains permit a leaking or damaged section of pipe to be shut off with minimum interruption of water service to adjacent areas.

Distribution reservoirs are used to supplement the source of supply and transmission system during peak demands, and to provide water during a temporary failure of the supply system. Ground storage reservoirs, if on high ground, can feed the distribution system by gravity, but otherwise it is necessary to pump water from the reservoir into the distribution system. Circular steel tanks and basins built of earth embankments, concrete, or rock masonry are used. Elevated storage reservoirs are tanks on towers, or high cylindrical standpipes resting on the ground. Storage reservoirs are built high enough so that the reservoir will maintain adequate pressure in the distribution system at all times. Elevated tanks are usually of steel plate, mounted on steel towers, but wood is sometimes used for industrial and temporary installations.

Pumps are required wherever the source of supply is not high enough to provide gravity flow and adequate pressure in the distribution system. The pumps may be high or low head depending upon the topography and pressures required. Booster pumps are installed on pipelines to increase the pressure and discharge, and adjacent to ground storage tanks for pumping water into distribution systems. Pumping stations usually include two or more pumps, each of sufficient capacity to meet demands when one unit is down for repairs or maintenance. The station must also include piping and valves arranged so that a break can be isolated quickly without cutting the whole station out of service.

Drinking water comes from surface and ground-water sources. Surface waters normally contain suspended matter, pathogenic organisms, and organic substances. Ground water normally contains dissolved minerals and gases. Both require treatment. Conventional water treatment processes include pretreatment, aeration, rapid mix, coagulation and flocculation, sedimentation, filtration, disinfection, and other unit processes to meet specific requirements.



Aeration (air or oxygen into water) and air stripping (water into air) primarily are used to remove dissolved gases, such as hydrogen sulfide which causes taste and odor, and to oxidize iron and manganese.

**2. Say what information was new for you. Comment on it.**

**3. Answer the questions:**

1. What dug wells are usually used for small domestic and farm supplies?

2. How deep could drilled wells be?

3. Why is it so necessary to have a distance between wells?

4. Name all kind of water sources.

5. Storage reservoirs are built high enough, aren't they? Why?

6. What does the height of pumps depend on?

7. What do surface waters normally contain?

8. What stages does conventional water treatment processes include?

**4. Give the annotation of the text.**

### Conversational Practice

**1. Remember some of the words and expressions to read the dialogue:**

to handle – управлять

staff training – работа с персоналом

parts supplier – поставщик комплектующих изделий

an affiliate – компаньон

to tackle – энергично браться за дело

Quality Assurance – гарантийные обязательства

Accomplishments – достоинства

quality engineer – инженер по качеству

**2. Read the dialogue “Water Supply Engineering in the World”:**

A. I'd like to know if you ever thought of the role of water supply in our rapidly changing world.

B. In popular books and journals we often read that water supply engineering is making greater strides.

A. And every year engineers are faced with more and more complex engineering problems: the quality of drinking water is awful in the world!

B. To tell the truth I am more puzzled with their complicated methods of purification.

- A. Naturally they are constantly improving conventional water treatment processes that includes pretreatment, aeration, rapid mix, coagulation and flocculation, sedimentation, filtration, disinfection.
- B. In most cases such problems are called for by industrial or ecological needs.
- A. To my mind the role of new technologies in water supplying is great in our society.
- B. Right you are. It is great.

**3. Answer the questions:**

- 1. Where do we read that science is making great strides?
- 2. What problems is water supply engineering faced with?
- 3. Are these problems called for industrial needs?
- 5. Is the role of an engineer great from this point of view?

**4. Role-play the dialogue with your partner using the information from the text.**

**5. Tell about new methods and technologies in water supply engineering.**

**6. Be ready to discuss the topic: “Drinking water in Future”. Use set expressions and phrases given below:**

- a) I'd like to know.
- b) To tell the truth.
- c) Naturally.
- d) That's that.

## UNIT VII. TRANSPORT ENGINEERING AND COMMUNICATIONS

### Modal Verbs (модальные глаголы)

Модальные глаголы – не обозначают действия, а выражают отношение к нему, т. е. возможность, вероятность или необходимость совершения действия. С определенными глаголами само действие выражается инфинитивом без частицы **to**, следующей за модальным глаголом. Модальные глаголы являются недостаточными глаголами (Defective Verbs), так как они не имеют всех форм, которые имеют другие глаголы. Модальные глаголы не имеют неличных форм – инфинитива, причастия, герундия.

Модальные глаголы не употребляются самостоятельно, а только в сочетании с инфинитивом смыслового глагола. Вопросительная форма образуется без вспомогательного глагола, причем модальный глагол ставится перед подлежащим. Отрицательная форма образуется при помощи частицы **not**, которая ставится непосредственно после модального глагола.

**Ситуация I** – автор активно относится к происходящему (*советует, настаивает, требует*).

It has been suggested that an end **should be put** to the barbarous treatment of nature.

Было предложено, чтобы был положен конец варварскому обращению с природой.

**Ситуация II** – автор занимает пассивную позицию наблюдателя и лишь оценивает вероятность или достоверность того, что имеет, имело или будет иметь место.

Some scientists suggest that intelligence life **should develop** on any planet where conditions are reasonably favourable for it.

Некоторые учёные полагают, что разумная жизнь должна возникнуть (вероятно возникает) на любой планете, где для этого есть достаточно благоприятные условия.

Глагол **must** в сочетании с Indefinite Infinitive употребляется для выражения необходимости (обязательности) совершения действия в силу определенных обстоятельств, а также для выражения прика-

зания. На русский язык глагол переводится *должен, нужно*. Глагол после **must** употребляется без частицы **to**.

I **must do** it now (необходимость в силу обстоятельств).

Я должен (мне нужно обязательно) сделать это теперь.

Глагол **to have** в сочетании с инфинитивом с частицей **to** употребляется для выражения необходимости совершаемого действия в силу определенных обстоятельств. В настоящем времени он переводится как *должен, нужно, приходится*, в прошедшем – как *должен был, нужно было, пришлось*, а в будущем – *должен буду, нужно будет, придется*.

I **have to put** a new visa in my passport.

Я должен (мне нужно) поставить новую визу в паспорт.

Глагол **to be** в сочетании с инфинитивом и с частицей **to** может употребляться для выражения необходимости совершить действие согласно предварительной договоренности или заранее намеченному плану. В будущем времени данный глагол для выражения долженствования не употребляется.

They **are to** begin this work at once.

Они должны начать эту работу немедленно.

**Shall** употребляется в вопросительных упражнениях с 3-м лицом единственного и множественного числа при обращении к собеседнику с целью получения распоряжения в отношении это 3-го лица. Данный глагол в этом случае имеет модальное значение, придавая действию оттенок долженствования. Глагол при переводе употребляется в форме инфинитива.

Where **shall** he wait for you? – Где ему ждать вас?

**Should** употребляется со всеми лицами в прямых и косвенных вопросах, начинающихся с **why** и выражающих сильное удивление или недоумение. Также данный глагол употребляется для выражения морального долга или совета. Он в этом случае имеет значение *должен, следует, следовало бы* и употребляется со всеми лицами единственного и множественного числа.

He **should** help you. Он должен помочь тебе.

Глагол **ought** должен, следует, следовало бы в сочетании с Indefinite Infinitive употребляется для выражения морального долга или совета, относящегося к настоящему или будущему.

He **ought not to have built** the hospital using toxic materials.

Он не должен был строить больницу с использованием токсичных материалов.

Глагол **may** в сочетании с Indefinite Infinitive употребляется для выражения разрешения и переводится на русский язык посредством *могу (можешь, может)*. Для выражения разрешения он употребляется только в настоящем времени. Глагол после **may** употребляется без частицы **to**.

You **may look** through my article.

Вы можете (вам разрешается) посмотреть мою статью.

В прошедшем времени для выражения разрешения употребляется **might**, а глагол **to allow** – в страдательном залоге.

He **was allowed** to go abroad.

Ему разрешено поехать за границу.

**Might** употребляется для выражения предположения в косвенной речи, зависящей от глагола.

He said that she **might know** this law.

Он сказал, что она, возможно, знает этот закон.

The steamer **can be discharged** tomorrow (**can** в сочетании с Indefinite Infinitive Passive переводится на русский язык посредством *может, могут* с инфинитивом страдательного залога или *можно* с инфинитивом действительного залога). Пароход **может быть** разгружен завтра.

He **could (was able to) swim** very well when he was young.

Он умел хорошо плавать, когда он был молодым.

Когда речь идет о фактически совершившемся действии, употребляется только **was able** со значением *смог, сумел, был в состоянии*.

We were able to find all mistakes of the project in twenty-four hours. Мы смогли найти все ошибки в проекте за 24 часа.

**Will** употребляется с 1-м лицом единственного и множественного числа с модальным значением, придавая действию в будущем времени оттенок желания, намерения, согласия или общения, просьбы.

**Will** you **show** me your calculations.

Покажите, пожалуйста, свои расчеты.

**Would** употребляется со всеми лицами единственного и множественного числа в отрицательных предложениях для выражения *упорного нежелания* совершать действия в прошлом.

I asked him several times to give up smoking, but he **would't**.

Я несколько раз просила его бросить курить, но он не хотел.

## Entry Test

### I. Chose the necessary modal verb.

1. I (can / may) speak English.
2. He (can/ was able) do it yesterday.
3. You (can/ may) take my pen.
4. You (should/ must) not make notes in the books.
5. He (have to/ should) go. He will have an exam tomorrow.
6. I (can/ must) not believe. I failed another test.
7. (might/ could) you turn the music down, please.
8. If you want to improve your English, you (can/must) work very hard.

### II. Translate the sentences into English using modal verbs *can, may, needn't*.

1. Вы можете взять эту книгу, если хотите.
2. Вы можете взять эту книгу: она не тяжелая.
3. Вы можете и не брать эту книгу.
4. Можешь сразу не соглашаться: подумай несколько дней.
5. Вы можете сегодня туда пойти.
6. Вы можете не принимать участие в данном пректе.
7. Он мог не приходиться: все уже сделано.
8. Вы можете оставить мне все расчеты, если хотите.

## Grammar Study

Study grammar again and do the following exercises.

### Ex 1. Paraphrase the sentences using modal verb *may* :

*Example: Possibly you left your book behind.*

*You may have left your book behind.*

1. Perhaps you left your drawings in the bus.
2. Perhaps he went to the café to wait for us.
3. Perhaps they came by plane.
4. Perhaps it was too cold for her to go out.
5. It is possible that he didn't pass the exam yesterday.
6. Perhaps Robert used my iPod.
7. Perhaps Nick has left his notebook at home.
8. Possibly Mary misunderstood you.

### Ex 2. Fill in modal verbs *can, may, must, need*.

1. Every student ... take exams at the end of each term.
2. Why ... not you understand it? It is so easy.

3. ... we do the exercise at once? – Yes, you ... do it right now.
4. ... you design this project?
5. You ... not leave to help us: we know what ... we do.
6. ... I take your pen ? Yes, please.
7. The crane ... not lift the construction: it is too heavy.
8. Everything is clear and you ... not go into detail now.

### Word Study

#### 1. Study your active vocabulary:

- environmentally compatible movement – экологически совместимый транспортный поток  
 involved territory – прилегающая территория  
 Air Transportation – авиаперевозки  
 Urban Transportation – городской транспорт  
 Highway – автомагистраль  
 Waterway – водная магистраль  
 Pipeline – трубопровод (нефтепровод)

#### 2. Match the phrases:

- |                                  |                                     |
|----------------------------------|-------------------------------------|
| 1) facilities                    | a) транспортное машиностроение      |
| 2) transportation engineering    | b) возможности                      |
| 3) forecasting                   | c) городское планирование перевозок |
| 4) urban transportation planning | d) назначение                       |
| 5) assignment                    | e) спрос                            |
| 6) demand                        | f) экологически совместимый         |
| 7) environmentally compatible    | g) прогнозирование                  |

### Reading Practice

#### *Text 1*

**1. Scan through the text. Note all the words and phrases you don't know. Look them in the English-Russian dictionary.**

#### TRANSPORTATION ENGINEERING

Transportation engineering is the application of technology and scientific principles to the planning, functional design, operation and management of facilities for any mode of transportation in order to provide for the

safe, efficient, rapid, comfortable, convenient, economical, and environmentally compatible movement of people and goods. Transportation engineering is a major component of the civil engineering and mechanical engineering disciplines, according to specialisation of academic courses and main competences of the involved territory. The importance of transportation engineering within the civil and industrial engineering profession can be judged by the number of divisions (Aerospace; Air Transportation; Highway; Pipeline; Waterway, Port, Coastal and Ocean; and Urban Transportation)

The planning aspects of transport engineering relate to urban planning, and involve technical forecasting decisions and political factors. Technical forecasting of passenger travel usually involves an urban transportation planning model, requiring the estimation of trip generation (how many trips for what purpose), trip distribution (destination choice, where is the traveler going), mode choice (what mode is being taken), and route assignment (which streets or routes are being used). More sophisticated forecasting can include other aspects of traveler decisions, including auto ownership, trip chaining (the decision to link individual trips together in a tour) and the choice of residential or business location (known as land use forecasting). Passenger trips are the focus of transport engineering because they often represent the peak of demand on any transportation system.

**2. Say what information was new for you. Comment on it.**

**3. Answer the questions:**

1. What is transportation engineering?
2. Transportation engineering is a major component of civil engineering and electronic engineering disciplines, isn't it?
3. What activities does transportation engineering involve?
4. Should a transportation engineer take into account auto ownership?

**4. Give the annotation of the text.**

## **Self-Training Work**

### *Text 2*

- 1. Read the text to yourself and try to understand what it is about.**
- 2. Scan through the text. Note all the words and phrases you don't know. Look them in the English-Russian dictionary.**
- 3. Translate the text in written form.**



## TRAFFIC ENGINEERING (TRANSPORTATION)

Traffic engineering is a branch of civil engineering that uses engineering techniques to achieve the safe and efficient movement of people and goods on roadways. It focuses mainly on research for safe and efficient traffic flow, such as road geometry, sidewalks and crosswalks, segregated cycle facilities, shared lane marking, traffic signs, road surface markings and traffic lights. Traffic engineering deals with the functional part of transportation system, except the infrastructures provided. Traffic engineering is closely associated with other disciplines:

- Transport engineering
- Pavement engineering
- Bicycle transportation engineering
- Highway engineering
- Transportation planning
- Urban planning
- Human factors engineering.

Typical traffic engineering projects involve designing traffic control device installations and modifications, including traffic signals, signs, and pavement markings. However, traffic engineers also consider traffic safety by investigating locations with high crash rates and developing countermeasures to reduce crashes. Traffic flow management can be short-term (preparing construction traffic control plans, including detour plans for pedestrian and vehicular traffic) or long-term (estimating the impacts of proposed commercial developments on traffic patterns). Increasingly, traffic problems are being addressed by developing systems for intelligent transportation systems, often in conjunction with other engineering disciplines, such as computer engineering and electrical engineering.

### Conversational Practice

#### 1. Remember some of the words and expressions to read the dialogue:

Customer Relationship Management – управление взаимоотношениями с клиентами

to hitch-hike – передвигаться автостопом

a jovial person – позитивный человек

a deadline – установленный срок

a prudent step – разумный шаг

## **2. Read Sample Job Interview Dialogue:**

*Interviewer:* “Tell me about yourself?”

*Interviewee:* “I am a traffic engineer with 4 years of experience in ‘Road Force’ with expertise in Customer Relationship Management process. Leaving aside that, I am a jovial person who loves to hitch-hike and indulge in white water rafting whenever time permits. All in all, a team person who loves to face challenges and deliver on deadlines!”

*Interviewer:* “Can you briefly explain what role you played in Customer Relationship Management process for ‘Road Force’?”

*Interviewee:* “Yes, sure. I was a team lead while designing the Customer Relationship Management project for Sales Force. The project was regarding international intelligent transportation systems. With a team of 15 members I was able to successfully affect our management strategy and helped the clients achieve a growth of 30% in sales.”

*Interviewer:* “Great! So, how do you think you fit in our organization?”

*Interviewee:* “I wish to make a career in transport engineering industry and keeping in mind my long term goals, I believe that associating with this organization will be the most prudent step. In here, I would surely be able to further utilize my engineering skills in the most effective manner and also, obtain a chance of acquiring newer skills.”

## **3. Answer the questions:**

1. Where did the interviewee work?
2. Why did he decide to apply this vacancy?
3. What were his ambitions?
4. What can you say about his character?
5. Have you ever had such an interview?

**4. Role-play the dialogue with your partner using the information from the text.**

**5. Be ready to discuss the topic: “Applying for a job in transport company”. Use set expressions and phrases given below:**

- a) I’d like to know...
- b) We have no doubt of (that)...

- c) It is to be noted...
- d) I am attaching some information about...

## SUPPLEMENTARY TEXTS FOR READING

### *Text 1*

#### **Ignacy Domeyko**

*Ignacy Domeyko or Domejko, pseudonym: Żegota (Spanish: Ignacio Domeyko) (July 31, 1802 – January 23, 1889, Santiago de Chile) was a Belarusian geologist, mineralogist and educator.*

Domeyko was born at a manor house located within the then Russian partition of the former Polish-Lithuanian Commonwealth, at Bear Cub Manor (Belarusian: *Мядзьеўедка*) near Nesvizh, Minsk Governorate, Imperial Russia (now Karelichy district, Belarus). The Domeyko family held the Polish coat of arms Dangieli. His father, Hipolit Domeyko, who was president of the local land court, died when Ignacy was seven years old; his uncles then served as his guardians.

Domeyko enrolled at Vilnius University, then known as the Imperial University of Vilna, in 1816 as a student of mathematics and physics. He studied under Jędrzej Śniadecki. Involved with the Philomaths, a secret student organisation dedicated to Polish culture and the restoration of Poland's independence, he was a close friend of Adam Mickiewicz. In 1823–24, during the investigation and trials of the Philomaths, Domeyko and Mickiewicz spent months incarcerated at Vilnius' Uniate Basilian monastery.

After a youth passed in partitioned Poland, Domeyko participated in the November 1830 Uprising against the Russian Empire. Upon its suppression, he was forced into exile and spent part of his life in France (where he had gone with fellow Philomath, Polish poet Adam Mickiewicz). Journeying through Germany, he arrived in France, where he would earn an engineering degree at Paris School of Mining. He also studied at the Sorbonne and maintained his political engagements with Belarusians, Poles, and Lithuanians.

In 1838 Domeyko left for Chile. There he made substantial contributions to mineralogy and the technology of mining, studied several previously

unknown minerals, advocated for the civil rights of the native tribal peoples, and was a meteorologist and ethnographer. He is also credited with introducing the metric system to Latin America. He served as a professor at a mining college in Coquimbo (La Serena) and after 1847 at the University of Chile in Santiago, of which he was a rector for 16 years (1867–83). A bronze bust of Domeyko stands in the *Casa Central* of Santiago's University of Chile. Domeyko gained Chilean citizenship in 1849, but declared at the time that "I may now never change my citizenship, but God grants me hope that wherever I may be – whether in the Cordilleras or in Paneriai (the Vilnius suburb) – I shall die a Lithuanian. "The term "Lithuanian" at that time, however, designated any inhabitant, whatever his ethnicity, of the territories of the former Grand Duchy of Lithuania.

In 1884 Domeyko returned for an extended visit to Europe and remained there until 1889, visiting his birthplace and other places in the former Commonwealth, as well as Paris and Jerusalem. In 1887 he was awarded an honorary doctorate by the Jagiellonian University, in Krakow. In 1889, soon after returning to Santiago, Chile, Domeyko died.

Domeyko is seen as having had close ties to several countries and thus in 2002, when UNESCO organized a series of commemorations of the 200th anniversary of his birth, he was referred to as "a citizen of the world".

Plaque commemorating the "distinguished son of the Polish nation and eminent citizen of Chile" In his youth he was a subject of the Russian Empire. Domeyko, however, had been brought up in the culture of the Polish-Lithuanian Commonwealth, a multicultural state whose educated and dominant classes had spoken Polish as a lingua franca and that, shortly before Domeyko's birth, had been dismembered in the partitions of the Polish-Lithuanian Commonwealth. For this reason, and because Domeyko subsequently spent most of his life in Chile, he is considered a person of national importance to Poles, Belarusians, Lithuanians and Chileans.

## *Text 2*

### **Kazimir Semenovich**

*Kazimir Semenovich (1600–1651) – Belarusian compatriot, military engineer and theorist of artillery. He is considered as one of the founders of world rocket ballistics and astronautics.*

There is no exact information on Semenovich's date of birth. Presumably, he was born in 1600, but it's known that he came from an impoverished gentry family of the Semenoviches who owned some land in Vitebsk region. Semenovich considered himself as Lithuanus. He had good knowledge of arithmetics, geometry, mechanics, hydraulics, pneumatics, architecture, physics and chemistry as well as fine arts, sculpture, engraving etc. He is believed to have acquired such encyclopedic knowledge (right in the spirit of the Renaissance) in Vilnia University.

Kazimir Semenovich was a participant of the war between Russian state and Poland (1632–34) and the siege of the Moscow garrison in the town of White (March-May 1634), a participant of the battle of Rzez Pospolita forces against the Tatars at the Akhmatovo (30.01.1644), where he was a witness of the Tatar fireworks. In 1645 he went to the Netherlands and in the same year took part in the siege of different cities by the troops of Frederick Henry of Oranski. In 1648 he took part in the war with the Cossacks.

Although his parents wanted him to become a politician, Semenovich strongly believed that it's artillery which combines both science and art as well as all the wisdom of the world. He studied artillery in Holland, took part in the war between Holland and Spain, on returning home he took posts of engineer of the Crown artillery and then lieutenant-general. After he retired he went back to Holland to publish his treatise "The Great Art of Artillery". Kazimir Semenovich's work was first published in Latin language in 1650. One year later the second edition in French language appeared. The book consisted of five parts and included a plenty of engravings based on the author's sketches. The book described the multi-staged rocket, the delta wing and the rocket system of volley fire. Original Belarussian words such as "berkavets" and "baryla" (old units of measurement) become international scientific terms. This study attracted the attention of experts in different countries and was translated into numerous European languages. During centuries this work had been not only one of the major scientific works in Europe, but also one of the most demanded textbooks on artillery.

Soon after the book was published he died. The causes of death are unknown.

### *Text 3*

#### **Barys Kit**

*Barys Kit (was born April 6, 1910) is a famous Belarusian and American rocket scientist.*

Kit was born on April 6, 1910 in Saint Petersburg, Russian Empire to the family of an employee at the Post and Telegraph Department, a Belarusian in origin. In 1918 Kit's family moved to their native village of Aharodniki (now merged with the town of Karelichy, Hrodna Region).

After graduation from Navahrudak Belarusian Lyceum in 1928 Kit entered the physics and mathematics faculty of Vilnius University. After graduation in 1933 he worked as a teacher at Vilnius Belarusian Lyceum. In 1939 he was appointed its Principal. After the Vilnius Region had been annexed to Lithuania in 1939, Kit returned to his native region. He was the Principal of Navahrudak Belarusian High School there and later a superintendent of a large school system district. Hundreds of elementary schools and several dozen high schools were opened in the region within a year due to Kit's direct participation.

During the Nazi Occupation of Belarus (1941–1944) Kit worked as a teacher in the village of Lebedzeva near Maladzyechna and later as a director of the Pastavy Teachers College. He was suspected of having partisan connections and was arrested by the German SD punitive bodies. He spent a month in prison and was saved from execution by his former pupils. In 1944 Kit and his family with the retreating German army moved to Germany, first to Offenbach-Lindau in Bavaria, then to Munich. In 1948 Kit emigrated to the United States. In 1950 he settled in Los Angeles and worked there as a chemist in various companies.

In the mid-1950s Kit began his scientific activities in the field of astronautics. For 25 years he worked in the American space research program. As a mathematician and systems analyst, he took part in projects aimed at the development of intercontinental missile systems. Kit took part in all the American space research projects, including mathematical support of the mission to the Moon.

In 1972 Kit moved to Frankfurt-am-Main in Germany, where he lives as of 2013. In 1982 Kit earned a Ph.D. in mathematics and science history from the University of Regensburg.

Kit is the author of the first manual on rocket propellant "Rocket Propellant Handbook", published by McMillan in 1960. The book received many positive reviews and is referenced in rocket science publications even today.

Kit is a long-standing member of the American Institute of Aeronautics and Astronautics, an honorary member of the Hermann Oberth German Astronautics Society Board of Directors, a member of the International Astronautics Academy in Paris, Vice-President of the Eurasian International Astronautics Academy, Professor Emeritus of Maryland University, Honorary Doctorate of Science of Hrodna State University, and Navahrudak's honorable resident.

A "time capsule" with Kit's name was immured in the wall of Capitol in Washington, D.C. Kit has always remained a conscious Belarusian: "Everything I did in my life – I did for my homeland and its fame".

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И ОБСУЖДЕНИЯ

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дневной и заочной формы обучения

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