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Кафедра «Гуманитарные дисциплины»

# ИНОСТРАННЫЙ ЯЗЫК

*Методические рекомендации к практическим занятиям  
для студентов технических специальностей  
и направлений подготовки  
дневной и заочной форм обучения*

**ЛЕКСИКО-ГРАММАТИЧЕСКИЕ ЗАДАНИЯ  
ПО АНГЛИЙСКОМУ ЯЗЫКУ**

**A**

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Методические рекомендации имеют своей целью развитие лексических и грамматических умений и навыков, расширение словарного запаса, выработку необходимых навыков перевода текстов технической тематики, развитие и совершенствование навыков и умений монологической речи и диалогического общения.

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## ИНОСТРАННЫЙ ЯЗЫК

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## Unit 1

### *Лексико-грамматические задания*

#### **Выполните письменно упражнения № 1–16.**

Прежде чем выполнять упражнения, внимательно изучите следующие правила.

1. Видовременные формы английского глагола в активном залоге.
2. Существительное.
3. Употребление артиклей.
4. Местоимение.
5. Прилагательное, наречие.
6. Модальные глаголы.

#### **1. Match the products and industries.**

1. diesel oil	a) the pharmaceutical industry
2. car components	b) the construction industry
3. buildings	c) the textile industry
4. medicines	d) the electronics industry
5. jet engines	e) the petrochemical industry
6. cardboard boxes	f) the aerospace industry
7. semi-conductors	g) the telecommunication industry
8. cloth	h) the automotive industry
9. mobile phones	i) the pulp and paper industry

#### **2. Complete the text by putting each of the verbs in brackets into the correct form of the Present Simple.**

A computer ... (1. to be) a machine with an intricate network of electronic circuits that ... (2. to operate) switches or ... (3. to magnetize) tiny metal cores. The switches, like the cores, ... (4. to be) capable of being in one or two possible states, that is, on or off; magnetized or demagnetized. The machine ... (5. to be) capable of storing and manipulating numbers, letters, and characters (symbols). The basic job of computers ... (6. to be) processing of information, which ... (7. to be) a series of operations that ... (8. to convert) data into useful information. Thus, a computer ... (9. to be) a device which ... (10. to accept) information in the form of instructions (a program) and characters (data), ... (11. to perform) mathematical and/or logical operations on the information and then ... (12. to supply) results of these operations.

#### **3. Choose the correct form of the verb in *italics* in the Present Perfect or the Present Perfect Continuous. It may be possible to use both forms.**

1. As you know, many new staff *have joined/been joining* us recently.
2. I *have been thinking/have thought* on your proposal for a week. I haven't made a decision yet.

3. How much holiday *have you taken/been taking* this year?
4. I *'ve sent/been sending* the invoice three times but they still haven't paid.
5. He *has written/has been writing* his thesis for three months.
6. I *'ve tried/been trying* to get through all day but the number is always engaged.
7. It's a successful business; they *'ve opened/been opening* eight branches in the last three years.
8. They *'ve been interviewing/interviewed* candidates all morning.
9. How long *has she written/been writing* the report?
10. How many times *have you visited/been visiting* this country?
11. This year we *have concluded/been concluding* three contracts.
12. He *has worked /been working* for this company for 25 years.

**4. Complete the texts by putting the verbs in brackets into the correct form of the Past Simple.**

**A.**

When we ... (1. start) a new project we ... (2. not have) the right people to develop software for it. I ... (3. suggest) that we hire a qualified team from a different company instead of training our personnel. It ... (4. help) us cut costs on the training programs and efficiently complete the project.

**B.**

When Fred Smith ... (1. attend) Yale University Business School, he ... (2. write) a project paper on the concept of overnight package delivery. The professor ... (3. award) Smith a "C minus" for it. This was because he ... (4. reason) the proposal ... (5. have) little potential as the postal industry was monopolized by the US Mail. Who would want to send a package through another courier when there was the US Mail? But Smith wasn't discouraged. He ... (6. start) the Federal Express. On the first day of business, his goal ... (7. be) to deliver 167 packages. However, he only ... (8. deliver) seven, five of which ... (9. be) packages sent to himself. Today, Federal Express is one of the world's largest overnight delivery companies.

**C.**

The famous American scientist Benjamin Franklin ... (1. to experiment) with atmospheric electricity and ... (2. to prove) that lightning ... (3. to be) a discharge of electricity. He ... (4. to invent) the lightning conductor, a metal device which ... (5. to protect) buildings from lightning by conducting the electrical charges to the earth. Franklin also ... (6. to prove) that unlike charges are produced due to rubbing dissimilar objects. He ... (7. to call) the charges negative and positive.

**5. Complete the dialogue by putting the verbs in brackets into the correct form of the Past Simple.**

<i>go get like have (x3) make (x2) be (x3) stay</i>
-----------------------------------------------------

Laura: Hi, Sam. You (1)... to the Homebuilding and Renovating Show last week, didn't you? (2) ... you ... a good trip?

Sam: Yes, it was great.

Laura: (3) ... you ... any useful contacts?

Sam: Well, there (4) ... a lot of people at the show, and I (5) ... a lot of good contacts but we (6) ... nearly as many orders as last year.

Laura: Oh, why was that? (7) ... they... our new projects?

Sam: No, no, that (8) ... the problem. There (9) ... much more competition this year.

Laura: How long (10) ... you ... ?

Sam: Three days. On my last day I (11) ... a late flight so I (12) ... a chance to see the city.

**6. Complete the texts by putting each of the verbs in brackets into the correct form of the Present Simple, Present Continuous, Past Simple, Present Perfect, Present Perfect Continuous.**

**Образец:** *I (live) in England since 2010. – I have lived in England since 2010. (Present Perfect)*

**A.**

My name is Sergey Ivanov. I am from Mogilev. I ... (1. be) born in Mogilev and ... (2. live) there for 20 years. I ... (3. go) to secondary school until I was 17. For five years I ... (4. study) mechanical engineering at the Belarusian-Russian University. I ... (5. graduate) in 2021 with honours. Up until a month ago, I was working in one of Mogilev companies. Last month I ... (6. decide) to apply for a job in one of the engineering companies in Minsk. I was lucky to be accepted and now I ... (7. look forward) to my new job. I just ... (8. move) to Minsk. I ... (9. never work and live) in Minsk before, but I have a few friends here. We ... (10. know) each other since we were at university so the move shouldn't be too difficult.

**B.**

Sam ... (1. to be) in his first year at university. He ... (2. to want) to be an engineer. He ... (3. to live) in a dorm and gets a scholarship. This month he ... (4. to work) part-time as a waiter. He ... (5. to start) work at 6 pm and ... (6. to finish) at midnight. This schedule ... (7. to suit) Sam because he doesn't have to skip classes.

**C.**

- What ... (1. you/do), Kate?
- I ... (2. work) as assistant to General Director.
- What ... (3. your company/do)?
- We ... (4. produce) software.
- Is that a big company?
- No, it's rather small. It ... (5. employ) only thirty people.
- You ... (6. be) still very young. Is that your first job?
- No, it's my second job. My first job ... (7. be) in a bank.
- Why ... (8. you/leave) that job?
- The bank ... (9. close) down.
- I understand. Competition ... (10.be) tough these days, isn't it? And how long ... (11. you/work) here?

– Three years. I ... (12. be) happy with my job. I ... (13. have) a good salary and good career opportunities.

– OK. Good luck with you job!

**7. Choose the correct alternatives in *italics*.**

1. This machine costs *a/-* thousand euros.
2. (*A/The*) CEO will arrive in *a/-* couple of minutes.
3. I work for *a/the* large multinational company.
4. Do you accept *-/the* credit cards?
5. We manufacture *the/-* components for our car production plants in *the/-* Europe.
6. Our office is in *a/the* centre of *a/the* city.
7. *A/the* construction engineer oversees the design and implementation of *the/-* large building projects.
8. There was *an/the* interesting article about our company in *a/the* local newspaper.
9. I need some time to think about *an/the* offer you made.
10. I have (*an/the*) appointment at *a/the* bank.
11. *The/a* domestic market accounts for about 40 per cent of our total production.
12. We design and assemble *the/a* wide range of *-/the* electric generators for hospitals, hotels and small factories.
13. *A/The* presentation was *a/the* great success.
14. Software engineering is one of *the/-* most in-demand occupations in the country.
15. I left *the/-* school at 17; then I went to *the/-* Belarusian-Russian University to study *-/ the* engineering.
16. I had *a/the* job interview yesterday. It didn't go well.
17. He worked as *an/the* engineer in *a/the* car manufacturing company for eight years.
18. I received *an/the* email from my business partner. He wants to negotiate *the/-* terms of *the/-* contract.
19. I know that you've got *a/the* problem with your computer. What exactly is *a/the* problem?
20. We want to start *a/the* new project.
21. You can view *the/a* list of available positions and job descriptions on our website.
22. This is *a/the* piece of equipment that controls the injection speed.
23. He sometimes travels to the sites to inspect the cables and electrical equipment in *-/the* person.
24. *-/the* Teamwork and *-/the* time management are critical to a business's success.
25. In my job I use *the/-* leadership and people management skills as I manage *the/-* interns and supervise *the/-* engineers.

26. At *-/the* university, I was involved in managing *a/the* student project. We wanted to enter *a/the* competition and our company has developed from that.

**8. Choose the correct alternatives in *italics*.**

1. There may be *an/some* information about the forum.
2. I'm afraid we haven't got *much/many* time.
3. *Is/Are* there *many/much* traffic in Beijing?
4. *How much/How many* information have we got about this company?
5. A career coach is a person *who/which* works with clients to help them achieve their career and employment goals.
6. *Is/Are* there *many/much* banks with a head office in London?
7. We bought *some/any* new equipment last month.
8. We bought *a few/a little* new machines last month.
9. *How much/How many* pages are there on your website?
10. You can choose *some/any* colour you want.
11. He gave me *an/some* advice which *was/were* really useful.
12. There are *a few/a little* ways to cut your monthly expenses. Which one you choose depends on your priorities.
13. An employment contract is an agreement between an employer and an employee *who/which* sets out terms and conditions of employment.
14. We have *some/any* black ones in stock, but we don't have *some/any* white ones.
15. This is a machine *which/who* controls the wire feed speed.
16. He travels *a lot/lot* on business. After long flights he usually feels tired the next day and tries not to schedule *any/some* important appointments until late afternoon.
17. I used to like to work on one project to its completion before starting *another/the other* one. Now that I've learned to work on several different projects simultaneously, I realized that I can be more creative and efficient in *each/every* of them.
18. I need good organisational skills to keep in contact with so *much/many* people.

**9. Complete the sentences with the word *a, an, some, much or many*.**

1. That's ... good idea.
2. There is ... important work that we need to do over the next few months.
3. We do some business in China, but not... .
4. We have a few customers in China, but not ... .
5. I'd like to make ... inquiry about training courses you offer at your university.
6. We'd like you to do ... research on the whole idea, and then write ... report on whether to go ahead or not.
7. Do you have ... trouble with the new machines in your plant?
8. Do you have ... difficulties with the new machines in your plant?
9. I need to claim ... expenses for my trip last month.
10. We didn't study ... economics at university, just a little.

11. I haven't got ... experience of this kind of thing.
12. Can I have ... information about trains to London?
13. It should be ... interesting job, and I think you're the best person to do it.
14. Well, that's ... progress, I suppose.
15. Have you got ... moment for a chat?

**10. Read the following sentences and identify the adjectives and adverbs. Translate the sentences into Russian.**

1. The smaller the transistor, the faster is the speed of its response.
2. I work for a large electrical automation company and we provide products and solutions that make buildings more efficient and eco-friendly through automation and digitisation.
3. I do a lot of computer software testing and analysing potential products. I use software to test motor vehicles. I also use another software to test which materials work best for the vehicles.
4. In the office, he checks power and energy readings to make sure the solar panels are working correctly.
5. If you want to sell your products or services successfully, you should use online marketing tools.
6. I applied to do Economics, but in my second year I picked up a maths module, and found I was more interested in maths and engineering, so I went on to do a Master's degree in Mechanical Engineering Technology.
7. At work, we use maths every day. We use spreadsheets and work with numbers as we try to be as cost-effective as we can.
8. Completing your work as soon as possible and to the right standard is crucial, as are skills such as communication and people skills.
9. In terms of soft skills, time management is very important – I try and break up my tasks throughout the day. In general, employees who can manage their time well are more productive, more efficient, and more likely to meet deadlines.
10. Teamwork and time management skills are needed as well. You have to work in a team and make sure things are done as quickly and safely as possible.
11. Workplace safety is very important in this job. You need to keep everyone safe because we are working with some potentially dangerous equipment.

**11. Match polite phrases to suitable responses.**

1. – Could you tell me how to get to the bank, please?
2. – Let me carry your suitcase for you.
3. – Would you please check the information?
4. – I'm really sorry about my mistake.
5. – Can you phone me tomorrow?
6. – Thanks very much for your help.
7. – Would you like a coffee?
8. – Can I help you?
9. – Can I introduce my colleague? This is Ann Smith.



10. – I could make a copy for you.

11. – Is it OK to smoke in here?

- a) – Thanks - that's very kind of you.
- b) – Pleased to meet you.
- c) – Not just now, thanks.
- d) – Yes, I'm looking for Mr Jones.
- e) – Yes, of course.
- f) – Thanks, but I don't really need one.
- g) – I'm sorry. I don't know the city very well.
- h) – That's all right.
- i) – I'm sorry. It isn't allowed.
- j) – No problem. You're welcome.
- k) – That would be very nice. Thank you!

**12. Choose the most appropriate words in italics.**

1. *You could/Could you* open the window, please?
2. *Do you want that I/Can I* help you with your bag?
3. *Could I/Let me* borrow your magazine to read?
4. *Could you/Would you like to* sit down?
5. *Could you/You could* say it again?
6. *Can I/I want to* see the photos?
7. *Can you/Please* give me your phone number?
8. *Can/I want* you give me a lift to work tomorrow, please? My car is being repaired at the moment.
9. *Can/Shall* I have a word with you?
10. *Would I/Could I* have some more water, please?

**13. Choose the best response to each offer or request.**

1	Would you mind giving me a hand?	a) I'll be glad to help. b) Yes, please. c) Of course I will.
2	Do you mind if I borrow your pen for a minute?	a) I'd love to. b) Not in the least. c) I'm afraid so.
3	Could I have the data by the end of the week, please?	a) Take your time. b) Certainly. c) Don't worry.
4	I could bring the files to your office.	a) Thanks – that's very kind of you. b) It's up to you. c) Certainly.

5	Will you explain it more clearly?	a) Not in the least. b) I'll try to. c) Anything you like.
6	Would you like another cup of coffee?	a) I'm afraid not. b) Not just now, thanks. c) No I don't.
7	Can you arrange an online bank transfer tomorrow by 3 o'clock?	a) Do it yourself. b) I'm pleased to. c) Yes, no problem.
8	Let me show you to the conference room	a) Of course. b) You're welcome. c) Thank you.
9	Would you send this invoice, please?	a) I'm sorry, I can't at the moment. b) It isn't possible. I'm busy. c) I certainly don't.
10	Would you do me a favour?	a) Here you are. b) It would be my pleasure. c) Don't mention it.

#### 14. Complete the sentences with a preposition.

<i>of</i>	<i>for(x3)</i>	<i>to</i>	<i>from...to</i>	<i>with (x3)</i>	<i>at</i>
-----------	----------------	-----------	------------------	------------------	-----------

- I'm in charge ... IT Services.
- I'm responsible ... managing the IT systems.
- I report ... the Human Resources Director.
- I studied ... my degree at this University.
- My work involves dealing ... customers.
- Laura works in an office ... 9 am ... 5 pm.
- I work as a project manager ... a software company.
- I arrive ... work at about 8.30, go straight to my desk and check my emails.
- He graduated three years ago ... a degree in economics.
- Your company's most important asset is its customers, so you need to make sure you're dealing ... your customers properly.

#### 15. Complete the sentences using a word from the box.

<i>salaries</i>	<i>apprentice</i>	<i>team</i>	<i>manufacture</i>	<i>flexi-time</i>	<i>position</i>
<i>expenses</i>	<i>shift</i>	<i>turnover</i>	<i>days off</i>	<i>vacation</i>	<i>operations</i>
	<i>plant</i>	<i>people</i>	<i>overtime</i>	<i>bonuses</i>	

- Our maintenance ... do all our repairs.
- He is going away on a short .... he will not come back until next week.

3. We are ahead of schedule on this project. You can take a couple of ... .
4. All the employees in our company usually get ... before Christmas.
5. I'm doing ... this week so I'll earn more money.
6. She works ... so she can start work any time between 8 a. m. and 9 a. m.
7. They ... electronic components for computers.
8. What ... are you on this week?
9. Our ... this year will be about \$500,000.
10. The company is opening a new car ... here next year.
11. Ann worked as a sales manager but she lost her job. Her ... became redundant due to the financial crisis.
12. Our company has ... in more than twenty countries.
13. I am working with a ... of six people.
14. I am an ... at a local motor vehicle assembly plant.
15. Common car ... usually include car insurance, gas, parking and speeding tickets.
16. For most people the main sources of incomes are their ... .

**16. People are talking about their jobs. Fill the gaps in these sentences with suitable words from the list.**

<i>tiring</i>	<i>traveling</i>	<i>developing</i>	<i>stimulating</i>	<i>involves</i>	<i>designing</i>	<i>hiring</i>
	<i>working</i>	<i>boring</i>	<i>dealing</i>	<i>maintaining</i>		

**A.**

1. ... the right people from the start is the best way to reduce employee turnover.
2. Obviously, my work involves ... a lot. It can be quite physically ..., but I enjoy ... with customers.
3. I like ... with figures, but my job is much less ... than people think. The work ... a lot of human contact and teamwork.
4. I love my job. It's very ... and it's very satisfying to write a program that works.
5. In my job, I'm responsible for ... databases, then ... them and later ... them.

**B.**

<i>work for</i>	<i>challenging</i>	<i>responsibilities</i>	<i>run</i>	<i>problems</i>	<i>deadlines</i>
<i>in charge of</i>	<i>deal with</i>	<i>responsible for</i>	<i>flexitime system</i>	<i>from meetings</i>	

I (1) ... an engineering company. In fact, I (2) ... the IT department. One of my (3) ... is to make sure that projects are completed on time. I'm (4) ... planning projects from start to finish. I'm also (5)... supervising support technicians. I (6) ... a lot of the technical engineering, as well as the business side, such as dealing with finances and clients. We have (7) ... in my company, which means we can work when we want, within certain limits. We can work (8) ... home using a computer and the Internet. Modern technologies makes communication very simple and fast.

Occasionally, I have to solve (9) ... by remote access. From time to time I have to attend (10) ... with managers. I have found that I enjoy working in a (11) ... environment. When I'm under pressure, I focus and get the job done. I've done some of my best projects under tight (12)... where the atmosphere was very stressful.

***Задания для чтения с последующим изложением прочитанного на английском языке***

При подготовке пересказа внимательно прочитайте текст, подчеркните предложения, содержащие основные мысли. Затем составьте план высказывания, выпишите слова, необходимые для передачи содержания. Не стремитесь пересказать текст дословно, опускайте маловажные детали.

<i>Useful expressions</i>	
1	The article deals with...
2	The present paper is (largely) concerned with...
3	The text highlights one of the vital issues...
4	First ... At first ... Firstly ... After this/that ... Then ... Next ... Finally ...
5	The article begins with the description of / with a short historical overview of...
6	At the beginning of the article the author describes / points out what ... / states that ... /explains why...
7	Then the author gives a detailed analysis/description / examines the argument / depicts / explains / mentions / points out ...
8	An important point is that ...
9	In addition ...
10	Moreover ...
11	Besides ...
12	Actually ...
13	In other words ...
14	As a matter of fact, ...
15	After all ...
16	However ...
17	On the one hand, ... , on the other hand, ...
18	As a result
19	For example ...
20	In particular ...
21	For this reason ...
22	The author concludes with the description of / the analysis of, some (few) critical remarks about / concerning ...
23	The author/writer concludes by saying that ... (comes to the conclusion that, emphasises) ...
24	At the end of the story the author sums it all up by saying ...
25	To conclude (to sum up), ...

26	In conclusion ...
27	On the whole ...
28	In my opinion ...
29	I must admit ...
30	I think ... / I believe ... / I guess ...

### 17. Summarise the main ideas of the text.

#### Isaac Newton – A Great Scientist

Isaac Newton was one of the world's greatest scientists. He did research in mathematics, physics, astronomy and many other fields.

Newton was born in 1642. He worked on his family's farm but was not really interested in farming. His father died before Isaac was born. In his childhood he spent a lot of time with his grandmother. Newton did not have many friends and never got married. Newton did most of his scientific work at Cambridge, where he was a professor for many years. Isaac Newton was a very ambitious scientist who carried out his experiments very accurately. Newton was an astronomer and studied the Earth, the planets and stars. Isaac Newton wondered why the moon and the planets always moved around the Earth and the sun. He found out that the same force that pulled an apple back to the ground also kept the moon moving around the Earth. He also showed that planets move around the sun in ellipses.

Isaac Newton became well-known for theories of gravity, in which he claimed that all objects of the universe have a gravitational force that pulled other objects towards them. An apple is pulled to the Earth's surface just like the Earth is being pulled towards the sun. He also explained that gravity depends on the mass of an object or the amount of material that it has.

He died in 1727 and was buried at Westminster Abbey in London.

#### *Задания для чтения и перевода*

18. Read the texts, translate them into Russian, write a list of unfamiliar words.

#### Text 1. Manufacturing

The word manufacturing is derived from the Latin *manu factus*, meaning *made by hand*. Manufacturing involves making products from raw materials by various processes or operations.

Manufacturing is generally a complex activity, involving people who have a broad range of disciplines and skills and a wide variety of machinery, equipment, and tooling with various levels of automation, including computers, robots, and material-handling equipment.

Manufacturing activities must be responsive to several demands and trends. A product must fully meet design requirements and specifications. A product must be manufactured by the most economical methods in order to minimize costs. Quality must be built into the product at each stage, from design to assembly, rather than relying on quality testing after the product is made. In a highly competitive environment, production methods must be sufficiently flexible so as to respond to changing market demands, types of products, production rates, production quantities, and on-time delivery to the customer.

New developments in materials, production methods, and computer integration of both technological and managerial activities in a manufacturing organization must constantly be evaluated with a view to their timely and economic implementation.

Manufacturing activities must be viewed as a large system, each part of which is interrelated to others. Such systems can be modelled in order to study the effect of factors such as changes in market demands, product design, material and various other costs, and production methods on product quality and cost. The manufacturing organization must constantly strive for higher productivity, defined as the optimum use of all its resources: materials, machines, energy, capital, labour and technology. Output per employee per hour in all phases must be maximized.

## **Text 2. Metals**

There are two groups of metals; ferrous and non-ferrous. Ferrous metals contain iron, for example carbon steel, stainless steel (both alloys; mixtures of metals) and wrought iron. Non-ferrous metals don't contain iron, for example aluminium, brass, copper (which can be remembered as ABC) and titanium.

**Ferrous Metals** As the most abundant of all commercial metals, alloys of iron and steel continue to cover a broad range of structural applications. Iron ore is readily available, constituting about 5% of the earth's crust, and is easy to convert to a useful form. Iron is obtained by fusing the ore to drive off oxygen, sulfur, and other impurities. The ore is melted in a furnace in direct contact with the fuel using limestone as a flux. The limestone combines with impurities and forms a slag, which is easily removed.

Common ferrous metals include stainless steels, carbon, tool and alloy steel. These metals are primarily used for their tensile strength and durability, especially mild steel which helps hold up the tallest skyscrapers and the longest bridges in the world. You can also find ferrous metals in housing construction, industrial containers, large-scale piping, automobiles, rails for railroad and transportation, most of tools and hardware you use around the house.

**Non-Ferrous Metals.** Nonferrous metals are specified for structural applications requiring reduced weight, higher strength, nonmagnetic properties, higher melting points, or resistance to chemical and atmospheric corrosion. They are also specified for electrical and electronic applications. Non-ferrous metals include aluminium, brass, copper, nickel, tin, lead, and zinc, as well as precious metals like gold and silver. They are primarily used where their differences from ferrous metals can provide an advantage. For instance, non-ferrous metals are much more malleable

than ferrous metals. Non-ferrous metals are also much lighter, making them well-suited for use where strength is needed, but weight is a factor, such as in the aircraft or canning industries. Because they contain no iron, non-ferrous metals have a higher resistance to rust and corrosion, which is why you will find these materials in use for gutters, water pipes, roofing, and road signs. Finally, they are non-magnetic, which makes them perfect for use in small electronics and electrical wiring.

### *Темы для обсуждения*

1. The Belarusian-Russian University.
2. Higher Education in the Republic of Belarus.
3. Student Life.

### **19. Read the text and answer the questions given below.**

#### **The Belarusian-Russian University**

The Belarusian-Russian University is a dynamic modern university with a long history of providing higher education to meet the needs of society and industry. The University is subordinate to the Ministries of Education of the Republic of Belarus and of the Russian Federation.

The Belarusian-Russian University was founded in 1961 as the Mogilev Mechanical-Engineering Institute and later was reorganized into a university. It trains engineers and economists in compliance with the Belarusian and Russian educational standards. Now it comprises a system of a continuous educational process: Lyceum, College of Architecture and Construction, University, Professional Development and Retraining Institute. The University has eight faculties: Faculty of Mechanical Engineering, Faculty of Construction, Faculty of Electrical Engineering, Faculty of Automotive Engineering, Faculty of Economics, Faculty of Engineering and Economics, Correspondence Faculty, Faculty of Pre-University Training.

Entrance to the University is by centralized testing. Those who pass tests successfully are enrolled on a course at the University. The basic subjects of the first year are Higher Mathematics, Physics, History of Belarus, Belarusian, Russian and a Foreign Language, PT classes, etc. These subjects lay the foundation for specialized subsequent years. The University has a good computer network and a good library.

Specialists of the highest qualification are trained through postgraduate (Master's and PhD) courses. The University has a specialized Board for defending theses and awarding the PhD degrees in Engineering.

The University close relationship with industry and commerce benefits students, teachers and the society. The University also highly values its many international contacts. Students from foreign countries are an important part of the Belarusian-Russian University.

The University has three Halls of Residence. There are several sports clubs, providing a wide range of sporting opportunities.

A good reputation of the Belarusian-Russian University and attractions of the city of Mogilev offer a strong incentive to live and study here.

**Questions.**

1. Do you agree that the choice of university determines your future life?
2. What were your reasons to choose the Belarusian-Russian University?
3. Would you like to proceed with your training through postgraduate courses? Why/Why not?

**20. Read the text and answer the questions given below.**

**Higher Education in the Republic of Belarus**

The higher education system of the Republic of Belarus is developing in line with global trends. Higher education in Belarus is represented by universities, institutes, academies. Belarusian higher education institutions offer training in a wide range of fields of study: technology and equipment; architecture and construction; natural sciences; environmental sciences; healthcare; art and design; humanities; economics; management, etc.

The current structure of higher education comprises two stages. The first stage enables students to obtain a diploma of higher education in a specific major field. Admission to the first stage is based on the results of centralized tests and the grade point average received at the general secondary education level.

Belarusian higher educational institutions offer both full-time and part-time study modes. Most undergraduates choose to study full-time. The students who have to balance study with personal or work life can enroll on a part-time course of study (correspondence or distance).

The academic year is divided into two semesters followed by exam sessions. The grading options are numerical grades or pass/fail. Ten is the highest grade achievable and one is the lowest. The minimum passing grade is four. Certain courses are offered on a pass/fail basis. The results of exams are recorded in the student academic record book. The students who meet the requirements of the curriculum and pass tests and exams in academic disciplines can progress to the next semester or academic year.

Final evaluation is carried out to determine whether the graduates' academic achievements conform to the requirements of educational standards. The final evaluation forms of student performance are state exams and defense of the graduation project. During their final year at the university students undergo internships which allow them to gain practical skills and workplace experience. Successful graduates receive state diplomas certifying their qualification and a transcript reflecting the courses taken and the grades earned by students throughout a course of study.

Higher education institutions offer accommodation to full-time non-resident students in student residence halls. Full-time students who demonstrate good



academic performance receive monthly allowances. Full-time students who receive education funded from state budget are provided with the first job placement.

Higher education in Belarus does not only mean lectures, seminars and exams. Students take part in scientific conferences and competitions, student exchange programs. Besides, they have the opportunity to participate in a variety of extracurricular activities: sports, music and dance groups, theater, volunteering, etc.

Universities are headed by rectors. Vice-rectors are in charge of managing particular areas of the university, e.g., research or academic affairs. Universities are generally divided into a number of academic departments, schools or faculties.

The second stage of higher education allows students to gain higher level skills and more specialized understanding of their subject area and leads to a master's degree. Advanced academic training is available through post-graduate and doctoral courses.

### **Questions.**

1. What institutions provide higher education in the Republic of Belarus?
2. What fields of study are offered at higher education institutions?
3. What is the current structure of the Belarusian higher education?
4. What are general requirements for admission to the first stage?
5. What study modes are available at Belarusian higher education institutions?
6. What grading system is used at Belarusian higher education institutions?
7. How are university studies organized in an academic year?
8. What documents are given to graduates?
9. What benefits are offered to higher education students? Can all students enjoy these benefits?
10. How are universities organized?
11. What options do university graduates have after the first stage of higher education?

## Unit 2

### *Лексико-грамматические задания*

#### **Выполните письменно упражнения № 1–13.**

Прежде чем выполнять упражнения, внимательно изучите следующие правила.

1. Видовременные формы английского глагола в страдательном залоге.
2. Причастие, формы и функции причастия, причастные обороты.
3. Инфинитив. Инфинитивные обороты.
4. Герундий, функции герундия в предложении, герундиальные обороты.
5. Условные предложения.
6. Числительное.

#### **1. Complete these sentences by putting the verbs in brackets into the correct form of the Present, Past or Future Simple Passive.**

1. The names of your files ... (keep) in a directory on each disk.
2. Metals ... (distinguish) from nonmetals by their high conductivity for heat and electricity, by metallic lustre and by their resistance to electric current.
3. Check that an Ethernet cable ... (plug) in to the correct card on the rear of the computer.
4. One of the earliest attempts to propel a vehicle by mechanical power ... (suggest) by Isaac Newton.
5. The first primitive houses... (make) of the building material at hand.
6. Modern skyscrapers ... (build) with materials such as steel, glass, reinforced concrete and granite, and utilise mechanical equipment such as water pumps and elevators.
7. Our lab ... (equip) with state-of-the-art electronic test and measurement equipment next year.
8. The energy consumption in our factory ... (reduce) by 10 per cent next year.
9. Later-model computers ... (provide) with the capability of handling numerous input devices directly.
10. The delay ... (cause) by the accident on the motorway.
11. The first practical internal combustion engine ... (introduce) in the form of a gas engine by the German engineer N. Otto in 1876.
12. In first lathes the work piece ... (rotate) to and fro by an assistant pulling on the ends of a cord wrapped two or three times around the work.
13. During the Renaissance arts and science underwent great changes. In architecture these changes ... (mark) by a return to classical forms and proportions of ancient Roman buildings.
14. The consignment ... (deliver) to the customer by next Monday.
15. Sensors ... (use) to check variations of light, heat, temperature, position, moisture and many other physical data.

16. Velocity ... (measure) in kilometers per hour, miles per hour, or meters per second.

17. In arc welding the intense heat needed to melt metal ... (produce) by an electric arc.

18. Diesel engines commonly ... (use) in heavy machinery, locomotives, ships and in cars.

19. If various objects ... (connect) to form separate paths between the terminals of a source of electric current, they are said to be "connected in parallel".

20. The length and terms of a probation period ... (write) in the employment contract.

21. A salary is a form of periodic payment from an employer to an employee, which may ... (specify) in an employment contract.

**2. Complete the sentences with the passive or active form of the verbs in brackets. Translate the sentences into Russian.**

**A.**

1. Electric drill ... (to drive) by an electric motor, while pneumatic drills are equipped with a compressed-air motor.

2. They ... (to build) a huge plant in this town recently.

3. Diamond often ... (to use) as working end of drill tools.

4. In a car the linear motion ... (to convert) into rotational motion by the crankshaft, to which the connecting rods ... (to attach).

5. The piston ... (to move) down and the air/fuel mixture ... (to push) into the cylinder by atmospheric pressure.

6. Manufacturing technology ... (to grow) exponentially over the past two decades, as many auto industry segments ... (to adopt) methods aimed at reducing labour and material costs while increasing productivity, efficiency and component quality.

7. Many people, including engineers and construction experts, ... (to involve) in figuring out what type of road should be made.

8. Gasoline car engines ... (to use) spark ignition whereas diesel engines use compression ignition.

9. Bill Gates and Paul Allen ... (to found) Traf-O-Data in 1971 to sell their computer traffic-analysis systems.

10. Civil engineers ... (to train) to design and manage construction projects, from bridges and buildings to transport links and sports stadiums.

**B.**

Nowadays automatic control systems ... (1. play) an important role. There has been an enormous growth in the application of controllers in technology and everyday life. Domestically, automatic controls in heating and air conditioning systems ... (2. regulate) the temperature and humidity. Industrially, they ... (3. employ) in quality control of manufactured products, power stations, etc. in space technology they ... (4. appear) in the form of guidance systems, fire control systems, etc. It is automation that ... (5. ensure) speed, accuracy, reliability, high quality and economy of technological processes.

**3. Complete the sentences using the correct form of the word in brackets (the present participle or the past participle). Translate the sentences into Russian.**

1. Scientists are experimenting with a system ... (allow) drivers to see better after dark.

2. The investigation ... (carry out) by the students is very interesting.

3. New technologies reduce the number of workers ... (need).

4. One ought to remember that the practical unit of current is the ampere, which is the current ... (produce) by a pressure of one volt in a circuit (have) a resistance of one ohm.

5. Gear teeth are designed to ensure the pitch circles of engaging gears roll on each other without slipping, ... (provide) a smooth transmission of rotation from one gear to the next.

6. Excavators and power shovels are two types of the equipment ... (use) by miners when they are removing rocks from ground.

7. Last month we launched a new product line ... (target) at a new market.

8. Engineers play an important role in economy, ... (apply) new ideas to address emerging opportunities, which in turn drives economic growth.

9. He surveys the jobs ... (complete) by different tradespeople on the construction site to make sure they all meet the correct quality standards.

10. Internet is known to be a global data communication system, its hardware and software infrastructure ... (provide) connectivity between computers.

11. ... (summarize) the results of his experiments, A. Popov expressed his hope that his device would make possible transmitting signals at a distance by means of rapid electrical oscillations.

12. They measure the speed of the body ... (move) under the action of an applied force.

13. There are some people ... (wait) for you in reception.

14. He manages ten solar farms, which are fields of solar panels ... (store) and ... (convert) energy from the sun.

**4. Read the following sentences and identify the infinitives and infinitive constructions. Translate the sentences into Russian.**

1. Governments should offer support to companies and organizations involved in manufacturing, industry or agriculture in order to find eco-friendly approaches.

2. Companies want to manufacture their products more efficiently, at a lower cost, and with better quality.

3. The purpose of this book is to describe certain properties of metals.

4. Employers have a responsibility to protect workers against health and safety hazards at work and implement safety solutions in the workshop and the office.

5. Countries must find ways to reduce fossil fuel consumption and take action to promote a greater use of renewable energy resources.

6. Electrical equipment should be designed and constructed so as to prevent danger from shock and fire and should always be maintained in a safe and good condition.

7. Employers can put their employees on a probation period to assess if employees are suitable for the position.

8. The necessary preventive measures should be taken to reduce risks of occupational diseases, injuries and illnesses.

9. The final strength of the cement paste is likely to be reached in three weeks.

10. The necessary preventive measures should be taken to reduce risks of occupational diseases, injuries and illnesses.

11. The most recent technological developments make it possible to use solar thermal panels to heat houses.

12. Companies usually want to deliver goods as soon as they have been completed because the storage takes up a lot of room and is very expensive.

13. Techniques to regulate temperature, provide adequate lighting and reduce noise are constantly being developed.

14. It is absolutely necessary to keep professional knowledge and skills up-to-date.

15. Different forms of mortar were used to hold the stones together.

16. Vehicles are not supposed to be driven at speeds which are higher than the posted maximum.

17. We have to improve the business processes in our company to increase productivity.

18. A company may create multiple business divisions in order to market different products and services.

19. The professor is reading a lecture on how to implement new management strategies in a company.

20. The company's management is going to restructure the business process and hire new personnel.

21. A career coach is a person who works with clients to help them achieve their career and employment goals.

22. A lot of applicants try to impress the interviewer while in fact the interviewer is looking for a candidate who is honest and straightforward and able to handle unexpected situations.

**5. Read the text and identify the infinitives and infinitive constructions. Translate the text into Russian.**

### **Michael Faraday**

Michael Faraday, one of the greatest men of science, had little chance to get an education. In his early youth Faraday had to save money to buy the apparatus necessary for his experiments. We know Faraday to have taken interest in many scientific and technical problems of his time. He took part in the creation of a safety lamp to be used in mines. To turn gases into liquids was one of the numerous problems he worked at. For several years Faraday is known to have been working at the problem of a perfect optical glass and to have made a glass that greatly improved the telescope. After a while Faraday set to work on another important problem, the problem of magnetism. There were many questions to be answered in this field of

science. The main task of his work was to find out the nature of electricity and magnetism.

**6. Make sentences by matching the halves A and B.**

**A.**

1. She is interested in
2. She avoids
3. You should give up
4. We really enjoy
5. I'm looking forward to
6. He is used to
7. She doesn't mind
8. Laura is good at
9. He remembered

**B.**

- a) doing extra work.
- b) starting my own business.
- c) working together.
- d) downloading that file.
- e) doing this research.
- f) being a team leader.
- g) working long hours.
- h) developing commercial software.
- i) working rotating shifts.

**7. Read the following sentences and identify the gerunds. Translate the sentences into Russian.**

1. I dislike being involved into the discussion, which has nothing to do with my scientific interests.

2. I regret having missed two seminars, but I was ill.

3. Exercising and eating healthy food can help you live a long and healthy life.

4. She is good at developing software.

5. In spite of having some problems, we managed to meet the deadline.

6. I look forward to hearing from you soon.

7. I am used to working long hours.

8. He didn't get the promotion in spite of working hard.

9. Besides possessing the necessary skills, being honest, doing the right thing at all times, taking responsibility for one's actions is another key factor of workplace behavior.

10. Both bosses and employees should refrain from accepting any gifts or benefits from other organizations or customers that may have impact on their decision or performance of their duties.

11. I hate being disturbed when I'm working.

12. Applying for a job usually involves three steps: writing a resume, preparing a cover letter and researching the company or the job.

13. Sharing your professional expertise helps your business grow.

14. Attending conferences is a great way to develop contacts and to stay up to date with your industry or subject area.

15. Being organized wasn't his strongest point, but after he started using time management techniques, he learnt how to organize his work day.

16. I want to be a civil engineer because the job involves working with new technology to find solutions to construction problems.

**8. Complete the following sentences by putting the verbs in brackets into the correct form (Conditionals).**

1. If they ... (to use) a new method, the results of the experiment would be different.
2. If we have any problem with the equipment after start-up, we ... (to invite) a representative of your company.
3. If you know the dimensions of the body, you ... (to calculate) easily its volume.
4. If the student had known the specific heat and the weight of the substance, he ... (to calculate) its thermal capacity.
5. If cars ... (to be) more efficient, we would use less fuel.
6. If they ... (to apply) the new technology, the productivity would have risen.
7. A number of important innovations would have been impossible unless new surface finish technology ... (to be used).
8. If electric motors ... (to be used), cars would not pollute the air.
9. The product quality ... (to improve) if latest innovations and techniques were used.
10. If I pass my exams, the company ... (to take) me on as an engineer.
11. I'm paid double-time if I ... (to work) at weekends.
12. If the code number of spare parts had been entered correctly the company ... (to supply) everything in time.
13. If the machine ... (to break) down within the guarantee period, it will be replaced free of charge.
14. You will get a bonus if you ... (to close) the deal successfully.

**9. Write the words in *italics* as numbers.**

1. This shows a rise of *fifteen point six five* per cent.
2. The room measures about *three hundred and twenty-five* metres.
3. That'll be *twenty-five dollars and twenty cents*, please.
4. He owns *a third* of the business.
5. New statistics show that the unemployment rate of postgraduates was lower (*one point nine per cent*) than that of undergraduates (*two point six percent*) and considerably lower than non-graduates (*four point eight per cent*).
6. There are exactly *seven thousand, three hundred and two* employees.
7. The account number is *three double-six three two five*.
8. The population of the city is *three hundred and twenty thousand, five hundred and three*.
9. From *nineteen fifty* to *two thousand and ten*, the world population increased from *two point five billion* to *six point nine billion*, or by *one hundred and seventy four* percent.
10. *Four point zero four* plus *three point zero two* makes *seven point zero six*.
11. My phone number is *three one nine oh five two eight*.

**10. Write in words how you would say the following numbers.**

- |         |           |              |
|---------|-----------|--------------|
| a) €9m  | f) 18.271 | k) 5,505     |
| b) 8.2  | g) 10.58  | l) 1/3       |
| c) 1/6  | h) 5,000  | m) 2,000 USD |
| d) 5 %  | i) 28 %   | n) 48,3 %    |
| e) £105 | j) 3/7    | o) 655       |

**11. Complete the gaps using a suitable word from the box.**

*responsibly average effects advancements tasks automation  
businesses developments technology innovations*

1. From the first metal tools, to the wheel and the printing press, ... have changed the course of history.
2. The advancement in ... has been exceptionally fast in the 20th and 21st century.
3. Technology has helped people to carry out complex ... in a simpler and quicker manner.
4. ... in information technology specifically set the stage for more technological evolution.
5. The IT revolution of recent years is the culmination of many ... in computer technology.
6. Technologies have changed the way ... operate.
7. Medical technologies have greatly increased ... life expectancy.
8. In spite of concerns that ... would cause mass unemployment, technology has continually led to the creation of new jobs.
9. Technology has had both positive and negative ... on society.
10. Technology can be a powerful tool for change, especially when used ... .

**12. Fill the blanks with a suitable word from the box.**

*computers, deals, electricity, homes, concerned, maintenance, makes,  
machinery*

Engineering is about putting ideas into action. Civil engineering is (1) ... with building roads, bridges, airports, etc. Mechanical engineering (2) ... with the manufacture of cars, trains, planes, (3) ... of all kinds and the tools needed to construct them. A mechanical engineer designs, develops and (4) ... the machines and different processing equipment. Electrical engineering is about the generation and distribution of (5) ... and its many applications. Electrical engineers provide all the services we need in our (6) ... and places of work, including lighting, heating, air-conditioning, ventilation, and lifts. Electrical engineers are also concerned with the production and distribution of electricity to homes, offices, industry, hospitals,



Universities and schools, and the installation and (7) ... of the equipment involved in these processes. Computer engineering is concerned with developing (8) ... and their components.

### **13. Complete the sentences with a, an or the where necessary.**

1) ... engineering students should have 2) ... understanding of 3) ... maths, physics and chemistry. You will produce 4) ... creative designs at 5) ... economical price while paying due concern to 6) ... environment. If your interest is in road building then you may decide to follow 7) ... specialized course in highway engineering. By studying electronic and electrical engineering you learn about 8) ... design of complete systems, such as 9) ... computers, ... controllers, power and transport systems. 10) ... mechanical engineers plan, design and develop a wide range of things: 11) ... washing machines, 12) ... cars and spacecraft. 13) ... production engineers work very closely with mechanical engineers, to make 14) ... new products at 15) ... right price, on 16) ... time and in 17) ... correct quantity. As well as designing and selecting 18) ... machines and ... materials, they also organize 19) ... people and ... finance.

### ***Задания для чтения с последующим изложением прочитанного на английском языке***

При подготовке пересказа внимательно прочитайте текст, подчеркните предложения, содержащие основные мысли. Затем составьте план высказывания, выпишите слова, необходимую для передачи содержания. Не стремитесь пересказать текст дословно, опускайте маловажные детали.

### **14. Summarise the main ideas of the text.**

#### **James Watt**

James Watt was born in Greenock, Scotland, and was taught at home, later he went to Greenock Grammar School. His technical expertise seems to have been obtained from working in his father's workshop and from early in life he showed academic promise. His early formal training was as an instrument maker in London and Glasgow.

Watt was interested in making experimental models of steam engines and this marks a historical milestone in engineering development. Watt's early interest in steam arose from experience in repairing a model steam engine in 1764 and in 1765 he invented the separate steam condenser. In 1769 he took out a patent on the condenser in which steam came into direct contact with cold water; that was a milestone by which steam engineering reached its practical and usable form. Apart from steam engines, Watt established the unit of power. He coined the term horsepower (hp).

Watt received many honors in recognition of his important works. He was a fellow of the Royal Society of London and Edinburgh, and he was a member of the Academy of Sciences in France.

James Watt died in 1819 in Heathfield. Later, a statue to Watt was placed in Westminster Abbey.

### *Задания для чтения и перевода*

**15. Read the texts, translate them into Russian, write a list of unfamiliar words.**

#### **Text 1. Automotive Engines**

Car engines vary in design, but certain elements are common to all engines and are used for engine classification. Engines can be classified in several ways such as the number of cylinders, the geometry of the block, or type of ignition system used. The two major engine types in use are spark ignition (gasoline engine) and compression ignition (diesel engine) which use different types of fuel. The following are ways engines are classified.

**Fuel Burned.** Fuel burned provides a broad engine classification. Two types of fuel are in general use: gasoline and diesel oil. Gasoline car engines use spark ignition whereas diesel engines use compression ignition (no spark.)

**Block Geometry.** There are four types of engine block geometry: V-type, inline, horizontally opposed and slant. Each refers to the orientation of the cylinders as viewed from the front or back of the engine. A V-type has two angled rows of cylinders, which form a “V”. An inline engine arranges the cylinders vertically in a row. The horizontally opposed engine has the cylinders horizontal and opposing each other. A slant design is one row of angled cylinders forming a half “V”. A slant block allows the hood line to be lower.

**Number of Cylinders.** The number of cylinders is often used in combination with the engine block geometry. The number of cylinders is an indication of how smooth the car engine will run. An eight-cylinder engine will run smoother than a four-cylinder engine since power strokes occur with greater frequency. The number of cylinders also contributes to power output: more cylinders, more power. However, this is not always a good indicator of power input. A turbocharged, four-cylinder engine can produce more power than a normally aspirated six-cylinder engine.

**Ignition type.** Two methods for igniting fuel are used, spark ignition and compression ignition. Gasoline car engines use spark ignition whereas diesel engines use compression ignition. This method compresses the air to the point where the resulting rise in temperature causes ignition to occur when diesel fuel is added.

## Text 2. Traditional and Non-traditional Machining

When people hear the word “machining” they generally think of machines that utilize mechanical energy to remove material from the work piece. Milling machines, saws and lathes are some of the most common machines using mechanical energy to remove material. The tool makes contact with the work piece and the resulting shear causes the material to flow over the tool. All traditional forms of metal cutting use shear as the primary method of material removal.

However, there are other sources of energy at work.

Chemical energy has a significant effect on every turning operation. Think of the effect that different kinds of coolants have on the cutting action of a tool. Some amount of chemical energy is being used in most metal cutting operations. All forms of manufacturing use more than one type of energy.

The category of nontraditional machining covers a broad range of technologies, including some that are used on a large scale, and others that are only used in unique or proprietary applications. These machining methods generally have higher energy requirements and slower throughputs than traditional machining, but have been developed for applications where traditional machining methods were impractical, incapable, or uneconomical.

**Non-traditional machining** can be thought of as operations that do not use shear as their primary source of energy. For example, abrasive water jet operations use mechanical energy, but material is removed by erosion.

Non-traditional machining methods are typically divided into the following categories:

- **mechanical** – ultrasonic machining, rotary ultrasonic machining, ultrasonically assisted machining;
- **electrical** – electrochemical discharge grinding, electrochemical grinding, electrochemical honing, hone-forming, electrochemical machining, electrochemical turning, shaped tube electrolytic machining, electro-stream;
- **thermal** – electron beam machining, electrical discharge machining, electrical discharge wire cutting, electrical discharge grinding, laser beam machining;
- **chemical** – chemical milling, photochemical machining.

## Text 3. Computer Aided Design

Computer Aided Design (CAD) allows engineers to create detailed designs of parts with maximum efficiency and minimal cost. The days of the drawing boards are essentially over with the release of affordable and easily used 2D and 3D CAD packages. The aim of CAD is to apply computers to both the modeling and communication of designs. This includes automating such tasks as the production of drawings or diagrams and the generation of lists of parts in a design, and providing new techniques which give the designer enhanced capabilities to assist in the design process.

Computer-aided design now involves the creation of a central design description or model data which all applications in design, analysis and manufacturing can

utilize. Computer-based techniques for the analysis and simulation of the design, and for the generation of manufacturing instructions, are now closely integrated with the techniques for modeling the form and structure of the design.

In principle, CAD could be applied throughout the design process, but in practice its impact on the early stages, where very imprecise representations such as sketches are used extensively, has been limited. There are some new software programs currently available which are trying to fill this niche. It remains to be seen how effective they will be and how widely they will be implemented.

#### **Text 4. Sensors**

A sensor is a device that produces a measurable response to a change in a physical condition, such as temperature or thermal conductivity, or to a change in chemical concentration. Sensors are particularly useful for making in-situ measurements such as in industrial process control.

Sensors are an important part to any measurement and automation application. The sensor is responsible for converting some type of physical phenomenon into a quantity measurable by a data acquisition (DAQ) system.

Factors to consider when choosing a sensor:

- accuracy – the statistical variance about the exact reading;
- calibration – required for most measuring systems since their readings will drift over time;
- cost;
- environmental – sensors typically have temperature and/or humidity limits;
- range – limits of measurement or the sensor;
- repeatability – the variance in a sensor's reading when a single condition is repeatedly measured;
- resolution – the smallest increment the sensor can detect.

Sensors are used to measure basic physical phenomena including: acceleration - shock and vibration, angular/linear position, chemical/gas concentration, humidity, flow rate, force, magnetic fields, pressure, sound, temperature, velocity.

**Load Cells** are intended for determination of static or dynamic tensile and compressive loads and come in many different forms including compression, tension, simple beam and single point. Force transducers can be used as load cells, but can also be used in weighing applications and measuring compression or tension. Load cells can be built utilizing either transducers, LVDTs, strain gauges or piezoelectric sensors.

**Strain gauges** are used for the measurement of tensile and compressive strain in a body and can therefore pick up expansion as well as contraction. Strain is caused in a body by internal or external forces, pressures, moments, heat, or structural changes in the material. In general, most types of strain gages depend on the proportional variance of electrical resistance to strain: the piezoresistive or semi-conductor gage, the carbon-resistive gage, the bonded metallic wire, and foil resistance gages.

The bonded resistance strain gage is by far the most widely used in experimental stress analysis. They typically consist of a grid of very fine wire or foil bonded to the

backing or carrier matrix. The carrier matrix attaches to test specimens with an adhesive. When the specimen is mechanically stressed (loaded), the strain on the surface is transmitted to the resistive grid through the adhesive and carrier layers. The strain is then found by measuring the change in resistance.

The bonded resistance strain gage is low in cost, can be made with a short gage length, is only moderately affected by temperature changes, has small physical size and low mass.

## **Text 5. Electricity**

Electricity is the set of physical phenomena associated with the presence and flow of electric charge. Electricity gives a wide variety of well-known effects, such as lightning, static electricity, electromagnetic induction and electric current. In addition, electricity permits the creation and reception of electromagnetic radiation such as radio waves. In electricity, charges produce electromagnetic fields which act on other charges. Electricity occurs due to several types of physics:

- electric charge: a property of some subatomic particles, which determines their electromagnetic interactions. Electrically charged matter is influenced by, and produces, electromagnetic fields, electric charges can be positive or negative;

- electric field: charges are surrounded by an electric field. The electric field produces a force on other charges. Changes in the electric field travel at the speed of light;

- electric potential: the capacity of an electric field to do work on an electric charge, typically measured in volts;

- electric current: a movement or flow of electrically charged particles, typically measured in amperes;

- electromagnets: Moving charges produce a magnetic field. Electric currents generate magnetic fields, and changing magnetic fields generate electric currents.

In electrical engineering, electricity is used for:

- electric power where electric current is used to energise equipment;

- electronics which deals with electrical circuits that involve active electrical components such as vacuum tubes, transistors, diodes and integrated circuits, and associated passive interconnection technologies.

Electrical phenomena have been studied since antiquity, though progress in theoretical understanding remained slow until the seventeenth and eighteenth centuries. Even then, practical applications for electricity were few, and it would not be until the late nineteenth century that engineers were able to put it to industrial and residential use. The rapid expansion in electrical technology at this time transformed industry and society. Electricity's extraordinary versatility means it can be put to an almost limitless set of applications, which include transport, heating, lighting, communications, and computation. Electrical power is now the backbone of modern industrial society.

## **Text 6. Computers**

A computer is a general purpose device that can be programmed to carry out a set of arithmetic or logical operations automatically. Since a sequence of operations can be readily changed, the computer can solve more than one kind of problem. Conventionally, a computer consists of at least one processing element, typically a central processing unit (CPU), and some form of memory. The processing element carries out arithmetic and logic operations, and a sequencing and control unit can change the order of operations in response to stored information. Peripheral devices allow information to be retrieved from an external source, and the result of operations saved and retrieved.

A laptop computer, also called a notebook, is a small personal computer designed for portability. Usually, all of the hardware and interfaces needed to operate a laptop, such as the graphics card, audio devices or USB ports, are built into a single unit. Laptops contain high-capacity batteries that can power the device for extensive periods of time, enhancing portability. Once the battery charge is depleted, it will have to be recharged through a power outlet. In the interests of saving power, weight and space, laptop graphics cards are in many cases integrated into the CPU or chipset and use system RAM, resulting in reduced graphics performance when compared to an equivalent desktop machine.

One of the drawbacks of laptops is that, due to the size and configuration of components, usually relatively little can be done to upgrade the overall computer from its original design. Internal upgrades are either not manufacturer-recommended, can damage the laptop if done with poor care or knowledge, or in some cases impossible, making the desktop PC more modular. Some internal upgrades, such as memory and hard disk drive upgrades are often easily performed, while a display or keyboard upgrade is usually impossible. Just as desktops, laptops also have the same possibilities for connecting to a wide variety of devices, including external displays, mice, cameras, storage devices and keyboards, which may be attached externally through USB ports and other less common ports such as external video. Laptops are also a little more expensive compared to desktops, as the components for laptops themselves are expensive.

## **Text 7. Road Construction**

Roads, wherever they are, represent major public investment and for this reason are expected to last for a long time. Rapid increases in the number of vehicles and thus a rise in traffic volumes and axle loads produce congestion, wear and tear on structures, along with air pollution and noise emissions. The materials used to construct modern roads, from the sub-base upwards to the asphalt or concrete wear surface have improved vastly over the years, as has the equipment involved.

The first step in building a road is planning. Even simple roads can take months of planning before construction can begin. Complex roads that involve different structural elements, such as bridges or overpasses, can take years to plan. Other factors that planners must consider include environmental impact of the road, cost,

availability of materials, and safety. Public meetings will also often be held, so that any citizens with concerns about the road construction project can voice their opinions.

Depending upon the size of the road project, construction can take from a few weeks to several years.

The first part of construction is one of the most important: earthwork. Huge earth-moving machines must be used to create a solid foundation for the road to be built. Without a solid foundation, any road that is built will fail long before its expected lifespan.

Bulldozers and graders move around dirt delivered by dump trucks to create a level surface that will support a road for many years to come. Gravel is added in layers and machines roll over the surface to compact and flatten it further. Drains and storm sewers are also installed at this early stage, so that rain will drain away from the road surface and make it easier for vehicles to travel in storms.

Once the foundation is finished and has been inspected, it is time to pave the way. The most common materials used for paving roads are asphalt and concrete. Factors such as cost and type and amount of traffic will determine which material will be used.

Asphalt uses an oil-based substance called bitumen to make sand and crushed rock stick together like glue. After the asphalt is heated to about 300° F, it is transported to the construction site, where construction crews spread and compact it onto the foundation already in place.

Concrete also uses sand and crushed rock, but it's held together with cement. Workers must pour liquid concrete into special steel molds called forms. As it dries, a special finishing machine vibrates it to make it settle evenly and then trims it to the correct height. To prevent cracks, workers make cuts - called joints - between concrete slabs. These joints allow the concrete slabs to expand and contract with changes in temperature without breaking.

### **Text 8. Modern Building Materials**

The construction industry consumes more natural resources than any other industry. With increasing public awareness of the needs and demands of sustainable development and environmental conservation, no other industry is called on as much as the country's construction and building industry to evolve their practices to satisfy the needs of our current generation, without curtailing the resources of future generations to meet theirs. For example, concrete is by far the most important building material, with billions of tons produced each year worldwide, and without which the nation's infrastructure is unthinkable. Considerable progress and breakthroughs have been made in recent years in concrete technology, which have largely gone unnoticed by the public at large.

It has been said that more progress has been made in the last 25 years than in the previous 150 years since Portland cement was invented. Modern cement composites can now be engineered to have strengths approaching those of steel, energy dissipation capacities of body armor, and durability properties that can make products

last basically indefinitely, and be as decorative and aesthetically pleasing as natural stone, yet with superior mechanical properties. Fiber-reinforced composites permeated the aerospace and automotive industries decades ago and are now slowly finding their way into civil engineering structures. Smart materials, defined as those materials that can change their properties in response to external conditions, are also being introduced into civil infrastructure systems, and so are new developments in metals, with new high-strength steel alloys and non-corrosive steels that are changing engineering practice. All of these advanced materials are essential for an efficient renewal and maintenance of the infrastructure of any country.

### *Темы для обсуждения*

1. Science and Technology.
2. Future Career.

### **16. Read the text.**

#### **Science and Technology**

Over the years, technology has revolutionized the world and affected every aspect of life. Technological progress has always been backed up by scientific advances. Scientists continually investigate new topics and put their knowledge and experience into practice improving people's life. Advances in science have led to innovative products and technologies and contributed greatly to economic growth.

Innovations have resulted in huge changes in agriculture and manufacturing. Machines and technological systems replaced ancient agricultural practices such as working animals and manual labor. Manufacturing robots automated repetitive tasks and increased productivity.

Today, people have better ways to communicate and travel, better medical care and better access to information and education. Technology has dramatically changed the teaching and learning process. Students find information on the Internet, make use of different educational apps or take online courses covering different subjects.

Examples of technological changes include new kinds of media, communication systems, fuel-efficient cars, innovative construction technologies, computer and information technology. In general, technological advances have made humans more productive and improved standards of living.

Technology clearly has done a lot to make human life easier, more enjoyable and convenient. However, technological advances can have negative impacts on the environment and society if they are not applied in a smart and responsible way. Some of the most troubling issues associated with the increasing use of technologies are pollution caused by industrialization, depletion of natural resources, health problems, etc.



**Do the following statements agree with the information in the text? If no provide the information.**

1. Technology increases efficiency and gives us safer machines which do not have a negative effect on the environment.
2. Recent advances in artificial intelligence and machine learning mark the beginning of a seismic shift in the world.
3. Developments in IT are likely to have more negative effects than positive in the future.
4. Progress in technology is not bad because it gives us new communication technologies, medical breakthroughs and economic growth.
5. Green energy solutions are possible thanks to technology.
6. Technological progress and innovations are bringing humans into a new era of prosperity and well-being (economy, healthcare, telecommunications).
7. Technology may be dangerous as there are a lot of processes which scientists cannot control and one mistake can destroy the entire ecosystem.

**17. Read the text and answer the questions given below.**

### **Future Career**

Careers in engineering are popular among young people. Engineering contains a large number of job opportunities and specialties but it isn't for everyone. It requires the ability to perform complex computations quickly, to be creative and innovative and to be ready to take responsibility for the safety of others. If you are good at science and math, have creative thinking, an engineering career is the right one for you and the Belarusian-Russian University is a good institution where you can choose an engineering course you want.

All industries today need well-trained and qualified professionals. Our University offers courses that teach the skills necessary for a managerial role in the specific industry. Students learn the latest practices and specialize in one or more areas. Before graduation, an engineering student will also have firm knowledge of computer applications to be used in the engineering career field.

There is a number of engineering fields to choose from, like mechanical engineering, electrical engineering, civil engineering, computer engineering, automotive engineering, welding engineering and quality control engineering, depending on a person's interests and abilities.

#### **Questions.**

1. Why engineering is a good career?
2. What makes a good engineer?
3. Why do you think that the career in engineering is the right one for you?
4. What career options are available to engineering graduates?

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