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Пособие предназначено для расширенного изучения функционального, технического аспекта английского языка. Представленный материал позволяет овладеть основами английского языка и навыками общения в научно-технической сфере. В книге содержатся тексты как по традиционным техническим специальностям (механика, машиностроение, электротехника, радиотехника, автоматизация производства и др.), так и по самым современным областям знания (компьютерная и лазерная техника, информационно-коммуникационные технологии, нанотехнологии).

Рассчитано на студентов высших технических учебных заведений, а также учащихся средних специальных учебных заведений, лицеев, гимназий, колледжей.

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СОДЕРЖАНИЕ

ПРЕДИСЛОВИЕ

Предлагаемое учебное пособие составлено в соответствии с государственными документами в области образования, принятыми в последние годы.

В условиях современности, когда наиболее развитые страны мира активно стремятся строить у себя общество знаний, для специалистов нашей страны крайне важно владеть функциональным (техническим) аспектом английского языка, который выступает, по существу, средством межнационального общения в научно-технической сфере. Именно такого рода языковая компетенция делает специалиста конкурентоспособным в современном мире. Учитывая дефицит такого рода учебной литературы, издание многопрофильного учебного пособия для технических вузов представляется весьма своевременным.

Цель данного курса обучить языковым средствам понимания специальных научно-технических текстов, умению свернуть и развернуть информацию при подготовке рефератов и аннотаций на русском и английском языках, а также навыкам общения в технической сфере знаний. Имеются в виду как традиционные технические специальности (*механика, машиностроение, электротехника, радиотехника, автоматизация производства и др.*), так и самые современные области знания (*компьютерная и лазерная техника, информационно-коммуникационные и нанотехнологии*).

Учебное пособие содержит:

— *тексты из оригинальной литературы*, относящиеся к разным областям техники;
— *учебные задания*, способствующие усвоению и запоминанию специальных терминов в соответствующих областях знаний;
— задания для развития навыков чтения, свертывания и развертывания информации, составления аннотаций и рефератов как на русском, так и на английском языке;
— задания по совершенствованию навыков письменного перевода;
— *упражнения* по усвоению грамматических явлений, характерных для научно-технических текстов;
— *диалоги* для развития навыков говорения;
— *контрольные тесты* в конце каждого раздела.

В качестве приложений предлагаются:

— *речевые модели* для развития навыков устной речи;
— *краткий грамматический справочник* и таблица неправильных глаголов;
— *англо-русский словарь* специальных технических терминов;
— краткий *словарь сокращений и условных обозначений* с элементами толкования.

Значительная часть предлагаемого материала прошла многолетнюю апробацию при обучении английскому языку в технических вузах страны.

Учебное пособие рассчитано на студентов высших технических учебных заведений. Оно может использоваться в средних специальных учебных заведениях, лицеях, гимназиях, колледжах, а также теми, кто профессионально занимается деятельностью в технической сфере, но не получил в свое время соответствующего образования для возможности выхода в широкий мир международной технической мысли.

Unit 1

INTRODUCTORY COURSE

1. Некоторые особенности произношения в английской речи.

На протяжении долгой истории своего существования Великобритания подвергалась многочисленным нашествиям и завоеваниям. Римляне, викинги, норманны, германские племена англов и саксов волна за волной накатывались на берега Британии и порабощали народы страны. Этим объясняется наличие в английском языке огромного количества слов, заимствованных из латинского, французского, немецкого и других языков. Поэтому английская орфография и правила произношения английского языка очень непоследовательны: много правил чтения и много исключений из них. Но пусть читателя это не пугает, ибо английский язык — один из немногих языков, который использует транскрипцию для правильного чтения незнакомых слов. Зная фонетические знаки, вы можете правильно прочесть любое английское слово в словаре.

1.1. Фонетические знаки. Транскрипция.

Гласные

i: — долгое «иии»: Pete, me, he, meat.
ɪ — краткое «и»: it, if, pit, still, king.
e — «е» в словах «эти», «шесть»: pen, net, men.
æ — «э» очень открытое: man, and, can, family.
ɑ: — долгое заднее «ааа»: car, start, hard, arm.
ʌ — слабое, неударное «а»: sun, run, but, up.
ɔ — краткое, открытое «о»: not, lot, from.
ɔ: — долгое «ооо»: all, ball, form, morning.
ɜ: — долгое «ёёё», но без «й», как в слове «Фёкла»: her, work, girl.
ʊ — краткое «у» со слабым округлением губ: put, book, good.

uː — долгое «ууу» без округления губ: **do, too, you.**
ə — неясный безударный звук (э, а): **under, a'ddress**

Дифтонги (двугласные)

eɪ — «эи»: **say, baby, train, table.**
əʊ — «оу»: **no, smoke, motor, hotel.**
aɪ — «аи»: **five, my, side, kind, right.**
aʊ — «ау»: **now, how, count, flower.**
ɔɪ — «ои»: **boy, coil, noise.**
ɪə — «иэ»: **dear, clear, really.**
ɛə — «эа»: **where, there, chair, care.**
ʊə — «уэ»: **sure, poor,** plural.

Трифтонги (трехгласные)

aʊə — «ауэ»: **our, hour, flower.**
aɪə — «аиэ»: **hire, byre.**

Согласные

p — «п»: **pay, people, help;**
b — «б»: **bad, beef, boy.**
t — «т»: **tree, tea, sit, stop;**
d — «д»: **day, sad, desk.**
k — «к»: **king, cold, black;**
g — «г»: **bag, gold, good.**
f — «ф»: **fine, far, safe;**
v — «в»: **very, seven, never.**
s — «с»: **so, sit, sleep;**
z — «з»: **zero, has, plays.**
m — «м»: **man, my, swim;**
n — «н»: **name, finish.**
l — «л»: **long, last, full;**
h — простой выдых: **his, happy, help.**
ʃ — мягкое «ш»: **ship, fish;**
ʒ — мягкое «ж»: **pleasure, measure.**
tʃ — твердое «ч»: **much, cheese.**
dʒ — «дж»: **John, age, large.**
w — «в» с вытянутыми (как для «у») губами: **will, away, window.**
r — невибрирующий звук «р» (кончик языка против нёба, где произносится звук «ж»): **red, rich, room, every.**
θ (глухой), ð (звонкий) — при произнесении этих звуков воздух проходит в щель между передним краем языка и верхними зубами.
θ — **thank, think, nothing.** ð — **then, there, with, together.**
ŋ — задненёбное «н», произнесенное не кончиком языка, а задней частью его спинки: **sing, king, English.**
j — слабое «й»: **yes, you, young, piano.**

1.2. Как видите, звуков, отличающихся от русских, в английском языке не так уж и много: [w, r, ŋ, θ, ð, ʃ, ʒ, j], а также [əː, ə,

æ, ɑ:]. Постарайтесь научиться произносить их правильно, а для этого обратите внимание на следующее:

а) звуки p, t, k произносятся ***с придыханием***. Например, Pete [p(h)i:t] — Петр, Kate [k(h)eɪt] — Катя, take [t(h)eɪk] — возьми.

б) ***звонкие согласные*** в конце слов всегда произносятся ***звонко:*** big, dad, his;

в) при чтении знаков транскрипции обращайте внимание на ***долготу гласных***, она выражается двумя точками [:]. Долгота гласных зачастую имеет смыслоразличительное значение, например, cut [kʌt] — резать и cart [kɑ:t] — тележка; pot [pɔt] — горшок и port [pɔ:t] — порт.

1.3. При чтении английских слов важную роль играет ***ударение***, которое в транскрипции изображается знаком ['], некоторые слова имеют два ударения: главное ['] и второстепенное [,], например, European [ˌjuərə'pi:ən]. Ударение, как правило, падает на имена существительные, прилагательные, числительные, смысловые глаголы, наречия, указательные и вопросительные местоимения и на вспомогательные глаголы в общем вопросе. Неударными слогами являются служебные слова — предлоги, союзы, артикли, вспомогательные глаголы, а также личные и притяжательные местоимения.

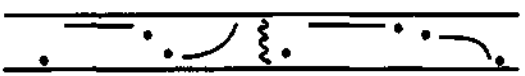
We 'study co,mmuni'cation at the 'technical 'college.

[wi: 'stʌdɪ kəˌmju:nɪ'keɪʃən ət ðə 'teknɪkəl 'kɔlɪʤ].

1.4. ***Речь*** у англичан очень ***плавная***, они любят связывать слова, особенно если слово заканчивается на букву «r», а следующее слово начинается с гласной, например, sister ['sistə], brother ['brʌðə], но sister and brother ['sɪstər ənd 'brʌðə].

1.5. Наконец, ***интонация*** — очень важный элемент английской речи. Проговаривая (длинную) фразу, англичанин мысленно разбивает ее на значимые сегменты (не более 5–7 слогов) и каждый сегмент произносит с ***повышенной*** интонацией, как бы давая понять собеседнику, что он еще не закончил мысль. В конце предложения последний ударный слог, как правило, произносится с ***пониженной*** интонацией (особым голосовым нажимом).

My 'father and I are 'fond of computing.



2. Прочтите 26 букв английского алфавита и запомните их.

Aa [eɪ], **Bb** [biː], **Cc** [siː], **Dd** [diː], **Ee** [iː], **Ff** [ef], **Gg** [ʤiː], **Hh** [eɪʧ], **Ii** [aɪ], **Jj** [ʤeɪ], **Kk** [keɪ], **Ll** [el], **Mm** [em], **Nn** [en], **Oo** [ou], **Pp** [piː], **Qq** [kjuː], **Rr** [ɑː], **Ss** [es], **Tt** [tiː], **Uu** [uː], **Vv** [viː], **Ww** [dʌbluː], **Xx** [eks], **Yy** [waɪ], **Zz** [zed].

3. Познакомьтесь с интонацией английских предложений.

Повествовательные предложения

Never mind.

I want to talk to you.

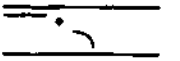
Вопросительные предложения. Специальный вопрос

Where do you live?

What can I do for you?

Повелительные предложения

Hurry up!



Come and write on the blackboard!

Восклицательные предложения

How interesting!

What a pretty girl!

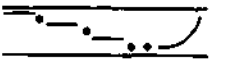
Общий вопрос

Do you understand?

Are you quite comfortable?

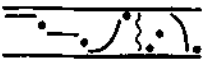
Просьбы

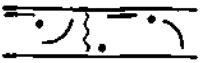
Will you kindly tell me the time?



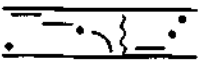
Couldn't you speak a little louder?

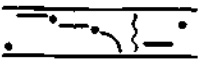
Альтернативный вопрос

Does he live in Kiev or in Moscow? 

Shall we walk or take a bus? 

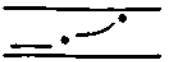
Разделительный вопрос

He speaks English well, doesn't he? 

You haven't found the book, have you? 

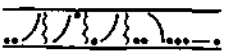
Переспрос

What did he say? 

Who has told you? 

Мелодия перечисления

One, two, three, four, five. 

There are pens, pencils, a book and a notebook on the table. 

4. Прочтите небольшие диалоги по ролям и запомните их.

Mike: Hello, Alice. Glad to see you.
Alice: Hi, Mike. How are you?
Mike: Fine, thanks. And how are things with you?
Alice: Very well. Where are you driving to?
Mike: To the office. Can I give you a lift?
Alice: Yes, of course. You'll do me a great favour. Thank you.
Mike: You are welcome.

* * *

Nick: Good morning, Kate. I'd like to introduce my friend to you.
Kate: How do you do, Nick. Who is your friend?
Nick: He is Mike Stuart. By the way, he studies in my group.
Kate: What is he interested in?
Nick: He is fond of physics and foreign languages.
Kate: Is he fond of English or German?
Nick: I think, he enjoys both languages.
Kate: OK. I'll meet him with great pleasure.

5. Прочтите тексты, правильно произнося звуки и обращая внимание на ударения и интонацию.

Let me introduce myself. I'm Michael Smirnov, Mike for short. I was born on the 15-th of May 2000 in Moscow in the family of an engineer. Now I'm 16 years old.

In my childhood I went to a kindergarten, as many children of my country. When I was seven, I went to school. It was a secondary school not far from our house. Now I'm a pupil of the 10-th form. We study many subjects at school, but my favourite subjects are physics and mathematics. I go in for sport. I like swimming and visit a swimming pool twice a week. I enjoy playing computer games and getting interesting information from the Internet.

* * *

My family is not very large. We are four: my father, mother, my sister and me. I also have a grandpa, two grannies, an aunt, uncles and many cousins, but they don't live with us. My father is an engineer and works in an office. He is 40. My father is a tall and strong man with short dark hair, grey eyes and a straight nose. He is very communicative and rather popular with all his friends.

My mother is a pretty lady of medium height, slim, with curly fair hair. She has an oval face, a small snub nose and large blue eyes. Everything comes easy to her. She paints a little, plays the piano, cooks well and helps my sister and me to do our homework.

My sister, Alice is only 10. She is a schoolgirl. She is very joyful and everybody likes her. She looks very much like my mother, I think.

Our family is rather friendly. We try to spend together as much time as possible. When we meet in the evenings there is no end of talking about the events of the day.

6. Составьте диалог с вашим другом о вас и ваших семьях. Воспользуйтесь приведенными ниже вопросами.

1. What is your name, I wonder? 2. How old are you? 3. Could you tell me where you were born? 4. Where do you live now? 5. Are you a pupil or a student? 6. Where do you study, I'd like to know? 7. What subjects do you study? 8. Is your family large? 9. Have you any sisters or brothers? 10. What is your sister's (brother's) name? 11. How old is she (he)? 12. Have you got any relatives (aunts, uncles, cousins)? 13. Have you many friends? 14. What are they (is he) fond of? 15 How do you spend your free time? 16. What is your hobby?

7. Представьтесь и расскажите о себе и вашей семье.

Unit 2

MECHANICS AND MECHANICAL ENGINEERING

Life requires motion.
Aristotle

Тексты: The Subject of Mechanics. Mechanical Engineering. Archimedes. Mikhail Lomonosov. Isaak Newton. "Volga" Motor Car. The Steam Engine. Internal Combustion Engine
Грамматика: Имя существительное. Суффиксы существительных. Времена Simple в действительном и страдательном залогах. Предлоги *of, on, in, at*

1. Ознакомьтесь с терминами текста 1.

Structural design ['strʌkʧərəl dɪ'zaɪn] — строительное проектирование
means of motion [mi:nz əv 'mouʃn] — средства передвижения
steam engine [sti:m 'enʤɪn] — паровой двигатель
the motion and equilibrium [ˌi:kwɪ'lɪbrɪəm] — движение и равновесие
to subject to forces [səb'ʤekt tə 'fɔ:sɪz] — подвергаться воздействию
displacement — смещение, сдвиг
subsequent effect ['sʌbsɪkwənt ɪ'fekt]] — последующее воздействие
to lay the foundation — заложить основу
exact sciences [ɪ'gzækt 'saɪənsɪz] — точные науки
in this connection — в этой связи
in this sense — в этом смысле
to give birth [bə:θ] — породить, дать толчок
civil engineering ['sɪvɪl ˌenʤɪ'nɪərɪŋ] — гражданское строительство
mechanical engineering — машиностроение

structural engineering — строительная техника
as it is stated above — как указывается выше
resulting interaction — возникающее взаимодействие
in the course of time [kɔːs] — в течение времени
according to [ə'kɔːdɪŋ tə] — в соответствии с, согласно

2. Прочтите текст и скажите, что изучает механика.

Text 1. THE SUBJECT OF MECHANICS

The progress of technology confronts the engineer with various problems connected with structural design, manufacture and operation of various machines, motors and means of motion, such as automobiles, steam engines, planes, ships and rockets. The solution of such problems is based on certain general physical principles — the laws that govern the motion and equilibrium of material bodies.

The branch of physics that deals with the behavior of physical bodies subjected to forces or displacements, and the subsequent effect of the bodies on their environment is called mechanics.

Mechanics has its roots in several ancient civilizations. During the early modern period, scientists such as Galileo, Kepler and especially Newton, laid the foundation for what is now known as classical mechanics. Much of the content of this subject was created in the 18-th and 19-th centuries. Classical mechanics is often viewed as a model for other so-called exact sciences.

Mechanics constitutes a central part of technology, the application of physical knowledge of the world for defined purposes. In this connection, the discipline is often known as engineering or applied mechanics. In this sense mechanics is used to design and analyze the behavior of structures, mechanisms and machines. Finally, as it is known, the study of mechanics gave birth to important fields of mechanical engineering, aerospace engineering, civil engineering, structural engineering, biomedical engineering and biomechanics and other branches of technology.

Thus, mechanics, as it is stated above, is the science that deals with the solution of all problems connected with the motion or equilibrium of material bodies and the resulting interactions between them. By motion in mechanics we mean any change in relative positions of material bodies in space that takes place in the course of time. By mechanical interaction between bodies is meant such a reciprocal action which changes the state of motion or the shape of the bodies. The physical measure of such mechanical interaction is called force. According to the above mentioned problems engineers divide mechanics into *statics*, that deals with bodies at rest, and *dynamics*, concerning the motion of

bodies. Dynamics, in its turn, consists of kinematics and kinetics. *Kinematics* deals with the geometric aspect of motion without considering the origins of forces. *Kinetics* studies the motion of bodies under the action of forces.

3. Просмотрите текст 1 еще раз. Дайте ответы на вопросы, используя информацию текста.

1. What confronts engineers with various problems? 2. What are these problems connected with? 3. What is the solution of these problems based on? 4. What is the role of physical laws in mechanics? 5. What is mechanics? 6. What famous scientists laid the foundation for the development of mechanics? 7. What does applied mechanics mean? 8. What important branches did the study of mechanics give birth to? 9. What is motion and what does mechanical interaction mean? 10. What fields do engineers divide mechanics into?

4. Прочтите, переведите и запомните следующие выражения.

To confront the engineer with various problems; structural design; manufacture and operation of machines; means of locomotion; to govern the motion and equilibrium; branch of physics; to be based on certain principles; the behavior of physical bodies; to subject to subsequent effect; to lay the foundation; what is now known as; to be often viewed as; exact sciences; application of physical knowledge of the world; in this sense; finally; as it is known; airspace engineering; structural engineering; mechanical engineering; as it is stated above; resulting interaction; by mechanical interaction we mean; to take place; in the course of time; physical measure; according to the above mentioned problems.

5. Подберите к терминам, данным в левой колонке, определения, представленные справа.

1. Technology	a) a plan, scheme, project; the arrangement of parts, details, forms so as to produce a complete, skillful equipment.
2. Kinematics	b) any machine that uses energy to develop mechanical power.
3. Equilibrium	c) physical strength, power, energy.
4. Design	d) reciprocal action or effect.
5. Designer	e) a worker skilled in using tools or in making, operating and repairing machines.

6. Engineer	f)	a person who makes original sketches, patterns.
7. Mechanic	g)	a method, process for handling a specific technical problem.
8. Force	h)	a state of balance or equality between opposing forces.
9. Engine	i)	a person who supervises the operation of technical equipment.
10. Interaction	j)	the branch of mechanics that deals with motion in the abstract with out reference to the force or mass.

6. Постарайтесь правильно прочесть следующие интернациональные слова. Догадайтесь об их значении.

Classical mechanics; physics; mathematics; mathematical effect; statics; dynamics; principles of kinematics; kinetics; civil; civilization; structure; structural; progress; technology; problems; design; designer; machines; motors; automobiles; rockets; material; modern period; model; central; discipline; mechanism; geometry; geometrical aspect; abstract; absolute deformation; selection; distance; constant; calculation; practice; practical; transmission; coordinate system; acceleration.

7. Запомните основные суффиксы существительных. Они помогут вам догадаться о значении многих ранее не известных вам слов. Переведите слова.

-er: engineer; designer; worker; user; founder; manufacturer.
-or: operator; actor; director; experimentor.
-tion: application; connection; motion; solution; creation.
-sion: transmission; dimension; expression.
-ture: manufacture; structure; nature; mixture.
-sure: measure; pressure; pleasure.
-ment: invironment; development; displacement; movement.
-ist: scientist; artist; typist; pianist.
-ty: possibility; conductivity; safety; responsibility.
-ance: distance; importance; performance; insurance.
-ence: reference; dependence; difference.
-dom: freedom; kingdom.
-ship: leadership; citizenship.

8. Вспомните образование Present Simple и составьте всевозможные типы вопросов к следующим предложениям по образцу.

А.

Statics is the branch of mechanics.
1. What *is* the branch of mechanics? (*Вопрос к подлежащему*).
2. *Is* statics the branch of mechanics? (*Общий вопрос*).
3. *Is* statics the branch of mechanics or electronics? (*Альтернативный вопрос*).
4. What *is* statics? (*Специальный вопрос*).
5. Statics *is* the branch of mechanics, *isn't* it? / Statics *is* not the branch of electronics, *is* it? (*Разделительные вопросы*).

1. Motion is a continuous change in position of a body. 2. Forces are vector quantities. 3. Hydrostatics is the study of fluids at rest. 4. An atom has a nucleus and a number of electrons that revolve around it. 5. Quantum mechanics is a comparatively recent invention. 6. Particles are bodies with little internal structure. 7. Mechanics has its roots in ancient civilizations.

Б.

A machine makes the work of an engineer easier.
1. What makes the work of an engineer easier? (*Вопрос к подлежащему*).
2. *Does* a machine make the work easier? (*Общий вопрос*).
3. *Does* a machine make the work easier or more difficult? (*Альтернативный вопрос*).
4. Whose work *does* a machine make easier? (*Специальный вопрос*).
5. A machine makes the work of an engineer easier, *doesn't* it? / A machine *doesn't* make the work difficult, *does* it? (*Разделительные вопросы*).

1. Mechanics studies forces and their effect upon matter. 2. The special physical laws govern the motion of material bodies. 3. Scientists divide mechanics into some parts: statics, kinematics and dynamics. 4. Mechanics analyses the behavior of structures and mechanisms. 5. A mechanical engineer uses skills and techniques from several subdisciplines. 6. Various changes take place in the position of machines in the course of time. 7. Engineers deal with the operation of various machines.

* * *

9. Составьте всевозможные типы вопросов в Past Simple к следующим предложениям по образцу.

А.

Lomonosov was the son of a peasant.
1. Who *was* the son of a peasant? (*Вопрос к подлежащему*).
2. *Was* Lomonosov the son of a peasant? (*Общий вопрос*).
3. *Was* Lomonosov the son of a peasant or a nobleman? (*Альтернативный вопрос*).
4. Whose son *was* Lomonosov? (*Специальный вопрос*).
5. Lomonosov *was* the son of a peasant, *wasn't he?*
   Lomonosov *was not* the son of a nobleman, *was he?* } (*Разделительные вопросы*).

1. Mechanics was the foundation of many sciences. 2. Newton's laws of motion were the basis of all calculations of motion. 3. Archemedes was born in Syracuse. 4. There was an hour's interval between the lectures. 5. All the students were in the classroom when the lecturer came in. 6. Lomonosov was the founder of research in many sciences. 7. There were twenty students in the laboratory.

Б.

M. Lomonosov founded the Moscow University in 1755.
1. Who *founded* the Moscow University in 1755? (*Вопрос к подлежащему*).
2. *Did* Lomonosov *found* the Moscow University in 1755? (*Общий вопрос*).
3. *Did* Lomonosov *found* the Moscow University in 1755 or in 1875? (*Альтернативный вопрос*).
4. What *did* Lomonosov *found* in 1755?
   What University *did* he *found* in 1755? (*Специальные вопросы*).
   When *did* he *found* the Moscow University?
5. Lomonosov *founded* the Moscow University, *didn't he?*
   Lomonosov *didn't found* the St. Petersburg University, *did he?* } (*Разделительные вопросы*).

1. In the 17-th century scientists laid the foundation for classical mechanics. 2. Classical mechanics served a model for exact sciences. 3. Students studied the problem of mechanical interaction between bodies at the lesson. 4. They measure the speed of the body moving under the action of an applied force. 5. The life taught Lomonosov to observe the natural phenomena. 6. Archimedes applied his knowledge

of mathematics to practical problems. 7. Newton discovered three basic laws of motion.

10. Ознакомьтесь с терминами текста 2.

Manufacturing and maintenance [ˌmænju'fæktʃərɪŋ ənd 'meɪntənəns] — производство и эксплуатация
key concepts [kiː 'kɔnsəpts] — ключевые понятия
motor vehicles ['moutə 'viːɪklz] — автомобили
aircraft ['ɛəkrɑːft] — летательные аппараты, самолеты
watercraft ['wɔtəkrɑːft] — морские средства передвижения
industrial equipment [ɪn'dʌstrɪəl ɪ'kwɪpmənt] — промышленное оборудование
machinery [mə'ʃiːnərɪ] — машинное оборудование, механизмы
in the most general sense — в самом общем смысле
pistons and cams — поршни и кулачки
fluid mechanics ['fluːɪd mə'kænɪks] — гидромеханика
engine cycles ['enʤɪn saɪkl] — обороты двигателя
intake system — система включения
structural failure — поломка конструкции
fatigue failure [fə'tiːg 'feɪljə] — усталостное разрушение
ultimate failure — окончательная поломка
drafting = technical drawing — техническое проектирование

11. Прочтите текст и скажите, что необходимо знать инженеру-механику для успешной работы.

Text 2. MECHANICAL ENGINEERING

Mechanical engineering is an engineering discipline that involves the application of principles for analysis, design, manufacturing and maintenance of mechanical systems. It requires understanding of key concepts including mechanics, kinematics, thermodynamics and energy. Mechanical engineers use these principles in the design and analysis of motor vehicles, aircraft, heating and cooling systems, watercraft, manufacturing plants, industrial equipment and machinery, medical devices, etc.

The field of mechanical engineering is a collection of many mechanical disciplines.

As we know, mechanics is, in the most general sense, the study of forces and their effect upon matter. Generally, engineering mechanics is used to analyse and predict the acceleration and deformation (both elastic and plastic) of objects under known forces (also called loads) or stresses. Mechanical engineers typically use *mechanics* in the design or

analysis phases of engineering. If the engineering project is the design of a vehicle, they employ *statics* to design the frame of the vehicle, in order to evaluate where the stresses will be most intense. *Dynamics* is applied when designing the car's engine, to evaluate the forces in the pistons and cams as the engine cycles. *Mechanics of materials* may be used to choose appropriate materials for the frame and engine. *Fluid mechanics* is used to design a ventilation system for the vehicle or to design the intake system for the engine.

Structural engineering is the branch of mechanical engineering devoted to examining why and how objects fail. Structural failures occur in two general modes: static failure and fatigue failure. Static structural failure occurs when the object with the applied force breaks or is deformed plastically. Fatigue failure takes place when an object fails after a number of repeated loading and unloading cycles. Fatigue failure occurs because of imperfections in the object: a microscopic crack on the surface of the object, for instance, will grow slightly with each cycle until the crack is large enough to cause ultimate failure. Structural analysis is often used by mechanical engineers after a failure has occurred, or when designing to prevent failure.

Thermodynamics is an applied science used in several branches of engineering, including mechanical engineering. Thermodynamics is the study of energy, its use and transformation through a system. Engineering thermodynamics is usually concerned with changing energy from one form to another. As an example, automotive engines convert mechanical energy from the fuel into heat, and then into mechanical work that turns the wheels.

Drafting or technical drawing is the means by which mechanical engineers create instructions for manufacturing parts. A technical drawing can be a computer model or hand-drawn scheme showing all the dimensions necessary to manufacture a part, as well as assembly notes, a list of required materials and other information.

Mechanical engineers are constantly pushing the boundaries of what is physically possible in order to produce safer, cheaper and more efficient machines and mechanical systems.

12. Просмотрите текст еще раз. Дайте ответы на вопросы, используя информацию текста.

1. What is mechanical engineering? 2. What key concepts must a mechanical engineer understand? 3. What disciplines does mechanical engineering include? 4. When should mechanical engineers use the knowledge of statics? 5. In what cases do they imploy their knowledge dynamics? 6. Where is fluid mechanics used? 7. What does structural engineering mean? 8. What are the main modes of structural failures?

9. What is thermodynamics and where is it applied? 10. By what means do mechanical engineers create instructions for their machinery?

13. Прочтите, переведите и запомните следующие словосочетания.

Mechanical engineering; mechanical engineers; manufacturing and maintenance; key concepts; the design and analysis of motor vehicles; aircraft and watercraft; heating and cooling systems; manufacturing plants; industrial equipment and machinery; medical devices; in the most general sense; effect of forces upon matter; to predict the acceleration; elastic and plastic deformation of objects; to design the frame of the vehicle; in order to evaluate; pistons and cams; engine cycles; to choose appropriate materials; fluid mechanics; the intake system; structural engineering; structural failures; fatigue failures; to occur; to take place; applied force; repeated loading and unloading cycles; because of imperfections in the objects; a crack on the surface; for instance; to cause ultimate failure; to prevent failures; several branches of engineering; changing energy from one form to another; to convert energy from fuel into heat; to turn the wheels; technical drawing; to create instructions; the necessary dimensions; as well as; assembly notes; to push the boundaries; to produce safer, cheaper and more efficient machines.

14. Подберите к терминам в левой колонке определения, представленные справа.

1. Manufacture	a) any device for carrying persons or objects over land or in space.
2. Maintenance	b) mechanisms; machines collectively.
3. Vehicle	c) the tendency of a material to crack and fail under repeated application of stress.
4. Machinery	d) creating instructions for manufacturing parts.
5. Failure	e) a person who makes plans of structures or machinery.
6. Static failure	f) the making of goods or articles by machinery, often on a large scale and with division of labour.
7. Fatigue	g) a breakdown in operation or function.
8. Drafting	h) the work of keeping machinery in a state of good repair.
9. Draftsman	i) any material (coil, oil,wood, etc.) burned to supply heat or power.

10. Fuel — j) plastic deformation or breaking under the action of an applied force.

15. Проанализируйте и переведите предложения, в которых глагол стоит в страдательном залоге (см. грамматический справочник, с. 205).

1. Materials *are selected* in a special way. 2. Lomonosov *was refused* admission to the Academy. 3. All the dimensions necessary for manufacturing machines *will be shown* in the computer model. 4. The principle of displacement *was discovered* by Archimedes. 5. The rate of speeding up *is called* acceleration. 6. The body *is accelerated* under the action of external forces. 7. The object *will* soon *be* greatly *deformed*. 8. Lomonosov *was sent* to study abroad as one of the most diligent students. 9. All solid bodies *are subjected* to the action of external forces. 10. Engineering mechanics *is used* for analysing acceleration and deformation of objects under stresses.

16. Преобразуйте предложения с глаголами в действительном залоге в страдательный залог.

1. The impressive Parphenon in Athens impress numerous tourists. 2. The ancient Egyptians built gigantic piramids. 3. We shall consider the fundamental notions for Strength of Materials at the next lesson. 4. Engineers call specific heat, coefficient of expansion, and other characteristics, physical properties of materials. 5. Engines convert mechanical energy into heat. 6. They produced safe, cheap and efficient mechanical systems. 7. The scientisy will conduct an important experiment tomorrow. 8. The Moscow University was founded in 1755 by M. Lomonosov. 9. Mechanical engineers create instructions for manufacturing parts of machines. 10. Petrov explained us the necessity of using the most up-to-date equipment.

17. Переведите предложения. Постарайтесь запомнить употребление предлогов.

Of 1. Deformation is *of* great importance in calculation *of* the strength *of* engineering structures. 2. Much *of* the content *of* mechanics was created in the 18-th and 19-th centuries. 3. Mechanics constitutes a central part *of* technology, the application *of* physical knowledge *of* the world for definite purposes. 4. The study *of* mechanics gave birth to important fields *of* mechanical engineering. 5. As it is known, mechanics consists *of* statics, dynamics and kinematics. 6. Mike is a top class mechanic and is quite independent *of* his parents. They are very proud *of* their son

and are never tired *of* talking about him. 7. This is the house *of* my father. He is a man *of* great abilities.

In 1. Many scientists *in* the branch of mechanics will arrive *in* Moscow *in* spring, *in* May, *in* particular, to take part *in* the international conference. 2. By motion *in* mechanics we mean any change *in* relative positions of material bodies *in* space that take place *in* the course of time. 3. *In* my opinion, the body is *in* absolute equilibrium. 4. Mr. Parker is interested *in* mechanics and has been engaged *in* it, *in* general, for more than 20 years. 5. Nick is going to finish his experiment *in* three days, but to do the work *in* time he is *in* need of help. 6. Scientists describe the motion of bodies *in* a special way, that is *in* terms of mathematical expressions. 7. As it is known, the sun rises *in* the east and sets *in* the west.

On 1. The solutions of many problems are based *on* general physical principles. 2. The amount of deformation depends *on* the forces that act *on* the body. 3. *On* the one hand, kinematics is an introduction to dynamics, *on* the other hand, its methods are widely used in studying the transmission of motion in mechanisms. 4. Archimedes said, "Give me a place to stand *on* and I can move the Earth". 5. I'm *on* leave *on* the 1-st of August. Do you happen to know what is *on* at our theatre *on* Sunday? 6. *On* our way home he was talking *on* and *on* as if he was delivering a lecture *on* the international situation. 7. I insist *on* going there *on* foot. — There's no objection *on* my part. Wait a moment, I'll put *on* my hat.

At 1. As you know, statics deals with bodies *at* rest. 2. Pete is bad *at* physics and is rather good *at* telling stories. He is quick *at* learning poems and is very slow *at* writing compositions. 3. He usually leaves the house *at* 8 o'clock and comes back *at* night. But *at* that time I found him *at* home *at* 7 o'clock. 4. We met *at* his father's. He was sitting *at* the window reading a magazine. 5. — What are you *at* now? — I am working *at* a new invention *at* present and I have a wonderful device *at* my disposal. — I'm greatly surprised *at* the news. 6. We were sitting *at* breakfast when somebody knocked *at* the door, *at* first we didn't hear the knock, but Ann ran to the door *at* once and opened it. 7. — What are you looking *at*? — I am looking *at* the ship over there, *at* the distance of a mile.

18. Дайте английские эквиваленты словосочетаниям, употребляя правильные предлоги.

На востоке, на западе, на севере, на юге; решение проблемы; таким образом; в пространстве; в 5 часов; утром, вечером; у окна; работа различных механизмов; в октябре; в общем; в настоящее время; весной, летом, осенью, зимой; содержание механики; в частности; в общем; дома; вовремя; поздно ночью; человек больших способностей; по моему мнению; на языке математики; средства движения; за завтраком, за обедом, за ужином; в течение времени; в этом смысле; на расстоянии; в этой связи; в 21 веке; через 2 года; пешком; по пути домой.

Находиться в покое; гордиться чем-нибудь; основываться на принципах; интересоваться механикой; состоять из; принимать участие в конференции; действовать на тело; плохо успевать по физике; прибывать в Ростов; нуждаться в помощи; постучать в окно; иметь большое значение; иметь в распоряжении; работать над чем-нибудь; удивиться новости; встретиться у матери; смотреть на что-то; чем вы заняты теперь?; быть в отпуске; идти все дальше и дальше; родиться второго мая; надеть шапку.

19. Составьте пары (или группы) близких по значению слов из перечня, приведенного ниже.

Существительные: motor, path, foundation, amount, application, subject, structure, field, shape, movement, way, work, engine, production, form, basis, mechanism, use, operation, branch, discipline, motion, manufacture, machine, composition.

Глаголы: to use, to name, to found, to face, to treat, to form, to call, to deal with, to apply, to employ, to confront, to use, to base, to constitute, to consider, to concern with.

Прилагательные: solid, various, small, rigid, principal, little, different, main.

20. Прочтите тексты 3 и 4 по вариантам и составьте 8–10 вопросов к ним.

Text 3. ARCHIMEDES

Ancient historians tell us that once an old man, over seventy, fought the strongest power in the world — Rome itself. The old man was Archimedes of Syracuse, the greatest scientist of the ancient world. Legends say that Archimedes set up curved mirrors on the walls of Syracuse and the attacking Roman ships caught fire. Archimedes was the first who applied his knowledge of mathematics to practical problems.

Archimedes was born in Syracuse, on the island of Sicily, in 287 B. C. in the family of an astronomer. Since his childhood he enjoyed inventing mechanical devices.

One of Archimedes' early achievements was discovering the explanation for the basic mechanics of the lever*. Imagine a shaft balanced on a pivot** with the shaft on one side of the pivot ten times longer than on the other. Pushing down the shaft at the long end moves the short end up only one-tenth the distance. The force pushing the long end down is multiplied ten times in the push of the short end up. Distance is exchanged for force. Therefore, make the lever long enough, push the long end down far enough, and any weight can be lifted at the short end. "Give me a place to stand on," Archimedes said, "and I can move the Earth".

Once a goldsmith made a gold crown for the king. But the king wondered if the smith had not added silver or copper instead of the gold. He ordered Archimedes to determine if the crown was pure gold without damaging it. Thinking the problem over Archimedes discovered the principle of displacement. From this he deduced the laws of buoyancy and specific gravity***. Archimedes filled a vessel with water, placed the crown in it and measured the volume of the water displaced. Then he did the same thing with an equal weight of pure gold. The volume of displaced water was smaller. The gold in the crown had been mixed with a lighter metal. The smith had been proved dishonest.

The discoveries of Archimedes have become part of mankind's heritage. He showed that it was possible to apply a scientific mind to the problems of everyday life.

Notes:

* the basic mechanics of the lever — основы механики рычага

** a shaft balanced on a pivot — стержень, уравновешенный на оси рычага

*** the laws of buoyancy and specific gravity — законы плавучести и удельного веса.

Text 4. MIKHAIL LOMONOSOV (1711–1765)

Mikhail Lomonosov was born in the family of a fisherman in the northern coastal village of Denisovka not far from Archangelsk. When he was ten years of age his father began to take him sea fishing. The dangerous life of a fisherman taught him to observe the natural phenomena. During the long winter nights young Lomonosov studied grammar and arithmetic diligently.

As he was the son of a peasant, he was refused admission to the local school. Some years later, through concealing his peasant origin, Lomonosov managed to enter the Slavonic-Greec-Latin Academy and for five years lived a hand-to-mouth existence* on three kopecks a day. The noblemen's sons studying with him made fun of the twenty-year-old giant who, in spite of his poverty, made rapid progress.

Lomonosov's ability and diligence attracted attention of the professors and as one of the best students he was sent abroad. He spent all the time there studying the works of leading European scientists in mathematics, mechanics, physics, chemistry, metallurgy and mining. On his return to Russia in 1745 he was made a professor and was the first Russian scientist to become a member of the Academy of Sciences.

A scientist of encyclopaedic knowledge, he was the founder of modern research in Russia in very many fields. In physics Lomonosov was the first scientist to explain thermal phenomena in terms of the atomic and molecular theory. At the same time as Franklin, he demonstrated the electric nature of lightning and invented the lightning rod.

He also made outstanding discoveries in astronomy — he detected the atmosphere of Venus and described the substance of comet tails. Lomonosov also did a great deal in metallurgy and mining, glass-making and pyrotechnics. He made forty mosaic panels and portraits in his studio. His best work is a portrait of Peter the Great, which is on display at the Hermitage Museum in St. Petersburg.

For the number of discoveries Lomonosov has no equal in Russian science. He proved

"That Newton, Platos of our own
And other men of world renown
On Russian soil can also grow!"**

His living memorial is the Moscow University, which he founded in 1755. And our greatful country will always remember Lomonosov, who, in Pushkin's words, was a "whole university" in himself.

Notes:

* lived a hand-to-mouth existence — жил впроголодь.

** «Что может собственных Платонов и быстрых разумом Ньютонов Российская земля рождать...».

21. Поменяйтесь вариантами текстов 3 и 4. Прочтите новый текст и дайте ответы на вопросы вашего товарища.

22. Прослушайте (прочтите) текст и проверьте свое понимание, отвечая на вопросы.

Text 5. ISAAK NEWTON (1642–1727)

Isaac Newton, one of the greatest men in the history of science, was born in a small village in England. His father was a poor farmer. Isaac was a silent thinking boy. He played little with other children, giving all his time to Mathematics, Mechanics and Physics. When the boy was fourteen his father died. Isaac left school and helped his mother on the farm. But the boy didn't like farming. He was fond of poetry and sciences. So Isaac was sent back to school to be prepared for college. At the age of eighteen Newton entered the University of Cambridge, where he became one of the best students, and where later he lectured on mathematics for more than 30 years.

Newton's curiosity and diligence resulted in his greatest discovery of the most fundamental law of the Universe — the Law of Gravity. Observing the fall of an apple from a tree, he came to the conclusion that the force, keeping the planets in their orbits around the sun, was the same force that caused the apple to fall, namely, the force of gravity. His law states that every particle of matter in the universe attracts every other particle with a force proportional to the product of their masses and universely proportional to the square of the distance between them. Newton extended the law of gravity to the whole universe. He suggested that it was gravity which bound the Moon to the Earth, and the Earth and the other planets to the Sun.

Newton's contribution to many sciences is so great that he may be considered the founder of modern mathematics, physics and spectroscopy. It was Newton who said that light is a combination of different rays of different colours, known to us as the spectrum, and that white light is a mixture of all these.

Newton lived a long life and was buried in Westminster Abbey. There is a monument to Newton in Trinity College at Cambridge with the inscription: "Newton, Who Surpassed all Men of Science".

* * *

1. When and where was Newton born? 2. What was his father? 3. What kind of a boy was Isaac in his childhood? 4. What University did he study at? 5. What was Newton's greatest discovery? 6. How did he come to the discovery of the law of gravitation? 7. What does this law state? 8. In what way did Newton extend his law of gravity to the universe? 9. What fields of science did Newton make contribution to? 10. What conclusion did he come to studying the nature of light?

23. Переведите текст 4 письменно и сверьте ваш перевод с образцом перевода, представленным ниже. Оцените ваш перевод.

Text 6. "VOLGA" MOTOR CAR

The "Volga" motor car is comfortable, simply and easily controlled, convenient for servicing and has very good dynamic and economic characteristics. Due to the proper arrangement of units the motor car, though of comparatively small overall dimensions, accomodates five adults. The good stability of the motor car on the road, its soft and elastic suspension and balloon tyres make it possible to drive at high speeds, ensuring very smooth travel. A high road clearance and good quality of the suspension provide for sufficiently high speeds on roads of lower quality and enable the driver to overcome rough roads and steep slopes. A reliable steering gear and hydraulic brakes ensure safe travel.

Specifications

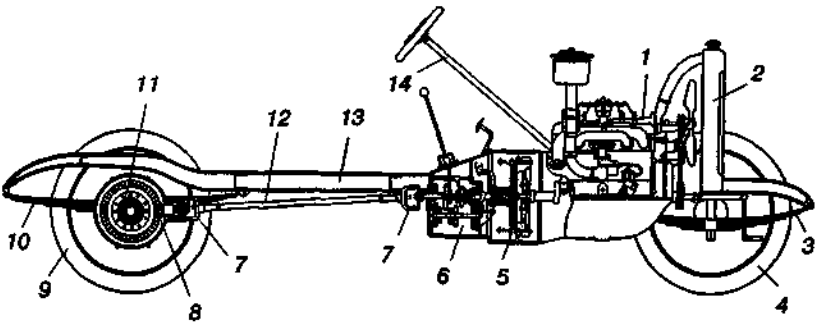
Body: Five-seat, four-door, sedan, all-metal, frameless design.

Engine: Type — four-cylinder, four-stroke, carburettor, with overhead valves.

Lubricating System: Combination splash and force-feed.

Fuel System: Downdraft carburettor equipped with air cleaner and suction muffler. Fuel — gasoline with octane rating 80.

Cooling System: Liquid closed type with forced circulation.



Automobile Framework:

1 — I.C. engine; *2* — radiator; *3* — front suspension spring; *4* — front wheels; *5* — clutch mechanism; *6* — transmission gears; *7* — universal joint; *8* — final drive; *9* — rear wheels; *10* — rear suspension spring; *11* — differential; *12* — propeller shaft; *13* — framework; *14* — steering gear

Power transmission: Dry single-plate clutch and mechanical three-stage transmission.

Propeller shaft drive: Open type. Two shafts and three universal joints with needle bearings. Equipped with centre bearing.

Running gear. Front suspension: independent on vertical coil springs mounted on removable crosspiece, equipped with two-way hydraulic shock absorbers.

Rear suspension: spring type on two shielded semielliptic springs with two-way hydraulic shock absorbers. *Rear axle:* made with cast casing and drop-forged cover connected at flange in vertical plane. *Brakes:* foot brake — hydraulic, shoe-type for all wheels. Parking brake of drum type, installed at rear of transmission. Suspended foot brake pedal equipped wearproof plastic sleeve which does not need greasing. *Steering gear:* worm with double roller. *Wheels:* stamped disks with chrome-plated caps. *Tyres:* ballon, tyre size 6.70″×15″.

Main Data: Maximum engine power at 4000 r. p. m., 80 h. p. Road clearance with full load 190 mm. Maximum speed, 135 km per hour. Fuel consumption, 9 Litres per 100 km. Fuel tank capacity, 60 Litres.

АВТОМОБИЛЬ «ВОЛГА»

Автомобиль «Волга» комфортабелен, прост и легок в управлении, удобен в обслуживании и обладает высокими динамическими и экономическими показателями. Благодаря удачному расположению агрегатов в автомобиле при сравнительно небольших габаритных размерах размещается пять человек. Хорошая устойчивость автомобиля на дороге, мягкая эластичная подвеска и шины низкого давления дают возможность движения на высоких скоростях, обеспечивая отличную плавность хода. Большой дорожный просвет и хорошее качество подвески позволяют держать достаточно высокую скорость на дорогах ухудшенного качества, а также преодолевать тяжелые участки дороги и крутые подъемы. Надежное рулевое управление и гидравлические тормоза гарантируют безопасность движения.

Технические характеристики

Кузов: пятиместный, четырехдверный, закрытый, цельнометаллический, несущей конструкции.

Двигатель: тип — четырехцилиндровый, четырехтактный, карбюраторный, с верхним расположением клапанов.

Система смазки: комбинированная — под давлением и разбрызгиванием.

Система питания: карбюратор с падающим потоком. Снабжен воздушным фильтром с глушителем шума всасывания. Топливо — бензин с октановым числом 80.

Система охлаждения: жидкостная, закрытого типа с принудительной циркуляцией.

Силовая передача: сухое, однодисковое сцепление и механическая трехступенчатая коробка передач.

Карданная передача: открытого типа. Имеет два вала и три кардана с игольчатыми подшипниками. Снабжена промежуточной опорой.

Ходовая часть: передняя подвеска: независимая на вертикальных спиральных пружинах, смонтирована на отъемной поперечине, оборудована двумя гидравлическими амортизаторами двойного действия. *Задняя подвеска:* рессорная на двух зачехленных полуэллиптических рессорах, снабженных резиновыми втулками, оборудована гидравлическими амортизаторами двойного действия. *Задний мост:* выполнен с литым картером и кованой крышкой, соединенными по фланцу в вертикальной плоскости. *Тормоза:* ножной — гидравлический, колодочный, действующий на все колеса. Стояночный тормоз — барабанного типа, установлен сзади коробки передач. Педаль ножного тормоза подвесная, снабжена износоустойчивой, не требующей смазки пластмассовой втулкой. *Рулевое управление:* червяк с двойным роликом. *Колеса:* дисковые, штампованные, снабжены хромированными колпаками. *Шины:* низкого давления, размером 6.70″×15″.

Основные данные: наибольшая мощность двигателя при 4000 об/мин. — 80 л. с. Дорожный просвет (клиренс) при полной нагрузке — 190 мм. Наибольшая скорость — 135 км/ч. Расход топлива на 100 км — 9 л. Емкость бензобака — 60 л.

24. Выполните самостоятельно письменный перевод текстов 5 и 6 по вариантам.

Text 7. THE STEAM-ENGINE

Long ago people noticed that steam had the power of moving things, and they began to wonder how steam could be made to work for them. The first steam-engine was made in ancient Egypt by Hero, a Philosopher of Alexandria. Hero's engine was regarded merely as a toy.

The earliest steam-engine to find employment in the industry was that of Thomas Savery in 1698. The engine was used quite extensively in pumping mines and raising water to supply houses and towns.

The Frenchman Denis Papin invented the safety valve and the piston which greatly improved the steam-engine. The next step forward

was taken by the English mechanic Thomas Newcomen, who combined the ideas of Savery and Papin and designed an engine that could be used not only to pump water, but also to drive other machinery.

An even better steam-engine was built in Russia in 1765 by the brilliant mechanic Ivan Polzunov. His device could be used for many purposes and not just for pumping water. Polzunov's engine had two cylinders. Hence, while the piston in one was going down, the piston in the other was rising.

The next inventor who helped to make the steam-engine what it is today was James Watt a maker of instruments at the University of Glasgow. In 1785 he developed a greatly improved steam-engine, which found many more uses than earlier models had had. This led to the Steam Age.

Text 8. INTERNAL COMBUSTION ENGINE

The internal combustion engine is one in which the energy of the fuel is turned into mechanical work by an explosion behind the piston. The first such engine was built by Samuel Brown in England in 1823. Brown engines were put in a road vehicle in 1826, and it was in this way that the motor-car was born.

The modern internal combustion engine is a heat engine in which pressure necessary to produce motion of the mechanism results from the ignition or burning of a fuel-air mixture within the engine cylinder.

Internal combustion engines may be classified: according to the fuel they work on (gas engines, gasoline engines and oil (diesel) engines); according to the number of piston strokes in one complete working cycle, (two-stroke engines and four-stroke engines); according to the number of cylinders (four-, six-, eight-, ten- and twelve-cylinder engines); according to the arrangement of cylinders (in-line engines, V-engines and star or radial engines); and according to the method of cooling (liquid-cooled and air-cooled engines).

The part of an engine in which the energy of the working fluid is converted into mechanical effort is called the cylinder. Within the cylinder there is a closely fitting piston with piston rings sliding in and out to make strokes. The reciprocating motion of the piston is converted to a rotary motion by means of a connecting rod and a crankshaft. The crankshaft revolves in bearing and delivers power to whatever machine the engine is driving.

TESTS

1. Вставьте необходимые слова вместо пропусков.

1. The science dealing with the general laws of motion and equilibrium is called ____ mechanics.
   a) classical; b) theoretical;
   c) fluid; d) practical.

2. Every machine has _____ on which the other parts are mounted.
   a) a piston; b) a cam;
   c) a key; d) a frame.

3. To design the intake system for the engine ____ is used.
   a) dynamics; b) fluid mechanics;
   c) mechanics of materials; d) kinematics.

4. Such properties as thermal conductivity and specific heat refer to ____ properties of materials.
   a) mechanical; b) physical;
   c) mathematical; d) chemical.

5. The property of breaking the material without any deformation is called _____.
   a) elasticity; b) plasticity;
   c) ductility; d) brittleness.

6. The development of the science of strength of materials began with ____.
   a) Archemedes; b) Galileo;
   c) Newton; d) Lomonosov.

7. From the earliest times people studied the _____ of structural materials to draw up the rules determining safe dimensions of material elements.
   a) strength; b) size;
   c) composition; d) force.

8. It is known that _____ studies the use and transformation of energy.
   a) structural engineering; b) dynamics:
   c) thermodynamics; d) mechanics.

9. Mechanical engineers should know the properties of the materials used ____ failures.
   a) to protect; b) to prevent;
   c) to perform; d) to prepare.

10. Structural failures often occur because of _____ in the objects.

a) impeachments; b) imperfections;
c) impossibilities; d) improvements.

2. Подберите к терминам, данным в левой колонке, определения, представленные справа.

1. Statics	a) the study of the flow properties of liquids and gases.
2. Dynamics	b) design, manufacture and maintenance of mechanical systems.
3. Thermodynamics	c) the branch of mechanical engineering dealing with constructions or management of machinery and examining the objects failures.
4. Fluid mechanics	d) the branch of mechanics dealing with bodies, masses or forces at rest or in equilibrium.
5. Mechanical engineering	e) the branch of mechanics dealing with the motion of material engineering bodies under the action of given forces.
6. Structural engineering	f) the branch of physics dealing with the transformation of heat to engineering and from other forms of energy and with the laws governing such conversion of energy.
7. Drafting	g) a breakdown in operation or function.
8. Draftsman	h) plastic deformation.
9. Failure	i) creating instructions for manufacturing parts.
10. Static failure	j) a person who makes plans of structures or machinery.

3. Раскройте скобки и выберите слово в нужной форме (причастие II, глагол в действительном или в страдательном залоге).

1. A body (a — expands; b — expanded; c — is expanded) when it (a — heats; b — heated; c — is heated). 2. Mechanics of materials (a — employs; b — employed; c — is employed) for choosing appropriate materials for machines. 3. Statics (a — studies; b — studied; c — is studied) the laws of equilibrium of material bodies (a — subject; b — subjected; c — are subjected) to the action of forces. 4. Newton (a — discovered; b — is discovered; c — was discovered) three basic laws of motion, these laws (a — based; b — are based; c — will be based) on his and Galileo's experiments. 5. Much of the content of classi-

cal mechanics (a — created; b — is created; c — was created) in the 18-th century and (a — extends; b — is extended; c — was extended) considerably the work of Newton. 6. It is known that Einstein's theory of relativity (a — expanded; b — is expanded; c — was expanded) mechanics beyond the mechanics of Newton and Galileo. 7. Einstein's mechanics (a — represents; b — is represented; c — was represented) classical mechanics in its most developed and most accurate form. 8. These boys (a — miss; b — missed; c — were missed) the lesson of physics yesterday and their test papers (a — didn't write; b — written; c — were not written) in a proper way. Tomorrow they (a — inform; b — will inform; c — will be informed) of their tests results.

Unit 3

ELECTRICAL ENGINEERING

Knowledge is power, power is knowledge.
Francis Bacon

Тексты: From the History of Learning Electricity. Electric Current. Michael Faraday. Three-Phase Electric Machines. Transformers
Грамматика: Модальные глаголы и их эквиваленты. Предлоги *to, into, from, out, out of.* Безличностная форма выражения английских предложений (местоимения *it, one*)

1. Ознакомьтесь с терминами текста 1.

The lightning flash ['laɪtnɪŋ flæʃ] — вспышка молнии
as early as about 600 B. C. (before Christ) — еще около 600 г. до нашей эры
owing to / due to — благодаря
lightning conductor — молниеотвод
unlike charges [ʌn'laɪk 'ʧɑ:ʤɪz] — разноименные заряды
the voltaic pile [vɔl'teɪk 'paɪl] — вольтов столб
continuous current [kən'tɪnjuəs 'kʌrənt] — постоянный ток
alternating ['ɔ:ltə:neɪtɪŋ] current — переменный ток
by means of — посредством, с помощью
electric quantities ['kwɔ:ntɪtɪz] — электрические величины
incandescent [ˌɪnkæn'desənt] lamp — лампа накаливания
long-distance power transmission — передача энергии на далекие расстояния

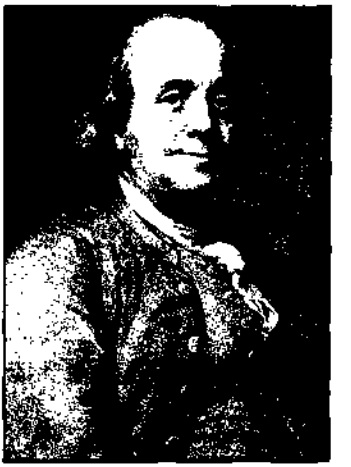
2. Прочтите текст и расскажите об основных этапах развития науки об электричестве.

Text 1. FROM THE HISTORY OF LEARNING ELECTRICITY

1. History shows us that almost 2500 years ago, the Greeks were already familiar with the strange force which is known today as electricity.

Generally speaking, three phenomena made up all of ancient people's knowledge of electrical effects. They were: the lightning flash — a dangerous power that could kill people and burn or destroy their houses; strange yellow stones that obtained the ability of attracting light objects when they were rubbed; and the so-called electric fish, which possessed the property of growing more or less strong electric shocks. But people could neither understand their observations nor find any practical applications for them. The Greek philosopher *Phales* who discovered the phenomenon of amber as early as about 600 B. C. didn't know that amber was charged with electricity owing to the process of rubbing.

Electricity has been the subject of scientific interest since the early 17-th century. The first electrical engineer was probably *William Gilbert* (1540–1603), who designed the versorium, a device that detected the presence of statically charged objects. He drew a clear distinction between magnetism and static electricity and established the term electricity (from the Greek "electrum" which means "amber").



Benjamin Franklin

The famous American scientist *Benjamin Franklin* (1706–1790) experimented with atmospheric electricity and proved that lightning was a discharge of electricity. He invented the lightning conductor, a metal device which protected buildings from lightning by conducting the electrical charges to the earth. Franklin also proved that unlike charges are produced due to rubbing dissimilar objects. He called the charges negative and positive.

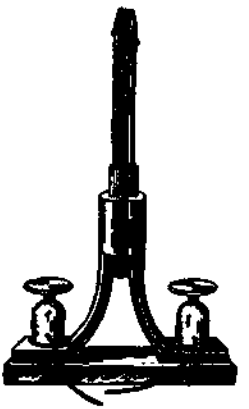
The famous Italian scientist *Alessandro Volta* (1745–1827) was the first to get the electric current. He constructed the voltaic pile, the first source of continuous current, a forerunner of the electric battery, in 1800. Since that time numerous scientists and inventors, Russian and foreign, have greatly contributed to the development and practical application of electricity.

2. The first Russian electrical engineer, Academician *Vasili Petrov* (1761–1834) described the methods of constructing and using a battery, and discovered the effects of insulation. Petrov made the world's first discovery of the electric arc and foretold the possibility of its application for lighting purposes.

In 1820 the Danish physicist *Oerstead* (1777–1851) discovered the magnetic effect of the electric current.

Andre Ampere

George Ohm



Yablochkov's electric candle

Soon *Andre Ampere* (1775–1836), one of the founders of electro-dynamics, determined the difference between the current and the static charges. He investigated the connection between electricity and magnetism and proved that magnetic effect could be produced without magnets, by means of electricity alone. He also created the first theory of magnetism.

In 1825 *George Ohm* (1787–1854) the German physicist established the main law of an electric circuit — the relationship between three basic electric quantities: resistance, current and voltage in 1827.

Michael Faraday (1791–1867), an outstanding English scientist, performed more than two thousand experiments in his lifetime and made valuable discoveries in chemistry and physics. But his greatest discovery was the discovery of electromagnetic induction in 1831, which later became the basis of all modern electrical engineering. His dynamo machine became the forerunner of modern generators.

The development of electric lightning was due to the efforts of Russian scientists and inventors. *Alexander Lodygin* invented the first incandescent lamp. *Pavel Yablochkov* improved *Petrov's* electric arc and invented the electric candle. He greatly contributed to the application of "Russian light" for lightning purposes. Yablochkov was also the first scientist in the world who used the alternating current in practice and created the principle of the transformer. *Michail Dolivo-Dobrovolsky* was the inventor of the generator and the wiring for the three-phase system. He showed the way to the long-distance power transmission and made electrification possible in the true sense of the word.

3. Просмотрите текст еще раз. Дайте ответы на вопросы, используя информацию текста.

1. When were the Greeks familiar with the force now known as electricity? 2. What phenomena made up people's knowledge of electrical effects? 3. Could ancient people explain those phenomena? 4. What kind of a device did W. Gilbert design? 5. What is B. Franklin famous for? 6. What do you know about A. Volta's discoveries? 7. What is A. Ampere noted for? 8. What law did G. Ohm establish? 9. How did M. Faraday contribute to the development of electric engineering? 10. What were the efforts of Russian scientists in the development of electric engineering?

4. Прочтите, переведите и запомните следующие словосочетания.

Generally speaking; to be familiar with; to make up people's knowledge; lightning flash; dangerous power; the ability of attracting light objects; to possess the property; more or less; neither ... nor; to find practical application; to discover the phenomenon; as early as about 600 B. C.; to charge with electricity; owing to; to be the subject of scientific interest; the early 17-th century; electrical engineer; to detect the presence of charged objects; to draw a clear distinction; discharge of electricity; the lightning conductor; to conduct electrical charges to the earth; unlike charges; due to; dissimilar objects; electric current; numerous scientists; to contribute greatly; to discover the effect of insulation; for lighting purposes; to determine the difference; to investigate the connection; to prove the magnetic effect; by means of; electric quantity; resistance and voltage; to make valuable discoveries; electromagnetic induction; incandescent lamp; the alternating current; wiring for three-phase system; the long-distance power transmission; in the true sense of the word.

5. Переведите предложения, обращая внимание на употребление модальных глаголов и их эквивалентов (см. грамматический справочник, с. 206–207).

1. An alternating current *can* be transformed to a direct current form for practical application. 2. In order to apply and control the effects that *can* be produced by the flow of electricity, engineers *must* control the current, that is they *have to* know its laws. 3. A magnetic field *may* be represented by means of magnetic lines of force. 4. M. Faraday *had to* make a lot of experiments before he *could* come to the discovery of electromagnetic induction. 5. Hans Christian Oersted *was able to* prove the existence of magnetic field around a current. 6. That part of the

motor *should* be repaired. 7. Electrical engineers *were allowed to* test the new equipment. 8. An electric current *will be able to* flow only when an electromotive force is established in a circuit. 9. — *Must* we go and bring Pete from the hospital now? — No, you *needn't*. Pete is still ill and he *will be allowed to* leave the hospital only in a week. 10. If you are so forgetful you ought to write down all the telephone messages.

6. Измените предложения (A) и дайте ответы на следующие вопросы (B) по образцу.

A.

I can't do it now; (tomorrow).
I'll be able to do it tomorrow.

1. Mike can't come to see you today; (on Sunday). 2. I can't ring you up at 3; (in the evening). 3. Nick can't leave the hospital tonight; (in a week). 4. I can't speak English fluently now; (I hope, ... in a year). 5. They can't discuss the problem today; (tomorrow). 6. They can't buy a new car now; (next year). 7. Kate is busy and can't go shopping now; (in the evening).

B.

— Did you have to do it yesterday? (A — last week; B — next week).
— No, I didn't. A — I *had to* do it last week.
B — *I'll have to* do it next week.

1. Did they have to put the new electric station into operation on Friday? (A — last month; B — next month). 2. Did the engineer have to solve the problem yesterday? (A — the day before yesterday; B — the day after tomorrow). 3. Did mother have to cook dinner at three? (A — at two; B — at five). 4. Did you have to translate the article for today? (A — for yesterday; B — for the next lesson). 5. Did you have to make the experiment an hour ago? (A — in the morning; B — after dinner). 6. Did they have to measure the current in the circuit? (during their lab. work). 7. Did the students have to take their exam in the morning? (A — last night; B — at three o'clock).

C.

— May I go out? — *Yes, you may. No, you mustn't.*
— Must I go there? — *Yes, you must. No, you needn't.*
— Can you speak English? — *Yes, I can. No I can't.*

1. Can electric pulses move at the speed of light? Yes, ... 2. May I take your book? No, ..., I need it myself. 3. Can you explain that electric phenomenon? No, ... 4. Must he know all the laws of electric-

ity to measure the resistance in the conductor? No, ... He must know Ohm's law. 5. Can computers replace people in their routine work? Yes, ... 6. Must we make the experiment at once? No, ... You may do it later. 7. May we take part in the preparation to that experiment? No, ... You are not ready for this work yet.

7. Раскройте скобки и поставьте модальный глагол в предложенном времени.

1. Scientists (сумели) to discover a number of free electrons in a material. 2. Engineers (должны были) measure the resistance in a conductor. 3. It (следует) be noted, that Ohm's law is of great importance in physics because it (может) be applied to many electrical phenomena. 4. Due to Ohm's law we (сумеем) define the force of current. 5. According to Ohm's law, resistance (должно) be equal to the potential difference divided by current. 6. He (разрешили) take part in that important experiment. 7. Coulomb, the famous French scientist, (смог) establish the law about static charges. 8. Devices connected in series (должны будут) operate at the same time. 9. That phenomenon (следует) be investigated. 10. You (нет нужды) come to school so early. You (можешь) come 10 minutes before the lessons begin.

8. Запомните основные суффиксы прилагательных. Переведите слова.

-al: classical; physical; structural; general; central.
-ic: basic; economic; electronic; atomic; systematic.
-ent: ancient; subsequent; different, dependent.
-ant: important; constant; distant.
-ive: effective; relative; active; progressive.
-able: deformable; considerable; measurable.
-ible: possible; impossible; responsible.
-ful: useful; helpful; powerful; successful; beautiful.
-less: useless; helpless; powerless; motionless; limitless.
-ous: famous; dangerous.

9. Преобразуйте прилагательные, данные в положительной степени, в прилагательные в сравнительной и превосходной степени.

а) ***простые прилагательные*** (суффиксы ***-er, -est***):
long; short; big; great; small; dark; weak; strong; happy; early; new; quick; easy.

б) ***сложные прилагательные*** (***more, the most***):

effective; comfortable; beautiful; important; practical; difficult; interesting; considerable.

в) ***исключения:***
good; bad; little; many / much; far.

* * *

10. Ознакомьтесь в терминами текста 2.

Negative charges ['ʧɑ:ʤɪz] — отрицательные заряды
difference of potentials [pə'tenʃəlz] — разность потенциалов
a complete path [kəm'pli:t pɑ:θ] — замкнутый контур
the source of supply [sɔ:s əv sə'plaɪ] — источник питания
electromotive force [ɪ'lektroumoutɪv fɔ:s] — электродвижущая сила
conductors [kən'dʌktəz] — проводники
resistors — резисторы
fuses ['fu:zɪz]– предохранители
inductance coiłs [ɪn'dʌktəns kɔɪlz] — катушки индуктивности
throttles [θrɔtlz] — дроссели
capacitors [kə'pæsɪtəz] — конденсаторы
closed and open circuits ['sə:kɪts] — замкнутые и разомкнутые цепи
series and shunt installations — последовательные и параллельные цепи
direct current — постоянный ток
as well as — а также
vice versa ['vaɪsə 'və:sə] — наоборот
to meet requirements [rɪ'kwaɪəmənts] — удовлетворять потребности

11. Прочтите текст 2 и расскажите, что представляет собой электрический ток.

Text 2. ELECTRIC CURRENT

Electrical engineering is an engineering field that deals with the study and application of electricity and electromagnetism. Electrical engineers are usually concerned with using electricity to transmit energy. So what is electricity?

As it is known, in any metal there is a large number of free electrons of negative charge which can move through the metal under the

action of an electric force. This flow of electrons is the electric current. A difference of electrical potential maintains a flow of electrons in conductor. The electric current flows through the electric circuit, a complete path, which carries a directed flow of electric charges under certain conditions. The necessary conditions mean the presence of the source of supply for an electromotive force generation and the load to which the electric current is delivered. Numerous conductors, resistors, fuses, inductance coils, throttles, capacitors, etc., are also included to the list of essential electric circuit components. The most popular circuit models are represented in electrical engineering by numerous electronic schemes, such as closed and open circuits, serious and shunt circuits, linear and non-linear installations, single-phase and polyphase systems. The schemes display the circuit components and the order of their connection.

It should be noticed that there are different types of electric current. The current moving steadily in one direction only is a direct current (DC). The current that changes its direction is called an alternating current (AC). The electrical systems in automobiles and airplanes, as well as the telegraph, telephone, the tram and special laboratories require the direct current for their operation. But it should be noticed that about 90% of electrical energy generated at present is the alternating current. One of the great advantages of alternating current is the ease with which power at low voltage can be changed into power at high voltage and vice versa. Hence, on the one hand alternating voltage can be increased when it is necessary for long-distance energy transmission and, on the other hand, one can decrease it to meet industrial requirements. Alternating current also finds wide application for lighting, heating, for operation of various devices at home and for numerous industrial purposes.

12. Просмотрите текст еще раз. Дайте ответы на вопросы, используя информацию текста.

1. What does electrical engineering deal with? 2. What is electric current? 3. What maintains the flow of electrons in the circuit? 4. What is an electric circuit? 5. What are the necessary conditions for the flow of electrons in the conductor? 6. What components can be included into the electrical circuit? 7. What are the most popular circuit models? 8. What are the main types of electric current? 9. Where is direct current used? 10. Where does alternating current find application?

13. Найдите в текстах 1 и 2 английские эквиваленты следующих словосочетаний.

Вообще говоря; вспышка молнии; опасная сила; способность притягивать предметы; так называемый; обладать свойством; находить широкое применение; заряжать электричеством; предмет научного интереса; обнаруживать наличие заряженных предметов; проводить четкое различие; молния; молниеотвод; разноименные заряды; постоянный ток; предшественник; вольтов столб; очень содействовать; изоляция; в целях освещения; определять различие; исследовать связь; посредством; сопротивление; электромагнитная индукция; на основе; благодаря усилиям ученых; лампа накаливания; электрическая дуга; электрическая свеча; переменный ток; электропроводка; передача энергии на большие расстояния; в настоящем смысле этого слова.

Электротехника; электротехник; отрицательный заряд; передвигаться под действием электрической силы; протекать по электрической цепи; замкнутый контур; при определенных условиях; наличие источника питания; выработка электродвижущей силы; нагрузка; доставлять электрический ток; следует отметить; преимущество переменного тока; проводник; катушка индуктивности; дроссели; предохранители; резисторы; конденсаторы; важные элементы цепи; замкнутые и разомкнутые цепи; линейные и нелинейные установки; последовательные и параллельные цепи; однофазные и многофазные системы; порядок соединения; постоянный ток; менять направление; а также; следует отметить; в настоящее время; низкое / высокое напряжение; наоборот; с одной стороны; с другой стороны; передача энергии на далекие расстояния; повысить / понизить напряжение; удовлетворять потребности; многочисленные промышленные цели.

14. Вспомните значение следующих глаголов и подберите к ним производные. Например: to electrify — electron — electric(al) — electricity — electrification.

To invent; to discover; to apply; to observe; to design; to conduct; to protect; to produce; to construct; to contribute; to insulate; to found; to investigate; to create; to resist; to develop; to improve; to transmit; to transform; to move; to act; to install; to direct; to require; to operate; to generate.

15. Подберите к терминам, данным в левой колонке, определения, представленные справа.

1. power	a) unit of electric pressure.
2. ohm	b) a source of supply.
3. ampere	c) unit of resistance.
4. volt	d) unit of current.
5. fuse	e) a device used for storing an electric charge.
6. capacitor	f) a discharge of electricity.
7. battery	g) electricity at rest.
8. lightning	h) the energy of motion.
9. static electricity	i) a safety device.
10. kinetic energy	j) a source of physical or mechanical force or energy.

16. Переведите предложения. Постарайтесь запомнить употребление предлогов.

To; into

1. Russian and foreign scientists contributed greatly *to* the development and application of electricity. 2. Listen *to* the teacher. He says that power at low voltage can be easily changed *into* power at high voltage due *to* transformers. 3. As *to* the motion, it is the relative displacement of a body in space with respect *to* other bodies. 4. What has happened *to* him? It seems *to* me he doesn't pay attention *to* your words at all. What can you reply *to* that? 5. You must always be attentive *to* what I say *to* you, sonny. Be polite *to* everybody and be quick *to* apologize *to* people if you're in fault. 6. Turn *to* the left and go *to* that building. If you enter it through the front door, you'll get *into* a large hall. 7. Water turns *into* steam at 100 degrees of Centigrade. This fact must be taken *into* account.

From; from ... to

1. Automotive engines convert mechanical energy *from* fuel *into* heat and then mechanical work. 2. Engineering thermodynamics deals with changing energy *from* one form *to* another. 3. The lightning conductor protected buildings *from* lightning by conducting electricity to the earth. 4. — I see that you are working too much, *from* morning *till (to)* night. What are you doing? — I'm *translating* some articles *from* English *into* Russian and *from* time *to* time I'm looking for unknown words in the dictionary. 5. You see I hide this book *from* children. You may take it *from* the shelf. Read it *from* the beginning *to* the end, it's very interesting *from* my point of view. 6. The patient suffered *from* terrible headache. Doctors did their best, but nothing resulted *from* their

efforts. The patient didn't recover *from* his illness and soon died *from* cancer. 7. They travelled *from* London *to* Sochi. Ships in this harbour are quite safe *from* storms, *from* now on this port will receive tourists *from* all over the world.

Out; out of

1. — Is Kate in? — I think, she is *out* and I'm afraid, she is away. — Could you find *out* her new address? 2. — Where is Nick? He is still not well. — Don't worry, dear. He is *out of* danger now and is playing football *out of* doors. 3. They worked *out* a new plan and set *out* to Sochi on board the boat. We came to see them off and watched their boat till it was *out of* sight. 4. — You see, I haven't seen them for a long time and their matter was quite *out of* my mind. — Don't take it close to your heart. *Out of sight, out of mind.* 5. I can't make *out* what he is talking about. But to agree with his plan is *out of* question.

17. Переведите словосочетания, употребляя правильный предлог.

Благодаря; с утра до вечера; по отношению к; время от времени; направо; со всего мира; с моей точки зрения; вне опасности; на дворе; отныне; с начала до конца; что касается; мне кажется; отныне; об этом не может быть и речи.

Преобразовать электричество в тепло; принимать во внимание; обращать внимание на; не быть дома; разрабатывать план; быть внимательным к...; прятать от; проистекать (происходить в результате); скрыться из виду; превращаться в; выяснять; переводить с... на...; умереть от ч.-т.; слушать к.-т.; понять (разобрать); извиняться перед; отправляться в Москву; быть внимательным со всеми; забыть (выскочить из памяти); страдать от болей; вы очень добры ко мне; с глаз долой, из сердца вон; что случилось с тобой?; способствовать чему-то; повернуть направо; изменить энергию из одной формы в другую; защищать от молнии; взять книгу с полки.

18. Запомните словосочетания, передающие безличностную форму выражения, характерную для научно-технических текстов.

It is (well) known — (хорошо) известно
It is noted that — отмечают, что
It should be noticed — следует отметить
It should be pointed out — следует указать
It is important to note — важно отметить
It is interesting to note — интересно заметить
It is of interest to compare — интересно сравнить

It is believed / it is expected / it is supposed — полагают
It's quite possible — вполне вероятно, что
It appears — оказывается
It is necessary to describe — необходимо описать
It is clear (from Fig. 1) that — из рис. 1 ясно, что
In this event it is indicated — в этой связи указывается
It is seen from Fig. 1 — из рис. 1 видно

19. Переведите предложения, обращая внимание на безличностную форму их выражения.

A. 1. *It is well known that* one form of energy can be converted into another form. 2. *It is difficult to imagine* now how people could do without electricity. 3. *It is necessary to remember* the term "circuit", as *it is impossible* to work with electricity without circuits. 4. *It is interesting to note* that Russian scientists made great contribution into the development of electrical engineering. 5. *It is known that* high voltage means low current, low current in its turn results in reduced heating losses in electrical wires. 6. *It is hard to imagine* how we could calculate without using electronic calculating machines. 7. *It is dangerous* to come into contact with high voltage.

B. 1. *It is* the ampere *that* is the unit of current. 2. *It was* Lomonosov *who* stated that heat phenomena were due to molecular motion. 3. *It is* the difference of potential *that* causes the free electrons to flow from one point of the conductor to another. 4. *It is* the sun *that* is an unlimited source of almost all kinds of energy. 5. *It was* Ampere *who* showed the difference between the current and the static charges. 6. *It was* thanks to Lomonosov *that* Moscow University was founded in 1755. 7. *It was* Academician Yoffe *who* predicted the future use of semiconductors.

C. 1. *One must remember* that it is necessary to study English at least an hour a day. 2. *One understands* the importance of electricity when one sees trams, trolley-buses and trains driven by it. 3. *One must know* the chemical properties of the atom. 4. *One can charge* dissimilar objects by rubbing them. 5. *One should remember* that the electric power can burn and kill, but it will serve us well if we use it wisely. 6. When the current is small, *one should use* a galvanometer. 7. *One can reduce* heat losses in transmission lines.

20. Прочтите текст 3. Составьте план в тезисной форме. Сопоставьте ваш план с данным ниже планом. Познакомьтесь с образцами планов в вопросной и назывной форме.

Text 3. MICHAEL FARADAY (1791–1867)

Michael Faraday, the famous English scientist, was born near London on September 22, 1791. His family was too poor to keep him in school long. At the age of 13 Michael began working as an errand boy in a bookshop. A year later he became an apprentice to a bookbinder. Both these jobs helped him to develop a passionate interest in books.

Faraday was also able to attend some public lectures by the world-famous chemist Sir Humphrey Davy. He attended the lectures with great enthusiasm and soon asked Davy to give him work as an assistant. Davy employed Faraday as a laboratory assistant, and Michael was very pleased to work in a scientific laboratory.

From now on Faraday could devote practically all his time to scientific research. He made a lot of experiments, and produced several new kinds of optical glasses that greatly improved the telescope. His discovery of benzene, which he separated from oil gas, found world-wide application. He discovered the law of electrolysis, etc. But the problem of electricity and magnetism interested him above all. Faraday wanted to know if electricity could be made with the help of a magnet? First he produced a current in a wire by a magnet, then, in 1831, he showed that an electric current could induce another current in a different circuit. This discovery of the electromagnetic induction later became the basis of all modern electrical engineering.

As it is known Faraday was one of those men who made possible the age of electricity. He measured the electric current for the first time. He also made several important observations on the conductivity of different materials. Faraday founded the theory of electric and magnetic fields and made great contribution into the development of electromagnetic theory of light.

It should be noticed that all his life Faraday was poor. He believed that a scientist could not serve science for money. Although Faraday enjoyed world-wide popularity, he remained a modest man and wanted neither high titles nor prizes for his numerous discoveries.

План (в тезисной форме)

1. М. Фарадей родился в бедной семье и не имел возможности получить образование.
2. Всемирно известный ученый оказал влияние на научные интересы Фарадея.
3. Фарадей открыл явление электромагнитной индукции — основы современной электротехники.
4. Благодаря своим многочисленным открытиям Фарадей сделал возможным век электричества.

5. Фарадей был скромным человеком, не стремящимся ни к званиям, ни к наградам.

План (в назывной форме)

1. Бедность семьи Фарадея и отсутствие возможности получения образования.
2. Знакомство с всемирно известным ученым и работа в научной лаборатории.
3. Первые открытия Фарадея.
4. Вклад Фарадея в развитие электротехники.
5. Фарадей как личность.

План (в вопросной форме)

1. Могла ли семья Фарадея предоставить ему возможность получить образование?
2. Кто оказал влияние на развитие у Фарадея интереса к электротехнике?
3. Каковы были первые открытия Фарадея?
4. Какой важный вклад в развитие электротехники внес Фарадей?
5. Каковы человеческие качества Фарадея?

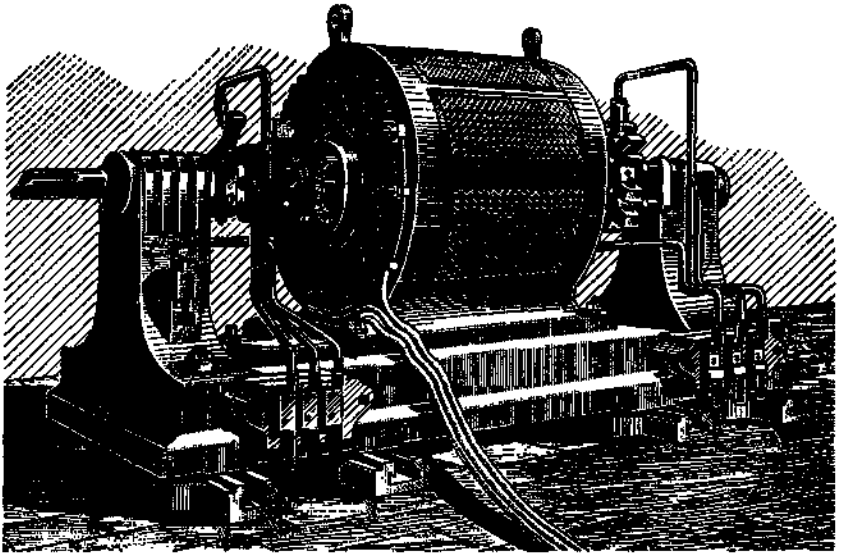
21. Передайте содержание текста о жизни и открытиях М. Фарадея, пользуясь составленным вами планом.

22. Выполните письменный перевод текстов 4 и 5 по вариантам.

Text 4. THREE-PHASE ELECTRIC MACHINES

Modern electric engineering deals with a great variety of three-phase machines based on the operation of three-phase electrical circuits. Such wide popularity of these systems can be explained by their numerous advantages which must involve the factors of economy, efficiency and certainly reliability.

A three-phase electric generator contains two essential parts — an armature or a rotor and an electromagnet or a stator. As a result of the operation of these parts three electromotive forces are induced in three turns. These electromotive forces are able to generate three electric currents with a phase difference of 120'. Thus a three-phase electric generator is able to convert mechanical energy directly into a three-phase electric current. In order to produce electricity under the most economical conditions, the generators must be as large as possible and they should always be kept fully loaded.



Dolivo-Dobrovolsky's engine

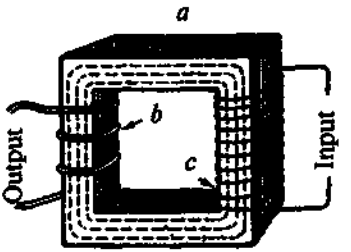
The construction and the operation of a three-phase electric motor have much in common with a three-phase electric generator. The both operate on the same principle of electromagnetic induction discovered by the famous English scientist M. Faraday. But an electric motor serves an opposite designation. A three-phase motor converts three-phase electrical energy directly into mechanical one. It should be noted that a three-phase motor has to drive only three-phase loads.

Text 5. TRANSFORMERS

As you know Russian scientists contributed greatly to the development of transformers. An induction coil invented by the famous Russian scientist P. Yablochkov was the forerunner of the modern transistor. In 1882 another Russian electric engineer and inventor Ivan Usagin improved the Yablochkov's transformer. And M. Dolivo-Dobrovolsky designed the first three-phase transformer in 1890.

It is well known that transformers serve for changing the electric current from one voltage to another. In other words they are used for increasing or decreasing voltage. Transformers found wide application in the long distance energy transmission, in the distribution of this energy among consumers, and also in various devices.

A transformer has two insulated windings or coils, arranged on an iron core. The primary winding is connected to the voltage source;



A step-down transformer:
a — laminated iron core; *b* — secondary; *c* — primary

it receives power. The secondary winding is connected to the load; it supplies energy to the load. The value of voltage in the secondary winding depends on the number of turns in it. In case the secondary has more turns than the primary, the output voltage is greater than the input voltage. A device of this type steps up the voltage and is called a step-up transformer. In case the secondary winding has fewer turns than the primary, the output voltage is lower than the input. This device decreases or steps down the voltage and is termed a step-down transformer.

It should be noted that electromagnetic induction enables the transformer to transmit energy from the primary to the secondary winding.

TESTS

1. Вставьте необходимые слова вместо пропусков.

1. According to Ohm's law _____ equals voltage divided by current, and ____ equals current times resistance.
   a) capacity; b) resistance;
   c) voltage; d) current.

2. The _____ serves to measure the value of current in the circuit.
   a) voltmeter; b) wattmeter;
   c) ammeter; d) conductor.

3. The insulation resistance of any installation should be regularly checked _____ measuring devices.
   a) in case; b) according to;
   c) in spite of; d) by means of.

4. Transformers are widely used to _____ power.
   a) receive; b) reduce;
   c) replace; d) result.

5. Generators change _____ energy into electricity.
a) chemical; b) heat;
c) mechanical; d) atomic.

6. Free electrons move through the metal under the action of _____.
a) DC; b) AC;
c) e. m. f.; d) unlike charges.

7. An alternating current can be transformed into a _____ current for practical application.
a) secondary; b) direct;
c) pulsating; d) induced.

8. Ohm discovered a dependence between electric _____.
a) theories; b) effects;
c) quantities; d) notions.

9. The law about the force of interaction between motionless electrical _____ was established by Coulomb.
a) processes; b) charges;
c) circuits; d) phases.

10. The electric current is a number of _____ which flow in a circuit per unit of time.
a) protons; b) electrons;
c) neutrons; d) atoms.

2. Подберите к терминам, данным в левой колонке, определения, представленные справа.

1. a generator	a) the flow of electrons in one direction.
2. a motor	b) the flow of electrons that changes its direction.
3. a transformer	c) the force that makes electrons move along the conductor.
4. D. C.	d) the coil of wire that rotates in a generator or a motor.
5. A. C.	e) a device that changes the electric current from one voltage to another.
6. e. m. f.	f) a machine that converts mechanical energy into electrical power.
7. electric circuit	g) a device that protects buildings from lightning strokes.

8. armature — h) a complete path along which the current flows from the source and back to the source.

9. conductor — i) any substance that easily carries an electric current.

10. lightning conductors — j) a device that turns electrical energy into mechanical power.

3. Раскройте скобки и поставьте модальный глагол в предложенном времени.

1. We (можем) cause the electrons to move through the conductors. 2. When a person uses electricity he (должен) be very careful. 3. Nowadays the nature of electric current (можно) be explained by the modern atomic theory. 4. M. Lomonosov (сумел) make the theoretical analysis of some electrical phenomena. 5. Students (следует) know that a resistor is one of the most common elements in any circuit. 6. The students (должны были) make an armature and use it in the laboratory experiment. 7. The engineer (сможет) to find practical application of these devices. 8. With short-circuiting of any unit in a series circuit the current (должен будет) be increased because the total resistance of the circuit will be decreased. 9. Students (разрещили) to use new devices in their lab. works. 10. Before great progress (может) be achieved, a lot of complicated problems (придется) be solved.

Unit 4

ELECTRONICS

Genius is 1 per cent inspiration and 99 per cent perspiration.
Thomas Edison

Тексты: Development of Electronics. Microelectronics and Microminiaturization. The Applied Science of Electronics. Transistors. Integrated Circuits
Грамматика: Времена группы Continuous в действительном и страдательном залогах. Причастие I, II. Предлоги *for, about, by, with, without, within*

1. Ознакомьтесь с терминами текста 1.

Applied physics [ə'plaɪd 'fɪzɪks] — прикладная физика
generation [ʤenə'reɪʃn] — создание, формирование, выработка
storage ['stɔrɪʤ] — запоминание, хранение
scientific research [saɪən'tɪfɪk rɪ'sə:ʧ] — научные исследования
due to the efforts — благодаря усилиям
manipulation — управление; обработка; преобразование
to replace vacuum tubes — заменять электронные лампы
a piece of semiconductor — полупроводниковый кристалл
reduced weight [rɪ'dju:st weɪt] — уменьшенный вес
power consumption ['pauə kən'sʌmpʃn] — потребление (расход) электроэнергии
to carry out ['kærɪ aut] — выполнять; осуществлять
solid body — твердое тело; кристалл; полупроводник
at a rate — со скоростью
integrated circuit (IC) — интегральная схема
batch processing [bæʧ prou'sesɪŋ] — пакетная обработка
to assemble [ə'sembl] — собирать; монтировать
to lower manufacturing — снизить производительность
to increase reliability [ɪn'kri:s rɪlaɪə'bɪlɪtɪ] — увеличить надежность

2. Прочтите текст и скажите, что изучает электроника и какие открытия способствовали ее развитию.

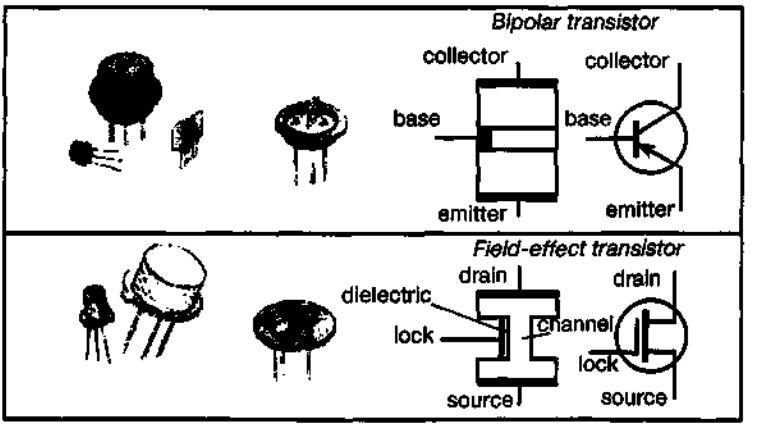
Text 1. DEVELOPMENT OF ELECTRONICS

Electronics is a field of engineering and applied physics dealing with the design and application of electronic circuits. The operation of circuits depends on the flow of electrons for generation, transmission, reception and storage of information.

Today it is difficult to imagine our life without electronics. It surrounds us everywhere. Electronic devices are widely used in scientific research and industrial designing, they control the work of plants and power stations, calculate the trajectories of space-ships and help the people discover new phenomena of nature. Automatization of production processes and studies on living organisms became possible due to electronics.

The invention of vacuum tubes at the beginning of the 20th century was the starting point of the rapid growth of modern electronics. Vacuum tubes assisted in manipulation of signals. The development of a large variety of tubes designed for specialized functions made possible the progress in radio communication technology before the World War II and in the creation of early computers during and shortly after the war.

The transistor invented by American scientists W. Shockly, J. Bardeen and W. Brattain in 1948 completely replaced the vacuum tube. The transistor, a small piece of a semiconductor with three electrodes, had great advantages over the best vacuum tubes. It provided the same



Schemes of bipolar and field-effect transistors

functions as the vacuum tube but at reduced weight, cost, power consumption, and with high reliability. With the invention of the transistor all essential circuit functions could be carried out inside solid bodies. The aim of creating electronic circuits with entirely solid-state components had finally been realized. Early transistors could respond at a rate of a few million times a second. This was fast enough to serve in radio circuits, but far below the speed needed for high-speed computers or for microwave communication systems.

William Bradford Shockley

John Bardeen

Walter Houser Brattain

The progress in semiconductor technology led to the development of the integrated circuit (IC), which was discovered due to the efforts of John Kilby in 1958. There appeared a new field of science — integrated electronics. The essence of it is batch processing. Instead of making, testing and assembling descrete components on a chip one at a time, large groupings of these components together with their interconnections were made all at a time. IC greatly reduced the size of devices, lowered manufacturing costs and at the same time they provided high speed and increased reliability.

3. Просмотрите текст еще раз. Дайте ответы на вопросы, используя информацию текста.

1. What is electronics? 2. Can you imagine modern life without electronics? 3. Where are electronic devices used? 4. What was the beginning of electronics development? 5. What made the progress in radio communication technology possible? 6. What is the transistor? 7. When was the transistor invented? 8. What aim was realized with the invention of the transistor? 9. When were integrated circuits discovered? 10. What advantages did the transistors have over the vacuum tubes?

4. Догадайтесь о значении следующих интернациональных слов и словосочетаний.

Electronics; electrons; physics; information; microelectronics; industrial design; to calculate trajectories; phenomena of nature; automatization of production processes; organisms; vacuum tubes; specialized functions; progress in radio communication technology; transistor; electrode; components; functions; to realize; communication system; technology; descrete components; chip.

5. Найдите в тексте английские эквиваленты следующих словосочетаний.

Прикладная физика; передача и прием информации; поток электронов; трудно представить; научные исследования; промышленное проектирование; вычислять траекторию космических кораблей; обнаруживать явления природы; благодаря электронике; отправная точка; способствовать управлению сигналами; быстрый рост; разнообразие ламп; создание первых компьютеров; полностью заменил; полупроводниковый кристалл; уменьшить вес; сократить стоимость; потребление электроэнергии; высокая надежность; твердотельные компоненты; довольно быстро ... но гораздо ниже; высокоскоростной компьютер; микроволновые системы связи; полупроводниковая технология; область науки; интегральная схема; пакетная обработка; сборка дискретных компонентов на кристалле; снизить производственные затраты; обеспечить высокую скорость и надежность.

6. Переведите следующие «цепочки существительных». Запомните, что переводить ряд существительных, не связанных предлогами, следует, как правило, с конца.

Power consumption; power consumption change; signals manipulation; transistor invention; circuit functions; circuit application; circuit components; communication systems; data processing systems; integrated circuits development; science field; process control; automatization processes control; circuit components; size reduction; electronics development; communication means; problem solution; space exploration; air traffic control; transmission line; long-distance power transmission; electricity discharge; energy distribution; electromotive force generation; an induction coil; internal combustion engine.

7. Прочтите и переведите словосочетания, содержащие

А. Причастие I (Participle I).

The science *dealing* with electronic circuits; devices *calculating* the spaceships trajectories; the Greek word 'electrum' *meaning* amber; the device *protecting* buildings from lightning; electrons *moving* through the metal; current *flowing* through the circuit; current *changing* its direction; laboratories *requiring* the DC; glasses *improving* the telescope; the scientist *enjoying* the world-wide popularity; the motor *operating* on the principle of electromagnetic induction; generators *converting* mechanical energy into electrical power; the *starting* point; the *working* operators; the *moving* electrons.

Б. Причастие II (Participle II).

The devices *used* in scientific research; information *received* by an operator; the transistor *invented* in America; vacuum tubes *replaced* by transistors; a lot of components *made* all at a time; the force *known* as electricity; the lightning conductor *invented* by B. Franklin; charges *conducted* to the earth; components *assembled* on a chip.

Applied physics; *transmitted* information; *decreased* voltage; *reduced* weight; *increased* reliability; *created* electronic circuits; *charged* objects; the *improved* electric arc; *closed* circuits; *generated and received* energy; the *designed* transistors; *lowered* manufacturing costs; *realized* aims.

8. Посмотрите на картинку, прочтите и переведите текст, обращая внимание на употребление the Present Continuous Tense.

Holiday at the Seaside

Mike Smirnov *is enjoying* his holiday at the seaside. The people in the picture *are staying* at the hotel. It is a fine day. It *isn't raining*. The sun *is shining* in the sky. There are some waiters in the picture. Two waiters *are standing*. One waiter *is speaking* to a woman, he *is receiving* the order. The men and women *are sitting* at the tables. One woman *is eating* an ice-cream. The man sitting next to her *is smoking* a cigarette. They *are talking*. Some of the men *are drinking* coffee. One of the women *is having* a cup of tea. Mike sitting opposite the woman *is reading* a newspaper. A dog *is lying* under the table. It *is not eating*. It *is sleeping*. The waiters *are not smoking* cigarettes; they *are not drinking* tea or coffee. One of the boys *is walking* to the water. The children *are playing* on the yellow sand. Some birds *are flying* over the sea.

9. Прочтите текст, проанализируйте глаголы в предложениях.

An Accident

I *saw* an accident this morning while I *was standing* at the corner of Elm Street and Central Avenue. A woman in a small red sports car *was driving* very quickly down Elm Street. A man in a large green truck *was driving* along central avenue very slowly. While he *was moving* through the intersection (перекресток), the woman in the red sports car *didn't stop* at a stop sign and she *crashed* into the truck. Fortunately, the woman *wasn't hurt*, but her nose *was bleeding* a little. The man in the truck *wasn't hurt* at all. He *was shouting* at the lady. I *left* when the police *came*. I *am* glad nobody *was hurt* very badly.

10. Преобразуйте следующие предложения в вопросительную форму по образцу.

I am waiting *for* Nick. (Who ... ?)
Who are you waiting *for*?

1. The man is running *after* the train. (What ... ?) 2. The woman was driving *through* the intersection. (What ... ?) 3. Alice is growing up and very soon she will be going *to* college. (What ... ?) 4. We are thinking *about* the holidays. (What ... ?) 5. The ship is coming *from* Liverpool. (Where ... ?). 6. I was standing *at* the corner of two streets. (What corner ... ?) 7. The boys are laughing *at* the clown's tricks. (What ... ?)

8. I was looking *for* my English text-book. (What ... ?). 9. Granny is taking care *of* her little grandson. (Whom ... ?) 10. We shall be starting *for* Moscow at this time tomorrow. (Where ... ?)

* * *

11. Ознакомьтесь с терминами текста 2.

Performance [pə'fɔ:məns] — рабочая характеристика; параметры; производительность; быстродействие
to predict [prə'dɪkt] — прогнозировать
capability [keɪpə'bɪlɪtɪ] — способность; возможность
branch of science [brɑ:ntʃ əv 'saɪəns] — область науки
circuit assembly ['sə:kət ə'semblɪ] — сборка схемы
film technique [fɪlm tək'nɪk] — пленочная технология (метод, способ)
invisible to unaided eye — невидимый невооруженному глазу
speed of response — скорость реакции (отклика)
advantage / disadvantage [əd'vɑ:ntɪdʒ] — достоинство, преимущество / недостаток
benefit ['benəfɪt] — выгода, польза; помогать, приносить пользу
packing density ['pækɪŋ 'densɪtɪ] — плотность упаковки
small-scale integrated circuit — малая интегральная схема (МИС)
medium-scale IC — средняя интегральная схема (СИС)
large-scale IC — большая интегральная схема (БИС)
very-large-scale IC — сверхбольшая интегральная схема (СБИС)
fineline ['faɪnlaɪn] — прецизионный; с элементами уменьшенных размеров
waveguide ['weɪvgaɪd] — волновод
mode — вид, метод, способ; режим работы
pattern — шаблон, образец; образ, изображение
power ['pauə] — мощность, энергия, питание; производительность, быстродействие; способность, возможность

12. Прочтите текст 2 и скажите, как вы понимаете термины «микроэлектроника» и «микроминиатюризация». Переведите текст.

Text 2. MICROELECTRONICS AND MICROMINIATURIZATION

The intensive effort of electronics to increase the reliability and performance of its products while reducing their size and cost led to the

results that hardly anyone could predict. The evolution of electronic technology is sometimes called a revolution: a quantitative change in technology gave rise to qualitative change in human capabilities. There appeared a new branch of science — microelectronics.

Microelectronics embraces electronics connected with the realization of electronic circuits, systems and subsystems from very small electronic devices. Microelectronics is a name for extremely small electronic components and circuit assemblies, made by film or semiconductor techniques. A microelectronic technology reduced transistors and other circuit elements to dimensions almost invisible to unaided eye. The point of this extraordinary miniaturization is to make circuits long-lasting, low in cost, and capable of performing electronic functions at extremely high speed. It is known that the speed of response depends on the size of transistor: the smaller the transistor, the faster it is. The smaller the computer, the faster it can work.

One more advantage of microelectronics is that smaller devices consume less power. In space satellites and spaceships this is a very important factor.

Another benefit resulting from microelectronics is the reduction of distances between circuit components. Packing density increased with the appearance of small-scale integrated circuit, medium-scale IC, large-scale IC and very-large-scale IC. The change in scale was measured by the number of transistors on a chip. There appeared a new type of integrated circuits, microwave integrated circuit. The evolution of microwave IC began with the development of planar transmission lines. Then new IC components in a fineline transmission line appeared. Other more exotic techniques, such as dielectric waveguide integrated circuits emerged.

Microelectronic technique is continuing to displace other modes. Circuit patterns are being formed with radiation having wavelength shorter than those of light.

Electronics has extended man's intellectual power. Microelectronics extends that power still further.

13. Просмотрите текст еще раз. Дайте ответы на вопросы, используя информацию текста.

1. What would you say about electronics? 2. Why is the development of electronics called a revolution? 3. What is microelectronics? 4. What techniques does microelectronics use? 5. What is the benefit of reducing the size of circuit elements? 6. What do you understand by the term of microminiaturization? 7. What does the speed of the signal response depend on? 8. What advantages of microelectronics do you

know? 9. What scales of integration are known to you? 10. How are microelectronics techniques developing?

14. Найдите в тексте английские эквиваленты следующих словосочетаний.

Интенсивные усилия; увеличить надежность; увеличить параметры; уменьшить размер и стоимость; вряд ли кто-нибудь мог прогнозировать; количественные и качественные изменения; область науки; пленочная технология; полупроводниковый метод; сокращать элементы схемы; суть миниатюризации в том, что; создать схемы с долгим сроком службы; чрезвычайно высокая скорость реакции; чем меньше, тем быстрее; преимущество; расходовать энергию; польза; уменьшение расстояния между элементами схемы; большая интегральная схема; микроволновая интегральная схема; волновод; линия передач; смещать; изображение схем; расширять возможности человека.

15. Прочтите текст и переведите его, обращая внимание на образование the Present Continuous Passive глаголов.

An Auto Repair Shop

Susan Thompson had a lot of trouble with her car last week, so she decided to take it to Joe's Auto Repair Shop to be fixed. The car is there now and is receiving a lot of attention from Joe and the other mechanics at his shop.

The engine *is being tuned.* The oil *is being changed.* The battery *is being charged.* The brakes (тормоза) *are being adjusted.* The heater (радиатор) *is being repaired.* The broken headlight (фара) *is being replaced.* The hood (капот) *is being repainted.* The tyres (шины) *are being checked.* And the broken rear window *is being fixed.*

Susan is aware that she's probably going to pay a lot of money for these repairs. But she is confident that her car will be returned to her in excellent condition by the fine people who work at Joe's Auto Repair Shop.

16. Преобразуйте глаголы второго абзаца упражнения 15 в прошедшее время и заполните пропуски.

Susan left her car at Joe's Auto Repair Shop yesterday and while she was working at her office the workers were busy with the car. So, the engine _____, the oil ____, the battery ____, the brakes ____, the heater ____, the broken headlight _____, the hood ____, the tyres ____, the broken rear window ____.

17. Прочтите и переведите предложения, обращая внимание на конструкцию the (more) ... the (better).

1. The more English books you read, the sooner you'll master English. 2. The smaller the computer, the faster it can work. 3. The higher we go into the atmosphere, the less is its pressure. 4. The greater the number of free electrons in a substance, the better that substance conducts electricity. 5. The higher the voltage, the higher is the electron velocity. 6. The lower the resistance of the material, the more current can pass through it. 7. The higher the resistance of an insulator, the greater the applied voltage must be. 8. The larger the size of the electrodes, the more current capacity they can supply. 9. The higher the temperature of a body, the faster it will burn. 10. The more weight the object has, the more work we must do to lift it.

18. Переведите предложения. Постарайтесь запомнить употребление предлогов.

For

1. This work is too difficult *for* me *for the time being*. 2. — When does the train *start for* Liverpool, I wonder? I'm *waiting for* it *for* half an hour. — I'm *sorry for* you, but the train left a few minutes ago. 3. I'm sorry, but I'm not *ready for* the lesson, *for* I haven't got a dictionary. You know, I was going to *prepare for* the test in English and *for this purpose* I called to Nick to *ask for* a dictionary, but Nick was out and I couldn't translate the text without a dictionary. 4. — Won't you *go for a walk* in the park? — You see, I'm not quite well *for a time* and can't go out *for fear* of catching cold. I've *sent for* the doctor and now I'm *waiting for* him. 5. He has worked at the plant *for* many years and got a good salary *for* his job. That plant is *famous for* its high class machines. 6. — Is it necessary *for* us to leave? — Yes, *for sure*. I'm afraid, we'll be *late for* dinner. Let's *start for* home soon. — It's *for* you to decide. *As for me*, I have no objection. I'm thankful *for* all the pleasant time I've had here. 7. He went *for* a tour around the country *for two weeks*, *for* he was going to *leave* that country *for* Canada *for ever*.

About

1. What are you *thinking about*, I wonder? Don't you hear me? I'm talking to you *for about ten minutes*. 2. — *Have* you got your watch *about* you? Could you tell me what the time is now? — Certainly, it's *about 3 o'clock*. Father will come back in *about* 5 minutes. 3. There were *about* ten children in the garden. We watched them *running about*. 4. — I'm hungry, *what about* dinner? — As far as I know, dinner is *about* 5 o'clock here. But as for me, I'm not hungry and I *don't care about* it. 5. Don't *leave* paper *about* when you go for a picnic.

By

1. It's well known that the novel "War and Peace" was written *by* L. Tolstoi. 2. He took me *by the hand* and asked me *by* what train I had come. I recognized him *by his voice*. 3. — What is your father *by profession, by the way*? — He is a businessman and often goes on business *by train* or *by plane*. As far as I know, he prefers travelling *by day* rather than *by night* and likes to send letters *by* special messengers, not *by post*. 4. — What do you mean *by that?* — I mean that I met him *by accident* and hardly recognized him because I knew him only *by name* and had never seen him before. 5. I'm sorry, I didn't learn the poem *by heart* because I took the wrong book *by mistake*. 6. — Did you come *by land* or *by sea*? — *By no means*. We came on foot and the rain caught us *by surprise*. 7. Come in *one by one* and tell me everything *step by step*.

With, without

1. Our teacher is very *popular with* the pupils and they always listen to him *with great interest*. 2. — Leave your message *with* the secretary *without* hezitation and come along *with* me. — *With pleasure*. 3. — Why are you *angry with* me? — I'm not *satisfied with* your work and I am not *pleased with* your papers written *with* this fountain-pen. I'm red *with anger*. 4. Have you got money *with you*? What have you bought *with* the money I gave you yesterday, I wonder? 5. She spoke English *without* any mistakes though *with* a slight accent. 6. — You can't do that *without* my permission. — OK, mum, *it goes without saying*. 7. There is no smoke *without* fire.

Within

1. I live *within* a mile from here. 2. He was not *within hearing* and it wasn't *within my power* to get him on the phone. 3. — Look, the yard is covered *with* snow. — Don't worry, I'll clean it from snow *within* two hours. 4. She promised to give me an answer *within* a week. 5. The building should be beautiful *within and without*. By the way, this door opens *from within*.

19. Подберите английские эквиваленты следующим фразам. Постарайтесь употребить правильный предлог.

В настоящее время; как насчет ужина; в течение некоторого времени; с этой целью; из-за боязни; около 7 часов утра; что касается меня; наверняка; идти гулять; иметь с собой; ожидать к.-н. в течение часа; думать о детях; быть готовым к уроку; уезжать в Москву на месяц; отправляться в Лондон; готовиться к уроку; послать за доктором; опаздывать к обеду; славиться (быть известным) ч.-н.; мне все равно.

Нет дыма без огня; пользоваться популярностью; слушать с интересом; писать карандашом; иметь при себе деньги; прибыть морем; лететь самолетом; взять за руку; без разрешения; говорить с акцентом; ни в коем случае; с удовольствием; в пределах слышимости; не в моей власти; по ошибке; неожиданно; случайно; между прочим; купить на деньги; ночью; днем; шаг за шагом; без ошибок; по профессии; узнать по голосу; послать по почте; внутри и снаружи; ехать поездом.

20. Прочтите текст и составьте на английском языке план (тезисный, назывной или вопросный), пользуясь которым вы сможете передать содержание текста. Обратите внимание на начальные слова каждого абзаца. Какую функцию в тексте они выполняют?

Text 3. THE APPLIED SCIENCE OF ELECTRONICS

It is well known that in the end of the 19-th century a professor of physics in Cambridge Joseph Thompson discovered the electron. The discovery of the electron and the investigation into its nature caused a revolution in physical science. The revolution in pure science led to the development of many fields of applied science of electronics.

First, the discovery of the electron led to the appearance of radio and television. The new electronics combined with the older techniques of the telegraph and telephone produced a revolution in communication. Radio electronics is widely used for trajectory measurements, for the transmission of radiotelemetric data and for radio communication with the earth.

Second, electronics contributed to the development of nucleonics and hence to the research of the great energy of the atom, that is to the development of nuclear power engineering.

Third, electronics gave birth to the electronic computer. Electronic devices form the basis of any automatic computer. Rocket technology and electronics are developing in close cooperation. Different electronic devices are used for guidance rockets by radar and infrared radiation.

Finally, electronics applied to medicine achieved great success in diagnosis and treatment. There appeared a lot of new medical devices helping doctors in their operations.

In conclusion, it is important to note that many branches of science and technology achieved progress due to electronics.

21. Прочтите тексты 4 и 5 (по вариантам) и озаглавьте их. Выполните письменный перевод текстов.

Text 4

1. It is well known that the quick development of electronics began with the invention of transistors. They replaced electronic tubes due to their numerous advantages. One of the main advantages of the transistors in comparison with the vacuum tube is absence of filament power loss*. One of the principal causes of damages in electronic circuitry is high temperature. The heat causes breakdown of tubes and other circuit elements that are very sensitive to this influence. The transistor, on the other hand, does not heat its surroundings.

Another advantage of the transistor is its long life. The life of the average transistor is more than ten thousand operating hours. Because of its long lifetime and ruggedness, the transistor is very reliable and has much better efficiency in professional equipment.

One more advantage of the transistor is its small dimensions. Because of their small size, the absence of heating and other properties, transistors make it possible to produce compact, small-dimensioned electronic devices which consume very little power.

In conclusion it is important to note that transistors revolutionized many fields of technology. They are successfully used for direct transformation of heat energy by means of thermal elements. They are also used to convert radiant energy into electricity with the help of photocells or solar batteries. Light sources and lasers are built on the basis of transistors. They find wide application in computers, automatic device, aviation, communication, etc.

Notes:

* Filament power loss — отсутствие энергии на нити накала

Text 5

It is interesting to note that microelectronics began to develop due to the creation of integrated circuits. An IC is a group of electrically interconnected components. Due to some special methods of IC fabrication, a great number of elements are produced on the same structure called wafer. Such methods of fabricating IC ensure high reliability, small size and low cost of the circuit. In addition to the advantage mentioned above, IC are characterized by the high level of integration and the great packing density.

It should be noted that there are different types of integrated circuits. By the method of their fabrication we distinguish semiconductor and film ICs. Semiconductor integrated circuits constitute the basis

of modern microelectronics. They consist of active elements, such as transistors and diodes, and passive elements — resistors and capacitors. These elements are fabricated simultaneously on a thin wafer of silicon, creating the necessary electronic circuit. A film integrated circuit is a microcircuit that consists of elements deposited on an insulating wafer.

According to their functional purpose ICs are divided into digital and analog ICs. Digital integrated circuits are designed for application in digital computers. Analog ICs serve for generation, transformation and amplification of signals, currents and voltages.

In conclusion we can't help mentioning about wide application of integrated circuits in various fields of science and industry. They are used in the electronic devices for space vehicles and missiles, in radar sets and TV systems, in radio communication and power control systems.

TESTS

1. Вставьте необходимые слова вместо пропусков

1. Transistors have many _____ over vacuum tubes.
   a) patterns; b) advantages;
   c) scales; d) forms.

2. They _____ very little power.
   a) consume; b) generate;
   c) embrace; d) convert.

3. An integrated circuit is a group of elements connected together by some circuit _____ technique.
   a) processing; b) integration;
   c) assembly; d) manipulation.

4. The transistor consists of a small piece of a _____ with three electrodes.
   a) diode; b) anode;
   c) conductor; d) semiconductor.

5. Modern _____ began in the early 20th century with the invention of electronic tubes.
   a) miniaturization; b) electronics;
   c) microelectronics; d) engineering.

6. John Fleming was the _____ of the first two-electrode vacuum tube.
   a) generator; b) receiver;
   c) inventor; d) designer.

7. One of the transistor advantages was lower power _____ in comparison with vacuum tubes.

a) consumption; b) reception;
c) transmission; d) generation.

8. Microelectronics greatly extended man's intellectual _____.

a) subsystems; b) achievements;
c) capabilities; d) dimensions.

9. The calculation of rockets trajectories became possible _____ electronics.

a) because of; b) in spite of;
c) due to; d) in addition to.

10. _____ contributed greatly to the discovery of integrated circuits.

a) W. Shockly; b) J. Kilby;
c) W. Brattain; d) J. Bardeen.

2. Подберите к терминам, данным в левой колонке, определения, представленные справа.

1. Electronics	a) a device used for storing an electric charge.
2. Microelectronics	b) a substance whose conductivity is poor at low temperatures but is improved by the application of heat, light or voltage.
3. Circuit	c) a device, a coil or length of wire, used in a circuit to provide resistance.
4. Semiconductor	d) a device whose electrical state is changed by the effect of light.
5. Vacuum tube	e) a complete or partial path over which current may flow.
6. Transistor	f) a science dealing with the application of electronic systems consisting of very small devices.
7. Capacitor	g) a solid-state electronic device, composed of semiconductor material.
8. Resistor	h) a device, containing one or two grids, used as an amplifier, rectifier, etc.
9. Wafer	i) a thin piece of a semiconductor on which integrated circuits are formed to create chips.
10. Photocell	j) a science that deals with the behavior and control of electrons in vacuum and gases.

3. Раскройте скобки и поставьте глагол в нужной форме.

THE PRINCIPLE OF STEAM ENGINE OPERATION

We (to stand) near a steam engine at the moment. You (to know) how it (to operate)? What (to take) place when it (to set) in motion? There (to be) fuel in the furnace of the steam engine. Look. It (to burn). You know that when fuel (to burn), heat (to produce). In the boiler there is water which (to boil) due to the heat of the fuel. The boiling water (to change) into steam and the steam engine (to drive) by the pressure of the steam. It (to mean) that the engine (to operate) due to the effect of heat.

Unit 5

COMPUTERS

A real man achieves everything due to his own efforts.
Konfutsi

Тексты: What Is a Computer? Central Processing Unit. Kinds of Computers. Application of Computers. Memory. Personal Computers
Грамматика: Времена Perfect в действительном и страдательном залогах. Времена Perfect Continuous в действительном и страдательном залогах. Perfect Modals. Отрицательные префиксы. Предлоги *after, before, till, until, since*

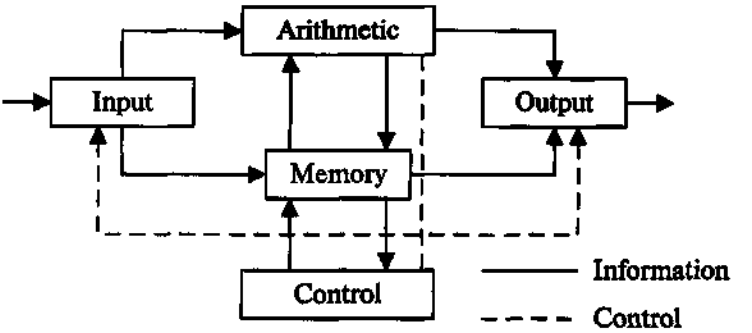
1. Ознакомьтесь с терминами текста 1.

Functional units — функциональные блоки, устройства, модули
hardware ['hɑ:dweə] — аппаратное обеспечение; аппаратура; оборудование
software ['sɔftweə] — программное обеспечение; программные средства
associated documentation — соответствующая документация
available [ə'veɪləbl] — доступный; имеющийся в наличии
at the appropriate time — в нужное время
arithmetic-logical unit — арифметико-логическое устройство
control unit — блок управления, системный блок
to issue commands ['ɪsju: kə'mɑ:ndz] — выдавать команды
set of instructions — пакет команд
pulse — no-pulse — (есть) импульс — холостой импульс
discrete quantities [dɪs'kri:t 'kwɔntɪtiz] — дискретные величины
to simulate on-going processes — моделировать непрерывные процессы

2. Прочтите текст и назовите основные функциональные блоки компьютера и их назначение.

Text 1. WHAT IS A COMPUTER?

A computer is a machine with an intricate network of electronic circuits that operate switches or magnetize tiny metal cores. The switches, like the cores, are capable of being in one or two possible states, that is, on or off; magnetized or demagnetized. The machine is capable of storing and manipulating numbers, letters, and characters (symbols). The basic job of computers is processing of information, which is a series of operations that convert data into useful information. Thus, a computer is a device which accepts information in the form of instructions (a program) and characters (data), performs mathematical and / or logical operations on the information and then supplies results of these operations.



It is necessary to distinguish hardware and software in any computer. The input, storage, processing and control devices are hardware. Not visible in a computer is the software — the set of computer programs, procedures and associated documentation that make possible the effective operation of the computer system.

As we know, all computer operations can be grouped into five functional categories. The method in which these functional categories are related to one another represents the functional organization of a computer. So, the five major functional units of a computer are: 1) Input — to insert outside information into the machine; 2) Storage or memory — to store information and make it available at the appropriate time; 3) Arithmetic-logical unit — to perform the calculations; 4) Output — to remove data from the machine to the outside world and 5) Control unit — to cause all parts of a computer to act as a team.

Figure shows how the five functional units of the computer act together. A complete set of instructions and data are usually fed through the input equipment to the memory where they are stored. Each instruction is then fed to the control unit. The control unit interprets the instructions and issues commands to the other functional units to cause operations to be performed on the data. Arithmetic operations are performed in the arithmetic-logical unit, and the results are then fed back to the memory. Information may be fed from either the arithmetic unit or the memory through the output equipment to the outside world.

The five units of the computer must communicate with each other. They can do this by means of a machine language which uses a code composed of combinations of electric pulses. These pulse combinations are usually represented by zeros and ones, where the one may be a pulse and the zero — a no-pulse. Numbers are communicated between one unit and another by means of these one-zero or pulse-no-pulse combinations. The input has the additional job of converting the information fed in by the operator into machine language. In other words, it translates from our language into the pulse — no-pulse combinations understandable to the computer. The output's additional job is converting the pulse — no-pulse combinations into a form understandable to us, such as a printed report.

The two basic types of computers are analog and digital. Analog computers simulate physical systems. They operate on the basis of analogy to the process that is being studied. Analog computers are used in applications that require continuous measurement and control. Digital computers deal with discrete quantities. They count rather than measure and use numbers instead of analogues physical quantities to simulate on-going processes. Machines that combine both analog and digital capabilties are called hybrid computers. Analog sensors provide inputs to the control centres of these systems, which are small digital computers.

3. Просмотрите текст еще раз. Дайте ответы на вопросы, используя информацию текста.

1. What are hardware and software of computers? 2. What represents the functional organization of a computer? 3. What is the function of the input device? 4. What does memory serve for? 5. What is the task of the arithmetic-logical unit? 6. What is the function of the output? 7. What is the main purpose of the control unit? 8. How do all units of the computer communicate with each other? 9. What is the difference between analog and digital computers? 10. What is a hybrid computer?

4. Прочтите, переведите и запомните следующие словосочетания.

Functional units; to distinguish hardware and software; associated documentation; a set of computer programs; a digital computer; to be related to one another; to receive a broad view; input; storage; arithmetic-logical unit; control unit; output; to insert outside information into the machine; to store information; to make information available at the appropriate time; to perform the calculations; to remove data from the machine to the outside world; to cause all parts of a computer to act as a team; to feed a complete set of instructions; to interpret the instructions and issue commands; to cause operations to be performed; to feed back to the memory; to communicate with each other; by means of a machine language; combinations of electric pulses; pulse — no-pulse combinations; in other words; to convert into an understandable form; to simulate physical processes; to require continuous measurement.

5. Прочтите, проанализируйте употребление времен Present, Past и Future Perfect. Переведите текст.

The Seaside Resort Hotel

Alice and Mike *have gone* to the seaside this summer and *have* already *spent* there for about three weeks. *I've got* a letter from them recently and I think it is the best vacation they *have* ever *taken*.

They wrote that the beach was the cleanest they *had* ever *seen*. The water was the warmest they *had* ever *swum* in. The room in the hotel was the most spacious and most comfortable they *had* ever *stayed* in and the food was the most delicious they *had* ever *eaten*. The hotel staff was the friendliest and most helpful they *had* ever *met*. The golf course was the most wonderful they *had* ever *played* on. And the nightclub show was the most entertaining they *had* ever *visited*.

Well, now I see that Alice and Mike really enjoy themselves at the Seaside Resort Hotel and I'm sure they *will have come* back only by the end of August.

6. Сравните употребление времен Present Perfect и Past Simple. Раскройте скобки и поставьте глагол в правильном времени.

1. — The train just (go). — You are mistaken, the train (go) 10 minutes ago. 2. — Where you (put) my book? I can't find it anywhere. — I (put) it on the shelf yesterday. 3. — I (not see) Mary for ages. And you? — I (see) her last summer. 4. — You ever (dream) to become an astronaut? — I (dream) to be an astronaut in my childhood. 5. — Ann (ring) me up today? — Yes, she (ring) you up in the morning, and she

just (ring) you up but you were out. 6. — We (not get) any letters from Phill for a long time. And you? — I (get) a letter from him two days ago. 7. — The dog just (eat) my sandwich. — No wonder, it is hungry, you (not feed) it yesterday evening. 8. I never (be) in St. Petersburg. And you? — I (be) there in May. 9. — You (bring) the papers I need? — Yes, I (bring) them in the evening. 10. — You (read) any books about Harry Porter? — Certainly, I (read) all of them last month.

7. Составьте диалоги в соответствии с образцами. Обратите внимание на употребление Perfect Modals.

A.

A. Barbara looks upset! She *must have failed* an exam today.
B. I'm not so sure. She *might / may have failed* an exam, but that doesn't usually make her so upset.

1. Daniel looks tired; work overtime. 2. Peggy looks exhausted; jog a little too much. 3. Fred looks upset; have an argument with the boss. 4. Our teacher looks angry; find a lot of mistakes in our homework. 5. Roger looks sad; have a quarrel with his girlfriend. 6. Our cat looks scared; be chased by the dog across the street. 7. Martha looks excited; drink too much coffee.

B.

A. Do you know that George swam to the other side of the lake?
B. You're kidding! He *shouldn't have done* that!
A. Of course he shouldn't. He *could have drowned.*

1. Jennifer; go skating on the town pond; fall through the ice. 2. Tony; move his piano by himself; break his back. 3. Grandma; run in the Boston Marathon; have a heart attack. 4. Harry; get into an argument with a policeman; end in a jail. 5. Steve; go hiking by himself in the mountains; get lost. 6. Julia; shout at the boss; get fired. 7. Timmy; play baseball in the rain; catch a bad cold.

C.

A. Do you realize what you have just done?
B. No, what have I just done?
A. You have just put my pen into your pocket.
B. Have I? I'm really sorry. I *must have thought* it was mine.

1. Drive past my house; forget your address. 2. Step on my feet; lose my balance. 3. Eat both our salads; be very hungry. 4. Drink all the milk in the refregerator; be really thirsty. 5. Sit on my cat; think it was

a pillow. 6. Call me Gloria; be thinking about somebody else. 7. Hit me with your umbrella; be looking the other way.

8. Дайте ответы на вопросы, употребляя предложенный в скобках глагол:

в Past Perfect

— Why didn't you tell him my new address? (forget).
— I didn't tell him your new address because I *had forgotten* it.

1. Why couldn't you get into your new flat at once? (lose the key). 2. What did you learn about Helen from her letter? (be ill for a month). 3. What did you hear about Bob? (get married). 4. Why did Tomas come home so soon from his vacation? (spend all his money). 5. Why didn't Kate want to go to the cinema? (see the film). 6. Why did he run to the refreshment room during the first break? (not have breakfast at home). 7. Why didn't you see Fred when you came to Moscow? (to leave before).

в Future Perfect

— Will Mike still be a student next year?
— Oh, no, he *will have graduated* by that year.

1. Will you still be asleep if I call on you at 8 o'clock? (get up). 2. Will the Smiths still be living in their old flat in November? (move to a new flat). 3. Will the boys still be taking their exams in the middle of June? (pass). 4. Will Kate be at home if I ring her up at 10? (go to the University). 5. Will Nick still be working in the garden when I come to see you? (finish his work). 6. Will you still be watching TV at 11 o'clock tonight? (switch off). 7. Will the typist be still typing the papers on Friday evening? (do everything).

9. Выполните задание по образцам. Запомните образование страдательного залога времен Perfect.

A.

The monitor *has* just *brought* the magazines. (the dictionaries).
But the dictionaries *have not been brought.*

1. They have already sent the letters. (the documents). 2. Workers have increased the labour productivity this month. (their wages). 3. Children have just closed the balcony door because of the thunder storm. (the windows). 4. Father has repaired our car recently. (my bicycle). 5. Students have measured the current in the circuit. (the volt-

age). 6. Engineers have already increased the current generation in the electric circuit. (to reduce power consumption). 7. Mary has already bought many things necessary for school (new copy-books).

B.

They *had repaired* the TV set by the New Year. (the player).
But the player *had not been repaired* by that time.

1. D. Mendeleyev had completed the description of more than 60 elements of his Periodic Table by 1869. (to discover some elements). 2. M. Faraday had discovered the electromagnetic induction before 1832. (to invent electric motors). 3. American scientists had made the explosion of an atomic bomb by the end of 1945. (to test the Russian bomb). 4. V. Petrov had discovered the electric arc before the beginning of the 19-th century. (electric lamps). 5. My parents had bought a new car by summer (the conditioner). 6. Children had prepared their task in maths before mother returned home. (the task in physics). 7. They had packed their suitcases before I came. (the bags).

C.

The manager *will have come* to the office by 10. (to sign the papers).
But the papers *will not have been signed* yet (by that time).

1. They will have typed all the necessary documents by the end of the working day. (the letters). 2. She will have read your letter by noon. (to write the reply). 3. We'll have translated the article by the beginning of the lesson. (to do exercises). 4. The students will have passed all their credit-tests by the end of May. (exams). 5. By July they will have graduated from the University. (to give the diplomas). 6. The train will have left the station by the time Mike gets to it. (to send the bus). 7. Max will have read many scientific books by the end of the year. (to prepare the thesis).

10. Преобразуйте предложения в действительном залоге в страдательный (начните новое предложение с дополнения исходного).

1. The pupils had finished their control papers before the bell rang. 2. They had made many mistakes before they learnt English grammar. 3. The students invited Professor Brown to take part in their discussion. 4. They were asking him questions for about two hours. 5. — Who has written this article? — Professor Brown has written it. He wrote the article last month. 6. They will have taken Pete to the hospital by 10 o'clock. 7. They were looking for the children everywhere and at last

they found them in the garden. 8. — Have they already built the new stadium in your region? — They will build it only in some months. 9. The postman usually brings our newspapers in the morning. But today he hasn't brought them yet. 10. The manager has not signed the documents yet. He is still checking them.

11. Переведите следующие слова. Обратите внимание на то, что префиксы *dis-, in-, un-, non-, ir-* придают словам отрицательное значение.

dis-: disadvantage; disconnect; disappear; disclose; discomfort; discontinue; discount; discredit; discriminate; disintegrate.
im-: imperfect; impossible; immovable; immaterial; improper.
in-: invisible; inaccurate; inactive; incapable; incompact; insignificant; inhuman; informal; ineffective; indifferent; indecisive; inconsumable; incorrect.
un-: uncontrollable; unbelievable; unknown; unchanged; uncomfortable; uncommunicative; undisciplined; unexpected; unfavourable; unforgettable; unkind.
non-: non-effective; non-aggressive; noncomparable; noncomputable; nonconstant; noncontrollable; nondigital; nondimensional; nonprogrammable; nonusable.
ir-: irregular; irrelative; irresponsive; irrational; irreplaceable; irrecognizable.

12. Ознакомьтесь с терминами текста 2.

Central processing unit (CPU) — центральный процессор (ЦП)
interchangeably [ˌɪntə'tʃeɪnʤəblɪ] — взаимозаменяемым образом
precisely [prɪ'saɪslɪ] — точно
internal memory — внутренняя память; внутреннее ЗУ
input-output port — порт ввода-вывода
control unit (CU) [kən'troul 'ju:nɪt] — устройство управления
arithmetic-logic unit (ALU) — арифметико-логическое устройство
step-by-step operations — пошаговые операции
on the other hand — с другой стороны
exponentiation [ekspə'nenʃɪ'eɪʃn] — возведение в степень
call for — требовать; предусматривать
to load ['loud] — загружать; выполнять загрузку

13. Прочтите текст и скажите, какой компонент составляет сердце компьютерной системы и в чем заключается его функция.

Text 2. CENTRAL PROCESSING UNIT

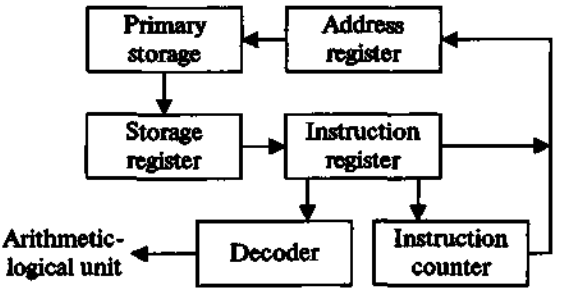
It is well known in computer science that the words 'computer' and 'processor' are used interchangeably. Speaking more precisely, 'computer' refers to the central processing unit (CPU) together with an internal memory. The internal memory, control and processing components make up the heart of the computer system. Manufacturers design the CPU to control and carry out basic instructions for their particular computer.

The CPU coordinates all the activities of the various components of the computer. It determines which operations should be carried out and in what order. The CPU controls the operation of the entire system by issueing commands to other parts of the system and by acting on responses. When required it reads information from the memory, interprets instructions, performs operations on the data according to the instructions, writes the results back into the memory and moves information between memory levels or through the input-output ports.

In digital computers the CPU can be divided into two functional units called the control unit (CU) and the arithmetic-logic unit (ALU). These two units are made up of electronic circuits with millions of switches that can be in one of two states, either on or off.

The function of the CU within the central processor is to transmit coordinating control signals and commands. The control unit is that part of the computer that directs the sequence of step-by-step operations of the system, selects instructions and data from memory, interprets the program instructions, and controls the flow between main storage and the arithmetic-logic unit.

The ALU, on the other hand, is that part of the computer in which the actual arithmetic operations, namely, addition, subtraction, mul-



Control unit functional diagram

tiplication, division and exponentiation, called for in the instructions, are performed.

Programs and the data on which the CU and the ALU operate, must be in internal memory in order to be processed. Thus, if located in secondary memory, devices, such as disks or tapes, programs and data are first loaded into internal memory.

14. Просмотрите текст еще раз. Дайте ответы на вопросы, используя информацию текста.

1. What words in computer science are used interchangeably and why? 2. What components make up the heart of the computer system? 3. What is the function of the CPU? 4. In what way does the CPU control the operation of the whole system? 5. Name the sequence of operations the CPU performs (use five verbs). 6. What are the CPU functional units made of? 7. What is the function of the CU? 8. What operations are performed in the ALU? 9. Where are data processed? 10. Where are data to be processed loaded into?

15. Найдите в текстах 1 и 2 английские эквиваленты следующих словосочетаний.

Функциональная организация; аппаратное обеспечение компьютера; программное обеспечение; устройство ввода; запоминающее устройство; блок управления; соответствующая документация; действия компьютера; связывать друг с другом; вводить информацию извне; делать информацию доступной; выполнять вычисления; выводить информацию; выдавать команды; заставлять выполнять команды; выходное устройство; внешний мир; связываться друг с другом; комбинация электрических импульсов; холостой импульс; импульсы, распознаваемые компьютером; аналоговые и цифровые компьютеры; непрерывные измерения; дискретные величины; скорее считают, чем измеряют; компьютеры смешанного типа.

Центральный процессор; взаимозаменяемые слова; внутренняя память (запоминающее устройство — ЗУ); осуществлять основные команды; координировать действия различных блоков; подавать команды; при необходимости; считывать информацию из ЗУ; арифметико-логическое устройство; электрические цепи с переключателями; два положения: включено или выключено; направлять последовательность пошаговых операций; толковать команды; с другой стороны; выполнять сложение, вычитание, умножение, деление, возведение в степень; находиться во вторичной памяти; загружаться во внутреннюю память.

16. Подберите пары или группы близких по значению слов из предложенных ниже. Переведите слова на русский язык.

Verbs: relate, employ, insert, perform, remove, operate, show, interpret, select, issue, use, receive, perform, cause, feed; print, make, compute, connect, execute, take away, require, act, convert, carry out, demand, permit, demonstrate, choose, transmit, type, store, get, calculate, proceed, continue, keep, allow.

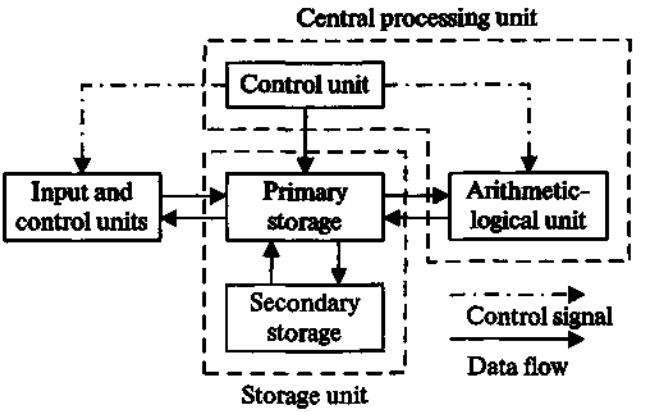
Nouns: response, unit, component, computation, storage, gate, amount, digit, element, memory, instruction, device, equipment, connection, circuit, order, command, information, relation, quantity, answer, calculation, number, data.

Adjectives: broad, complete, each, appropriate, every, basic, essential, digital, original, full, wide, initial, major, large, numerical, common, necessary, usual, important, general, great.

17. Переведите цепочки существительных.

Control unit; processing system; data processing system; computer data processing system; computer components; computer application; computer-controlled robots; program compatibility; storage capacity; weather forecast; problem-solving devices; customer accounts; instructions sets; space exploration; traffic control; air traffic control; fire control; problem solution; problem solution importance; circuit functions.

18. Расскажите о действии функциональных устройств компьютера, пользуясь приведенной ниже схемой.



Computer system organization

19. Проанализируйте и переведите предложения, обращая внимание на употребление Perfect Continuous Tenses.

1. For hundreds of years people *have been dreaming* of cosmic flights. 2. It *had been snowing* for an hour when I started to drive home. 3. I *had been driving* for 20 minutes before the accident happened. 4. How long *will* the spacecraft *have been flying* when it reaches the space station? It *will have been flying* for two weeks. 5. How long *had you been studying* English before you entered the University? 6. Many people *have been taking* the bus every day for many years. 7. That man *has been standing* at the bus stop, and *has been waiting* for the bus for fifteen minutes. 8. How long *will* your Granny *have been working* before she retires? She *will have been working* for about 30 years. 9. How long *have they been broadcasting* this news ? They *have been broadcasting* it for more than 15 minutes already. 10. How long *will you have been reading* before you go to bed? *I'll have been reading* for half an hour before going to bed.

20. Дайте ответы на вопросы по образцам.

A. in the Present Perfect Continuous.

— Why are you so angry? (quarrel with Max).
— I am angry because *I've been quarrelling* with Max.

1. Why are her eyes red? (cry). 2. Why are you so dirty? (repair my car in the garage). 3. Why is Kate's coat wet? (walk in the rain). 4. Why is the Den's mouth blue? (eat bilberries). 5. How did she learn to speak English so well? (live in England). 6. Why is Mike not at the lesson? (wait for Alice). 7. Why is Mary not at the seminar? (look after her little brother). 8. Why haven't they had time to call on us? (arrange their journey).

B. in the Past Perfect Continuous.

— Did she work at the University? — Yes, she did.
— How long *had she been working* there before she retired? (for 25 years).
— She *had been working* at the University for 25 years.

1. Did you stay at the hotel when you were in St. Petersburg? ... How long ... when Mary arrived? (for a week). 2. Did they study French before they went to France? ... How long ... (for five years). 3. Did Mr. Smith work at his book last year? ... How long ... before he sent it to the publishing house? (for about a year). 4. Did you play chess yesterday? ... How long ... before you took part in the chess tournament

for the first time? (for five years). 5. Did it rain yesterday? ... How long ... before you could go for a walk? (for an hour). 6. Did the Petrenkos live in Kiev in 1940? ... How long ... when the war broke out? (for ten years). 7. Did Kate work at the language laboratory last week ? ... How long ... before she could speak fluently? (for three years).

C. in the Future Perfect Continuous.

— How long *will he have been working* at the factory by the end of this year? (for twenty years).
— He *will have been working* there for twenty years.

1. How long will you have been writing your book when I arrive? (for some months). 2. How long will she have been studying English when she enters the University? (for seven years). 3. How long will he have been working at his thesis when his supervisor come back from America? (for half a year). 4. How long will Mrs. Rice have been teaching Russian before she comes to Russia? (for three years). 5. How long will the train have been running when it reaches Tula? (for 12 hours). 6. How long will they have been waiting for Ann when she returns from the concert? (for about four hours). 7. How long will Alex have been using your car before you return from Moscow? (for three weeks).

21. Переведите предложения. Постарайтесь запомнить употребление предлогов.

After, before

1. The students entered the room *one after the other* and left *after* the lecture was over. 2. Father is leaving *the day after tomorrow, before* I take my exam. 3. Do you always have a walk *before* supper? — No, I try to live according to the proverb: *after* dinner sleep a while, *after* supper walk a mile. 4. *Before* 1918 Petrograd was the capital of Russia and St. Petersburg is considered the second capital *before now*. It's a wonderful city now, I've never been there *before*. 5. Ann was *named after* her Grandmother and *took after* her mother in appearance and *after* her father in character. 6. — Couldn't you do the room *long before*, Kate? — I'm sorry, I couldn't, but I'll do it *before long*. 7. — Do you know that Alice got married just *after* her birthday? — Yes, I've heard that *before*. 8. — What's the matter with Nick, *after all*? — He must have fallen ill. — You don't say so. What a pity! He seemed quite well just *the day before*.

Till, until, since

1. Mike left Moscow in 2005 and I haven't seen him *since*. 2. Don't be in a hurry, wait *till (until)* the train will stop. 3. *Until* recent times the other side of the Moon was not seen by anybody. 4. It has been rain-

ing *since* morning. Let's wait *till (until)* the rain stops. 5. Don't talk to him *until* he pays attention to you and don't make any actions *until* he asks you about it. 6. I hope I'll finish this work *till* 5 o'clock. 7. Heat water *until* it boils. 8. About 50 years have passed *since* the first man was launched into space. 9. — *Since when* have you cleaned the window? — I cleaned it last summer and haven't cleaned it *since then*. 10. *Since* Ann is ill, Mark decided to do the work for her. He has been working in the reading hall *since* 10 o'clock.

22. Подберите английские эквиваленты следующим фразам. Постарайтесь употребить правильный предлог.

До сих пор (раньше); задолго до этого; до обеда; после моего дня рождения; друг за другом; в конце концов; до недавнего времени; накануне; послезавтра; позавчера; пока не прекратится дождь; с тех пор как; скоро (вскоре); раньше я этого не слышал; быть похожим на кого-либо; подожди пока она не придет; он тренируется с 10 часов; назвать в честь бабушки.

23. Составьте на русском языке рефераты к текстам 3 и 4. Обратите внимание на то, что стиль рефератов и аннотаций, как правило, имеет безличностный характер. Выберите и используйте при работе следующие клише:

Статья (текст) посвящена проблеме / вопросу ...
В начале статьи — речь идет о ...
— дается определение ...
— обосновывается значимость ...
— привлекается внимание к ...
Далее — описывается ...
— рассказывается ...
— рассматривается ...
— излагается ...
В частности, — отмечается, например, ...
— подробно излагается ...
— описывается схема ...
— указывается ...
— доказывается мысль ...
Наконец — раскрывается ...
В заключение — приводятся примеры
Подытоживая сказанное, следует отметить ...
Как мне кажется, статья представляет интерес для ...
Думается, статья может оказаться полезной для ...

Text 3. KINDS OF COMPUTERS

There are some types of computers: personal computers, mainframes, laptop computers, mini computers, super computers and embedded computers.

A "desktop computer" is a small machine that has a screen (which is not part of the computer). Most people keep them on top of a desk, that is why they are called "desktop computers." Desktop computers are all-in-one computers that have the CPU and speaker in the same case as the monitor. "Laptop computers" are computers small enough to fit on your lap. This makes them easy to carry around. Both laptops and desktops are called personal computers, because one person at a time uses them for things like playing music, surfing the web, or playing video games.

There are bigger computers that many people at a time can use. These are called "Mainframes," and these computers do all the things that make things like the internet work. You can think of a personal computer like this: the personal computer is like your skin: you can see it, other people can see it, and through your skin you feel wind, water, air, and the rest of the world. A mainframe is more like your internal organs: you (hopefully) never see them, and you barely even think about them, but if they suddenly went missing, you would have some very big problems.

There is another type of computer, called an embedded computer. An embedded computer is a computer that does one thing and one thing only, and usually does it very well. For example, an alarm clock is an embedded computer: it tells the time. Unlike your personal computer, you cannot use your clock to play Tetris. Because of this, we say that embedded computers cannot be programmed, because you cannot install programs like Tetris on your clock. Some mobile phones, automatic teller machines, microwave ovens, CD players and cars are examples of embedded computers.

Text 4. APPLICATION OF COMPUTERS

At present a great deal of the work force of most countries is engaged in creating, processing, storing, communicating and just working with information. Computers have become commonplace in homes, offices, stores, schools, research institutes, plants.

One of the most important jobs that computers do for people is helping with communication. Computers have helped people move forward in science, medicine, business, and learning, because they let experts from anywhere in the world work with each other and share information. The Internet lets people communicate between their computers.

The use of computers in business and industry is widespread today. Computer-controlled robots are able to improve the quality of manufactured products and to increase the productivity of industry. Computers can control the work of power stations, plants and docks. They help in making different decisions and in management of economy.

The work of banks depends upon computer terminals for millions of daily operations. Without these terminals, records of deposits and withdrawals* would be difficult to maintain**.

Computers form a part of many military systems including communication and fire control. They are applied for automatic piloting and automatic navigation. Space exploration depends on computers for guidance and research of on-board environment***. Air traffic control is impossible without computer application. It fully depends upon computer-generated information.

Computers find application in astronomy and upper atmosphere research. Weather forecasting, library information services can benefit from computers too.

Computers became valuable medical diagnostic tools. They are used for optical scanning and image processing. Technicians can operate computer tomography scanners which combine x-rays with computer technology to give sectional views of patients. The views then can be combined into a single image shown on the screen.

It should be noticed that learning on a computer can be fun. Studies spend more time with computer-aided instruction performing the assigned task, as compared with conventional classroom.

Notes:

* deposits and withdrawals — вклады и изъятие (выемка).
** to maintain records — вести учет.
*** on-board environment — бортовое окружение.

24. Выполните письменный перевод текстов по вариантам.

Text 5. MEMORY

It is interesting to note that memory, one of the basic components of the computer, is often called storage. It stores calculation program, the calculation formulae, initial data, intermediate and final results. Therefore, the functions of the computer memory may be classified in the following way. Firstly, the computer memory must store the information transmitted from the input and other devices. Secondly, memory should produce the information needed for the computation process to all other devices of the computer.

Generally, memory consists of two main parts called the main, primary or internal, memory and the secondary, or external memory. The advantage of the primary memory is an extremely high speed. The secondary memory has a comparatively low speed, but it is capable of storing far greater amount of information than the main memory. The primary storage takes a direct part in the computational process. The secondary storage provides the information necessary for a single step in the sequence of computation steps.

The most important performance characteristics of a storage unit are speed, capacity and reliability. Its speed is measured in cycle time. Its capacity is measured by the number of machine words or binary digits. Its reliability is measured by the number of failures (отказ) per unit of time.

Text 6. PERSONAL COMPUTERS

Personal computers (PC) appeared in the late 1970s. One of the first and most popular personal computers was the Apple II, introduced in 1977 by Apple Computer (company). This computer as well as IBM* PC became the most widely spread computers in the world. In less than a decade the microcomputer has been transformed from a calculator and hobbyist's toy into a personal computer for almost everyone.

What is a personal computer? How can this device be characterized?

First, a personal computer is microprocessor-based. Its central processing unit, called a microprocessor unit, or MPU, is concentrated on a single silicon chip.

Second, a PC has a memory and word size that are smaller than those of minicomputers and large computers.

Third, a PC uses smaller, less expensive, and less powerful input, output and storage components than do large computer systems. Most often, input is by means of a keyboard, soft-copy output is displayed on a cathode-ray tube screen. Hard-copy output is produced on a low-speed character printer.

A PC employs floppy disks as the principal online and offline storage** devices and also as input and output media.

Finally, a PC is a general-purpose, stand-alone system that can begin to work when plugged in and be moved from place to place.

Probably the most distinguishing feature of a personal computer is that it is used by an individual, usually in an interactive mode. Regardless of the purpose for which it is used, either for leisure activities in the home or for business applications in the office, we can consider it to be a personal computer.

Notes: _____

* IBM — International Business Machine — фирма по производству компьютеров.

** online and offline storage — неавтономное ЗУ (оперативно доступная память) и автономное ЗУ.

TESTS

1. Подберите вместо пропусков подходящие по смыслу слова.

1. The method of _____ all functional categories to one another represents the functional organization of a computer.
   a) showing; b) relating;
   c) performing; d) entering.

2. Instructions and data are fed through the _____ equipment to the _____ .
   a) output; b) memory;
   c) input; d) control.

3. The main units of the computer communicate with each other _____ a machine language.
   a) in spite of; b) because of;
   c) by means of; d) in connection with.

4. The control unit serves for _____orders.
   a) reading; b) interpreting;
   c) inputting; d) storing.

5. The four _____ are used to perform basic operations in a computer.
   a) basics; b) circuits;
   c) tools; d) means.

6. A computer can solve very complex numerical _____ .
   a) communication; b) computations;
   c) instructions; d) compensation.

7. Numbers and instructions forming the program are _____ in the memory.
   a) solved; b) supplied;
   c) simulated; d) stored.

8. Any digital calculation is usually broken down into a _____ of elementary operations.
   a) sequence; b) storage;
   c) segments; d) sections.

9. The function of memory is to store _____ the original input data _____ the partial results.

a) not only ... but also; b) either ... or;
c) neither ... nor; d) no sooner ... than.

10. The _____ includes the control unit and the arithmetic-logical unit.

a) memory; b) input-output unit;
c) central processor; d) arithmetic-logic unit.

2. Согласуйте слова в левой колонке с их интерпретацией, предложенной справа.

1. Functional organization	a) processes and stores large amount of data and solves of a computer problems of numerical computations.
2. Input	b) simulates physical systems.
3. Memory	c) method of interrelation of the main units of a computer.
4. Control unit	d) removes data from the device to the outside world.
5. Output	e) inserts information into the computer.
6. Arithmetic unit	f) a code of combinations of electric pulses.
7. Machine language	g) performs addition, subtraction, multiplication, etc.
8. Central processor	h) stores original data as well as partial results.
9. Digital computer	i) causes all parts of the computer to act as a team.
10. Analog computer	j) controls the operation of the system by issueing commands to other units.

3. Раскройте скобки и поставьте глагол в нужной форме.

1. It was clear that the possibility of error (to reduce) if data (to put) correctly into the data processing system. 2. The teacher told us that by the beginning of the 20-th century electromechanical machines (to develop) and (to use) for business data processing. 3. Those early electromechanical processors (to call) unit record machines because each punched card (перфокарта) (to contain) a unit of data. 4. Ones data (to enter) correctly into the computer, human manipulations (to eliminate). 5. He explained that a set of instructions and data usually (to insert) through the input equipment to the memory where they (to store). 6. We knew that as soon as information (to enter) into the

system properly the human manipulation (to limit). 7. He noted that it (to be) A. Yoffe, the prominent Russian scientist, who (to prove) that semiconductors (can use) for the direct conversion of heat and light into electric power and due to this invention photocells (to develop). 8. They said that research work now (to carry out) in that field of science. 9. Father promised that if Nick (to study well) he (to buy) a new computer next month. 10. He said that he not (to know) what the main capabilities of computers (to be).

Unit 6

COMMUNICATION SYSTEMS

People stop thinking when they stop reading.
Didro

Тексты: Some Steps from the History of Communication Systems Development. Radio Communication. Modern Means of Communication. The Invention of Radio. Radio Transmitters. Radio Receivers
Грамматика: Согласование времен. Прямая и косвенная речь. Причастие: Participle I, Participle II, Perfect Participle. Независимый причастный оборот. Предлоги *above, below, over, under, up, down, along, across.* Составные предлоги

1. Ознакомьтесь с терминами текста 1.

Something like — нечто подобное
means of communication — средства связи
the telegraph sending key — телеграфный ключ
dots and dashes — точки и тире
the mirror galvanometer — зеркальный гальванометр
powdered carbon — порошковый углерод
a far sensitive receiver — гораздо более чувствительный приемник
the method of frequency modulation — метод частотной модуляции
wireless communication — беспроводная связь
a transmitting / receiving coil — передающая / принимающая катушка

2. Прочтите текст и расскажите о роли российских ученых в истории развития систем связи.

Text 1. SOME STEPS FROM THE HISTORY OF COMMUNICATION SYSTEMS DEVELOPMENT

Long long ago men found it necessary to communicate at a distance. When the alphabet was invented, they began to use papyrus and something like the modern letter appeared. The first to send letters were the ancient Egyptians. A runner delivered them. But the best *postal system* of ancient times was organized by the Romans.

From then on until the 19-th century there were practically no advances in the means of communication. Even when Queen Victoria began to rule England in 1837, her means of communication with distant parts of her empire were no faster than those of Julius Caesar.

The first practical electromagnetic ***telegraph*** was invented by the Russian scientist *Pavel Shilling* in 1828, and in 1832 he established telegraph communication between the Winter Palace and the Ministry of Transport in St. Petersburg. Shilling's work was continued in Russia by *B. Yakobi*, who made several improvements in the electromagnetic telegraph and linked St. Petersburg with Tsarskoye Selo. This 25 kilometre-line was the longest in the world at that time. Yakobi invented the telegraph sending key, adopted by the American *Samuel Morse*. Morse, however, invented the telegraph code of dots and dashes, which is used all over the world to this day.

B. Yakobi

The first transatlantic telegraph cable from Europe to America was laid in 1858 due to the great British scientist Professor *William Thomson*. He also invented the mirror galvanometer, the very sensitive instrument used at first to receive signals transmitted over very long cables. Three letters could be transmitted per minute over the first transatlantic cable. The present speed of operation of telegraph cables reaches 2,500 letters per minute.

The telephone is a much younger invention than the telegraph. The French mechanic *Charles Boursel* first suggested the idea of transmitting speech electrically. The first telephone that found application was invented by the American *Graham Bell* in 1876. Russian inventors made several important improvements in the telephone. In 1879 the Russian engineer *Mikhalsky* made a microphone with powdered car-

bon, a prototype of the present-day microphone. Next year another Russian inventor, *Golubitsky* made a far sensitive receiver than the receiver of Bell. In 1880 the Russian military communication expert *G. Ignatyev* invented a device that made it possible to use the same wire simultaneously for a telephone conversation and for telegraph communication. Today the method of frequency modulation makes it possible to transmit several hundred telephone conversations over the same wire simultaneously.

The telegraph and the telephone were soon followed by an even more wonderful invention, which made possible communication without wires. Numerous scientists from different countries contributed to the appearance of ***wireless communication.*** *Heinrich Hertz* constructed a primitive radio system capable of transmitting and receiving space waves through free space. In 1893, *Nikola Tesla*, in America, first demonstrated the feasibility of wireless communications. He proved that intelligible messages could be transmitted without wires and established a system which was composed of a transmitting coil (or conductor) and a receiving coil. At last, in 1895, the Russian scientist *A. S. Popov* demonstrated his first radio receiver. In March 1897 *G. Marconi*, an Italian inventor, transmitted wireless telegraphy signals over a distance of two miles and later he established the first transatlantic radio communication between Canada and England. For this achievement he was awarded the Nobel Prize.

Guglielmo Marconi

Nicola Tesla

Early uses of communication were maritime for sending telegraphic messages using Morse code between ships and land. Radio was used to pass on orders and communications between armies and navies in World War I. Broadcasting became possible in the 1920s with the introduction of radio receivers in Europe and the U.S.A. Another use of

radio was the development of detecting and locating aircraft and ships by the use of radar.

Today radio takes many forms, including wireless networks and mobile communications of all types, as well as radio broadcasting.

3. Просмотрите текст еще раз. Дайте ответы на вопросы, используя информацию текста.

1. When and how did the first messages appear? 2. Where were the first letters delivered? 3. Who established the first telegraph and when? 4. Who continued and improved the achievements of P. Shilling? 5. What did B. Yakobi invent? 6. What is S. Morse famous for? 7. Who first suggested the idea of transmitting speech? 8. What Russian engineers perfected the idea of telephone conversation? 9. What scientists contributed to the development of wireless communication? 10. Who was awarded the Nobel Prize and what for?

4. Прочтите и догадайтесь о значении следующих интернациональных слов.

Communication system; distance; the alphabet; papyrus; practical electromagnetic telegraph; the Ministry of Transport; the telegraph code; transatlantic telegraph cable; galvanometer; instrument; signals; minute; telephone; a microphone; a prototype; the method; modulation; the theoretical basis; electromagnetism; a primitive radio system; to demonstrate; a conductor; telegraphy signals; radio signals; transatlantic radio communication; the Nobel Prize; Morse code; radar.

5. Прочтите, переведите и запомните следующие словосочетания.

Communication system development; postal system; from then on; to establish telegraph communication; to make several improvements; the telegraph sending key; the telegraph code of dots and dashes; to lay the cable; due to; to invent the mirror galvanometer; at first; to transmit per minute; to reach the speed of operation; the idea of transmitting speech; to find application; to make several important improvements; powdered carbon; the present-day microphone; a far sensitive receiver; to use the same wire simultaneously; to contribute to the appearance of wireless communication; the feasibility of wireless communications; intelligible messages; a transmitting coil and a receiving coil; at last; a radio receiver; to be awarded the Nobel Prize; to pass on orders; radio broadcasting; to become feasible; detecting and locating aircraft and ships.

6. Вспомните значение глаголов и переведите их производные.

To transmit — transmitter; transmission; transmitted; transmissible; transmitting (coil).

To receive — receiver; reception; receptive; receptivity; receiving (coil).

To communicate — communication; communicative; uncommunicative; communicator.

To improve — improvement; improver; improved; unimproved; improvable; unimprovable.

To appear — to disappear; appearance; disappearance.

To establish — to disestablish; established; establishment.

To follow — follower; following.

To contribute — contribution; contributor; contributory.

To invent — inventor; invention; invented.

To predict — predicted; prediction; predictor.

7. Прочтите текст. Сравните и проанализируйте употребление английских времен в косвенной речи.

Unfair Accusations

Margaret's boss, Mr. Lewis, sent her a memo (memorandum).

To: Margaret Parker
From: Mr. Lewis
Reason: Your Performance at Work
I'm concerned at your performance at work.
You ***have been working*** too slowly.
You often ***get*** to work late.
You ***took*** too many sick days last month.
You ***aren't*** very polite to the customers.
And you ***don't get*** along with the other employees.
I'd like to meet with you as soon as possible to discuss this.

In the memo Mr. Lewis *said* that Margaret *had been working* too slowly. He also *said* that she *got* to work too late. In addition, he *observed* that she *had taken* too many sick days the month before. He also *mentioned* that she *wasn't* very polite to the customers. And finally he *complained* that she *didn't come* along with the other employees.

When Margaret got the memo, she was very upset. She *feels* that her boss *is making* unfair accusations. Margaret *is sure* that she *hasn't been working* too slowly. She also *feels* that she *doesn't often get* to work late. In Margaret's opinion, she *didn't take* too many sick days last month. She *thinks* she *is* rather polite to the customers and *gets along* well with the other employees.

8. Преобразуйте утвердительные предложения в косвенную речь по образцу.

A.

— I ***study*** English at school.
— What ***does*** he (she) ***say***?
— He (she) ***says*** (that) he (she) ***studies*** English at school.

1. I like apples better that oranges. 2. I am fond of electric engineering. 3. I have lost my money. 4. I went to the seaside with a friend of mine. 5. I shall be at the college at 8 o'clock sharp. 6. I had read *War and Peace* before I went to see the film. 7. We'll come to the evening party in time. 8. I am going to the theatre with my cousine. 9. I've been studying English for five years already. 10. They were playing chess when I saw them.

B.

— I ***am*** very busy and ***can't help*** you.
— What ***did he (she) say (tell you)***?
— He ***said*** (that) he ***was*** very busy and ***couldn't help*** you.

1. My train leaves at six sharp. 2. I know these two girls very well. 3. My friend is waiting outside. 4. We don't remember where Tom lives. 5. We are reading *Anna Karenina* this term. 6. Helen's brother is not a teacher. 7. It's a pity that Fred hates higher mathematics. 8. I am awfully sorry. 9. It's snowing heavily. 10. I don't like the way Den speaks English.

C.

— I ***met*** her last year.
— What ***did he say***?
— He ***said*** (that) he ***had met*** her the previous year.

1. I stayed at this hotel two years ago. 2. You came too late. 3. I've been ill for a fortnight. 4. We've been shopping all the morning. 5. I had no time to look through the newspapers. 6. I have read half the book already. 7. We enjoyed the game last week. 8. My brother didn't go fishing yesterday. 9. We have just ordered the tickets for the new performance at the theatre. 10. The Smirnovs have been living here since 1995.

D.

— I ***shall be*** ready in some minutes.
— What ***did he say***?
— He ***said (that)*** he ***would be ready*** in some minutes.

1. I'll check up your papers tomorrow. 2. I'll leave the plan on the table. 3. The new satellite will be launched in some days. 4. I'll be translating the article all day long. 5. Helen will have returned by September. 6. President will soon appoint Prime Minister. 7. Pete will go to the country for his summer holidays next year. 8. I'll inform you about it later. 9. Elections to the State Duma will have taken place by the end of the year. 10. The bill will soon be approved by the President.

9. Преобразуйте диалог в косвенную речь. (Используйте слова: He wondered; wanted to know; was interested in; added...) Начните рассказ следующим образом: Alex was very surprised to see Max and said that he had never expected to meet him there. Max greeted him and noticed that it was a small world ... Выучите диалог наизусть.

Hello! How is life?

Alex: Why, if it isn't Max. What a pleasant surprise! Never expected to meet you here.
Max: Hello, Alex. This is a small world. It's a long time since I saw you last. I'm happy to see you. How are you?
A.: Fine, thank you, and how are you getting on?
M.: No complaints, thanks. How is life?
A.: Life is going its usual way. And how are things with you?
M.: Ah, nothing to boast of.
A.: You look upset. What's the matter?
M.: I have problems at school.
A.: Can I help you?
M.: I'm afraid, not. Thank you very much.
A.: I wish you good luck, then. Good bye.
M.: So long. See you later.

10. Сформулируйте вопросы и дайте ответы на них, пользуясь предложенными косвенными вопросами. Работайте в парах.

1. Ask your friend what he usually does on Sundays. 2. Ask him how many exams he will have to take this summer. 3. Ask him if he has been asked at the English lesson. 4. Ask him if he will have translated the English texts by tomorrow. 5. Ask him how long he had been taught English. 6. Ask him what sport he goes in for if any. 7. Ask him if there are excellent facilities for sport in his school. 8. Ask him if he has ever taken part in any sport competition. 9. Ask him if he knows the date when the first man was launched into space. 10. Ask him if he has any idea of the spheres of computer application.

11. Переведите предложения, обращая внимание на употребление предлогов:

Above, below

1. It was very cold last January; the temperature was about 20 degrees *below* zero. But summer was rather hot — about 40 degrees *above* zero. 2. When I was leaving the house I heard a noise *above*. 3. Health is *above* wealth. 4. This staircase leads *above*, to the second floor. 5. He likes to stand on the hill-top and look at the plains *below* him. 6. I can see everything from *above*. 7. The water came *above* his knee and his coat became wet as it reached *below* the knee. 8. The plane was flying about 10 thousand meters *above* the sea-level.

Over, under

1. People speak English all *over* the world. 2. — Excuse me, where is the bus stop? — It's *over there*, round the corner. 3. I have no control *over* the circumstances. But *under* these circumstances it's impossible to fulfil my promise. 4. The plan is *under discussion* at the present moment. They speak about *it over* and *over* again. 5. We were tired, for we were walking for *over* three hours and we lay down *under* the tree to rest. 6. He took the dictionary from *under* my eyes and I didn't notice it. 7. Who is the boy standing *over there*, at the window? — It's Vadim, my friend, he lives on the floor *above*, just *under* the attic, a small room *below* the roof. 8. Children *under* 14 are not allowed to see that film. Pay attention to the *above-mentioned* fact.

Up, down

1. I say, Den, I wanted to talk to you over the telephone but you didn't pick *up* the receiver. Where were you *up* to 11 o'clock, I wonder? 2. — Where do you live? —Well, *write down* my address, before you forget it. Go *down* the street, then take the first turning to the left. 3. Transformers, as we know, can step *up* and *down* the voltage. 4. Hurry *up*, pupils. Hand in your control papers. The time is *up* and the lesson is *over*. 5. The boys were sitting *up* all the night talking and mother couldn't wake them *up* in the morning. 6. I *looked down* and saw Pete *running down* the road. 7. What is *up* with you, Pete? Your work is not quite *up* to the mark. You must work harder. When you grow *up*, you won't be able to become a successful man because of your laziness. And give *up* smoking, it gives you much harm. 8. Nick was saving *up* money for several years and bought an *up-to-date* model of the Moskvich at last.

Along, across, through

1. When we were walking *along* the bank of the river we saw a fallen tree lying *across* the road. 2. He made his way *through* the crowd with

great difficulties. 3. We took all our dictionaries *along*. But we didn't know the language and spoke with the Chinese *through* an interpreter. 4. I came *across* my old friend when we were walking *along* the road. 5. The boy got an unsatisfactory mark only *through* his carelessness. 6. How are they getting *along*? — I'm afraid, they don't get *along*. — I knew it all *along*. 7. The construction of a railway line *across* the taiga required great engineering skill. 8. The rays of the sun pass *through* the atmosphere without heating it.

12. Подберите английские эквиваленты следующим фразам. Постарайтесь употребить правильные предлоги.

Здоровье дороже денег; во всей стране; при данных обстоятельствах; ни при каких обстоятельствах; температура ниже / выше нуля; в чем дело?; обсуждаемая проблема; лестница ведет вверх; время истекло; урок закончился; вон там, за углом; вышеупомянутый факт; над уровнем моря; из-за болезни; свыше двух часов; под деревом; дети до 16 лет; современная машина.

Проталкиваться сквозь толпу; разговаривать через переводчика; говорить по телефону; плыть по реке; понижать и повышать напряжение; владеть ситуацией; слышать по радио; взять из-под носа; поднять телефонную трубку; говорить без умолку; записать адрес; быть на должной высоте (годиться); садитесь; встаньте, пожалуйста; поторопитесь; спускаться вниз; жить этажом выше; случайно наталкиваться (встречаться); ладить с людьми; бросить курить; (знать) с самого начала; проходить сквозь атмосферу; экономить деньги; как поживаете?

13. Ознакомьтесь с терминами текста 2.

A transmitter [trænz'mɪtə] — передатчик
a receiver [rɪ'si:və] — приемник
a high-frequency oscillator [haɪ 'fri:kwənsɪ 'ɔsɪleɪtə] — высокочастотный генератор колебаний
an oscillatory circuit ['ɔsɪlətərɪ 'sə:kɪt] — колебательный контур
a capacitor [kə'pæsɪtə] — конденсатор
an amplifier ['æmplɪfaɪə] — усилитель
to travel — распространяться
transmitting range — дальность передачи
the audio frequency ['ɔ:dɪou 'fri:kwənsɪ] — звуковая частота
a detector — детектор, следящий механизм
a rectifier — выпрямитель, детонатор
to couple together — соединять, спаривать
by means of a switch — с помощью переключателя (коммутатора)

14. Прочтите текст 2 и объясните коротко принцип действия радиосвязи.

Text 2. RADIO COMMUNICATION

Radio communication is the transmission of high frequency energy from the transmitter to the receiver without wires. Radio is a device that transmits and receives signals and programs by electromagnetic waves. Since the process of radio communication includes transmission and reception of signals, the two necessary components of radio are a transmitter and a receiver.

The first component of radio, *the transmitter*, is a device producing radio-frequency energy. The transmitter consists of a high-frequency oscillator including an oscillatory circuit (a coil and a capacitor) and one or more amplifiers. Electric oscillations are produced in the antenna of the transmitter. They travel in all directions. Electron lamps are used to amplify currents and give greater transmitting range and better reception.

Radio waves are electric waves of very high frequency; they travel through space at the speed of light, and differ from other wave forms only in frequency (number of vibrations per second).

The second important component of radio communication is *the receiver*, a device that receives waves sent out by a transmitter. Radio receiver demodulates these waves, and they are heard as speech, music or signals. To understand this process let us consider the principle of operation of these devices.

A microphone is connected to the circuit of the transmitting antenna. When we speak into the microphone its resistance varies with the audio frequency. An alternating current is established in the microphone and antenna circuits, and its frequency is the same as the audio frequency. Oscillations of the same frequency are induced in the antenna and the oscillatory circuit of a receiver. These oscillations are in fact a high-frequency current. In order to reproduce the transmitted sound, this current modulated by audio frequency should be sent through the telephone, and a detector or rectifier should be connected to the telephone circuit. The audio frequency rectified current passes through the telephone and produces oscillations. These oscillations will reproduce the sounds produced at the transmitting station. The operation of a radio set will be the better, the more energy is received by its oscillatory circuit. The oscillatory circuit is also provided with a ground. It is important for good operation of the receiver. The antenna should be grounded by means of a switch.

Internet radio, also known as web radio or net radio, is an audio broadcasting service transmitted via the Internet. Internet radio ser-

vices are usually accessible from anywhere in the world. This makes it popular among listeners with interests that are not adequately served by local radio stations. Internet radio services offer news, sports, talk and various genres of music — everything that is available on traditional radio stations.

15. Просмотрите текст еще раз. Дайте ответы на вопросы, используя информацию текста.

1. What is radio communication? 2. What are the main components of radio? 3. What is the transmitter? 4. What does it consist of? 5. What is used for amplifying currents? 6. What happens in the microphone when we speak into it? 7. What kind of current is established in the microphone and antennas circuit? 8. What device should be connected to the circuit in order to reproduce the transmitted sounds? 9. By what means is the antenna grounded? 10. How are transmitted sounds reproduced in the receiver?

16. Найдите в текстах 1 и 2 английские эквиваленты следующих словосочетаний.

Развитие систем связи; доставлять сообщения; с тех пор; средства связи; установить телеграфную связь; изобрести телеграфный ключ; код, состоящий из точек и тире; благодаря; зеркальный гальванометр; чувствительный прибор; сначала; найти применение; важные усовершенствования; порошковый углерод; современный микрофон; гораздо более чувствительный приемник; сделал возможным; использовать один и тот же провод одновременно; за телефоном последовал; связь без проводов; содействовать появлению беспроводной связи; понятные послания; передающая и принимающая катушки; наконец; присуждать Нобелевскую премию; беспроводные сети; мобильная связь.

Радиосвязь; передача высокочастотной энергии; передавать и принимать сигналы; электромагнитные волны; передача и прием; передатчик и приемник; высокочастотный генератор колебаний; колебательный контур; катушка индуктивности; конденсатор; усилитель; электрические колебания распространяются во всех направлениях; диапазон передачи; скорость света; число колебаний в секунду; принцип работы прибора; сопротивление; звуковая частота; наводить колебания одинаковой частоты; высоко-частотный ток; для того чтобы; выпрямленный ток; производить колебания; доступный из любой точки мира; различные музыкальные жанры.

17. Подберите пары или группы близких по значению слов из предложенных ниже. Переведите слова на русский язык.

Nouns: Traffic; improvement; dot; instrument; speed; transport; operation; expert; wire; point; conversation; invention; wireless; communication; tool; state; link; power; connection; perfection; possibility; prize; oscillations; bonus; capacitor; vibrations; energy; radio; feasibility; country; rate; work; conductor; specialist; discovery; speech; condenser; device.

Verbs: To provide; to produce; to establish; to demonstrate; to induce; to amplify; to involve; to build; to improve; to receive; to lay; to link; to continue; to invent; to use; to go on; to apply; to supply; to install; to intensify; to construct; to perfect; to connect; to put; to get; to advance; to include; to move forward; to excite; to show; to generate.

Adjectives: Distant; fast; important; modern; several; wonderful; various; intelligible; simple; different; quick; some; far; primitive; understandable; remarkable; present-day; significant.

18. Переведите словосочетания, содержащие формы причастий в различных функциях (см. грамматический справочник, с. 221–223).

A. Participle I Active and Passive.

The *ruling* Queen; the *transmitting* coil; the *receiving* station; the *following* problem; *developing* countries; the *leading* branch of industry; a *growing* interest; the age of "*thinking* machines".

The runner *delivering* letters; the engineer *operating* with high frequency modulator; inventors *improving* the telephone; experts *using* the same wire simultaneously; people *talking* over the telephone; scientists *contributing* to the development of wireless communication; magnetic fields *forming* electromagnetic waves.

When using papyrus...; *while sending* letters ...; *demonstrating* the possibility of wireless communication ...; *dreaming* of cosmic flights...; *when placing* the Sputnic into the orbit...; *developing* the communication systems...; *while dividing* a bar magnet into two parts; *while flowing* along a conductor.

Being based on the principle of electromagnetic induction; *being launched* in 1957, the satellite...; *being founded* in 1995; *being fond* of Tsiolkovsky's ideas; *being organized* by the Romans; *being examined*; *being heated*; *being supplied* with the necessary equipment.

B. Participle II Passive.

The *established* telegraph communication; the *transmitted* news; the *suggested* idea; the *received* messages; the *used* device; the *unmanned* spacecraft; the *improved* machine; the *invented* telegraph sending key.

The postal system *organized* by the Romans; the telegraph *invented* by P. Shilling; improvements *made* in the telegraph; the code of dots and dashes *used* all over the world; the first transatlantic cable *laid* in 1858; the telegraph sending key *adopted* by S. Morse; signals *transmitted* over very long cables.

As used the telegraph code...; *if arranged* according to the atomic weight the elements...; *when transformed* into electric energy the heat...; *as mentioned* above; *though repaired* the machine...; *if placed* in a strong magnetic field; *if broken* anywhere.

C. Perfect Participle Active and Passive.

Having transmitted the message they were waiting for the reply; *having achieved* great success; *having made* improvements in the device; *having sent* the spaceship to the Moon; *having created* the theory of interplanetary flights; *having established* the telegraph communication; *having passed* all the exams; *having lost* some electrons.

Having been repaired the device operated well; *having been used* for a long time the machine...; *having been established* the telegraph communication...; *having been given* all the necessary information, the students...; *having been tested*, the machine... .

19. Проанализируйте и переведите предложения, содержащие различные формы причастий.

A. 1. *Being supplied* with a special appliance a television set may have a remote control. 2. *While working* at his candle P. Yablochkov made many experiments with the induction coil. 3. *While making* his experiments Yablochkov realized the advantages of a transformer. 4. The *rising* standards of modern civilization and *growing* industrial application of the electric current result in an *increasing* need of energy. 5. The earliest practical application of magnetism was connected with the use of a simple compass *consisting* of one small magnet *pointing* north and south. 6. *When dividing* a bar magnet into two parts we can find that each of the two parts is a magnet *having* both a north pole and a south pole. 7. *While flowing* along a conductor a current heats it. 8. The wave *being transmitted* upwards is reflected back to the Earth again. 9. *Working* as a scientist and a teacher A. Popov always carried on some practical job, *solving* many practical problems. 10. In the *following* year Popov's receiver was used at the electric power station in Nizhni Novgorod for warning about *approaching* thunderstorms.

B. 1. *If arranged* according to their atomic weights the elements show the periodicity of their properties. 2. The problem *solved* helped to increase the speed of the energy transmission. 3. The first source of

continuous current *constructed* by A. Volta appeared in 1800. 4. *When subjected* to high temperatures this material melts (плавится). 5. *As mentioned* above, the electric current flows provided there is a complete circuit. 6. *If broken* anywhere, the electric current will immediately stop carrying a current. 7. The speed of the car may be increased *if desired*. 8. The experiment *described* attracted everybody's attention. 9. The data *obtained* helped the students in their research work. 10. The experiment *carried out* resulted in the improvement of all parts of the system.

C. 1. *Having been cooled* the water turned into ice. 2. *Having achieved* great success in the development of communication systems our scientists are steadily advancing forward. 3. *Having told* us about the principle of telephone operation the teacher demonstrated the system. 4. *Having been used* for a long time, the instrument lost its former quality. 5. *Having been given* all the necessary information he continued his job. 6. *Having passed* all the examinations successfully we went to the seaside to have a rest. 7. *Having lost* some of its electrons the atom becomes positively charged. 8. The atom has a negative charge *having acquired* an excess of electrons. 9. *Having been rubbed* many substances become electrified. 10. *Having been tested* under unfavourable conditions the machine was successfully put into operation.

20. Раскройте скобки, употребляя глаголы в нужной форме причастия.

1. An electric current (to pass) through a wire heats that wire. 2. While (to make) a series of experiments with the induction coil P. Yablochkov found out that the alternating current had many advantages over the direct current. 3. (to use) for the measurement of distance radio devices have greatly contributed to the development of radio navigation. 4. (to improve) the quality of the sound, our technicians have achieved a high degree of perfection in telecasting. 5. (to apply) special television sets (to stablish) on board a plane, we are able to see through the surface of the earth down to the deposits of coal, oil, iron ore, etc. 6. (to test) the devices found wide recognition. 7. The thermocouple (to use) consists of two wires of different metals (to join) at each end. 8. (to design) for application in railroad transport, special television devices helped engine drivers to see in the dark. 9. A compass needle (стрелка) is deflected when (to bring) near a wire (to pass) the electric current. 10. Experiments (to make) by many scientists showed that all gases expand when (to heat).

21. Прочтите и переведите предложения, содержащие независимый причастный оборот (см. грамматический справочник, с. 223).

A. 1. The resistance being small, the current will be large. 2. Mendeleyev having given the world the Periodic Table of elements, chemistry made great progress. 3. Bequerel having discovered radioactivity, scientists received a means of studying and explaining the structure of the atom. 4. The components of the velocity of a body moving in the air being known, the resultant velocity may be found. 5. The Earth's orbit being an ellipse, the distance between the Earth and the Sun constantly changes as the Earth revolves around the Sun. 6. The boiling point having been reached, the temperature of the water cannot be increased any more. 7. Great progress having been achieved in rocket technique, it was possible to construct a rocket overcoming the earth's gravitation. 8. The motor having been repaired, we could use it in our work. 9. The temperature being increased, the resistivity of the semiconductor decreases. 10. The primary coil being connected to the voltage source, the secondary coil is connected to the load resistance and supplies energy to the load.

B. 1. Radio was invented in Russia, its inventor being the Russian scientist A.S. Popov. 2. The wireless telegraphy was the result of Popov's experiments, this fact having been acknowledged by foreign science and engineering. 3. The true size of the earth and the true distance to the moon having been calculated, Newton solved the problem of universal gravitation. He discovered the laws of motion, these laws having become the basis of practical mechanics. 4. The rocket houses automatic and radio-controlled instruments, these instruments receiving any order the earth may send. 5. The professor entered the lecture hall, his assistant following him. 6. The lecturer spoke on the problems of space research, his lecture being illustrated by diagrams. 7. The problems of the seminar were discussed in details, many students taking part in this discussion. 8. The general diagram of a radio communication system is similar to that of a radio broadcasting system, the difference being that the telegraph station uses a key instead of a microphone. 9. The atoms of different substances have different weights, their properties being also different. 10. Gilbert contributed greatly to the study of magnetism, Galileo taking great interest in Gilbert's achievements.

22. Замените придаточные предложения причастными оборотами или соедините попарно два простых предложения, используя независимый причастный оборот.

1. After P. Yablochkov had come to Paris he could continue working at his "candle". 2. While P. Yablochkov was working at his "candle" he made many experiments with the induction coil. 3. Radio is the fastest way to detect an artificial satellite. It is largely used for that purpose. 4. Those new devices have already been tested. They received recognition. 5. Television sets are made according to special designs. They make visible the resources of the earth and the oceans. 6. Electrical engineering owes much to Yablochkov and Lodygin. Their inventions have contributed to the development of this branch of knowledge. 7. Man-made satellites moving round the earth will help to solve many problems connected with space travel. 8. The flow of the current is reduced. The speed of the motor is decreased. 9. The dictionaries have been brought from the library. The students began translating the articles. 10. The energy sources of the world decrease. The scientists must look for new sources of energy.

23. Переведите предложения, обращая внимание на составные предлоги.

Thomas Alva Edison

The name of Thomas Alva Edison, a self-taught inventor, is widely known *due to* his numerous inventions. When a child Edison used the cellar (чердак) of his parents' house *instead of* a laboratory. *In spite of* his lack of schooling Edison became one of the greatest inventors of his time. Edison lost his hearing *because of* a railroad accident. He communicated with other people *by means* of a phonograph, a special device of his own invention. *Irrespective* of his limited education Edison took interest in most technical problems of his time. *Owing to* his remarkable capacity for work he perfected his knowledge in most fields of engineering. The wide-spread use of his incandescent filament lamp could become possible only *in connection with* and *thanks to* the development of

Edison and his phonograph

an effective system of electric light distribution. Edison made numerous experiments and *in addition to* that read much on the subject.

24. Прочтите внимательно текст 3 и составьте реферат на английском языке, пользуясь представленными ниже клише.

— The text / article under review ...(gives us a sort of information about ...)

— The article deals with the problem ...

— The subject of the text is ...

— **At the beginning** (of the text) the author describes ... (dwells on ...; explains ...; touches upon ...; analyses ...; comments ...; characterizes ...; underlines ...; reveals ...; gives account of ...).

— The article begins with the description of ..., a review of ..., the analysis of ... .

— The article opens with ...

— **Then** (after that, further on, next) the author passes on to ..., gives a detailed (thorough) analysis (description), goes on to say that ...

— **At the end** of the article the author draws the conclusion that ...; the author sums it all up (by saying ...).

— To finish with, the author describes ... .

— **In conclusion** the author ...

Text 3. MODERN MEANS OF COMMUNICATION

As we know communication is exchange of information and messages. Because of modern means of communications, it is possible for the people from any part of the world to communicate with their fellows within short time. Modern means of communication help to exchange thoughts in spoken (via radio), written (via newspaper) and visual (via television) form.

It is interesting to note different forms of communication, such as: radio and television broadcast, telephony, telegraphy, radar, sonar, fax (facsimile telegraphy), e-mail, teleprinting, telemetering, mobile phones, Internet.

Television is a popular means of mass communication. Television plays a key role in social and cultural transformation of the country. Important news and messages are telecast on television. Besides, through television we can directly see the person reading the news or giving information. Incidents happening in far away places can be seen by watching television at home.

Telephone and mobile phone services are the important means of communication. People use the telephone to contact a person whether

he is far or near. We can also watch live news and do mobile phone banking today with the help of internet facility.

One can also send matter, pictures, photos, etc. in seconds to a person at a far away place through telefax. We are able to send important messages and good wishes immediately through telegram. The massage sent should be very short. It can be received in a very short period of every time.

Now, recent methods of sending messages are through computer. The messages can be sent throughout the world in seconds by e-mail. One can also watch live news and do internet banking.

In addition to the above systems, communications networks may utilize Internet, cellular, wireless, satellite technologies and more. Those systems which take advantage of two or more media are considered hybrid communication networks. Much research is being devoted to finding better ways of developing communications systems through countless combinations of all of these communications technologies.

25. Внимательно прослушайте текст 4 и дайте ответы на вопросы, представленные ниже.

Text 4. THE INVENTION OF RADIO

A. Popov

As we know the birthday of radio is May 7, 1895. On that day a teacher of the military school from Kronshtadt Alexander Stepanovich Popov demonstrated his first radioreceiving set in operation. There were no transmitters then, therefore his receiver could only pick up signals produced by lightning discharges during a thunder-storm. Popov called his device a storm indicator.

It should be noted that many scientific discoveries of famous scientists from different countries preceded Popov's works. It is well known that in 1831 a great English physicist Michael Faraday discovered the electromagnetic induction that became the basis of modern electrical engineering. Thirty years later, in 1864 his country-man James Maxwell, using Faraday's invention, discovered the theory of electromagnetic oscillations, that is widely used nowadays. The existence of electromagnetic waves was experi-

mentally proved by a German Physicist Heinrich Herz in 1888. And two years later, in 1890 a French scientist E. Branly invented a coherer, the installation for picking up electromagnetic waves. Having used the achievements of those scientists, A. Popov improved his wireless telegraph and on March 1896 demonstrated the transmission and reception of the first radiogram over a distance of 250 m. It consisted of two words: "Heinrich Hertz". Four years later the range of transmission was increased to 50 km. The device was later called *radio* because electromagnetic or radio waves travel from a radio station along radii, just as rays of light at the speed of 300,000 km/sec.

Popov's invention laid the foundation for further inventions and improvements in the field of radio communication. Since that time scientists all over the world have been developing the modern systems of radio-telegraphy, broadcasting, television, radiolocation, radionavigation and other branches of radio-electronics.

* * *

1. What was A. S. Popov? 2. When did he demonstrate his first radio-receiving set? 3. How was it called? 4. What were the possibilities of that device? 5. What discoveries preceded Popov's invention? 6. What was the content of the first radiogram? 7. At what distance was it transmitted? 8. Why was the device called "radio"? 9. How did Popov's invention contribute to further development of radio communication? 10. What new sciences could develop due to radio communication?

26. Выполните письменный перевод текстов со словарем.

Text 5. RADIO TRANSMITTERS

As it is known the history of radio transmitters dates back to 1895 when a great Russian scientist A. Popov transmitted the first radiogram. Since that time many Russian and foreign scientists contributed much to the theory of radio transmitting devices.

The function of the radio transmitter is to convert the electrical power received from a primary source into radio-frequency energy modulated with a signal for transmission by means of electromagnetic waves through space.

The radio transmitter consists of two principal components: the radio-frequency section and the audio-frequency one. The radio-frequency section produces radio-frequency power of continuous waves, the audio-frequency section being concerned with modulation of radio signals.

The parameters of the radio transmitter are: output power, frequency stability, efficiency and modulation. Radio transmitters are classi-

fied into many different types. When classifying them according to the service for which they are used, radio transmitters may be of communication, broadcast, radar and other types. Taking into consideration the type of transmitting signals, specialists subdivide radio transmitters into telegraph, telephone and pulse transmitters. According to the power consumed transmitters are of low-power, medium power and other types. At last they may be of fixed and mobile types. To meet the requirements of high transmission quality of radio transmitters much is being done for improving radio transmitters performance by developing new designs of these devices.

Text 6. RADIO RECEIVERS

As it is known the theory of radio receiving devices was worked out by the Russian scientist V. Siforov. But it is A. Popov who invented and demonstrated the first radio receiving set. Since that time radio devices have been improving and perfecting.

The receiver performs the function of converting the current in the receiving antenna into the intelligence contained in the transmission. The main parameters of radio receivers are sensitivity, selectivity and fidelity. Sensitivity is a measure of the receiver's ability to receive weak signals, as it is known that the farther an electromagnetic wave travels, the weaker is its energy. Selectivity is the ability of the receiver to reject undesirable signals. Fidelity is a measure of the receiver's ability to reproduce clearly audio-frequency currents, which are in accordance with the modulation envelope of the received signals.

However simple the radio receiver may be, it includes an antenna, an input tuning circuit, a detector and a pair of earphones.

The principle of operation of the radio receiver is not very difficult to understand. The electromotive force is impressed upon the receiving antenna and produces a current, this current is a reproduction of the current of the transmitting antenna.

There are various types of receivers, communication and broadcast receivers being the principal types of them. Communication receivers are used in radio telephone and telegraph service, broadcast receivers finding application for the reception of sound and visual programms. Wherever radio receivers were applied, they must meet an important requirement as reliability in operation.

TESTS

1. Подберите вместо пропусков подходящие по смыслу слова.

1. It's known that W. Thomson invented the _____.
   a) induction coil; b) sending key;
   c) tuning circuit; d) mirror galvanometer.

2. The method of _____ modulation gives the possibility to transmit a lot of telephone conversations over the same wire simultaneously.
   a) accuracy; b) frequency;
   c) currency; d) reliability.

3. The first postal system with papyrus letters was organized by the _____.
   a) Romans; b) Egyptians;
   c) British; d) Russian.

4. The aim of any form of _____ is to provide complete understanding of a message.
   a) communication; b) calculation;
   c) computation; d) completion.

5. It was _____ who invented transmitting and receiving coils and described the possibility of wireless communication.
   a) G. Marconi; b) H. Hertz;
   c) A. Popov; d) N. Tesla.

6. In addition to amplifiers the transmitter includes _____, consisting of a coil and a capacitor.
   a) a wireless telegraph; b) an oscillatory circuit;
   c) an audio frequency; d) electromotive force.

7. James Maxwell discovered the theory of electromagnetic _____, that is widely used nowadays.
   a) combinations; b) communication;
   c) oscillations; d) induction.

8. Gr. Bell made an instrument that successfully _____ a complete sentence: "Mr. Watson, come here, I want you".
   a) transmitted; b) amplified;
   c) rectified; d) improved.

9. The power of the receiver being _____, the device began to reproduce audio frequency signals more clearly.
   a) decreased; b) increased;
   c) reduced; d) selected.

10. Today it would be difficult to name an area of science and engineering that doesn't make use of the _____ of radio and electronics.

a) environments; b) improvements;
c) displacements; d) achievements.

2. Подберите к терминам, данным в левой колонке, определения, представленные справа.

1. Modulation	a) the number of vibrations per second.
2. Resistance	b) anything wound or gathered into a series of rings or a spiral.
3. Frequency	c) property of a conductor by which it opposes the conducting material.
4. A coil	d) a device used for storing an electric charge.
5. A switch	e) a device used for increasing the strength of an electric signal.
6. A capacitor	f) a device that converts an alternating current into a direct current.
7. An amplifier	g) a device that converts incoming electromagnetic waves or electric signals into audible or visual signals.
8. A receiver	h) a device that generates radio waves, modulates their amplitude or frequency and transmits them by means of an antenna.
9. A transmitter	i) a device used to open or close an electric circuit.
10. A rectifier	j) a variation in the amplitude, frequency or phase of a wave in accordance with some signal.

3. Найдите причастия и определите их форму: a) PI Active; b) PI Passive; c) PII; d) Perfect Participle Active; e) Perfect Participle Passive. Переведите предложения на русский язык.

1. When performing the function of carrying information, radio waves must be accordingly changed or modulated. 2. The electrical signals generated by transistors may be converted or amplified. 3. Being tested the device demonstrated its reliability in operation. 4. Having been discovered semiconductor devices became useful for different technical purposes. 5. The operation of the receiving station influenced by a number of factors was discussed by engineers. 6. Reliable means

of protection having been created, people are not affected by radioactive radiation. 7. Leaving a transmitting antenna, a radio wave travels in all directions. 8. Having finished the research, the scientist made a detailed analysis of the data obtained. 9. Having been insulated with a new kind of insulating material the cable was tested under different conditions. 10. Great progress having been achieved in rocket technique, it was possible to construct a rocket overcoming the Earth's gravitation.

Unit 7

INFORMATION COMMUNICATION TECHNOLOGIES

Learning is light, not learning is darkness.
A. Suvorov

Тексты: Communication Systems and Information Theory. The Internet. Television and Telecommunication. Mobile Phone Features. Optical Communication System. Duplex Communication System

Грамматика: Герундий (Gerund). Герундиальные обороты. Сравнение причастия I и герундия. Наречие. Предлоги *among, between, besides, except, beyond.* Повторение изученного материала: английские времена в действительном и страдательном залогах

1. Ознакомьтесь с терминами текста 1.

Information Communication Technologies (ICT) — информационно-коммуникационные технологии
the source output — исходный вывод
a sequence of binary digits ['si:kwəns] — последовательность двоичных цифр
a storage medium — запоминающая среда, носитель ЗУ
distinguishing characteristics [dɪs'tɪŋgwɪʃɪŋ] — отличительные свойства
probability theory — теория вероятности
encoder — кодирующее устройство, шифратор
decoder — декодирующее устройство, дешифратор
level of performance — уровень пропускной способности
random processes — беспорядочные, случайные процессы
additive noise — аддитивный (дополнительный) шум
prescribed delay — заданная задержка
software applications — прикладное программное обеспечение

installing applications — установка (размещение) прикладных программ
data management — управление (работа с) данными
networking — объединение в сеть
engineering computer hardware — конструирование аппаратного обеспечения компьютера
manipulate — управлять; обращаться с; обрабатывать; преобразовывать

2. Прочтите текст и скажите, что представляют собой информационно-коммуникационные технологии.

Text 1. COMMUNICATION SYSTEMS AND INFORMATION THEORY

Communication theory deals primarily with systems for transmitting information from one point to another. The source output might represent a voice waveform, a sequence of binary digits from a magnetic tape, the output of a set of sensors in a space probe, or a target in a radar system. The channel might represent a telephone line, a high frequency radio link, a space communication link, or a storage medium.

As it is known, in the early 1940's a mathematical theory for dealing with more fundamental aspects of communication systems was developed. The distinguishing characteristics of this theory are, first, a great emphasis on probability theory and, second, a primary concern with the encoder and decoder, both in terms of their functional roles and in terms of their achieving a given level of performance. In the past 20 years, information theory has been made more precise, has been extended and brought to the point where it is being applied in practical communication systems.

Much of modern communication theory stems from the works of communication systems as well as from desirability of modelling both signal and noise as random processes. N. Wiener was interested in finding the best linear filter to separate the signal from additive noise with a prescribed delay. His work had an important influence on subsequent research in modulation theory.

Information technology (IT) is the study, design, development, implementation, support or management of computer-based information systems, particularly software applications and computer hardware. Information technology deals mainly with the use of electronic computers and computer software to convert, store, protect, process, transmit and securely retrieve information.

Today the term information technology includes many aspects of computing and technology and covers many fields. Information

technology professionals perform a variety of duties that range from installing applications to designing complex computer networks and information databases. The duties of IT specialists may involve data management, networking, engineering computer hardware, database and software design, as well as the management and administration of the whole system. When computer and communication technologies are combined, the result is information technology, or "infotech". Information technology describes any technology that helps to produce, manipulate, store, communicate and /or disseminate information.

Thus, Information Communication Technology (ICT) embraces all technologies for the communication of information. It includes any medium to record information (paper, pen, magnetic disk / tape, optical disks — CD / DVD, flash memory etc.) and also technology for broadcasting information — radio, television. It involves any technology for communicating through voice and sound or images — microphone, camera, loudspeaker, telephone. At present it is apparently culminating to information communication with the help of Personal Computers (PCs) networked through the Internet, information technology that can transfer information using satellite systems or intercontinental cables.

3. Просмотрите текст еще раз. Дайте ответы на вопросы, используя информацию текста.

1. What system does communication theory deal with? 2. When was the mathematical theory for communication systems developed? 3. What are the distinguishing features of this theory? 4. What does modern communication theory stem from? 5. What was Wiener's contribution into the development of communication theory? 6. What is IT? 7. What does it deal with? 8. What jobs are IT experts engaged in? 9. What do you understand by "infotech"? 10. What technologies does ICT include?

4. Прочтите, переведите и запомните следующие словосочетания.

Communication theory; primarily; the source output; a voice waveform; a sequence of binary digits; a set of sensors; a space probe; a high frequency radio link; a storage medium; distinguishing characteristics; a great emphasis on probability theory; a primary concern; encoder and decoder; in terms of; a given level of performance; to stem from; as well as; desirability; linear filter; additive noise; a prescribed delay; to have influence on subsequent research; implementation; support; management; particularly; software applications; computer hardware; to retrieve information securely; to cover many fields; perform a variety

of duties; installing applications; to design complex computer networks and information databases; data management; networking; engineering computer hardware; database and software design; to disseminate information; to communicate through voice and sound or images; a loudspeaker; to network through the Internet.

5. Вспомните значение новых слов и переведите словосочетания, употребляемые с ними.

Information (информация; данные; сведения): availability information; binary information; common information; complete information; copyright information; current information; delivery information; directory information; error information; extra information; free information; help information; on-line information; out-of-date information; read-only information; selected information; service information; support information; up-to-date information.

Communication (связь; коммуникация; сообщение; взаимодействие): computer communication; data communication; digital communication; electronic communication; emergency communication; interactive communication; mobile communication; network (on-line) communication; PC-based communication; real-time communication; satellite communication; visual communication; wireless communication.

Technique (метод; способ; технические приемы; техника; оборудование): analogue technique; common technique; computing technique; design technique; digital technique; display technique; formatting technique; hardware technique; information technique; measuring technique; modeling technique; numerical technique; programming technique; scanning technique; software technique; testing technique.

Technology (технология; техника; методы; устройства): CD-ROM technology; advanced technology; communication technology; education(al) technology; encoding technology; information (-processing) technology; latest technology; management technology; microprocessor technology; network technology; PC-based technology; printing technology; processing technology; software technology; storage technology; telecommunication technology.

6. Выполните обратный перевод терминологических словосочетаний с новыми словами на английский язык. Используйте предыдущее упражнение.

Метод программного решения; информация о наличии; видеосвязь; технология распространения на компакт-дисках;

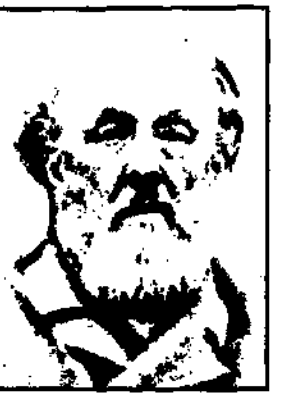
двоичная информация; служебная информация; новейшая технология; общепринятая методика; компьютерная технология; информация общего пользования; технология печати; цифровая связь; информация об авторских правах; технология хранения данных; аварийная связь; текущая информация; способ проверки; технология организации дальней связи; передача в режиме реального времени; информация о каталогах; методика проектирования; информация об ошибках; методы управления; связь через (компьютерную) сеть; технология организации связи; дополнительная информация; способ вывода на экран; методика программирования; бесплатная информация; метод аппаратного решения; неизменяемая информация (только для чтения); методы моделирования; выборочная информация; измерительная техника; вспомогательная информация; беспроводная связь.

7. Прочтите текст. Проанализируйте формы герундия и способы его перевода (см. грамматический справочник, с. 223).

K.E. Tsiolkovsky

It is well known that K. Tsiolkovsky was a self-educated scientist. In his childhood he lost his *hearing* but this didn't prevent him from *acquiring* knowledge. With endless patience his mother went on *teaching* him and after her death he began *studying* by himself without *attending* school. On *having reached* a point where *reading* books at home could teach no more, the sixteen year old boy went to Moscow and continued his *studying* in libraries. Tsiolkovsky lived and worked under very hard conditions without *being assisted* by the tsarist government. The Soviet government did much for *helping* Tsiolkovsky, putting at his disposal everything he needed for his research.

Tsiolkovsky suggested the idea of the possibility of *using* atomic energy for *conquering* interplanetary space. Besides *creating* the theory of interplanetary travel he outlined the design of the first jet-driven machine. Russian scientists succeeded in *acquiring* Tsiolkovsky's ideas and *putting* them into practice. By *sending* up the satellite people have made the first step towards *realizing* space flights. After *having made* complicated calculations Russian scientists and inventors succeeded in *creating* manned space ships. *Penetrating* beyond the



K.E. Tsiolkovsky

limits of the atmosphere and *exploring* the boundless cosmic space has long been no more a dream today.

8. Переведите предложения, содержащие герундий в различных функциях и формах. Найдите герундиальные обороты.

1. Pete's knowing English well helped him in learning other foreign languages. 2. Though he was against postponing the discussion of the question, we didn't get used to solving such important problems without the manager and put off discussing the matter till his returning to the office. 3. — When do you think of going to Moscow? — I insist on leaving immediately. If we succeed in arriving at Moscow in the morning we'll have a lot of time for discussing the problem and making an agreement. 4. I have no objection to being sent to Moscow, but I think there is no sense in going there, and I'm afraid of being late. In addition there is no hope of my getting the ticket. 5. I was surprised and disappointed at not finding them at home. I thought at once of their going to the railway station for seeing Ann off to Moscow. 6. He was accused of having taken our books with him yesterday. This resulted in our not being ready for the lesson and prevented from getting good marks. Though he apologized for taking our books, we were angry with him for his forgetting to return our books. 7. After having studied the phenomenon of atmospheric electricity, Franklin invented the lightning rod. Thanks to the lightning conductor having been invented, it became possible to protect buildings from strokes of lightning.

9. Запомните слова с предлогами, после которых употребляется герундий. Составьте собственные предложения с ними.

1. *To accuse of* — обвинять в; *to approve (disapprove) of* — одобрять (не одобрять) ч.-л.; *to be afraid of* — бояться ч.-л.; *be engaged in* — заниматься ч.-л.; *to be fond of* — увлекаться; *to be interested in* — интересоваться ч.-л.; *to be proud of* — гордиться ч.-л.; *to be surprised at* — удивляться ч.-л; *to count on* — рассчитывать на; *to depend on* — зависеть от; *to insist on* — настаивать на; *to get used to* — привыкнуть к; *to object to* — возражать против; *to result in* — приводить к ч.-л.; *to succeed in* — удаваться.

2. *Apology for* — извинение; *astonishment at* — удивление; *chance of* — удобный случай; *disappointment at* — разочарование; *interest in* — интерес; *means of* — средство; *objection to* — возражение; *reason for* — причина, основание; *way of* — способ.

10. Переведите предложения, обращая внимание на употребление предлогов.

A. among, between

1. Bus N5 runs *between* Piccadilly Circus and Trafalgar Square. 2. They like to walk in the forest *among* the high trees. 3. I can't find my handkerchief *among* all those things. 4. Let it stay *between* you and me. 5. He is lying on the grass *among* beautiful flowers. 6. Who is that boy standing *between* Fred and Alex? 7. There is a little table *between* two armchairs.

B. besides, except

1. All the boys are playing football *except* Tom. He is watching their game. 2. We study many subjects at school *besides* English. 3. Kate likes all the fruits *except* bananas. 4. I have two more friends *besides* Pete. 5. Den trains much in the gym, *besides* his morning exercises. 6. *Besides* jazz I enjoy rap and rock. 7. Everybody agrees with me *except* Mike.

C. beyond

1. You can't enjoy the sea, it's *beyond* that big hill. 2. I'm doing my best, but to help him is *beyond* my power. 3. The scenery in some parts of the Caucasus is beautiful *beyond* description. 4. Children, don't go *beyond* the garden-gate! 5. His honesty is *beyond doubt*. 6. I can't help you to get tickets; it's *beyond* me. 7. The house is a little *beyond* the bridge.

* * *

11. Ознакомьтесь с терминами текста 2.

The Internet — Интернет (система соединенных компьютерных сетей мирового масштаба)
Advanced Research Projects Agency (ARPA) — Агентство передовых исследовательских проектов
to regain a technological lead — вернуть техническое первенство
packet switching ['pækɪt 'swɪtʃɪŋ] — коммутация пакетов
mainframe — большая ЭВМ
dial-up telephone line — коммутируемая телефонная линия (связи)
the time-shared computers — компьютеры, работающие в режиме разделения времени
computer networking — организация компьютерной сети
operational infrastructure — действующая инфраструктура, (основные) средства
Internet Protocol (IP) — межсетевой протокол

fibre-optic cables — волоконно-оптические кабели
on-line chat — электронный разговор в режиме реального времени
file transfer — пересылка файлов (между компьютерами)
file sharing — одновременный доступ к файлу (совместное использование)
on-line gaming — сетевая игра
high level functionality — высокий уровень функциональных возможностей
datacards — платы данных
handheld game console — консоль (пульт) карманной игры
cellular network ['seljulə] — сеть сотовой связи
web browsing ['brauziŋ] — просмотр информационной сети
like nothing before — как ничто другое до (него)
to set the stage — создать арену
at once — вместе с тем; в то же время
without regard — безотносительно; не считаясь

12. Прочтите текст 2 и скажите, что представляет собой Интернет и каковы его возможности.

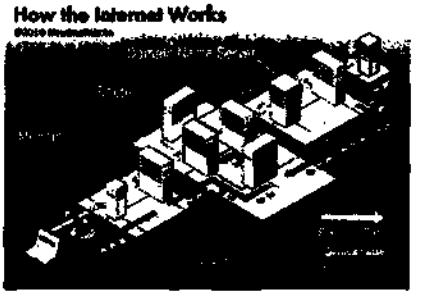
Text 2. THE INTERNET

The Internet is a global system of interconnected computer networks that use the standard Internet protocol suite to serve billions of users worldwide. It is a network of networks that consists of millions of private, public, academic, business, and government networks. They are linked by a broad set of electronic, wireless and optical networking technologies. The Internet carries an extensive range of information resources and services, such as the inter-linked hypertext documents of the World Wide Web (WWW) and the infrastructure to support e-mail.

Most traditional communications media including telephone, music, film, and television are being reshaped or redefined by the Internet, giving birth to new services such as Voice over Internet Protocol (VoIP) and Internet Protocol Television (IPTV). Newspaper, book and other print publishing are adapting to Web site technology, or are reshaped into blogging and web feeds. The Internet has enabled and accelerated new forms of human interactions through instant messaging, Internet forums, and social networking.

Even though the Internet is still a young technology, it's hard to imagine life without it now. Every year, engineers create more devices to integrate with the Internet. This network of networks crisscrosses the globe and even extends into space. But what makes it work?

To understand the Internet, let's look at it as a system with two main components. The first of those components is hardware. It includes everything from the cables carrying terabits of information every second to the computer that is in front of you.



Other types of hardware that support the Internet include routers, servers, cell phone towers*, satellites, radios, smartphones and other devices. All these devices together create the network of networks. The Internet is a malleable system — it changes in little ways as elements join and leave networks around the world. Some of those elements may be static and make up the backbone of the Internet. Others are more peripheral. These elements are connections. Some are end points, or clients — the computer, smartphone or other device you are using to read. Machines that store the information we seek on the Internet are servers. Other elements are nodes which serve as a connecting point along a route of traffic. And then there are the transmission lines which can be physical, as in the case of cables and fiber optics, or they can be wireless signals from satellites, cell phone or 4G towers, or radios.

All of this hardware wouldn't create a network without the second component of the Internet: the protocols. Protocols are sets of rules that machines follow to complete tasks. Without a common set of protocols that all machines connected to the Internet must follow, communication between devices couldn't happen. The various machines would be unable to understand one another or even send information in a meaningful way. The protocols provide both the method and a common language for machines to use to transmit data.

Thus, as we see, the Internet has revolutionized the computer and communications world like nothing before. The invention of the telegraph, telephone, radio and computer set the stage for this unprecedented integration of capabilities. The Internet is at once a world-wide broadcasting capability, a mechanism for information dissemination, and a medium for collaboration and interaction between individuals and their computers without regard for geographical location.

Note:

* cell phone tower — вышка ретранслятор оператора мобильной связи.

13. Просмотрите текст еще раз. Дайте ответы на вопросы, используя информацию текста.

1. What is the Internet? 2. What networs does it consist of? 3. What are they linred by? 4. What media is the Internet reshaped? 5. What two main components does the Internet include? 6. What types of hardware support the Internet? 7. What are servers? 8. What is the function of nodes? 9. What do you understand by protocols? 10. What kind of a medium is the Internet?

14. Найдите в текстах 1 и 2 английские эквиваленты следующих словосочетаний.

Информационно-коммуникационные технологии; системы связи; иметь дело главным образом с; последовательность двоичных цифр; набор (совокупность) датчиков; космический зонд; высокочастотная радио связь; носитель запоминающего устройства; отличительные свойства; теория вероятности; первостепенный интерес; на языке (с точки зрения); беспорядочные процессы; отделять сигнал от аддитивных шумов; заданная задержка; оказывать значительное влияние; последующие исследования; автоматизированные информационные системы; главным образом; извлекать информацию; охватывать многие области; размещать прикладные программы; конструирование аппаратного обеспечения; проектирование программного обеспечения; управлять; распространять; охватывать.

Взаимосвязанные компьютерные сети; пакет протоколов; широкий набор сетевых технологий; информационные ресурсы и службы; широкий спектр; всемирная паутина; электронная почта; средства связи; пересекать земной шар; выпуск печатной продукции; мгновенные сообщения; маршрутизаторы; основа интернета; конечные пункты; хранить (запоминать) информацию; узлы; маршрут движения; линии передач; волоконная оптика; сотовые телефоны; пакет (набор) правил; не способен понять; передавать информацию; осмысленным образом; как ничто ранее; беспрецедентные возможности интеграции; глобальные возможности; распространение информации; среда для сотрудничества; без учета. невзирая на.

15. Расшифруйте и переведите сокращения, употребляемые в технической литературе, с которыми вы встречались в изученных темах.

IT; ICT; CD; CD ROM; PC; Internet; WWW; IP; CPU; ALU; CU; I/O units; IOP; AC; DC; COBOL; FORTRAN; PL/1; BASIC; EDVAC; RTG; H_2O; IC; SIC; MIC; LIC; VLIC; ARPA; IPTO.

16. Вспомните новые слова и переведите производные от них.

To inform — informal; informatics; information; informer; informative; informationally; informatization.

To communicate — communicant; communicable; incommunicable; communicating; communication; communicative; incommunicative.

To implement — implementation; implemented.

To retrieve — retrieval; retrievable; irretrievable.

To browse — browser; browsing.

To originate — origin; original; unoriginal; originally; origination; originator.

To address — addressability; addressable; addressee; addressing; addressless; addressness.

Access — accessibility; inaccessibility; accessible; inaccessible; accessory.

Sequence — sequent; sequential; sequencer; consequently.

Function — functional; functionality; functionally.

17. Найдите в текстах 1 и 2 слова, близкие по значению словам, предложенным ниже.

Nouns: concept; intelligence; memory; property; wish; simulation; effect; investigation; advancement; controlling; method; branch; expert; guidance; leader; significance; way; understanding; development; measurement; passing; display; cooperation.

Verbs: to transfer; to carry out; to expand; to result from; to divide; to take out; to transform; to include; to embrace; to assemble; to spread; to establish; to rotate; to address.

Adjectives: following; fundamental; initial; accurate; up-to-date; additional; main; wide; definite; mobile; present-day; imaginable.

Adverbs: mainly; safely; evidently; widely; consequently.

18. Прочтите и дайте свою интерпретацию следующих английских слов, ставших общеупотребительными в технической литературе.

Archive; authorization; ampersand (&); bit; byte; banner; binary file; browser; buffer; chat; communicators; cache; document; domain (ru); disk; diskette; fax; facsimile; filter; formatting; frame; Google; host; hosting; hacker; hypertext; identification; interface; interactivity; innovation; Internet; Internet service; Internet service provider (ISP); logotype; machine translation; media; multimedia; menu; modem; moderator; netiquette; nick(name); on-line; off-line; pager; personal computer; pentium; protocol; Rambler; Runet; server; scanner; smiles;

spam; spamer; tag; telex; terminal; traffic; unicode; user; weblogs; Yahoo; Yandex.

19. Переведите цепочки существительных.

Communication theory; probability theory; communication systems; communication systems development; telegraph cables operation speed; wireless telegraphy signals; radio communication components; storage medium; data management; modulation theory; software application; software design; computer hardware; computer software; information technology professionals; Advanced Research Project Agency; computer research program; packet switching theory; Internet development; web browsing; information dissemination; transmission systems; radio wave energy.

20. Прочтите текст. Определите часть речи выделенных слов (герундий, причастие I или причастие II). Назовите их форму и функцию.

Semiconductors

As we know, semiconductors are materials widely *used* in different spheres of technology, their conductivity *ranging* between that of conductors and nonconductors or insulators. While the conductivity of metals is very little *influenced* by temperature, the conductivity of semiconductors sharply increases with *heating* and falls with *cooling*. This dependence has *opened* great prospects for *employing* semiconductors in *measuring* techniques. Light as well as heat increases the conductivity of *semiconducting* materials, this principle *being used* in *creating* photo resistances. It is also widely *applied* for *switching* on engines, for *counting* parts on a conveyer belt, as well as for various systems of emergency signals and for *reproducing* sound in a cinematography. Besides *reacting* to light, semiconductors react to all kinds of radiations and are therefore *employed* in *designing* electronic counters.

Engineers and physicists turned their attention to semiconductors more than 70 years ago, *seeing* in them the way of *solving complicated engineering* problems. *Converting* heat into electricity without *using* boilers or other machines was one of them. The electricity *generated* by semiconductor thermocouples can produce not only heat but also cold, this principle *being used* in *manufacturing* refrigerators. By *converting* semiconductors with a layer of radioactive matter we can create "atomic batteries" *transforming* nuclear energy into electric power.

ПОВТОРЕНИЕ ИЗУЧЕННОГО МАТЕРИАЛА

21. Раскройте скобки и поставьте глагол в нужной форме.

1. — What you (to do) here? — I (to translate) an article about Shakespeare's life. — I think you (to translate) it for a long time, ... n't you? — Yes, this article (to be) rather long and difficult. I (to work) at it for two days. Usually I (to translate) from English into Russian quite quickly. But as for this article I (to translate) it since Wednesday.

2. Don't enter the classrom. The students (to examine) there. You'll have to wait till the examination (to finish). I think it (to be over) by two or three o'clock. Some of the students already (to pass) their exam. They (to have) a rest at the refreshment room, drinking coffee at the moment. Others (to do) their laboratory work in the classroom now.

3. Kate (to make) her report last week. As for me, I (to prepare) my report this week. I (to work) at my report when you entered the room. I (to write) it for about an hour when you entered. I didn't think that the report (to take) me so much time.

4. — You already (to show) the new videofilms? — Well, one film (to show) an hour ago.

As for the other, it (not to show) yet. Two new guests (to wait) at the moment. The film (to show) when they (to come). I was said they (to come) in some minutes, and the film (to show) before lunch.

22. Вспомните, как строятся безличные предложения, проанализируйте и переведите предложения на русский язык.

1. Бесполезно говорить ему об этом. Нужно попросить Катю объяснить ему эту ситуацию. 2. Трудно разговаривать на английском языке без ошибок. 3. Когда не знаешь грамматики, часто допускаешь ошибки. 4. В некоторых обстоятельствах иногда не знаешь, что следует делать (как поступить). 5. Чужие ошибки видишь быстрее, чем свои собственные. 6. Чтобы стать образованным человеком, следует много читать. 7. Сколько тебе понадобится времени, чтобы добраться до станции? Думаю, мне потребуется не меньше получаса, чтобы добраться туда. 8. — Дождь идет? — Нет, но темно и похоже на дождь. 9. Интересно отметить, что несмотря на участие многих ученых в развитии систем связи, первый радиоприемник был создан в России. 10. Именно российский ученый, Александр Попов, стал изобретателем первой радиоустановки.

23. Прочтите текст и выразите составные предлоги, указанные в скобках, по-английски.

Copernicus of Geometry

The Great Russian Mathematician, Nikolai Lobachevsky, created one of the greatest masterpieces of mathematics — non-Euclidean geometry. (Из-за) his great discovery Lobachevsky was called "Copernicus of Geometry". (Благодаря) his remarkable capacities in mathematics as well as in other subjects, Lobachevsky was admitted to the university at the age of 14. (Что касается) his progress there, it was so rapid that at the age of 18 he took his master's degree and was appointed assistant professor. (В дополнение к) the courses in mathematics he lectured on astronomy and physics. (Несмотря на) his new duty as a rector of the university, Lobachevsky continued to work in the library and the museum. (Благодаря) his energy and courage he didn't lose his head and saved the university library from fire which destroyed half Kazan. Lobachevsky learned architecture (для того чтобы) see that the work on reconstruction of Kazan University was done well. (В отличие от) Euclid Lobachevsky proved that several parallels to the given line can pass through a point outside that line. (В соответствии с) Lobachevsky's theory there are no absolute truths in our conceptions of space and time.

24. Преобразуйте диалог в косвенную речь. Выучите диалог наизусть.

Let Me Introduce My Friend to You

Pete: Hello, Max, let me introduce my friend to you. This is Alex. Is his name familiar to you?
Max: I don't think so. How do you do, Alex. Glad to know you.
Alex: Good evening, Max. Pleased to meet you. How are you getting on?
M.: Very well, thank you. And what about you?
A.: Very much the same, thanks. It's a fine day, isn't it?
M.: Yes, lovely weather we are having today. I hope it will keep fine.
A.: By the way, Max, I think, I'm acquainted with your brother.

M.: Really? You don't say so. Do you work together?
A.: No, we don't, but I see very much of him. He is clever, well-educated and has good manners.
M.: Glad to hear it. And where did you get acquainted with him?
A.: We played a game of tennis the other day. I'm sorry, I must be off. It was a pleasure to meet you.
M.: Thank you. I was glad to make your acquaintance too. Come over and see me one of the days. Good bye for the time being.
A.: And you too, keep in touch. All the best. So long.

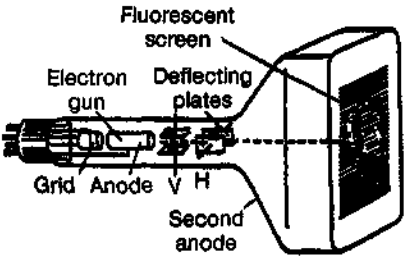
25. Прочтите тексты 3 и 4 и подготовьте рефераты на английском языке, передав их краткое содержание.

Text 3. TELEVISION AND TELECOMMUNICATION

Television is a widely used telecommunication medium for sending (broadcasting) and receiving moving images, either monochromatic (black and white) or colour, usually accompanied by sound.

In its early stages of development, television included only those devices employing a combination of optical, mechanical and electronic technologies to capture, transmit and display a visual image. As it is known, all modern television systems are based on electronic technologies, however the knowledge gained from the work on mechanical-dependent systems was important in the development of fully electronic television.

In 1884 Paul G. Nipkow, a 20-year old university student in Germany invented the first electromechanical television system which employed a scanning disk, a spinning disk with a series of holes spiraling toward the centre, for "rasterization", the process of converting a visual image into a stream of electrical pulses. The beginning of the 20-th century brought advances in amplifier tube technology and the use of a rotating mirror-drum scanner to capture the image. Most of the 20-th century televisions depended also upon the cathode-ray tube invented by Karl Braun in 1927.



The cathode-ray tube

Telecommunication, a transmission of signals over a distance for the purpose of communication, is an important part of modern society. In telecommunication, a communication system is a collection of individual communications networks, transmission systems, relay stations, tributary stations and data terminal equipment usually capable of interconnection and interoperation to form an integral whole. The components of a communication system serve a common purpose, they are technically compatible, use common procedures, respond to controls and operate in unison.

Text 4. MOBILE PHONE FEATURES

All mobile phones have a number of features in common. The main components found on all phones are:

— a rechargeable battery providing the power source for the phone functions;

— an input mechanism and display to allow the user to interact with the phone. The most common input mechanism is a keypad, touch screen being also found in some high-end smart phones;

— basic mobile phones services to allow users to make calls and send text messages;

— all GSM phones use a SIM (Sibscriber Identity Module) card to allow an account to be swapped among devices, some CDMA devices also having a similar card called a R-UIM;

Other features that may be found on mobile phones include GSM navigation, music and video playback, RDS radio receiver, alarms, memo recording, personal digital assistant functions, ability to watch streaming video, video download, video calling, built-in cameras and camcorders (video recording), with autofocus and flash, ringtones, games, instant messaging, Internet e-mail and browsing and serving as a wireless modem.

The most commonly used data application on mobile phones is, of course, SMS text messaging. The first SMS text message was sent from a computer to a mobile phone in 1992 in the UK, while the first person-to-person SMS from phone to phone was sent in Finland in 1993.

Other non-SMS data services used on mobile phones include mobile music downloadable logos* and pictures, gaming, gambling and advertising.

Note:

* downloadable logos — загружаемые логотипы.

26. Выполните письменный перевод текстов 5 и 6 на русский язык.

Text 5. OPTICAL COMMUNICATION SYSTEM

The word "Optical" stands for light. As the name itself suggests, optical communication system is any form of telecommunication that uses light as the transmission medium. In an optical communication system the transmitter converts the information into an optical signal (signal in the form of light) and finally the signal then reaches the recipient. The recipient then decodes the signal and responds accordingly. In optical communication system, light helps in the transmission of information. The safe landing of helicopters and aeroplanes work on the above principle. The pilots receive light signals from the base and decide their next movements. On the roads, red light communicates the individual to immediately stop while the individual moves on seeing the green light.

Optical communication systems offer many improvements over other types, and have also been responsible for revolutionizing the telecommunications industry. The main reason for this is because the medium used in optical systems is light, which allows for them to be faster, clearer, and more reliable than electrical or radio signals. These reliable signals are usually carried through optical fiber, although an optical signal can be sent over relatively short distances through the air, usually only over a couple of miles.

Text 6. DUPLEX COMMUNICATION SYSTEM

A duplex communication system is a point-to-point system composed of two connected parties or devices that can communicate with one another in both directions. A duplex system has two clearly defined paths, with each path carrying information in only one direction: A to B over one path, and B to A over the other. There are two types of duplex communication systems: full-duplex and half-duplex.

In a full-duplex system, both parties can communicate with each other simultaneously. An example of a full-duplex device is a telephone; the parties at both ends of a call can speak and be heard by the other party simultaneously. The earphone reproduces the speech of the remote party as the microphone transmits the speech of the local party, because there is a two-way communication channel between them.

In a half-duplex system, there are still two clearly defined paths/channels, and each party can communicate with the other but not simultaneously; the communication is one direction at a time. An example of a half-duplex device is a walkie-talkie* two-way radio that

has a "push-to-talk" button**; when the local user wants to speak to the remote person they push this button, which turns on the transmitter but turns off the receiver, so they cannot hear the remote person. To listen to the other person they release the button, which turns on the receiver but turns off the transmitter.

Systems that do not need the duplex capability may instead use simplex communication, in which one device transmits and the others can only "listen". Examples are broadcast radio and television, garage door openers, wireless microphones, and surveillance cameras. In these devices the communication is only in one direction.

Notes:

* a walkie-talkie – переносная рация.

** a "push-to-talk" button – микрофонный клапан.

TESTS

1. Подберите вместо пропусков подходящие по смыслу слова.

1. The first public demonstration of the electric telegraph discovered by _____ took place on Oct. 21, 1832.
   a) Morse; b) Thomson;
   c) Popov; d) Shilling.

2. The Soviet sputnic having been launched, the U.S.A. wished _____ their superiority.
   a) to receive; b) to regain;
   c) to remove; d) to repeat.

3. As we know, the operation of the Internet is based on _____ .
   a) packet switching; b) probability theory;
   c) web browsing; d) datacards.

4. A personal computer _____ to the Internet has become an important device for communicating during the past few decades.
   a) concerned; b) considered;
   c) connected; d) conducted.

5. People have dreamt of a universal _____ since the end of the 19-th century.
   a) data collection; b) data unit;
   c) data base; d) data exchange.

6. A lot of Network Information Centres (NICs) serve the Internet _____ with documentation, guidance, advice and assistance.

a) specialists; b) architects;
c) professionals; d) users.

7. One of the main _____ of the World Wide Web documents is their hypertext structure.

a) characters; b) characteristics;
b) concepts; d) counters.

8. All the Internet services are accessible to many people _____ pocket-sized devices.

a) in addition to; b) instead of;
c) regardless of; d) due to.

9. The Web allows users on one computer _____ information stored on another through the world-wide network.

a) to address; b) to access;
c) to account; d) to accomplish.

10. As the popularity of the Internet increases, people become more aware of its colossal _____.

a) capacities; b) capabilities;
c) characteristics; d) combinations.

2. Согласуйте слова в левой колонке с их интерпретацией, предложенной справа.

1. Internet	a) communicating over by converting sounds or signals into electromagnetic waves and transmitting them through space.
2. Computer	b) a method, process for handling a specific technical problem.
3. Radio	c) a system for conveying speech over distances by converting sounds into electric impulses sent through a wire.
4. Telegraph	d) a circuit device that determines the content of a given instruction or performs digital-to-analogue conversion.
5. Telephone	e) an apparatus or system that converts a coded message into electric impulses and sends it to a distant receiver.

6. Decoder	f) an electronic machine which, by means of stored instructions and information, performs complex calculations.
7. Networking	g) process of development or gradual progressive change.
8. Evolution	h) a world-wide network of computers, communicating with each other by using Internet Protocol.
9. Modulation	i) the interconnection of computer systems over communication lines.
10. Technology	j) a variation in the amplitude, frequency or phase in accordance with some signal.

3. Прочтите и проанализируйте предложения. Назовите часть речи, форму (время) и функцию выделенных слов.

1. — Have you *heard* about precision control devices *having been used* for *controlling* the manufacture of some industrial processes? — Certainly, I know of man's *being relieved* of many monotonous activities due to automation.

2. — The *readings* of the meter should *be checked*. *Having been applied* for a long time the meter lost its former quality. I think it was *broken* when we were *making* the experiment yesterday. — That's right. Our mechanic *has been repairing* it for half an hour and says the meter will be *operating* well during our next experiment.

3. While *reading* the article I had to look for some words in the dictionary. *Having been read* the article is now *being condensed* into a summary according to the task *being given* by our teacher.

4. *Having invented* the lightning conductor B. Franklin continued *working* at the problem of atmospheric electricity. He proved that unlike charges are *produced* by *rubbing* dissimilar objects.

Unit 8

AUTOMATIC CONTROL SYSTEMS

There's the only good — knowledge,
and the only evil — ignorance.
Socrate

Тексты: Automation. Elements and Structures of Automatic Control Systems. From the History of Automatic Control Theory. Control Systems Classification. Relays
Грамматика: Инфинитив (Infinitive), его формы и функции. Инфинитивные конструкции. Повторение изученного материала: способы выражения подлежащего в английском предложении

1. Ознакомьтесь с терминами текста 1.

To suggest an idea to smb — натолкнуть на мысль
a weaving loom — ткацкий станок
a float-type controller — поплавковый регулятор
the centrifugal speed governor — регулятор скорости
transfer machining — механическая перестановка
control engineering — техника регулирования
a self-feeding process — процесс автоматической подачи
self-initiating — автоматическое включение
self-checking process — самопроверяющийся процесс
detect faults accurately — обнаруживать ошибки с большой точностью
above-mentioned advantages — вышеупомянутые достоинства
continuous cycle production — непрерывный производственный цикл
automatic aircraft pilot — автопилот самолета
to direct on the correct path — направлять по заданной траектории
ensure safe landing — обеспечивать мягкую посадку

2. Прочтите текст и объясните, что такое автоматизация и каковы ее достоинства.

Text 1. AUTOMATION

James Watt

It is well known that since ancient times people have tried to construct automatic toys. Those toys were put into motion by hidded mechanisms of automatic devices. The mechanical wonders of the past indicated the road for developing automatic systems later. Clocks and watches, being the first automatic systems, suggested to people an idea of producing automata in industrial manufacture. The Frenchman Vaucanson built a weaving loom replacing fifty weavers. The talented Russian mechanic Ivan Polzunov invented a float-type controller for his steam engine. Steam engines found universal application due to the invention of the centrifugal speed governor, designed by the English inventor James Watt. Soon automation spread to all technological spheres and became a moving force of technological advance.

So, automation deals with the theory and construction of control systems which can function without man's participation. It should be noted that modern automatic industrial process involves four independent components, each component becoming more powerful in the presence of the other. They are: transfer machining, automatic assembly, communication engineering and control engineering. These four components are linked together into a single process called *automation*. When two or more automatic machines are connected together with automatic controls, which may be mechanical, electrical, electronic or a combination of them, an automated control system is formed. This system creates a self-feeding, self-initiating and self-checking process.

It should be noted that electronics has greatly extended the range of automatic control and has made the processing of information rapid and automatic. Electronic devices are able to respond very quickly to signals and take measurements and detect faults very accurately. So, they can effectively control many processes and machines working at high speeds. Due to the above-mentioned advantages automatic control systems find wide application in many fields of technology. Automatic controls relieve man of many monotonous activities. Besides, they can perform functions which are beyond the physical abilities of man.

People make great use of automation in industry, it is especially effective in continuous cycle production. Various kinds of electronic devices are applied in automatic aircraft pilots, as radio aids to air and marine navigation. Owing to automation special devices make precise calculations for space vehicle movement, help to launch missiles and to direct them on the correct path. Automatic interplanetary stations and space rockets are equipped with orientation systems, photo-television apparatus, special soft landing radio systems and movement control systems of high precision. These systems ensure safe returning and safe landing.

Automation to be developed successfully has become one of the main factors of engineering progress today.

3. Просмотрите текст еще раз. Дайте ответы на вопросы, используя информацию текста.

1. How were the first automatic toys put into motion? 2. What were the first automatic systems? 3. Who was the first to show the advantages of automatic devices? 4. Due to what did steam engines find wide application? 5. What is automation? 6. What components does an automatic industrial process include? 7. What conditions can an automatic control system be formed under? 8. What processes does such system create? 9. What extended the range of automatic control? 10. What fields of technology are automatic control systems used in?

4. Прочтите, переведите и запомните следующие словосочетания.

To put into motion; mechanical wonders; to suggest an idea to people; industrial manufacture; to invent a float-type controller; a steam engine; to find universal application; due to the invention; centrifugal speed governor; a moving force of technological advance; transfer machining; automatic assembly; communication engineering; control engineering; automatic controls; automatic control systems; to create a self-feeding, self-initiating and self-checking process; to extend the range of automatic control; to respond to signals quickly; to take measurements; to detect faults accurately; due to the above-mentioned advantages; continuous cycle production; automatic aircraft pilot; radio aids; air and marine navigation; owing to automation; to make precise calculations; space vehicle movement; to launch and direct missiles on the correct path; to be equipped with orientation systems; movement control systems of high precision; to ensure safe returning and safe landing.

5. Прочтите и переведите текст, обращая внимание на формы инфинитива и способы его перевода.

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. Переведите словосочетания, содержащие инфинитив.

To provide a high potential is not easy; to raise the cathode temperature means...; to build... is of great importance; to obtain new data was necessary; to test the equipment is possible; to prove the law experimentally is very difficult.

The students task was to study...; the main aim of the designers is to improve...; the problem is to find materials for...; the object of the system is to provide ...; the purpose of the experiment was to convert...; the engineer was to investigate... .

The device to measure the temperature; the problem to be discussed; the signal to convey information is...; data to be fed into the computer; the film to have been running for over a month; the report to have been discussed at the conference yesterday; the progress to have resulted in...; computers to have been designed; molecules are too small to be seen; he was the first to invent.

To stop the current, you must...; switches are used to open the circuit; to develop the national economy people should ...; radio was used to communicate with ...; people launch spaceships to learn more about...; to avoid the damage of the engine you must...; some tubes are used to rectify an AC.

7. Проанализируйте предложения, определяя форму и функцию инфинитива. Переведите предложения (см. грамматический справочник, с. 224–225).

1. It is known that to stop the current flow you must open the circuit or, to put it in other words, to break the circuit in some point. Various

switches are used to open or to close a circuit. 2. To develop national economy is the main task of the government. To develop it people have to use natural resources of the country most efficiently. 3. The problem to be discussed requires very careful consideration. That is why the report to have been discussed at the conference attracted great attention of the public. 4. The progress of electronics to have resulted in the invention of electronic computers was a breakthrough (прорыв) of the second part of the 20-th century. 5. Computers to have been designed originally for arithmetic purposes are applicable for great variety of tasks at present. 6. Your assistant must have brought the journal you wanted to look through, but he hasn't. He may have forgotten it in the office. 7. In the early 1990s amateur radio experiments began to use personal computers with audio cards to process radio signals. 8. To know everything means to know nothing. 9. Satellites use the solar cells to convert light from the sun into electric power but the cells need covers to protect them from radiation. 10. Molecules are too small to be seen with the most powerful microscope.

8. Преобразуйте сложные предложения в простые, употребляя инфинитив вместо придаточных предложений.

A. Yuri Gagarin was the first man *who flew into space.* Yuri Gagarin was the first man *to flow into space.*
B. This report includes all the data *which must be discussed.* This report includes all the data *to be discussed.*

1. K. Tsiolkovsky was the first who put forward the theory of space flights. 2. Russia was the first that started the cosmic era. 3. The machine parts which are to be repaired will be brought next week. 4. A. Lodygin was the first who invented the electric lamp. 5. The problem which must be discussed at the meeting requires careful consideration. 6. Kepler was the first who discovered the exact laws governing the movements of the planets. 7. Lectures which are delivered at our club are always attended by hundreds of students and teachers. 8. The hydropower station which will be erected in this region will be one of the most powerful stations in the country. 9. Our country was the first which used atomic power for peaceful purposes. 10. You will be the last who will answer at the exam.

* * *

9. Ознакомьтесь с терминами текста 2.

Physical variables — физические переменные (величины)
process control systems — системы управления (производственным) процессом

reference input / driver — задающее устройство
an error detector — прибор по обнаружению ошибки
a controlled quantity — управляемая величина
feedback path elements — элементы обратной связи
to supply a feedback signal — поставлять сигнал обратной связи
transducers — преобразователи
servomotors — сервомоторы
a variable resistance — переменное сопротивление
to cover a lot of spheres — охватывать многие области

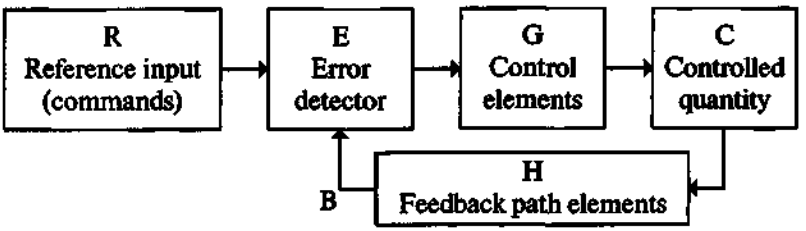
10. Прочтите текст и расскажите о составных элементах автоматических систем управления.

Text 2. ELEMENTS AND STRUCTURE OF AUTOMATIC CONTROL SYSTEMS

Automatic control is the use of means which can maintain physical variables, such as temperature or pressure, at a desired level automatically. Systems which perform the control of physical variables are called automatic control systems (ACS).

Automatic control systems may be classified as servo-mechanisms, process control systems and regulators, but whatever the classification be, the same principles of operation are common to them all. Every ACS should contain five main components. They are: a driver or reference input, an error detector, control elements, a controlled quantity and feedback path elements. The basic control system operation may be described by the simple block diagram:

The reference input or driver sets the desired level or position of controlled quantity C in this system. *The controlled quantity* C is the resulting level or position of the variable parameter, that is the position to be controlled by this ACS. *The feedback path elements* H supply a feedback signal B that indicates the level of the controlled quantity C. *The error detector* receives the feedback signal B and compares it with the input command signal R; any error (or difference between B and R) produces an output or resulting signal E. *Control elements* G receive,



amplify and transform the output signal E to maintain the controlled quantity at the desired level.

To produce an automatic control system it is necessary to use a lot of various elements. These are logical elements, relays, potentiometers, magnetic amplifiers, transducers and other devices. The basic components of every ACS are *logical elements* which may be deduced to transducers and servomotors. *Relays* are usually sensitive devices that can control the action of large or remote apparatus in circuits. *A potentiometer* consists basically of a variable resistor. If connected to a circuit the variable resistance makes it possible to vary the amount of voltage supplied to a load. Magnetic *amplifiers* belong to a large group of magnetically controlled devices. The principle of their operation is based on the process of magnetizing a core by varying a magnetomotive force periodically. *Transducer* is known as a converting device. Many well-known devices act as transducers, for example, an electric motor acts as a transducer converting electrical energy into mechanical one.

The application of automatic control systems covers a lot of spheres, ranging from the use for the guidance of space vehicles to the control of industrial processes.

11. Просмотрите текст еще раз. Дайте ответы на вопросы, используя информацию текста.

1. What is automatic control? 2. What are automatic control systems? 3. How can they be classified? 4. What components does an ACS contain? 5. What is the function of a driver? 6. Try to describe the basic control system operation. 7. What are the basic elements of any automatic control system? 8. What is the function of relays? 9. What is the principle of amplifiers operation based on? 10. What do transducers serve for?

12. Найдите в текстах 1 и 2 английские эквиваленты следующих словосочетаний.

Автоматизированные системы управления; приводить в движение; натолкнуть на мысль; промышленное производство; изобрести поплавковый регулятор; паровой двигатель; благодаря изобретению регулятора скорости; движущая сила технического прогресса; механическая перестановка; автоматическая сборка; техника связи; техника регулирования; создавать процесс автоматической подачи; автоматическое включение; расширять диапазон автоматического управления; быстро реагировать; обнаруживать погрешности с высокой точностью; благодаря вышеупомянутым достоинствам; непрерывный производствен-

ный цикл; автопилоты; радиосредства; выполнять вычисления; полеты космических кораблей; направлять ракеты по заданной траектории; системы управления полетом высокой точности; обеспечивать мягкую посадку.

Поддерживать физические переменные величины; желаемый уровень; задающее устройство; прибор по обнаружению ошибки; управляемая величина; элементы обратной связи; подавать сигнал обратной связи; любая погрешность; усиливать; преобразовывать; преобразователи; чувствительные приборы; переменное сопротивление; менять величину напряжения, подаваемого к нагрузке; принцип действия; периодическое намагничивание сердечника; охватывать много областей; наведение космических летательных аппаратов; управление производственными процессами.

13. Найдите в текстах 1 и 2 слова, близкие по значению предложенным словам.

Nouns: regulator (2); motor; branch (2); means; aeroplane; movement; concept; production; motor; use; progress; rate; type; mistake; failure; value; standard; element; road; work (2); instruction; converter; number.

Verbs: to build (2); to mean; to include; to connect; to widen; to react; to find out; to manage (2); to keep up; to provide; to install (2); to show; to get (2); to fabricate (2); to use (2); to intensify; to convert (2); to change; to operate.

Adjectives: quick; up-to-date; broad; on-going; particular; main; different; distant; feasible; accurate.

14. Прочтите, переведите и проанализируйте предложения, содержащие инфинитивные конструкции (см. грамматический справочник, с. 225–227).

A. 1. It is too late *for you to go* there. 2. The text was very difficult *for Ann to translate* it without a dictionary. 3. It is necessary *for us to see* him today. 4. There was no time *for the teacher to check up* their control papers. 5. It is warm enough *for her to go* to school without her coat. 6. There is no reason *for them to change* the terms of agreement. 7. Electromotive force is necessary *for the current to flow* along the circuit.

B. 1. I've never heard *him speak* English. 2. We know *the electrons to flow* from the negative terminal of the battery to the positive one. 3. We suppose *the strength of current to depend* upon the resistance of the circuit. 4. He hates *somebody to interrupt* him when he works. 5. We con-

sider *nuclear energy to be* the prime source of heat energy. 6. M. Curie found *the atomic weight of radium to be* 226. 7. The teacher wanted *all the students to take* those factors into consideration.

C. 1. *The current* is known *to flow* when the circuit is closed. 2. *The overloading of the line* is likely *to produce* a short circuit. 3. Ampere supposed the current to flow from the positive pole of the source to the negative pole, but *he* appeared *to be mistaken*. 4. *The new power plant* is expected *to have been put* into operation and *it* proved *to be* of great practical importance. 5. *The water* seems *to be boiling*. 6. *The lightning rod* proved *to be* the most effective means of protecting against the effects of lightning. 7. *The secondary winding* in a step-up transformer is sure *to have* more turns than the primary one. 8. *The antenna* was found *to receive* only a small part of energy radiated by the transmitter.

15. Преобразуйте сложные предложения в простые, употребляя инфинитивные конструкции.

A.

We expect that *they will arrive* soon. We expect *them to arrive* soon.

1. I suppose that Max is about 40 years old. 2. They knew that he was strong enough to take part in the expedition. 3. I believe that Alice is going to leave for Moscow tomorrow. 4. We find that Mike is a very clever man. 5. We didn't notice that she came into the room. 6. I don't like when you say such things. 7. I don't consider that he is an honest man. 8. We heard that the bell rang and went to the door to see who was there. 9. I heard that Professor Stewart mentioned about these facts in his lecture. 10. The manager wishes that the work should be done at once.

B.

It is likely that *they will return* soon. *They are likely to return* soon.
It was said that *many houses had been damaged* by the fire. *Many houses were said to have been damaged* by the fire.

1. It is known that he is a great book-lover. 2. It is reported that he has been working at this problem for many years. 3. It happens so that I know when the contract was signed. 4. It is unlikely that the telegram will be delivered today. 5. It is sure that Steve will win the game. 6. It seems that the house has been built by a foreign architect. 7. It is known that San Francisco is called the city of the Golden Gate. 8. They say that every Englishman is a countryman at heart. 9. It is considered that

the British people are the world's greatest tea-drinkers. 10. It appeared that she spoke English very well.

16. Переведите предложения на английский язык, употребляя инфинитивные конструкции.

A. 1. Мы ожидали, пока он вернется. 2. Нам очень трудно получить эту информацию. 3. Вашей сестре необходимо повидать его. 4. Мне нелегко говорить на английском языке. 5. Михаилу нет необходимости переводить эту статью. 6. Сейчас слишком поздно, чтобы студенты проводили эксперимент. 7. Ему очень важно прийти туда вовремя.

B. 1. Я считаю, что это вещество является хорошим проводником. 2. Профессор не выносит (to hate), когда студенты опаздывают на занятия. 3. Никто не заметил, как двигатель остановился из-за того, что отключили ток. 4. Мы знаем, что Миша успешно сдал вчера последний экзамен. 5. Я считаю, что он прав. 6. Мы ожидаем, что они скоро приедут. 7. Ник хочет, чтобы мы навестили его в субботу.

C. 1. Полагают, что атомное ядро состоит из протонов и нейтронов. 2. Говорят, что инженеры открыли новые способы испытания оборудования. 3. Он наверняка уже проанализировал результаты эксперимента. 4. Чувствительность прибора оказалась слабой (poor). 5. Много лет тому назад думали, что атом неделим (indivisible). 6. Этот вопрос, по-видимому, представляет для них большой интерес. 7. Кажется, эта статья была опубликована в газете на прошлой неделе.

17. Вспомните все времена, проанализируйте и переведите предложения:

A. с английского на русский язык.

1. My brother (work) at a research institute. He (work) there for five years since 2002. This year he (work) at his thesis. He (write) his thesis for some months. Now he (make) experiments at the laboratory. I hope he (to finish) his job by midday and we (to go) to some place to have a snack.

2. Nick (write) a letter when I came. He (write) a letter for an hour when I entered. Nick (not write) a letter yesterday and he (not write) it before my coming. He just (finish) to write his letter and now (to put) it into an envelope.

3. Don't go out, it (rain) now. It (rain) since early morning. I think it soon (stop) raining. It often (rain) in autumn, you know. Two days

ago it also (rain) and we (to get) wet through while we (to run) home from the river.

4. Mike (learn) German next year. He (study) German for seven years when he enters the University. He (learn) these new words and (translate) the article by the time you come to see us in the evening. He (to like) German and (to speak) the language rather well.

5. Helen (do) her homework in an hour. She (do) it from 5 till 7 o'clock. She (finish) her work by 7 o'clock and then we (go) for a walk.

Б. с русского на английский язык.

1. — Аня так часто болтает по телефону, ты заметил? О, смотри, она и сейчас разговаривает по телефону. — Как долго она разговаривает? — По-моему, она разговаривает вот уже полчаса. По крайней мере (at least), я жду ее не меньше 30 минут. –Ты уверен, что она будет разговаривать с тобой после того, как закончит разговор по телефону? — Я не уверен, что она вообще его закончит когда-нибудь.

2. Сегодня я пошел в офис повидать Петра по делу. Мы договорились (arrange) встретиться в три часа дня. Когда я пришел, секретарь сказала мне, что Петр еще не вернулся с конференции, и попросила меня подождать немного. Я сел на стул и начал читать газету, которую я купил по дороге в офис. В то время, как я читал газету, пришел Петр. Он опоздал, так как конференция закончилась позже, чем он ожидал. Он был мне рад и пригласил в кабинет, где мы разговаривали почти целый час.

ПОВТОРЕНИЕ ИЗУЧЕННОГО МАТЕРИАЛА

18. Образуйте наречия от следующих прилагательных и переведите новые слова.

High; great; good; wide; late; rapid; soft; safe; main; universal; powerful; automatical; industrial; technological; special; direct; correct; mechanical; electrical; independent; accurate; effective; successful.

19. Проанализируйте способы выражения подлежащего и переведите предложения.

А. 1. It is well known that people constructed automatic toys since ancient times. 2. It is relays that control the action of large and remote devices in circuits. 3. One can reduce heat losses in a transmission line. 4. It should be noted that electronics has greatly extended the range of automatic control. 5. It is the difference of potential that causes free electrons to flow from one point of the conductor to another.

B. 1. Learning English is not an easy task. 2. Using a lot of elements is necessary for producing an ACS. 3. Describing the control system operation requires the use of a block-diagram. 4. Converting electrical energy into mechanical power can be performed by a transducer. 5. Linking of four components together into a single process is called automation.

C. 1. To know a foreign language is quite necessary for a specialist nowadays. 2. To put toys into motion is impossible without a small automatic device hidden inside. 3. To determine resistance in a circuit is not difficult if you know Ohm's law. 4. To produce the necessary electromotive force is the purpose of the electric source. 5. To amplify electrical signals means to use small signals and produce larger ones.

D. 1. Automation is sure to have become one of the main factors of engineering progress of today. 2. Automatic industrial processes are said to involve four independent components. 3. The computer is known to carry out operations in accordance with the fed program. 4. Electrons are supposed to be free carriers of charges. 5. Transducer proves to serve a converting device.

20. Переведите «грамматикализованные» предложения, содержащие всевозможные грамматические явления, на русский язык.

1. The circuit to be integrated on a single chip gives a reduction in a number of elements. 2. There are various types of automatic control systems, an adaptive control system being one of them. 3. When stored this information is available for the user when needed. 4. Experts think the inefficiency in a transformer to be mainly caused by heat losses. 5. When classifying control systems experts divide them into closed, open, adaptive systems and other types. 6. Functional integration is sure to result in a substantial increase in the packing density. 7. To rectify current is possible by using a p-n junction. 8. Having been fed from the memory the information was sent through the output equipment to the outside world. 9. The greater the number of free electrons in any metal, the greater is its conductivity. 10. In digital computers all the data connected with the problem to be solved are converted into electrical pulses by very fast electronic switches.

* * *

1. There are many factors to be taken into consideration when designing a spaceship. 2. The smaller the transistor, the faster is the speed of its response. 3. Internet is known to be a global data communication system, its hardware and software infrastructure providing connectivity

between computers. 4. Having summarized the results of his experiments, A. Popov expressed his hope that his device after being perfected would make possible transmitting signals at a distance by means of rapid electrical oscillations. 5. The designers assume the system operation to be improved as a result of replacing some of its parts. 6. It is a well-known fact that having been rubbed many substances behave like amber does. 7. The installation received required some improvements. 8. No appliance ever created by man has probably such a variety of application as a motor. 9. Water falling from its raised position, energy is changed from potential to kinetic one. 10. M. Lomonosov and B. Franklin happened to make their experiments in the field of atmospheric electricity at about the same time.

21. Выполните перевод «грамматикализованных» предложений на английский язык.

1. Наматывая провод на железный сердечник, мы получаем электромагнит. 2. Упомянутая статья объясняла суть эксперимента. 3. Янтарь может быть заряжен электричеством вследствие трения. 4. Свободные электроны могут передвигаться по металлу под действием электродвижущей силы. 5. Оказывается, что минералы и кристаллы обладают некоторыми неожиданными свойствами. 6. Чтобы определить сопротивление в цепи, нужно воспользоваться омметром. 7. На полученные данные часто ссылаются. 8. Существует несколько различных видов шаровой молнии и каждая имеет свои собственные свойства. 9. Когда (если) предмет теряет свою потенциальную энергию, эта энергия превращается в кинетическую. 10. Будучи оборудованной современными приборами, наша лаборатория смогла провести важные исследования.

22. Преобразуйте диалог в косвенную речь. Выучите диалог наизусть.

What's the News?

Mr. Jones: Good evening, Mr. Lewis, how are you?
Mr. Lewis: Very well indeed, thank you, and how are you doing?
Mr. J.: Quite well, thanks. Won't you sit down? Have a cigarette.
Mr. L.: With pleasure. Thank you.
Mr. J.: Well, what's the news, Mr. Lewis? How's business?
Mr. L: Pretty good, thank you. And how are things with you?
Mr. J.: Well, not too good, I'm afraid, and going from bad to worse.

Mr. L.: I'm sorry to hear that. I hope things will soon improve.
Mr. J.: Yes, let's hope for the best. And how is everybody at home?
Mr. L.: They are all well. You know, my daughter is staying in the country just now with some of her friends.
Mr. J.: How long is she going to stay there?
Mr. L.: I don't know exactly, but she is having a very pleasant time and it's doing her a lot of good, so the longer she stays, the better.

23. Прочтите текст, разделите его на смысловые части и озаглавьте их, составив таким образом план текста в назывной форме. Прочтите текст еще раз и составьте реферат, расширив информацию по каждому пункту плана.

Text 3. FROM THE HISTORY OF AUTOMATIC CONTROL THEORY

The concept of control and the use of control devices were known long ago. Simple control systems with an input signal controlling an output element have been used by people for a long time. In recorded history it is found that the Romans invented a water-level control device 2000 years ago.

The mathematical foundations for control theory have been laid by J. Fourier and P. Laplace. Research work in analytical dynamics was carried out by A. Routh. A. Lyapunov was the first to develop the theory of stability of automatic control systems.

Real development of automatic control theory began in the 1920s. World War I brought a tremendous impetus for the advancement of control. Such problems as the automatic bombing and control systems for anti-aircraft guns required fundamental theory and complex equipment. To meet these requirements investigations in the field of automation were accelerated.

Nowadays automatic control systems play an important role in the development of civilization. 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 regulate the temperature and humidity. Industrially, they are employed in quality control of manufactured products, power stations, etc. In space technology and weapon systems they appear in the form of guidance systems, fire control systems, etc. It is automation that ensures speed, accuracy, reliability, high quality and economy of technological processes.

Automation control is irreplaceable where it is necessary to maintain various physical properties at a desired level. Among many physical properties that can be controlled there are temperatures and pressures in chemical industry, moisture content in textile industry, thickness of insulation around wires in electrical engineering.

24. Выполните письменный перевод текстов 4 и 5 по вариантам.

Text 4. CONTROL SYSTEMS CLASSIFICATION

As it is known control systems are classified according to the degree of their automation. A control system is called automatic if the basic functions of control are performed without the participation of man, that is automatically. Completely automated control systems are defined as closed-loop systems. Partially automated control systems are termed open-loop ones.

A closed-loop control system or feedback system automatically controls and modifies its own operation by responding to data generated by the system itself. The example of a closed-loop control system is a switch of a high-speed printer, used in computer systems. The switch finds if there is paper in the printer. If the paper runs out, the switch signals the system to stop operation.

An open-loop system does not provide for its own control or modification. It must be controlled by people. The example is the operation of a printer having no switch. In this case a human operator must notice when the paper runs out and signal the system to stop printing.

The former system is automatically controlled by self-regulation, the letter one being controlled by man. This difference determines their application. Open systems are used for stabilization and program control. Closed systems replace man in hard and dangerous work.

Text 5. RELAYS

Today forms and applications of electric relays are numerous and varied. Having improved relays scientists received a more reliable form of control. As it is known there is a large range of electric relays which are utilized to operate switchgear, totalisator, road traffic signals and certain types of automatic telephone equipment.

Sometimes it is necessary to operate a circuit by reversing a current in the actuating circuit. This is done by using a polarized relay. The special feature of this relay is the employment of a permanent magnet. Giving the armature a definite polarity, the permanent magnet makes it possible to control the direction of the armature movement when a current passes through the relay coils. This permanent magnet is neces-

sary to maintain the same polarity at each end of the armature. When energised with the poles directed to the north and south, the relay attracts one end of the armature and repels the other one.

Using this type of relay engineers often employ it for the remote control of wireless sets and similar purposes, when needed, to economise energy of batteries.

When used in such applications as temperature control, coil winding machines, etc., another type of relay is very effective. It is a plug-in relay. These relays are medium speed devices. Requiring relatively low coil power they are preferable in many applications.

TESTS

1. Вставьте необходимые слова вместо пропусков.

1. We suppose automation has become _____ of technological progress.
   a) a mechanical wonder; b) a moving force;
   c) an electromotive force; d) a self-checking process.

2. James Watt is known to invent _____ .
   a) a load-type controller; b) self-initiating device;
   c) centrifugal speed governor; d) weaving loom.

3. Automatic control is sure to have made the _____ of information rapid and accurately.
   a) collecting; b) processing;
   c) storing; d) perfecting.

4. It is known that automatic control system is formed by connecting automatic machines with _____.
   a) self-feeding process; b) automatic assembly;
   c) control engineering; d) automatic controls.

5. Many special devices make highly precise calculations _____ automation.
   a) due to; b) according to;
   c) because of; d) in spite of.

6. Increasing the strength of current power _____ are widely used in voltage dividers.
   a) detectors; b) potentiometers;
   c) transducers; d) amplifiers.

7. Automatic control systems _____ people of many monotonous activities.

a) require; b) relieve;
c) revise; d) relax.

8. Without knowing the basic elements of the ACS it is impossible to regulate _____ it components.

a) completely; b) independently;
c) properly; d) mechanically.

9. _____ are said to be electromagnetic devices controlling the action of other devices in a circuit. They can also operate as switches.

a) capacitors; b) conductors;
c) resistors; d) relays.

10. _____ the stability of a feedback path an engineer could perfect the stability of the whole system.

a) being improved; b) having improved;
c) having been improved; d) to improve.

2. Подберите к терминам, данным в левой колонке, определения, представленные справа.

1. Transducer — a) an instrument for measuring, comparing or controlling electric voltage.
2. Potentiometer — b) a device used to increase the strength of an electric signal.
3. Relay — c) any machine part that communicates motion to another part.
4. Amplifier — d) a mechanism for controlling the movement of machinery, the flow of liquids, gases, electricity, steam, etc.
5. Detector — e) any device that transmits energy from one system to another or converts the energy in form.
6. Driver — f) an electromagnetic device controlling a larger current or activating other devices in the same or another electric circuit.
7. Regulator — g) an apparatus for indicating the presence of smth., as electric waves.
8. Feedback — h) a defect in a circuit, which prevents the current from following the intended course.

9. Assembly — i) the transfer of part of the output of an active circuit or device back to the input.

10. Fault j) a fitting together of parts to make the whole.

3. Раскройте скобки и поставьте глагол в нужной форме.

1. — What about my proposals? They already (to discuss)? — I don't think so. They (to discuss) just now. As soon as your plan (to discuss), the important decisions (to make), I hope.

2. — The goods (to examine) by the custom (таможня) officers yesterday? — I'm afraid, not. The goods (not to examine) yesterday, and they (not to examine) before we came to the port. I think, the goods (to examine) at the moment. After the goods (to examine), they (to load) to the customers. Don't worry. I'm sure the goods (to load) to the clients by night.

3. — You already (to pass) your exam in physics? — Yes, I (to pass) it two days ago. And now I (to prepare) for my English exam. I (to listen) to some conversational topics in this laboratory for three hours. We (to take) English tomorrow from 9 to 12, I think. This (to be) my last exam this term. If I (to pass) this exam successfully I (to get) an increased scholarship next term as I (to pass) all the previous exams with excellent marks. I (to plan) to go to England with a group of students in summer to master my English there.

Unit 9

CYBERNETICS

Mathematics possesses not only truth, but supreme beauty.
Bertrand Russel

Тексты: From the History of Cybernetics. Cybernetics. Technological Revolution in Russia. Artificial Intelligence. Industrial Robots
Грамматика: Сослагательное наклонение. Сложносочиненные и сложноподчиненные предложения. Союзы и союзные слова. Повторение изученного материала: способы выражения определения и дополнения в английском предложении

1. Ознакомьтесь с терминами текста 1.

A holding tank — бак-сборник
a coneshaped float — конусообразный поплавок
to run dry — работать всухую
self-regulatory device — саморегулирующееся устройство
feedback — обратная связь
knowledge management — управление знаниями
to be of outstanding importance — иметь огромное значение
one can't but mention — нельзя не упомянуть
to keep great minds busy — занимать умы великих людей.

2. Прочтите текст 1 и расскажите, что вы узнали о истории возникновения науки кибернетики.

Text 1. FROM THE HISTORY OF CYBERNETICS

As it is known, the first artificial automatic regulatory system, a water clock, was invented by the mechanic Ktesibios (2–1 century BC) from ancient Greece. In his water clocks water flowed from a source such as a holding tank into a reservoir, then from the reservoir to the mechanisms of the clock. The device used a coneshaped float to monitor the level of the water in its reservoir and adjust the rate of flow of

the water accordingly to maintain a constant level of water in the reservoir, so that it neither overflowed nor was allowed to run dry. This was the first artificial truly automatic self-regulatory device that required no outside intervention between the feedback and the controls of the mechanism.

The word *cybernetics* was first used in the context of self-governance by Plato (428–348 BC) in the Laws to signify the governance of people. In 1834 Andre Marie Ampere, the French physicist and mathematician systematized the human knowledge of his day. He classified all the sciences of human knowledge of that time under different numbers. Under number 83 he listed a science that was to deal with the methods of regulating society. Ampere termed this science "cybernetics" from the Greek word "kubernetes" meaning 'steersman' or 'pilot'. This literal translation embodies much of the modern relevance of the cybernetics principles.

Norbert Wiener

After Ampere, however, the term 'cybernetics' was forgotten until it appeared again in 1948 in a book of the well-known American mathematician Norbert Wiener (1894–1964). His book was entitled "Cybernetics or Control and Communication in the Animal and the Machine". The name 'cybernetics' was coined by N. Wiener to denote the study of "teleological mechanisms", that is machines with corrective feedback. Wiener was part of a group of very brainy people of various specialities — psychology, mathematics, sociology, philosophy, knowledge management. So, the modern study of cybernetics began at the intersection of neurology, electronic network theory and logic modelling. Wiener popularized the social implications of cybernetics, drawing analogies between automatic systems such as a regulated steam engine and human institutions. The laws described by N. Wiener as the basis of cybernetics greatly interested scientists of many specialities.

The foundations of cybernetics were laid and its basic principles were formulated in the works of mathematicians, physicists, physicians and engineers. Of outstanding importance were the works of American scientists Claude Shannon and John von Neumann and the ideas of the world famous Russian physiologist Ivan Pavlov. One can't but mention the important contribution of outstanding Russian scientists I. Vyshnegradsky, A. Lyapunov, A. Kolmogorov and others.

Thus, as we can see, the study of control and response to complex systems has been keeping great minds busy for thousands of years, and Wiener seems to be regarded as the chief modern architect.

3. Просмотрите текст еще раз. Дайте ответы на вопросы, используя информацию текста.

1. When did the first automatic regulatory system appear? 2. How did Ktesibios's system operate? 3. When was the word 'cybernetics' first used? 4. Who used it and how? 5. What kind of classification did Ampere do? 6. What does the word 'cybernetics' mean? 7. Who is considered to be the founder of cybernetics? 8. What did Wiener denote by the word 'cybernetics'? 9. What sciences was cybernetics founded on? 10. What scientists contributed to its development?

4. Прочтите, переведите и запомните следующие словосочетания.

The first artificial automatic regulatory system; a water clock; ancient Greece; a holding tank; to use a coneshaped float; to monitor the level of the water; to adjust the rate of flow of the water; accordingly; to maintain a constant level of water; to overflow; to run dry; self-regulatory device; to require no outside intervention; feedback; self-governance; to systematize the human knowledge; the methods of regulating society; to term the science; steersman; literal translation; to embody relevance of the cybernetics principles; very brainy people; knowledge management; intersection of sciences; electronic network theory; the social implications of cybernetics; to draw analogies; a regulated steam engine; to lay the foundation; to formulate the basic principles; to be of outstanding importance; one can't but mention; control and response to complex systems; to keep great minds busy.

5. Проанализируйте и переведите предложения, содержащие сослагательное наклонение.

A. 1. Without the sun there would be no light, no heat, no energy of any kind. 2. Would you like to travel to Britain? 3. Choose the place you would like to visit. 4. What would you do in that situation? 5. I wouldn't wait for the whole week. 6. You shouldn't have gone there yesterday. 7. I'll ring him at once so that he shouldn't wait for me.

B. 1. It is desirable that everything should be ready by five o'clock. 2. It is strange that she should have done it. 3. It is necessary that he take measures immediately. 4. It is important that they should repair the car by tomorrow. 5. It's very annoying that you should have forgot-

ten it so soon. 6. It was impossible that he should participate in that tournament. 7. It is surprising that he shouldn't know it.

C. 1. I suggest that you (should) see the new film. 2. The doctor insists that I (should) give up smoking. 3. He ordered that all (should) take part in the work. 4. They recommended that Ann (should) go to the south in summer. 5. He demanded that the newspapers should be delivered immediately. 6. He insisted that she should consult a doctor. 7. Roentgen suggested that the rays he had discovered should be called x-rays.

D. 1. I wish I knew many foreign languages. 2. Mike wishes he had more time for learning English. 3. I wish Victoria were with us now. 4. I wish we had known it before. 5. I wish I knew how to drive a car. 6. I wish I hadn't told them about that. 7. I wish she had been at the theatre yesterday.

6. Измените предложения в соответствии с представленными моделями.

a) It's a pity it isn't summer. *I wish it were* summer now.
b) It's a pity I don't know where they live. *I wish I knew* where they live.
c) It's a pity I didn't phone him yesterday. *I wish I had phoned* him yesterday.

1. It's a pity I didn't know what was wrong with him. 2. It's a pity she was so nervous at the exam. 3. It's a pity he is not responsible for the work. 4. It's a pity we didn't take umbrellas. 5. It's a pity Mike is away on a holiday now. 6. It's a pity Kate has a sore throat after going on that outing. 7. It's a pity she was so upset to hear that news. 8. It's a pity you are cross with me. 9. It's a pity he told you the sad news. 10. It's a pity you didn't mention these facts while the subject was being discussed.

7. Выразите ваше желание или сожаление в связи с данными ситуациями. Используйте образец.

a) It's raining now. We can't go to the country. *I wish it would stop* raining. We *could go* for a walk.
b) The weather was cold and windy on Sunday. I caught cold. *I wish the weather hadn't been* so cold and windy on Sunday. *I wouldn't have caught* cold.

1. The doctor is very busy now. I'm afraid he won't see the patient. 2. The medicine (лекарство) is very bitter (горькое). I can't make the child take it. 3. The bus is packed. It won't pick up all the passengers. 4. He always argues (спорит) about everything. It's difficult to work with him. 5. I haven't booked a return ticket and now I'm afraid it may be difficult to book it for a thorough train. 6. Helen is so shy. She hasn't made friends with anybody here yet. 7. The girl was very nervous at the exam. She couldn't answer a single question. 8. You find fault with everybody. You are becoming difficult to deal with. 9. The child was so restless. He could hardly sit quiet for a moment. 10. You are bothering me with questions all the time. I can't finish this work.

8. Переведите на английский язык.

1. Я очень устал и хотел бы отдохнуть. 2. Желательно, чтобы ребята лучше работали над изучением английского языка. Как бы я хотел, чтобы они работали усерднее. 3. Было необходимо, чтобы он принял меры немедленно. Жаль, что он не сделал этого вчера. 4. Он потребовал, чтобы работа была выполнена вовремя. 5. Запишите мой адрес еще раз, чтобы (lest) не забыли. Жаль, что вы потеряли мой адрес и не смогли позвонить. 6. Он говорит по-английски, как будто он настоящий англичанин. 7. Как бы (however) занят он ни был, он всегда помогает нам. 8. Что бы (whatever) он ни говорил, я не изменю своего решения. 9. Как бы я хотел, чтобы у меня было больше времени для изучения английского языка. 10. Как жаль, что сейчас так холодно. Как было бы хорошо оказаться в Крыму сейчас.

* * *

9. Ознакомьтесь с терминами текста 2.

Principles of regulating and responding — принцип регулирования и реакции
the way we relate to our world — то, как мы соотносимся с нашим миром
behavioural responses — поведенческий отклик (реакция)
self-determination — самоопределение
tolerance and variety of responses — допуск и разнообразие откликов
the subject matter — предмет (кибернетики)
the controlled object — объект управления
the control unit — управляющее устройство
feed-forward and feedback — прямая связь и обратная связь
the applied cybernetics — прикладная кибернетика
power supply — источник питания

10. Прочтите текст 2 и расскажите, что изучает наука кибернетика.

Text 2. CYBERNETICS

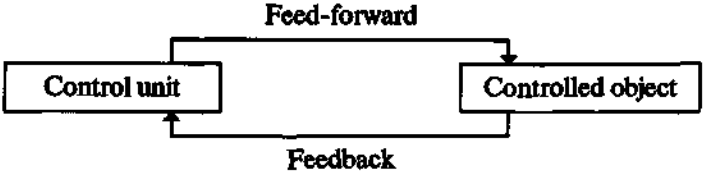
I. As we know, contemporary cybernetics began as an interdisciplinary study connecting the fields of control systems, electrical network theory, mechanical engineering, logic modeling, evolutionary biology and neuroscience in the 1940s. It was N. Wiener who has combined the main cybernetics perspectives which have been developed by many and various people over the past two thousand years. He defined the principles of regulating and responding to *mechanical and electrical systems, social and governmental systems, human and animal nervous systems, and human and animal social systems.* The cybernetics concept is relevant to the modern development of management and one's own role and potential within systems of all kinds. The organization in which we work, the world in which we live, the people around us — these are all systems. Cybernetics is central to our understanding of life, organizations and the way we relate to our world.

The first law of cybernetics is considered to be the following: "The unit within the system with the most behavioural responses available to it, controls the system." This law has great significance especially in understanding and developing greater individual self-determination; and greater understanding, tolerance and variety of responses to situations and people around us. And this all is essential for our ability to interact and respond effectively within work and beyond. The first law of cybernetics is one of the most powerful maxims for living a happy productive and successful life. And while 'successful' is of course a matter of individual interpretation, cybernetics provides the key to achieving it, whatever your interpretation might be. It's a very powerful concept — in a way cybernetics is the source of thoughtful choice over unquestioning instinct.

II. Thus, as we see, cybernetics is the science of general principles of control, means of control and their utilization in engineering, living organisms and human society. The subject matter of cybernetics is a cybernetic system, including a variety of interconnected elements which are able to store, process and exchange information. The examples of cybernetic systems may serve an automatic regulator, a computer, a human brain and the human society.

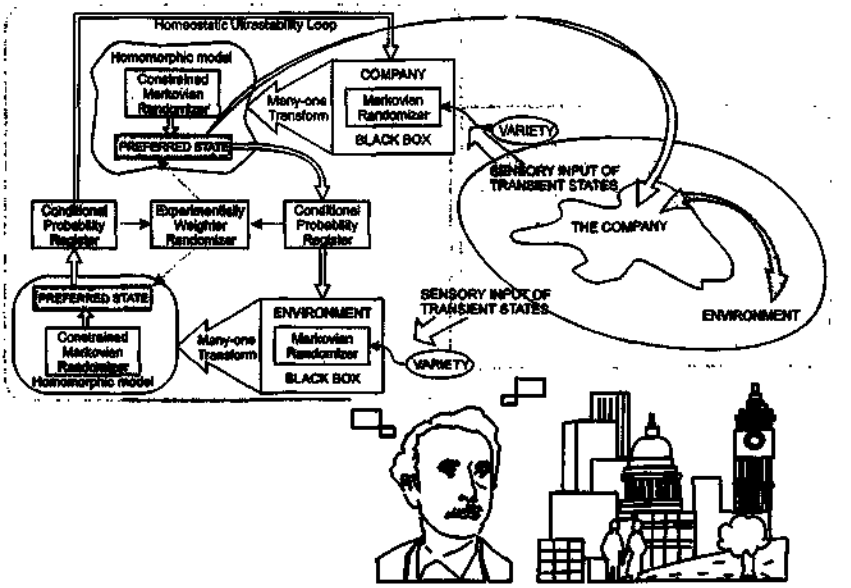
Any control process, to be used in a cybernetic system, implies continuous information exchange between the controlled object (a machine or a human muscle) and the control unit (an automatic regulator or the brain of a living organism). The control process represented on the scheme below involves the transmission, accumulation, storage

and processing of information about the controlled object. The laws governing control processes are based on such fundamental concepts as feed-forward and feedback. The controlled object receives information from the control unit through the feed-forward and modifies its behavior. The information transmitting process about the effects or results of the control operations is achieved through the feedback.



The scheme of the control process

Cybernetics can be subdivided into theoretical cybernetics and technological one. The cornerstones of theoretical cybernetics are information theory, the theory of algorithms and the theory of automatic systems which investigates the methods of building data-processing systems. Technological cybernetics is concerned with design and oper-



Example of cybernetic thinking. On the one hand a company is approached as a system in an environment. On the other hand cybernetic factory can be modelled as a control system

ation of technical control systems and computer hardware. The applied cybernetics is associated with the use of theoretical and technological cybernetics for solving specific control tasks to be found in industry, power supply, transport, communication, etc.

Cybernetics studies human thinking to create algorithms for computer programming. It also studies the automata design principles and investigates the possibilities of using them to mechanize human mental processes. The main goal of cybernetics is to achieve maximum automation of control processes in various spheres of human activity.

11. Просмотрите текст еще раз. Дайте ответы на вопросы, используя информацию текста.

1. Why can cybernetics be called an interdisciplinary science? 2. What fields does contemporary cybernetics connect? 3. Who is considered the founder of cybernetics? 4. What did he do to develop the science? 5. What kind of science is cybernetics? 6. What is the main law of cybernetics? 7. What is the subject matter of cybernetics? 8. What does any control process used in a cybernetic system imply? 9. What fundamental concepts govern control processes in cybernetics? 10. What do theoretical and technological cybernetics deal with?

12. Найдите в текстах 1 и 2 английские эквиваленты следующих словосочетаний.

Искусственная система автоматического регулирования; баксборник; водяные часы; следить за уровнем воды; регулировать скорость потока воды; соответственно; поддерживать постоянный уровень воды; работать всухую; саморегулирующееся устройство; обратная связь; самоуправление; рулевой; буквальный перевод; социальная причастность; регулируемый паровой двигатель; заложить основу; иметь значение; нельзя не упомянуть; занимать умы великих людей.

Междисциплинарная наука; теория электрических сетей; машиностроение; определять принципы регулирования и отклика; правительственные системы; понятие «кибернетика»; в пределах всевозможных систем; понимание жизни; самоопределение; разнообразие реакций; взаимодействовать; эффективно реагировать; мощные (сильнодействующие) правила; плодотворная и успешная жизнь; средства управления; предмет «кибернетика»; запоминать и обрабатывать информацию; человеческий мозг; человеческое общество; непрерывный обмен информацией; объект управления; управляющее устройство; прямая связь; обратная связь; модифицировать поведение; процесс передачи информации.

13. Переведите сложносочиненные и сложноподчиненные предложения, обращая внимание на союзы, которые связывают предложения в них.

A. 1. You should eliminate the failure in the system *and* the device will continue to supply energy. 2. We agree to the conditions of work *but* we object to the terms of payment. 3. Hurry up *or* you will miss the train. 4. The manager is *either* in the office *or* in the laboratory. 5. *Both* Newton *and* Byron studied at Cambridge University. 6. Mike *not only* promised to help me *but* he *also* brought his books at my disposal. 7. Some people like strong coffee *whereas* others don't. 8. *Neither* my parents *nor* my friends and I have been to the U.S.A. 9. We have received your telegram *as well as* your letter of the 11-th of November. 10. Petrov works hard at his English, *while* Smirnov doesn't.

B. 1. It is well known in computer science *that* the words "computer" and "processor" are used interchangeably. 2. The operation part of the instruction is decoded *so that* the proper arithmetic and logic operation can be performed. 3. It is difficult to establish *whether* this problem can be solved at all. 4. Programs and data on *which* the control unit and the arithmetic-logical unit operate must be in internal memory *in order to* be processed. 5. The CU has a register *that* temporarily holds the instructions read from memory *while* it is being executed. 6. *Regardless of* the nature of the I/O devices, I/O interfaces are required to convert the input data to the internal codes used by the computer and to convert internal codes to a format *which* is usable by the output devices. 7. The purpose of registers in the ALU is to hold the numbers and the results of the calculation *until* they can be transferred to the memory. 8. *Since* the computer deals with pulses, the input device is a way of converting numbers written on paper into pulses and sending them to the storage. 9. The principal characteristics of personal computers are *that* they are single-user system and are based on microprocessors. 10. However, *although* personal computers are designed as single-user systems, it is common to link them together to form a network.

14. Составьте 10 предложений с союзами и союзными словами (см. грамматический справочник, с. 235).

15. Соедините два простых предложения в сложное, употребляя нужный союз или союзное слово. Сделайте изменения при необходимости.

1. An electromagnet loses its magnetic properties. The current flows through the wire. 2. The electric energy is produced at the power station. It must be transmitted over wires to substations and then to the

consumers. 3. Silver is the best conductor known. It offers the least resistance to the current flow. 4. The current will flow. You will close the circuit. 5. The temperature rises. The opposition to the passing current increases. 6. The manager of our office speaks several foreign languages. He is a highly educated man. 7. The bell rang. All the students set to work. 8. The speed and accuracy of the computer are great. They are successfully employed in various branches of science and engineering. 9. The computer performs complicated computations. The output unit produces final results. 10. We cannot imagine technical progress without automation. It is the highest stage of mechanization.

16. Прочтите бессоюзные предложения и переведите их.

1. It is quite impossible to name a scientific problem M. Lomonosov didn't turn his attention to. 2. Specialists know automatic and electronic devices are precise and reliable. 3. The heat the reactor generates may be used to transform liquid hydrogen into gaseous form. 4. The drive signal the reference input produces passes to the error detector. 5. The feedback signal the error detector receives is compared with the input command signal. 6. Engineers consider the logical elements of ACSs may be deduced to transducers and servomotors. 7. Relays we are speaking about are very sensitive devices. 8. I know the transmitting vacuum tube is called the iconoscope. 9. In the kinescope we have just read in the text its electron beam is synchronized with an electron beam of the iconoscope. 10. We consider the creation of the modern electronic transmitting system is connected with the works of Russian scientist B. Rosing.

ПОВТОРЕНИЕ ИЗУЧЕННОГО МАТЕРИАЛА

17. Раскройте скобки и поставьте глагол в нужной форме.

1. — Who you (talk) to yesterday when I (to meet) you in the street? — I (to talk) to my friend. He (to come) from St. Petersburg some days ago. We already (to talk) for 15 minutes when you (to see) us. Why you (not to come up) to us. I (can) introduce you to him.

2. — What you (to do) at this time tomorrow? — I (to work) at the reading hall at that time. — What you (to do) that for? — I must prepare a report and I (to collect) the material until the library (to be closed). — What a pity, I (to want) to invite you to fishing.

3. When the work was over Ann (to leave) the University, (to take) a bus and (to go) home. When she (to arrive) home, her son (to prepare) his homework. He (to work) for two hours when mother (to come).

While Ann (to cook) supper her son (to learn) a poem by heart. They (to have) supper before they (to go) to bed.

4. — What you usually (to do) in the evenings? — I usually (to do) my homework, (to read), sometimes I (to watch) TV. But now I (to listen) to the radio. A very interesting information (to broadcast) and I (to listen) to the radio for more than an hour. When the broadcast (to finish) I (to ring) up to Mary and we (to meet) for a walk.

18. Проанализируйте способы выражения определения и переведите предложения.

A. 1. As you know, Wiener defined the principles of regulating and responding to mechanical and electrical systems. 2. Cybernetics investigates the possibilities of using the automata design principles to mechanize human mental processes. 3. The discovery of new methods of planning and management and many other discoveries made L. Kantorovich a famous Russian scientist. 4. The first mechanical clocks suggested to people an idea of producing automata in industrial manufacture. 5. The principle of operating a three-phase electric generator is based on electromagnetic induction.

B. 1. The transistor operation is based on charge carriers moving through a semiconductor. 2. Contemporary cybernetics began as an interdisciplinary science connecting many other fields. 3. A cybernetic system including a variety of interconnecting elements is able to store, process and exchange information. 4. The laws governing control processes are based on feed-forward and feedback. 5. Transformers changing the voltage of electric current are employed for reducing the current in the transmitting systems.

C. 1. The basic principles formulated in the works of outstanding scientists were laid into the foundation of cybernetics. 2. Wiener is supposed to combine the main cybernetic principles developed by many scientists of the past. 3. A. Lyapunov devoted his life to disinterested service to his country. 4. Electrical appliances linked in the circuit one after another constitute a series closed circuit. 5. Now it is possible to transmit electric energy at great distances in any direction required.

D. 1. Any control process to be used in a cybernetic system implies an exchange of information between the controlled object and the control unit. 2. Transistors to operate at relatively low voltages are widely used in many spheres of engineering. 3. The applied cybernetics is associated with the performing of tasks to be found in industry power supply, etc. 4. The operation of a transformer to contain two windings and several cores is based on the principle of electromagnetic induc-

tion. 5. The students must study the data to have been obtrained as a result of that experiment.

19. Проанализируйте способы выражения дополнения и переведите предложения.

A. 1. Scientists know some traditional techniques to have been developed in the last century in Interface and Colloid Science for characterizing nanomaterials. 2. Some methods are based on light scattering. 3. Others apply ultrasound for testing concentrated nanodispersions and microemulsions. 4. Progress has been made in using nanomaterials for medical applications. There are hopes for applying nanorobots in medicine. 5. Carbon-dioxide lasers are said to be used in industry for cutting and welding.

B. 1. Automatic controls make it possible to relieve people of many monotonous activities. 2. The students asked the teacher to explain what nanotubes were made of. 3. They recommended the students to process new data by means of a computer. 4. The engineer promised his pupils to demonstrate the process of diffusion. 5. The experimentor advised engineers not to connect the new apparatus to a circuit until it is checked properly.

C. 1. We expect the AFM (atomic force microscope) and the STM (scanning tunneling microscope) to be the two early versions of scanning probes that launched nanotechnology. 2. Scientists know some other types of scanning probe microscopy to make possible to see structures at the nanoscale. 3. We heard Rostislav Lapshin have suggested a promising way to implement nanomanipulations in automatic mode. 4. We believe scanning probe microscopy to become an important technique both for characterization and synthesis of nanomaterials. 5. We consider quantum dots to be nanoparticles with quantum confinement properties, such as size-tunable light emission.

20. Переведите «грамматикализованные» предложения, содержащие всевозможные грамматические явления на русский язык.

1. Having been performed in the arithmetic unit the results were then fed back to the memory. 2. Various electrical appliances people make use of at home operate due to the remarkable phenomenon of electric current. 3. When invented early in the history of mechanization textile machines were semi-automatic mechanisms widely employed in engineering. 4. Specialists think adaptive control systems to have some advantages as compared to the feedback control systems.

5. A transistor is known to be a device for amplifying voltage and power. 6. Having learned to transmit power far away from its source the people expanded the range of transmission. 7. Functional integration eliminating the need for many isolating elements, the packing density increases. 8. The greater the number of free electrons in a substance, the better that substance conducts electricity. 9. The induction coil is connected to the circuit to increase its inductance. 10. While coming down from a charged cloud to the earth, lightning usually strikes the nearest conductor.

* * *

1. When fabricated an integrated circuit represents a group of electronic elements connected in a single package to perform a certain function. 2. The electric bell circuit is considered to be a typical example of a series circuit. 3. Kurchatov knew the neutron to be the key to splitting the atom. 4. While flowing through a conductor the alternating current reverses its direction at regular intervals. 5. Semiconductors found application in measuring techniques thanks to their being very sensitive to light, temperature and atmospheric humidity. 6. Being connected together some automatic machines and automatic controls form an automated system. 7. Having developed different control systems scientists did not stop at the creation of more effective control systems. 8. The electric circuit being broken or opened anywhere, the current stops everywhere in the circuit. 9. Specialists think the inefficiency in a transformer to be mainly caused by heat losses. 10. In considering some aspects of the automatic control systems theory it is necessary to turn to the question of their practical application.

21. Выполните перевод «грамматикализованных» предложений на английский язык.

1. Автоматическое управление в простейшей форме было известно со времени появления парового двигателя. 2. Оказалось, что новое изобретение имеет огромное практическое значение. 3. Чем дольше я смотрю на картину, тем больше она мне нравится. 4. Я надеюсь, что потерянная книга будет найдена к началу занятий. 5. Известно, что моторы широко используются не только в промышленности, но и в повседневной жизни. 6. Говорят, что первый телескоп мог быть изобретен голландским рабочим. 7. При входе в плотные слои атмосферы скорость спутника уменьшается. 8. Не увеличивая температуру металлов, невозможно повысить их сопротивление. 9. О новом открытии много говорят. 10. Нельзя опаздывать на занятия.

22. Преобразуйте диалог в косвенную речь. Выучите диалог наизусть.

Dialogue. Smith Is Speaking

Mr. Black: Hello! Is this 1–2–7–3–8–9–5?
Voice: No, you've got the wrong number.
Mr. Black: Oh, I'm sorry. ... Hello, is this the home of Mr. Smith?
Voice: Yes, who is speaking, please?
Mr. B: This is Mr. Black. Can I speak to Mr. Smith?
Voice: I'm afraid Mr. Smith is out. Any message?
Mr. B.: I've just come from Moscow and brought a letter to Mr. Smith. I'm staying at Devon Hotel.
Voice: OK. As soon as Mr. Smith comes, he will call you up. Oh, hold the line, please, wait a minute. Mr. Smith is just coming.
Mr. Smith: Smith is speaking.
Mr. B.: Hello, Martin, this is Mike speaking. How are you?
Mr. S.: Glad to hear you, Mike. I'm fine, thank you, and how are things with you?
Mr. B.: Pretty much the same. I've brought a letter from Moscow to you. Let's meet tonight.
Mr. S.: With pleasure. No objection on my part. What time shall we make it?
Mr. B.: Does 8 p.m. suit you?
Mr. S.: Sure. That's settled. It's very nice of you to call me up. I'll be in time.
Mr. B.: I'm looking forward to meeting you. I'm in room 75. By the way, you know Devon Hotel, don't you?
Mr. S.: It goes without saying. See you later.
Mr. B.: Good bye.

23. Вставьте составные предлоги.

1. He was pardoned (из-за, благодаря) his age. 2. (Несмотря на) her being busy she helped me with my work. 3. We asked mother to make up some sandwiches (на тот случай) we got hungry. 4. (Вместо того чтобы) writing the translation, I made it orally. 5. The girl would have fallen (если бы не) me. 6. We've planted some bushes with gooseberies (перед) the house. 7. He always left the house at 8 o'clock (для того чтобы) that he might not miss the train. 8. You'll be punished (в соответствии с) the seriousness of your crime. 9. The accident was (из-за, вследствие) careless driving. 10. She still believes him (несмотря на) everything.

24. Прочтите текст и составьте краткий реферат на английском языке.

Text 3. TECHNOLOGICAL REVOLUTION IN RUSSIA

As it is known Computer Science and Cybernetics appeared as late as in the middle of the century and had quite exceptional achievements. It is the real basis of what is now called "New Technological Revolution". Up to the recent time, the history of Computing in Eastern Europe and the former Soviet Union was practically unknown to the computer community in the West. This situation is now changing. In 1996, on the 50th Anniversary of Computing, the Computer Society has honoured prominent Russian computer scientists Victor Glushkov, Sergey Lebedev and Alexey Lyapunov as Computer Pioneers among other Eastern European scientists. V.M. Glushkov was awarded for founding the first USSR Institute of Cybernetics in the Ukraine, and for establishing the theory of digital automaton, computer architecture, and a high-level recursive, macropipeline processor. S.A. Lebedev is known to have designed and constructed the first computer in the Soviet Union and founded the Soviet computer industry. A.A. Lyapunov developed the first theory of operator methods for abstract programming and founded Soviet cybernetics and programming. Indeed, the awarded scientists, together with A.I. Berg, A.P. Ershov, A.N. Kolmogorov, L.V. Kantorovich and others, made a decisive contribution to the formation of Soviet cybernetics and Computer Science. These talented and noble people assured the front-rank position of Russian Computer Science.

Alexey Andreevich Lyapunov was a typical representative of progressive Russian intelligentsia. Over fourty years of his life he devoted to disinterested service to his science and his country. The area of his scientific interests was so widespread that he can be truly called an encyclopedic scientist. Despite the broad spectrum of his scientific interests, Lyapunov's activities in science were always distinguished by professional skill. The biologists considered him a biologist, the geophysicists a geophysicist, the philosophers a philosopher. His large erudition and encyclopedic knowledge, combined with his integrating, non-dividing approach in natural science, in the whole complex of scientific knowledge became the rich soil which provided the sprout of cybernetical ideas. In this respect, there is some similarity of A.A. Lyapunov with Norbert Wiener, who was also a scientist of deep and broad mind working in different areas.

The name of Leonid Kantorovich, his life, his role in the science, and his struggle for his ideas occupy a special position in the history of science of the 20th century. Kantorovich's importance to science and

society has not as yet found an adequate expression in the scientific literature. The early blossoming of his talent, the discovery (at the age of 27) of new methods of planning and management, the extraordinary breadth of interests, the uncompromising nature of a fighter, and, at the same time, his modesty and nobility — all these features form the unique phenomenon of Kantorovich.

The mathematical investigations of Kantorovich served as a basis of the formation of new important directions in mathematics. At the same time, he is rightfully considered one of the founders of modern mathematical economics, the kernel of which is the linear programming he created. It is the most important concept of the economical cybernetics allowing to transform the economics into objective science, thus ensuring most efficient results of the economic activity. Kantorovich is an outstanding economist, a scientist who changed essentially the understanding of economical events, the economic thinking, and became a founder of an original economic school.

25. Выполните письменный перевод текстов 4 и 5 по вариантам.

Text 4. ARTIFICIAL INTELLIGENCE

One of the main problems of cybernetics is known to be creation of artificial intelligence. It is a scientific trend including mathematics, linguistics, psychology, engineering, etc. An artificial intelligence is considered to be a machine intelligence, dealing with the application of a computer which, in operation, is like a human intelligence.

To make an artificial intelligence fully similar to human intelligence is impossible because the human brain is a very complex system, to say nothing of the fact that a machine cannot have human emotions. Being often called a thinking machine, in reality a computer can't think either logically, or figuratively. Therefore even the most complex machine cannot be compared to the human brain.

When speaking of the origin of the term 'artificial intelligence', it should be noted that it is the model of creative processes in computers that gave birth to this term. But that doesn't mean that computers possess it. The 'intelligence' is put into the computer by an expert who develops the program for solving some practical creative problems.

But nevertheless, scientists continue the research into the field of an artificial intelligence. Production becoming automated, management must become automated as well. That is why the question of an artificial intelligence acquires special importance for economic planning and management.

Text 5. INDUSTRIAL ROBOTS

The word 'robot' is said to be coined by Karel Chapek in 1920 and is linked with the Russian word for work — работа. A robot is defined as a mechanical device which can be programmed to perform some task. An automatic machine, stationary or mobile, containing a manipulator and a reprogrammable device of program control, is called an industrial robot.

Industrial robots are made up of some basic components: the manipulator, the control and the power supply. Being hydrolically, pneumatically or electrically driven, the manipulator performs the useful functions of the robot. Engineers consider robots to have some manipulators with up to seven degrees of coordinated motions. Feedback devices on the manipulator provide information on its motions and positions to the robot control, the control storing the necessary motions of the robot in its memory. The control directs the manipulator operations by means of a program upon a command. A power supply is certain to provide energy for driving the manipulator.

Industrial robots perform production processes better and faster than men. The job changing, robots may be reprogrammed. They can imitate the manual actions of people, being able to substitute manual actions of man. Thus, the industrial robot is the most important form of automated means.

TESTS

1. Вставьте необходимые слова вместо пропусков.

1. Cybernetics _____ effective methods for the study and control of extremely complex systems.

a) proves; b) provides;
c) processes; d) proceeds.

2. _____ classified all the sciences of human knowledge under different numbers.

a) Ktesibios; b) Neuman;
c) Wiener; d) Ampere.

3. The modern science of cybernetics began at the _____of many sciences.

a) intersection; b) interconnection;
c) intervention; d) interdiscipline.

4. In the first automatic water clock _____ helped to maintain a constant level of water in the reservoir.

a) a self-regulatory device; b) a holding tank;
c) a coneshaped float; d) feedback.

5. It was _____ who gave the name and laid the foundation of the new science.

a) A. Kolmogorov; b) N. Wiener;
c) A. Lyapunov; d) C. Shannon.

6. A control process implies continuous information _____ between the controlled object and the control unit.

a) input; b) output;
c) processing; d) exchange.

7. The principle of _____ used in all cybernetic systems is the cornerstone of cybernetics.

a) feed-forward; b) feedback;
c) interaction; d) back connection.

8. Cybernetics opened the way for applying precise scientific analysis in solving problems of _____ of modern technological processes.

a) operation; b) communication;
c) control; d) studying.

9. Modern technology includes numerous automatically _____ systems.

a) regulated; b) resulted;
c) repeated; d) reversed.

10. Scientific analysis applied in solving problems of control is _____ without cybernetics.

a) impulsive; b) improvable;
c) impressive; d) impossible.

2. Подберите к терминам, данным в левой колонке, определения, представленные справа.

1. Mathematics a) any mechanical device operated automatically by remote control.
2. Sociology b) the science dealing with quantities, magnitudes and forms, and their relationships by the use of numbers and symbols.
3. Philosophy c) the power of regulating and directing the action of devices.

4. Physiology	d) the branch of medicine dealing with the nervous system, its structure and its disease.
5. Neurology	e) the transfer of part of the output of an active circuit or device back to the initial point.
6. Psychology	f) the science of human society and of social relations, organization and change.
7. Feedback	g) theory or logical analysis of the principles underlying conduct, thought, knowledge and the nature of the universe.
8. Robot	h) the branch of biology dealing with the functions and vital processes of living organisms, their parts and organs.
9. Algorythm	i) the science dealing with the mind and with mental and emotional processes.
10. Control	j) predetermined set of instructions for solving a problem in a limited number of steps.

3. Найдите неличные формы глагола в предложениях и определите их форму и функцию, а также конструкции с ними. Переведите предложения на русский язык.

1. Automatic temperature regulators using the principle of feedback can maintain the required temperature. 2. Cybernetics is considered to be the science of general laws of control. 3. I suppose the control process to involve the transmission, accumulation, storage and processing of information. 4. The computer can perform various mathematical operations involved in solving scientific and engineering problems. 5. Electronic computers having appeared, automatic control of complex industrial processes became possible. 6. To exchange information a cybernetic system must operate with continuous or discrete signals. 7. A. Lyapunov proves to have given the exact definition of the subject matter of cybernetics. 8. The transformer is a device having no moving parts and used for changing the electric current from one voltage to another. 9. The methods applied improved the quality of production. 10. Copper being a good conductor, we were asked to use it when carrying on our research work.

Unit 10

NANOTECHNOLOGIES

He never makes mistakes who does nothing, though this is his main mistake.
A. Tolstoi

Тексты: What is Nanotechnology? History of Nanotechnology. Nanofabrication. Possibilities of Nanotechnology. Approaches in Nanotechnology
Грамматика: Сложно-подчиненные предложения. Три типа условных предложений. Повторение изученного материала: способы выражения обстоятельства в английском предложении. Английские времена в действительном и страдательном залогах. Неличные формы глагола и конструкции с ними

1. Ознакомьтесь с терминами текста 1.

Conventional approach — традиционный подход
pre-existing materials — существовавшие ранее материалы
raw materials — сырье
in simple terms — говоря простым языком
car airbag pressure sensors — датчики давления воздуха в машине
cochlear implant — ушной протез (имплантант)
inkjet printers — струйные принтеры
'disruptive' solutions — «прорывные» решения
old ways ... are overtaken and discared — старые пути (способы) пройдены и отброшены
flat screen display — плоский экран
to build strength into the shell — накапливать силу в раковине
to engineer new lightweight tough materials — создавать прочные материалы легкого веса
to deliver sting — жечь, передавать жгучесть (о крапиве)
nano coatings — нанопокрытия

to make more 'body friendly' implants — изготавливать более совместимые (с организмом) протезы
to encourage acceptance — способствовать совместимости

2. Прочтите текст и скажите, что такое нанотехнологии.

Text 1. WHAT IS NANOTECHNOLOGY?

I. Nanotechnology is an emerging science in which new materials and tiny structures are built atom-by-atom, or molecule-by-molecule, instead of the more conventional approach of making parts from pre-existing materials. In other words it is the engineering of functional systems at the molecular scale. It is an exciting area of scientific development which promises 'more for less'. It offers ways to create smaller, cheaper, lighter and faster devices that can do more and cleverer things, use less raw materials and consume less energy.

Nanotechnology originates from the Greek word meaning "dwarf". Nano is a prefix meaning one-billionth, so a nanometer is one-billionth (10^{-9}) of a metre, which is tiny, only the length of ten hydrogen atoms, or about one hundred thousandth of the width of a hair! Although scientists have manipulated matter at the nanoscale for centuries, calling it physics or chemistry, it was not until a new generation of microscopes were invented in 1980s in IBM, Switzerland that the world of atoms and molecules could be visualized and managed.

In simple terms, nanotechnology can be defined as 'engineering at a very small scale', and this term can be applied to many areas of research and development — from medicine to manufacturing and computing, and even to textiles and cosmetics. It can be difficult to imagine exactly how this better understanding of the world of atoms and molecules has and will effect the everyday objects we see around us.

Nanotechnology, in one sense, is the natural continuation of the miniaturization revolution that we have witnessed over the last decade, where millionth of a metre (10^{-6} m) microengineering became commonplace, for example, in the automotive and aerospace industries enabling the construction of higher quality and safer vehicles and planes. It was the computer industry that kept on pushing the limits of miniaturization, and many electronic devices we see today have nano features that owe their origins to the computer industry — such as cameras, CD and DVD players, car airbag pressure sensors and inkjet printers.

II. Because of the opportunities nanotechnology offers in creating new features and functions, it is already providing the solutions to many long-standing medical, social and environmental problems. Because of its potential, nanotechnology is of global interest. It is

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1 — A quantum computer which can find two 100 digit numbers knowing their product (производное). *2* — Biological nanomachines — natural robots that can assemble and dismount other molecules. *3* — Atomic force microscope capable of displacing atoms. *4* — Carbon nanotubes with the highest heat conductivity. *5* — A quantum dot — an electronic unit capable of "capturing" electrons and holding them in space of some nanometres. *6* — Gigantic magneto-resistive effect produced a revolution in computer discs. *7* — Nanoparticles of dioxide titan greatly increase their antibacterial properties under the action of the sun (the phenomenon of photocatalysis). *8* — The Kremlin star is made of colloid gold (Kassy purple). *9* — Small inhibiting RNA (ribonucleic acid) — a real prototype of cancer medicine.

the area of research that is truly multidisciplinary. The contribution of nanotechnology to new products and processes cannot be made in isolation and requires a team effort, which may include life scientists — biologists and biochemists — working with physicists, chemists and information technology experts. Consider the development of a new cochlear implant, and what that might require — at least a physiologist, an electronic engineer, a mechanical engineer and a biomaterials expert. This kind of teamwork is essential, not only for a cochlear implant, but for any new, nano-based product.

Nano scientists are now enthusiastically examining how the living world 'works' in order to find solutions to problems in the 'non-living' world. The way marine organisms build strength into their shells has lessons in how to engineer new lightweight, tough materials for cars; the way a leaf photosynthesizes can lead to techniques for efficiently generating renewable energy; even how a nettle delivers its sting can suggest better vaccination techniques. These ideas are all leading to what is termed 'disruptive' solutions, when the old ways of making things are completely overtaken and discarded, in much the same way as a DVD has taken over from videotape, or a flat screen display from a cathode ray tube.

There are many examples of the application of nanotechnology from the simple to the complex. For example, there are nano coatings which can repel dirt and reduce the harmful cleaning agents, or prevent the spread of hospital-borne infections. New-generation hip implants can be made more 'body friendly' because they have a nanoscale topography that encourages acceptance by the cells in their vicinity. Moving on to more complex products, a good example of the application of nanotechnology is a mobile phone, which has changed dramatically in a few years — becoming smaller and smaller, while growing cleverer and faster, and cheaper!

Let's have a look at some examples of nanomaterials.

3. Просмотрите текст еще раз. Дайте ответы на вопросы, используя информацию текста.

1. What is the difference between nanotechnological and conventional approaches of making things? 2. What kind of engineering is nanotechnology? 3. What advantages does nanotechnology offer in creating new products? 4. What is the origin of the word 'nanotechnology'? 5. What basic inventions contributed to the development of the new science? 6. What electronic devices have nano features? 7. Is nanotechnology a multidisciplinary science? Prove it. 8. Can you give an example of the necessity of the team efforts for the development of nanotechnology products? 9. What do scientists learn so enthusiastically

the environment world for? 10. Give some examples of the application of nanotechnology.

4. Прочтите, переведите и запомните следующие словосочетания.

An emerging science; tiny structures; built atom-by-atom; conventional approach; pre-existing materials; the engineering of functional systems at the molecular scale; to promise 'more for less'; to offer ways to create; to use less raw materials and consume less energy; to originate from the word; to manipulate matter; to visualize and manage the world of atoms; in simple terms; in one sense; to witness the miniaturization revolution; to become commonplace; safer vehicles of higher quality; to push the limits of miniaturization; to owe the origin; car airbag pressure sensors; inkjet printers; because of the opportunities; long-standing environmental problems; to require a team effort; life scientist; cochlear implant; a scratch-resistant lens; soap powder; to build strength into shells; to engineer new lightweight; to generate renewable energy; a nettle delivers its sting; 'disruptive' solutions; to overtake completely; to discard old ways; nano coatings; to repel dirt; to reduce the need for harmful cleaning agents; to prevent the spread of hospital-borne infections; hip implants.

5. Найдите в тексте термины, соответствующие следующим определениям.

1. A path, road or other means of attaining a purpose.
2. One-billionth of a meter.
3. The engineering of functional systems at the molecular scale.
4. A device for detecting, measuring or recording physical phenomena.
5. The technology dealing with very small compact devices.
6. A digital carrier of encoded information.
7. A device for taking photographs.
8. Covering of special material which can repel dirt, preventing the spread of infections.
9. A device producing or transmitting sound.
10. An operation to produce immunity to a specific disease.

6. Прочтите и переведите предложения, обращая внимание на слова one (ones) и that (those).

A. 1. *One* need not explain *that* a current is unable to flow in a circuit consisting of metallic wires alone. A source of an e. m. f. should be provided as well. 2. The motor in question is more powerful than

the *one* you spoke about yesterday. 3. The speed of the rocket should be neither less nor more than the necessary *one*. 4. In connection with the introduction of up-to-date techniques, many old devices have been replaced by new *ones*. 5. *One* must understand *that* the problem is not an easy *one*. 6. If *one* wants to become a good specialist, *one must* study much. 7. You asked me to get you new books. Are these the *ones* you wanted?

* * *

B. 1. The physics of bodies at rest is much simpler than *that* of the bodies *that* are in motion. 2. Radio-controlled instruments are more reliable in operation than *those* used before. 3. There was a time when lightning was a problem *that* scientists tried to solve but at present everybody knows *that* it is an electric spark like *that* produced by the electric machines. 4. *That* a solenoid has two poles *that* attract and repel the poles of other magnets is a well-known fact. 5. On May, 1790 the National Assembly of France suggested *that* a society of scientific men from France with the cooperation of *those* from England should define a standard unit of length, so *that* other units might be derived from *that* one. 6. *These* control systems are more efficient than *those* described in *that* journal. 7. It has been stated that that type of a versatile computer processes information much faster.

7. Переведите, обращая внимание на выделенные слова.

1. *The more* you read, *the more* you learn. 2. *The shorter* the wire, *the less* is its resistance to current flow. 3. *The faster* the molecules of a substance move, *the higher* is the temperature of the substance. 4. *The larger* the water pipe, *the more* water passes through it. 5. *The greater* the number of free electrons in a substance, *the better* that substance conducts electricity. 6. *The higher* the temperature of a metal, *the higher* is its resistance. 7. *The faster* the rotor of a generator rotates, *the greater* the output voltage the machine will produce. 8. *The harder* you work at your English, *the better* progress you make. 9. *The shorter* the day, *the longer* the night. 10. A joke: *The more we study*, the more we know; the more we know, the more we forget; the more we forget, *the less we know. The less we study*, the less we know; the less we know, the less we forget; the less we forget, *the more we know*. So, why study?

8. Проанализируйте способы выражения обстоятельства и переведите предложения.

A. 1. Thanks to lasers electrical power may be transmitted over considerable distances without applying transmission lines. 2. Solid state laser materials are usually made by doping a crystalline solid host

with ions that provide the required energy state. 3. We can increase the current by reducing the resistance of the circuit. 4. The conductivity of minerals increases with heating and falls with cooling. 5. In designing electronic computers scientists have passed from valves to integrated circuits. 6. Before dealing with this new device one should study all its details. 7. Lasing without maintaining the medium excited into a population inversion, was discovered in 1992 in sodium gas and again in 1995 in rubidium gas by various international teams.

B. 1. Being built on the basis of transistors lasers are successfully used in technology. 2. When placing a magnetic material in the field of another magnet we can magnetize it to a certain degree. 3. Being tested this automatic device showed its reliability in operation. 4. Being a very simple-looking device a laser can perform wonders. 5. While dropping back to their previous level the particles give off energy. 6. Being designed with the help of transistors electronic devices consume very little power. 7. When constructing atomic cars it will be necessary to build reactors of small dimensions.

C. 1. When heated to a high temperature a conductor loses its conductive properties. 2. If arranged according to their atomic weight, the elements show the periodicity of their properties. 3. When bombarded by neutrons from a reactor, the uranium undergoes fission. 4. Unless repaired this part cannot be used in the equipment. 5. One might use this motor at high speed as well as at low speed, if desired. 6. Unless treated properly, this material will not be a good insulator. 7. Though repaired the device failed in operation.

D. 1. Having absorbed green light electrons in the ruby laser give a pure red ray due to the process of stimulated emission of radiation. 2. Having been developed transistors were used instead of vacuum tubes in many devices. 3. Having been built on the basis of transistors lasers found wide application in many spheres of economy and engineering. 4. Having learnt his point of view I concluded that our opinions differ. 5. Having developed the first automatic devices scientists saw their great advantages. 6. Having been introduced electronic devices greatly influenced progress in many sciences. 7. The atom has a negative charge having acquired an excess of electrons.

E. 1. A laser is built to emit a continuous beam or a train of short pulses. 2. Laser beams are used to boost spaceships into orbit and make them develop an enormous jet thrust. 3. To make the system more efficient engineers had to improve some of its parts. 4. Numerous sputnics have been launched to study the ionosphere and radio waves in outer space. 5. To design a good control system the designer must have some

knowledge of the work to be performed by this system. 6. The thin beams of coherent light can be applied to speed up the functioning of computers; to transmit a billion of simultaneous telephone conversations; to reach billions of miles into space to guide a spaceship and to communicate with life in other solar systems; to speed up chemical processes thousands of times; to construct ultra-precise clocks, guidance systems and laboratory instruments and so on and so forth.

9. Прочтите текст и сформулируйте 10–11 вопросов, которые задали Генри на собеседовании.

The Job Interview

Henry had a job interview a few days ago at the United Insurance Company. The interview lasted almost an hour, and Henry had to answer a lot of questions.

First the interviewer asked Henry how old he was and where he had been born. Then she asked where Henry had gone to school and if he had any special training. She interested where he had worked. She also asked if he was willing to move to another city. She wanted to know if he could work overtime and weekends. She asked how his health was. She wondered if he had ever been fired. She also wanted to know why he had had four different jobs in the past year. And finally, the interviewer asked the most difficult question. She wondered why Henry thought he was more qualified for the position than the other fourty-two people who had applied.

Henry had never been asked so many questions at a job interview before. He doesn't know how well he did, but he tried his best.

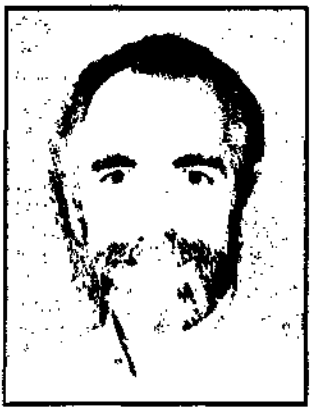
10. Ознакомьтесь с терминами текста 2.

From the bottom up — снизу доверху
on the scale of molecules — на молекулярном уровне
incredible devices — невероятные устройства
accusations of science fiction — обвинения в научном вымысле
the current era — нынешнее время
nanostructures for multitasking — многоцелевые наноструктуры
like a mammalian cell — подобно клетке млекопитающего
molecular manufacturing — молекулярная нанотехнология
guided assembling — управляемая сборка
the scanning tunneling microscope (STM)— сканирующий туннельный микроскоп
fullerenes — фулерены
carbon nanotubes — углеродные нанотрубки

quantum dots — квантовые точки
the atomic force microscope — атомно-силовой микроскоп
oncovalent bonding interactions of molecules — взаимодействие молекул внековалентных связей
self-replicating machines — саморепродуцирующие машины
chemical engineering — химическая технология
novel phenomena — неизведанные явления

11. Прочтите текст и расскажите об истории развития нанотехнологии.

Text 2. HISTORY OF NANOTECHNOLOGY



K. Eric Drexler

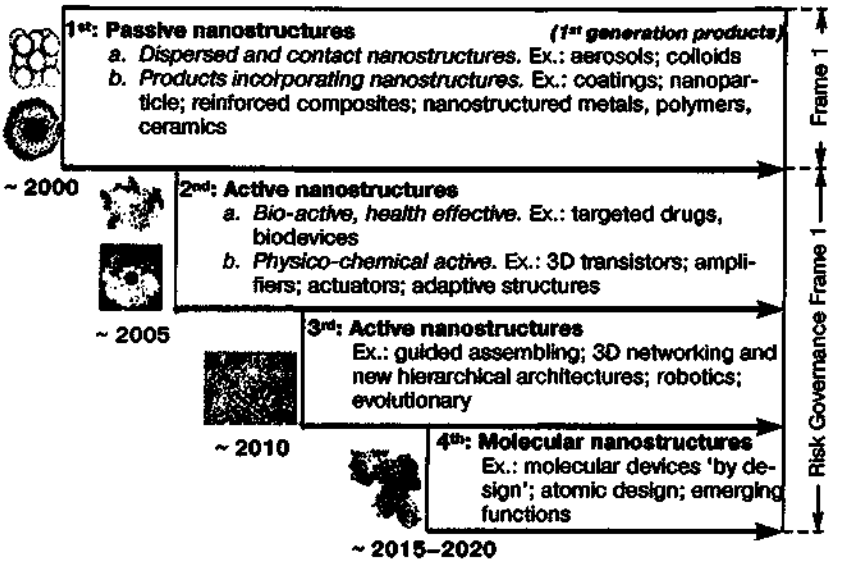
Nanotechnology, in its traditional sense, means building things from the bottom up, with atomic precision. This theoretical capability was first envisaged as early as 1959 by the renowned American physicist Richard Feynman, Nobel Prize winner in physics. Feynman described a process by which the ability to manipulate individual atoms and molecules might be developed, using one needed scale.

K. Eric Drexler popularized the word 'nanotechnology' in the 1980s. He was talking about building machines on the scale of molecules, a few nanometers wide—motors, robot arms, and even whole computers, far smaller than a cell. Drexler spent the next ten years describing and analyzing these incredible devices, and responding to accusations of science fiction. Meanwhile, his technology was developing the ability to build simple structures on a molecular scale. As nanotechnology became an accepted concept, the meaning of the word shifted to encompass the simpler kinds of nanometer-scale technology, including anything smaller than 100 nanometers with novel properties.

Mihail Roco of the U.S. National Nanotechnology Initiative has described four generations of nanotechnology development (see chart below). According to Roco the current era is that of passive nanostructures, materials designed to perform one task. The second phase introduces active nanostructures for multitasking; for example, actuators, drug delivery devices, and sensors. The third generation began emerging around 2010 and will feature nanosystems with thousands of interacting components. A few years after that, the fourth

integrated nanosystems, functioning much like a mammalian cell with hierarchical systems within systems, are expected to be developed.

As work progresses through the four generations of nanotechnology leading up to molecular nanosystems, which will include molecular manufacturing, it will become increasingly obvious that engineering of functional systems at the molecular scale is what nanotech is really all about.



Thus, as we see, nanotechnology and nanoscience got started in the early 1980s with two major developments: the birth of cluster science and the invention of the scanning tunneling microscope (STM). This development led to the discovery of fullerenes in 1986 and carbon nanotubes a few years later. In another development, the synthesis and properties of semiconductor nanocrystals was studied. This led to a fast increasing number of metal oxide nanoparticles of quantum dots. The atomic force microscope was invented six years after the STM appeared.

Nanotechnology is a highly multidisciplinary field, drawing from fields such as applied physics, materials science, interface and colloid science, device physics, supramolecular chemistry (which refers to the area of chemistry that focuses on the noncovalent bonding interactions of molecules), self-replicating machines and robotics, chemical

engineering, mechanical engineering, biological engineering, and electrical engineering.

Two main approaches are used in nanotechnology. In the "bottom-up" approach, materials and devices are built from molecular components which assemble themselves chemically by principles of molecular recognition. In the «top-down» approach, nano-objects are constructed from larger entities without atomic-level control. The impetus for nanotechnology comes from a renewed interest in Interface and Colloid Science, coupled with a new generation of analytical tools such as the atomic force microscope, and the scanning tunneling microscope. Combined with refined processes such as electron beam lithography and molecular beam epitaxy, these instruments allow the deliberate manipulation of nanostructures, and lead to the observation of novel phenomena.

12. Просмотрите текст еще раз. Дайте ответы на вопросы, используя информацию текста.

1. What is nanotechnology in its traditional sense? 2. Who was the first to envisage the theoretical capabilities of nanotechnology? 3. What is the role of K. E. Drexler in the advancement of nanotechnology? 4. How many generations of nanotech development did M. Roco describe? 5. Say a few words about each of them. 6. When did the nanoscience start? 7. What inventions contributed to the development of nanotech? 8. What fields did nanotechnology use for its development? 9. What are the two main approaches in nanotechnology? 10. What gave an impetus for nanotech development?

13. Найдите в текстах 1 и 2 английские эквиваленты следующих словосочетаний.

Создавать поатомно; традиционный подход; техника функциональных систем на молекулярном уровне; предлагать пути (способы); изобрести новое поколение микроскопов; трудно представить; свидетельствовать; автомобильная и авиационная промышленность; безопасные летательные аппараты; расширять границы; обязан своим происхождением; датчики давления воздуха в машине; благодаря возможностям; обеспечить решение давнишних проблем; нуждаться в усилиях команды; биологи, химики, биохимики, физики, механики, специалисты по информационным технологиям; ушной протез; для того чтобы; то, как морские организмы; создавать прочные легкие материалы; предлагать улучшенные методы вакцинации; «прорывное» решение; пройти и отбросить старые способы производства; таким же

образом; предотвращать распространение больничных инфекций; протез бедра; сделать более приживаемым; способствовать совместимости с окружающими клетками.

В традиционном смысле; атомная точность; рассмотреть теоретические возможности; лауреат Нобелевской премии; невероятные приборы; обвинения в научном вымысле; тем временем; принятое понятие; неизведанные свойства; нынешнее время; пассивные / активные наноструктуры; многоцелевой; приводы; датчики; клетка млекопитающего; усиленные составляющие; управляемая сборка; групповая наука; сканирующий туннельный микроскоп; углеродные нанотрубки; полупроводниковые нанокристаллы; металооксидные наночастицы квантовых точек; атомно-силовой микроскоп; прикладная физика; саморепродуцирующие машины; принцип молекулярного распознавания; подходы «снизу — вверх», «сверху — вниз»; усовершенствованные процессы; литография электронного луча; осмотрительное обращение с наноструктурами.

14. Подберите в текстах 1 и 2 слова

a) близкие по значению предложенным словам.

Nouns: Method; group; part; existence; copy; technique; level; sphere; point; type; possibility; specialist; portion; aim; covering; mixture; medicine; force; display; matter; environment; property; ability; branch; device.

Verbs: To determine; to come from; to suggest; to ensure; to demand; to involve; to produce; to decrease; to continue; to investigate; to design; to adjust; to connect; to purify; to amplify; to appear; to consider; to suppose.

Adjectives: Common; important; very small; famous.

b) противоположные по значению.

Verbs: To finish; to pull; to lose; to attract; to weaken; to increase.

Adjectives: Large; expensive; heavy; slow; stupid; less; old; complex; easy; approximately; worse; low; soft; useful; many; dangerous.

15. Проанализируйте и переведите условные сложноподчиненные предложения (см. грамматический справочник, с. 228–229).

A. 1. An electric current will run through the wire if we connect the two ends by a wire 2. If we have any trouble with the equipment we shall take the necessary measures. 3. If light is reflected from the object of the transmission we shall see the image on the fluorescent screen. 4. If they use a tachometer they will be able to produce a voltage proportional to speed. 5. If the mechanic has enough time he will repair

the equipment. 6. If you want to solve the complex problems automatically you will have to use a computer. 7. If you read this book you will learn some interesting facts about the development of lasers.

B. 1. It would be a good thing if you didn't smoke. 2. If I were in your place I should learn to speak English fluently. 3. If Mike had the time he would help you to solve the problem. 4. Were I an engineer I would try to invent more reliable automatic devices than those we have at present. 5. If I were a school director I should introduce one more free day per week for the benefit of pupils. 6. It would take much more time to carry out complicated calculations if we didn't make use of computers. 7. If the device detected the object it would determine in what direction the object was moving.

C. 1. You would have passed your English exam more successfully if you had attended preliminary courses. 2. Had the manager had this information before he would have acted differently. 3. If this new method of work had been applied we shoud have succeeded in obtaining better results long ago. 4. Specialists would have applied more sensitive instruments if they had been produced by that time. 5. If the device had operated well we should have finished processing information in time. 6. Had computers not been worked out numerous important problems might not have been solved. 7. If it had been possible the new technology would have been introduced last year.

16. Переведите текст на английский язык.

Нанотехнологии

Известно, что нанотехнологии сегодня находят все большее применение во многих областях науки и техники.

С помощью нанотехнологий создаются новые, более совершенные устройства для фильтрации, очистки и опреснения воды — эти разработки позволят решить проблему чистой воды на планете. Углеродные нанотрубки обладают самой высокой тепловодностью на микроуровне, которая достигает 6000 ватт на метр-кельвин. Лыжи и лыжные палки из углеродных нанотрубок легче и прочнее обычных материалов.

Нанотехнологии сделают дешевыми и легкими солнечные батареи, ими можно будет покрывать стены зданий, что несомненно поможет в борьбе с энергетическим кризисом. Стены и окна домов можно сделать самоочищающимися, если применить природную технологию. Посмотрите, как капли воды скатываются с листьев лотоса (lotus), оставляя их сухими и чистыми.

Знаете ли вы, что квантовая точка — это электронное устройство, способное «захватывать» электроны и удерживать их в пространстве размером в несколько нанометров? А с помощью атомно-силового микроскопа можно не только перемещать отдельные атомы, но и измерять силу, необходимую для этого. В медицине широко применяется оптический пинцет, который может перемещать микроскопические частицы с помощью сфокусированного лазерного луча.

Нельзя не упомянуть (one can't but mention) о графене — слое графита толщиной в одну молекулу. Он представляет собой двумерный кристаллический углеродный материал, у него есть высота и ширина. Он очень прочен, гибок, обладает уникальными электронными свойствами и считается одним из кандидатов на замену кремния в электронике будущего.

ПОВТОРЕНИЕ ИЗУЧЕННОГО МАТЕРИАЛА

17. Преобразуйте предложения в страдательный залог.

1. Scientists were making the first observations and size measurements of nanoparticles during the first half of the 20-th century. We associate those observations with the name of Zsigmondy who made detailed studies of some nanomaterials with sizes down to 10 nm and less. He had used ultramicroscope that employed a dark field method for seeing particles with sizes much less than light wavelength before new microscopes appeared. Scientists widely applied some traditional techniques for first generation passive nanomaterials. 2. The Nobel Committee awarded the American scientists the Nobel Prize for developing and implementing molecular beam epitaxy (MBE) as a research tool. Due to MBE scientists lay down automatically-precise layers of atoms and, in the process, build up complex structures. 3. Creating devices smaller than 100 nanometres opens many doors for the development of new ways to capture, store and transfer energy. People have already begun the search of ways utilizing nanotechnology for the development of consumer products.

18. Найдите неличные формы глагола в предложениях, проанализируйте их и переведите на русский язык.

1. It is well known that there are two main approaches used in nanotechnology. 2. Top-down approaches, applied in nanotechnology seek to create smaller devices by utilizing larger ones to direct their assembly. 3. While growing cleverer, faster and cheaper a mobile phone

has greatly changed our life. 4. Having studied the synthesis and properties of semiconductor nanocrystals scientists came to a fast increasing number of metal oxide nanoparticles of quantum dots. 5. A number of physical properties of nanostructures change when compared to macroscopic size. 6. There are nanocoatings to repel dirt, to reduce the harmful cleaning agents and to prevent the spread of infections. 7. Carbon nanotubes are considered to be created by vaporizing carbon and allowing it to condense on a surface. 8. When condensed the carbon forms a nanosized tube composed of carbon atoms. 9. This tube appears to have a high surface area increasing the amount of charge stored. 10. Scientists expect nanotubes to be an increasing form of capacitors due to their superb chamical stability, high conductivity, light mass and their large surface area.

19. Преобразуйте сложноподчиненные предложения в простые с инфинитивными или причастными конструкциями.

1. Gas lasers using many gases have been built for many purposes. They are one of the oldest types of lasers. 2. It appeared that light sources and lasers have been built on the basis of transistors. 3. Eximer lasers are powered by a chemical reaction. It includes an excited dimer or excimer. These lasers usually produce ultraviolet light and are used in eye surgery. 4. They suppose that transistors opened new means of designing reliable electronic devices. 5. The two basic techniques that are used in fabrication of integrated circuit devices are the semiconductor and film techniques. 6. As the scale of integration grows, the reliability improves. 7. The operator believes that this computer will detect all the faults in mathematical calculations. 8. We all watched how the new automatic device was operating in the laboratory. 9. It was James Watt who applied the first automatic control to his steam engine. 10. As the speed of light is very great we cannot measure it by ordinary methods.

20. Переведите «грамматикализованные» предложения, содержащие всевозможные грамматические явления

А. на русский язык.

1. Materials reduced to nanoscale can show different properties compared to what they exhibit on a macroscale, enabling unique applications. 2. Molecular self-assembly proves to use concepts of supramolecular chemistry, and molecular recognition in perticular, to cause single-molecule components to automatically arrange themselves into some useful structure. 3. Many technologies descended from conventional solid-state silicon methods for fabricating microprocessors, are

now capable of creating features smaller than 10 nm falling under the definition of nanotechnology. 4. Molecular electronics seeks to develop molecules with useful electronics properties, these molecules being used as single-molecule components in a nanoelectronic device. 5. The development of a silicon laser is sure to be important in the field of optical computing. 6. Silicon, the chief ingredient of computer chips, being able to produce lasers, it would allow the light to be manipulated like electrons are in usual integrated circuits. 7. Thus photons would replace electrons in the circuits, which highly increases the speed of the computer. 8. Photonic crystal lasers are said to be based on nanostructures that provide the mode confinement and the DOS structure required for the feedback to take place. 9. Atomic force microscope as well as scanning tunneling microscope can be used to look at surfaces and to move atoms around. 10. By designing different tips for these microscopes, they can be utilized for carving out structures on surfaces and to help guide self-assembling structure.

Б. на английский язык.

1. Заряжая элемент, ток вызывает химические изменения. 2. Автоматические межпланетные станции оборудованы современными системами управления высокой точности. 3. Световые и радиоволны представляют собой электромагнитные колебания, отличающиеся длиной волны. 4. Радиоприемники сантиметрового и дециметрового диапазона были разработаны на основе квантовых усилителей. 5. Идея создания наносистем, работающих на молекулярном уровне, называется молекулярной нанотехнологией. 6. Этот термин связан с понятием молекулярного ассемблера, машины, которая может производить нужную структуру поатомно, используя принципы технического синтеза (mechanosynthesis). 7. Изготовление продуктивных наносистем, несомненно, отличается от традиционных технологий, применяемых для производства наноматериалов, таких как углеродные нанотрубки и наночастицы. 8. Предполагают, что наносистемы будущего будут представлять собой гибриды силиконовой технологии и биологических молекулярных машин. 9. Сообщили, что американские ученые создали три молекулярных прибора: наномотор на нанотрубках, молекулярный привод и наноэлектромеханический генератор. 10. Работа этих приборов управляется с помощью настольного пульта (desktop) с меняющимся напряжением.

21. Преобразуйте диалог в косвенную речь. Выучите диалог наизусть.

Dialogue 1. AT THE HOTEL

Mr. Sokolov: How do you do, sir. We'd like to have a double room.
Clerk: Good morning, sir. Have you made any reservations?
Mr. S.: No, we've just come from Moscow.
Clerk: How long are you planning to stay here, sir?
Mr. S.: I guess, we'll stay for three days.
Clerk: All right. I can give you an outside room on the 7-th floor with all modern conveniences: bath, telephone, colour television as well as bar and refrigerator.
Mr. S.: Is it noisy?
Clerk: By no means. The street is very quiet. In front of the hotel you can see a big park and in the inside yard you'll find a beautiful swimming pool.
Mr. S.: How much is the room?
Clerk: 70 dollars a day. The charge includes breakfast.
Mr. S.: All right, we'll take it.
Clerk: Could you, please, fill in registration forms.
Mr. S.: Sure. Look. I've put down my name, nationality and my home address. Anything else?
Clerk: Yes, please. The place and date of your birth and the date of your departure.
Mr. S.: Prepare my bill, please. I'd like to pay for three days in advance.
Clerk: Here you are, sir. The bill includes service charge. You won't have to tip your maid and the waiter.
Mr. S.: I'll keep it in mind. Thank you.

22. Вспомните словосочетания, употребляемые в разговорной речи, которые вы встречали в диалогах предыдущих разделов. Составьте диалог или предложения с ними.

How are you getting on?; Fine, thanks; How are things with you?; Very much the same as usual; How is life?; Life is going its usual way; What's the news?; No news is good news; I haven't seen you for ages; Excuse my troubling you; By the way; What can I do for you?; What's the matter?; You've been very helpful; I can't thank you enough; I won't keep you then; Give my best regards to...; Keep well; It was a pleasure to meet you; The pleasure was mine; Bye for now; Good luck to you; Keep in touch; So long.

23. Прочтите текст и передайте его содержание в виде реферата.

Text 3. NANOFABRICATION

Nanotechnology, a new field in science, is any technology that contains components smaller than 100 nanometers. For scale, a single virus particle is about 100 nanometers in width.

It should be noticed that materials reduced to the nanoscale can show different properties compared to what they exhibit on a macroscale, enabling unique applications. For instance, opaque substances become transparent (copper); inert materials become catalysts (platinum); stable materials turn combustible (aluminum); solids turn into liquids at room temperature (gold); insulators become conductors (silicon). A material such as gold, which is chemically inert at normal scales, can serve as a potent chemical catalyst at nanoscales. Much of the fascination with nanotechnology stems from these quantum and surface phenomena that matter exhibits at the nanoscale.

An important subfield of nanotechnology related to energy is nanofabrication. Nanofabrication is the process of designing and creating devices on the nanoscale. Creating devices smaller than 100 nanometers opens many doors for the development of new ways to capture, store, and transfer energy. The inherent level of control that nanofabrication could give scientists and engineers would be critical in providing the capability of solving many of the problems that the world is facing today related to the current generation of energy technologies.

People in the fields of science and engineering have already begun developing ways of utilizing nanotechnology for the development of consumer products. Benefits already observed from the design of these products are an increased efficiency of lighting and heating, increased electrical storage capacity, and a decrease in the amount of pollution from the use of energy. Benefits such as these make the investment of capital in the research and development of nanotechnology a top priority.

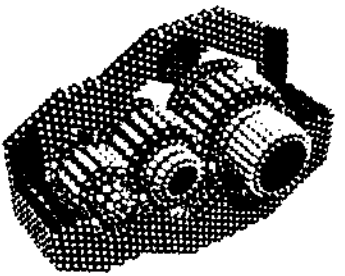
Research for longer lasting batteries has been an ongoing process for years. Researchers have now begun to utilize nanotechnology for battery technology. Some laboratories have utilized nanomaterials to alter the wetting behavior of the surface where the liquid in the battery lies to spread the liquid droplets over a greater area on the surface and therefore have greater control over the movement of the droplets. This gives more control to the designer of the battery. This control prevents reactions in the battery by separating the electrolytic liquid from the anode and the cathode when the battery is not in use and joining them when the battery is in need of use.

24. Выполните письменный перевод текстов.

Text 4. POSSIBILITIES OF NANOTECHNOLOGY

As we know, nanotechnology refers to a field of applied science and technology whose theme is the control of matter on the atomic and molecular scale, generally 100 nanometers or smaller, and the fabrication of devices or materials that lie within that size range. Nanotechnologies are sure to possess numerous possibilities nowadays. They include:

- The creation of entirely new materials with superior strength, electrical conductivity, resistance to heat and other properties.
- Microscopic machines for a variety of uses, including probes that could be injected into the body for medical diagnostics and repair.
- A new class of ultra-small, super-powerful computers and other electronic devices, including spacecraft.
- A technology in which biology and electronics are merged, creating "gene chips" that instantly detect food-borne contamination, dangerous substances in the blood or chemical warfare agents in the air.
- Artificial organs.
- The development of "molecular electronics" and devices that "self assemble," similar to the growth of complex organic structures in living organisms. Theoretically, once set in motion, such self-assembling devices would build themselves, making electronics processing far less expensive than conventional semiconductor processing.



With 15,342 atoms, this parallel-shaft speed reducer gear is one of the largest nanomechanical devices ever modeled in atomic detail.

Text 5. APPROACHES IN NANOTECHNOLOGY

As it is known, there are two main approaches, used in nanotechnology.

Bottom-up approaches seek to arrange smaller components into more complex assemblies. These techniques include chemical syn-

thesis, self-assembly and positional assembly. Another variation of the bottom-up approach is molecular beam epitaxy or MBE.

DNA (deoxyribonucleic acid) nanotechnology utilizes the specificity of Watson-Crick basepairing to construct well-defined structures out of DNA and other nucleic acids. Approaches from the field of "classical" chemical synthesis also aim at designing molecules with well-defined shape. More generally, molecular self-assembly seeks to use concepts of supramolecular chemistry, and molecular recognition in particular, to cause single-molecule components to automatically arrange themselves into some useful conformation.

Top-down approaches seek to create smaller devices by using larger ones to direct their assembly. Many technologies descended from conventional solid-state silicon methods for fabricating microprocessors are now capable of creating features smaller than 100 nm, falling under the definition of nanotechnology. Giant magnetoresistance-based hard drives fit this description, as do atomic layer deposition (ALD) techniques. Peter Grenberg and Albert Fert received the Nobel Prize in Physics for their discovery of Giant magnetoresistance and contributions to the field of spintronics in 2007.

Solid-state techniques can also be used to create devices known as nanoelectro-mechanical systems or NEMS, which are related to microelectromechanical systems or MEMS. Atomic force microscope tips can be used as a nanoscale "write head" to deposit a chemical upon a surface in a desired pattern in a process called dip pen nanolithography. This fits into the larger subfield of nanolithography.

TESTS

1. Вставьте необходимые слова вместо пропусков.

1. Interface and Colloid Science gave great _____ to the advancement of nanoscience.

a) birth; b) development;
c) impetus; d) research.

2. Nanotechnology is the engineering of functional systems at the _____ scale.

a) atomic; b) particle;
c) electron; d) molecular.

3. Due to nanotechnology we can create things _____ less energy.

a) consuming; b) converting;
c) producing; d) generating.

4. Scientists could _____ the world of atoms owing to the invention of new microscopes.

a) verify; b) visualize;
c) offer; d) penetrate.

5. New _____ of microscopes helped advance the science of nanotechnology.

a) gravitation; b) production;
c) generation; d) contribution.

6. Implants made with the use of nanotechnology _____ acceptance by the native cells.

a) encourage; b) enlarge;
c) endeavour; d) engage.

7. The science of nanotechnology attracted attention of scientists all over the world _____ its limitless possibilities.

a) in spite of; b) instead of;
c) because of; d) regardless of.

8. _____ worked out the technology that allowed him to build new devices at a molecular scale.

a) R. Feynman; b) R. Drexler;
c) V. Roco; d) B. Gates.

9. The invention of _____ led to the discovery of nanotubes and the research of semiconductor nanocrystals.

a) AFM; b) STM;
c) IBM; d) DVD.

10. Nanotechnology is supposed to appear in _____ .

a) 1959; b) 1980;
c) 1986; d) 2005.

2. Подберите к названиям специалистов, данным в левой колонке, определения, представленные справа.

1. Biologist	a) a worker skilled in using tools or in making operating and repairing machines.
2. Biochemist	b) an expert in the science dealing with the composition and properties of substances and with the reactions by which substances are produced from or converted into other substances.
3. Computer system architect	c) a specialist in the science dealing with behaviour and control of electrons in vacuums and gases and with the use and manipulating of electronic devices.

4. Chemist d) a person whose work is the construction, repair or installation of electric apparatus.

5. Physiologiste) a specialist in chemistry of life processes in plants and animals.

6. Cybernetist f) an expert learning properties, changes, interactions of matter and energy.

7. Mechanic g) a specialist having a strong engineering background for designing computers and their accessory equipment.

8. Electronist h) an expert in the science dealing with the origin, history, physical characteristics, life processes, habits of plants and animals.

9. Electrician i) a specialist in the branch of biology dealing with the functions and vital processes of living organisms or their parts and organs.

10. Physicist j) an expert in the comparative study of human control systems (the brain and nervous system) and complex electronic systems.

3. Раскройте скобки и поставьте глагол в нужной форме.

1. A new scanning tunneling microscope (был приобретен) by the laboratory by the beginning of the experiment. 2. The manager of the laboratory said that in addition to the new microscope some new equipment (будет доставлено) too. 3. As soon as it (будет установлено) the scientists (начнут) their experiment. 4. The experimentors (надеятся) that they (удастся — to succeed) in researching the novel properties of nanostructures. 5. If they (обнаружили бы) any novel properties of nanoparticles they (бы создали) new implants for the patients. 6. I wish I (был) an expert in Colloidal Science or biological engineering, I (создавал бы) self-replicating machines and robots. 7. If nanoscience (пришла бы) to our country earlier, I (бы освоил) this speciality many years ago. 8. The performance of the maser receiver (был усовершенствован) greatly by new technological developments. 9. The problem of launching spaceships into orbit by means of a laser (обсуждалась) by scientists for a long time. 10. Like electricity or computers before it, nanotechnology (несомненно предложит) greatly improved efficiency in almost every sphere of life.

РЕЧЕВЫЕ МОДЕЛИ

GENERAL FORMULAS
(общеупотребительные фразы)

Well ...; Well now ... — Ну ...; Ну что же ...
Let me see / Let me think. — Постойте, дайте подумать.
Just a minute / Just a moment. — Сейчас, минуточку.
By the way (by the by) /Incidentally. — Между прочим.
I see. — Понятно.
I say / Look here. — Послушайте.
They say. — Говорят.
First; Second; Third ... — Во-первых; во-вторых; в третьих ...
First of all. — Прежде всего.
Speaking of ... / Talking of... — Говоря о ...; Кстати о ...
To my mind. — По-моему.
In my opinion. — По моему мнению.
It seems to me. — Мне кажется.
As far as I know /remember. — Насколько мне известно / я помню.
As far as I can see. — Насколько я понимаю.
I suppose / I believe / I guess... — Полагаю, что ...
I wonder. — Интересно, хотелось бы знать.
You see / You know. — Видите ли ..., понимаете?
I don't quite follow you. — Я не совсем вас понимаю.
What do you mean? — Что вы имеете в виду?
What does it mean? — Что это значит?
I mean to say ... — Я имею в виду... Я хочу сказать ...
What do you think of ... — Что вы думаете о ...
It's not to the point. — Это не по существу.
Keep to the point. — Говорите по существу.
That's neither here nor there. — Это сюда не относится.
You've got it all wrong. — Вы совершенно неправильно все поняли.
Not exactly. — Не совсем так.
The way things are ... — Судя по тому, как обстоят дела ...
Generally speaking ... — Вообще говоря ...
As a matter of fact. — По существу, по сути дела.
In fact... — Фактически, в действительности.
In a way... — В некотором роде, как-то
The matter / the thing / is that ... — Дело в том, что ...

The fact / the point / is that...
Under the circumstances ... — При данных обстоятельствах ...
In (this, that,any) case. — В этом (таком, любом) случае
On the one hand. — С одной стороны.
On the other hand. — С другой стороны.
Above all. — Прежде всего.
More than that. — Больше того, кроме того.
... and so on and so forth. — ... и так далее, и тому подобное.
On the whole (All in all). — В целом (В общем).
After all ... — В конечном счете, в конце концов.
In the long run. — В конечном итоге.
In short.
The long and the short of it. — Короче говоря.
To make a long story short.
That explains it. — Тогда понятно.

GREETINGS
(Приветствия)

Hello / Hi [hə'lou / 'haɪ]. — Привет.
How do you do ['hau dju'du:]. — Здравствуйте.
Good morning / afternoon / evening. — Доброе утро / день / вечер.
I haven't seen you for ages ['hævnt 'si:n ju: fər 'eɪʤɪz] — Не видел вас вечность.
It's a long time since I saw you last. — Давно мы не виделись.
It's good (How nice) to see you again. — Хорошо повидаться снова.
I'm glad we've met [aɪm 'glæd wi:v 'met]. — Я рад, что мы встретились.
Why, if it isn't Ann! ['waɪ ɪf ɪt 'ɪznt 'æn]. — Неужели это Анна!
What a pleasant surprise! ['wɔt ə 'plezənt sə:'praɪz]. — Какой приятный сюрприз!
Never expected to meet you here ['nevər ɪks'pektɪd tə 'mi:t ju: 'hɪə]. — Не ожидал тебя здесь встретить.
How are you? ['hau ɑ: 'ju:] — Как поживаешь?
How are you getting on? — Как ты поживаешь?
How are you doing — Как ты поживаешь, как дела?
How is life? ['hau ɪz 'laɪf] — Как жизнь?
How are things with you? ['hau ɑ: 'θɪŋz wɪð ju:] — Как дела у тебя?
How is your mother / sister ...? — Как поживает мама / сестра ...?
How is everybody at home? — Как поживают твои домашние?
Possible reaction.
Fine; I'm fine; Just fine [aɪm 'faɪn; ʤʌst 'faɪn]. — Прекрасно

I'm doing fine [aɪm 'du:ɪŋ 'faɪn]. — У меня все замечательно

Very well / perfectly well ['verɪ / 'pə:fəktlɪ 'wel]. — Очень хорошо

Not bad (could be worse / better). — Не плохо (могло быть хуже / лучше).

Very much the same / The same with me. — Так же; и я тоже.

No complaints ['nou kəm'pleɪnts]. — Не жалуюсь.

Nothing to boast of ['nʌθɪŋ tə 'boust əv]. — Хвастаться нечем.

So-so / I'm (just) middling / Middling. — Так себе.

I'm feeling out of sorts. — Я неважно себя чувствую.

I'm not up to the mark. — Я чувствую себя не совсем хорошо.

Life is going its usual way ['laɪf ɪz 'gouɪŋ ɪts 'ju:ʒuəl 'weɪ]. — Жизнь идет своим чередом.

PARTING
(Прощание)

Good bye / Bye bye / Bye. — До свидания.

Good bye for the present / Bye for now / So long. — До свидания, пока.

See you tomorrow ['si: ju: tə'mɔrou]. — Увидимся завтра.

See you again / soon / later. — Увидимся (позже).

Good luck to you — Желаю удачи.

All the best. — Желаю удачи.

Have a happy holiday. — Желаю хорошо провести отпуск (каникулы).

A happy weekend to you. — Удачных выходных.

The same to you — И вам того же.

Keep well. — Будьте здоровы; не болейте.

Take care — Будьте осторожны.

I must be going / I must be off. — Мне нужно уходить.

Well, I'd better be off . — Мне, пожалуй, пора.

It's (high) time to go home. — (Давно) пора домой.

Could you give me a lift? — Вы не могли бы меня подвезти?

Thank you for coming. — Спасибо, что пришли.

It was a pleasure to see you ['pleʒə]. — Было приятно повидаться.

The pleasure was (all) mine / My pleasure. — И мне было приятно.

Remember me to / Give my regards to ... Передавайте привет ...

MAKING AN INTRODUCTION
(Знакомство)

May I introduce Mr. K. to you? — Можно представить вам мистера К.?

Allow me to introduce myself (to you). — Позвольте представиться.

Let me introduce you to my colleague. — Позвольте представить вас моему коллеге.

(Please) will you introduce me to your sister. — Будьте добры, познакомьте меня с вашей сестрой.

I'd like to meet (Dr. M). — Я бы хотел познакомиться (с доктором М.).

Are you acquainted with Miss. K? — Вы знакомы с мисс К. ?

I'm glad to get acquainted with you. — Рад познакомиться с вами.

Is this name familiar to you? — Вам знакомо это имя?

Here is my visiting card. — Вот моя визитная карточка.

Glad to meet you. — Рад познакомиться с вами.

Pleased to know you . — Приятно познакомиться с вами.

With pleasure [wɪð 'pleʒə]. — С удовольствием.

The other day / One of the days. — На днях.

I wonder who that man is? — Интересно, кто этот человек?

What's your trade / profession / occupation? — Какая у вас специальность?

What does he do (for a living)? — Кто он (по профессии)?

THANKS
(Выражение благодарности)

Thank you (very much) ['θæŋk ju: 'verɪ 'mʌʧ]. — Большое спасибо.

Thanks a lot / Many thanks. — Большое спасибо.

Thank you for reminding me / for coming. — Спасибо, что напомнили / пришли.

Thank you for the wonderful evening. — Благодарю за прекрасный вечер.

Thank you for the pleasure. — Благодарю за доставленное удовольствие.

Thank you for the trouble you've taken. — Благодарю за беспокойство.

That's very kind of you. — Очень мило с вашей стороны.

I'm very grateful to you. — Я вам благодарен.

I'm very much obliged to you [...əb'laɪʤd]. — Я вам очень признателен.

Thank you. You've been very helpful. — Спасибо, вы мне очень помогли.

You've done me a great favour [...'feɪvə]. — Вы оказали мне огромную услугу.

I can never thank you enough [...ɪ'nʌf]. — Просто не знаю, как вас благодарить.

Possible replies

Don't mention it / That's all right / Not at all. — Не стоит благодарности.

It's a pleasure. — Мне приятно (оказать вам услугу).
It was a (real) pleasure for me to do it. — Мне это доставило удовольствие.
The pleasure was mine. — Это я вас должен благодарить.
You are (always) welcome. — Всегда готов помочь.
Please, don't thank me. — Не благодарите меня, пожалуйста.
That's really nothing. — Это пустяк.
No trouble at all. — Никакого беспокойства.

REQUESTS
(Просьбы)

Please...; Will you ...?; Will you please...? — Пожалуйста, ...
Be so kind as to ...[kaɪnd] — Будьте любезны ...
Would you (kindly) ...? Would you please ...? — Не будете ли вы любезны...
Would you be so good as to...? — Не будете ли вы так добры ...
Would you mind (+ Ving) [maɪnd]? — Вы не будете возражать, если ...?
Could I trouble you for ...[kud aɪ trʌbl]? — Можно вас побеспокоить? *Could you do me a favour?* ['feɪvə] — Не сделаете ли вы мне одолжение?
May I ask you to...? — Можно вас попросить ...?
May I trouble you for...? — Могу я вас побеспокоить ...?
I should be much obliged if ... [ə'blaɪʤd] — Я был бы вам очень обязан, если бы...

Possible positive replies

Why, yes. ['waɪ 'jes] — Конечно.
Why, certainly / of course / sure / naturally. — Конечно, естественно.
Not at all / not in the least — Ничуть! Ни в коей мере!
With pleasure! [wɪð 'pleʒə] — С удовольствием!
By all means [baɪ 'ɔ:l 'mi:nz]. — Конечно, обязательно.
(Most) willingly ['moust 'wɪlɪŋlɪ]. — (Весьма) охотно.
All right / OK ['ɔ:l 'raɪt / 'ou 'keɪ]. — Хорошо, ладно.
Here you are. Here it is. — Вот, пожалуйста.
No trouble at all — Ничуть не трудно, никакого беспокойства.

Possible negative replies

(No), I'm afraid I can't [aɪm ə'freɪd aɪ 'kɑ:nt] — Боюсь, я не смогу.
I'm sorry, I can't [aɪm'sɔrɪ aɪ 'kɑ:nt]. — К сожалению, не могу.
I'd rather not [aɪd 'rɑ:ðə 'nɔt]. — Пожалуй нет.
Don't! Please, don't! — Пожалуйста, не надо.
Would you mind not doing it. — Пожалуйста, не делайте этого.
Try not to ... — Постарайтесь не ...

APOLOGIES
(Извинения)

I'm sorry [aɪm 'sɔrɪ]. — Простите; виноват.

Sorry I've kept you waiting. — Простите, что заставил вас ждать.

Sorry to trouble / disturb you [dɪs'tə:b]. — Простите за беспокойство.

I'm very sorry. I do hope I haven't hurt you. — Виноват; надеюсь я вас не ушиб.

Excuse me. Forgive me [ɪks'kju:z mɪ. fə'gɪv mɪ]. — Извините меня.

Excuse my troubling you. — Извините, что беспокою вас.

Excuse my intrusion [ɪn'tru:ʒn]. — Извините за вторжение.

Excuse me for a moment. I shan't be long. — Извините, я ненадолго отлучусь.

Excuse my back. — Простите, что (сижу) к вам спиной.

Pardon me. I didn't mean any harm. — Извините, я ничего плохого не имел в виду.

I beg your pardon for being so rude (for being late). — Прошу извинить меня за то, что я был так груб (что опоздал).

I apologize. I didn't really mean what I said [ə'pɔlədʒaɪz]. — Прошу прошения. Я не то хотел сказать.

I must apologize. It's my fault. ['fɔ:lt] — Я должен извиниться. Это моя вина.

Possible replies to apologies

It's quite all right. Forget it. — Ну что вы!

Oh, that's all right. Don't worry. — Ничего, все в порядке. Не волнуйтесь.

Not at all. — Ничего (нисколько), пожалуйста.

Never mind — Ничего, пустяки (забудьте).

(There's) no harm done. — Никто не пострадал. Все благополучно.

No need to be sorry. — Незачем извиняться.

It's no trouble (at all). — Никакого беспокойства.

You needn't (apologize). Why should you? — Ну что вы! Не надо. Зачем?

It's nothing to speak of. — Стоит ли об этом говорить.

It's unforgivable. How could you! — Непростительно! Как вы могли!

It's a lame excuse / That is no excuse. — Это слабая отговорка.

CONGRATULATIONS AND WISHES
(Поздравления, пожелания)

Congratulations! — Поздравляю!

My heartiest (best) congratulations to you on ... — Сердечно поздравляю вас с ...

I wish you all the happiness in the world! — Желаю вам большого счастья!

I wish you luck! — Желаю удачи!

Good luck to you! — Желаю удачи!

I wish you a speedy recovery. — Желаю вам быстрого выздоровления!

All the best! — Всего наилучшего!

Best wishes for ... — Наилучшие пожелания к ...

May all your dreams come true! — Пусть сбудутся все ваши желания!

A very enjoyable holiday to you! — Желаю весело провести каникулы!

Have a good time! — Желаю хорошо провести время!

Have fun! Enjoy yourself! — Желаю вам повеселиться!

Many happy returns of the day! — Поздравляю с днем рождения!

Happy New Year! — С Новым годом!

Merry Christmas! — Веселого Рождества!

AGREEMENT, DISAGREEMENT
(Согласие, несогласие)

That's (all) right! All right! — Хорошо. Правильно.

You are right! Right you are! — Вы правы.

I quite agree with you. — Я совершенно согласен с вами.

I agree to any terms. — Согласен на любые условия.

I agree to your proposal. — Согласен с вашим предложением.

Agreed! (That's) Settled! — Решено. Договорились.

That's a good idea. — Хорошая мысль.

That suits me. — Это меня устраивает.

That's just what I think. — Это как раз то, что я думаю

That's just what I was going to say. — Это как раз то, что я хотел сказать.

That's it! Exactly so! Quite so! — Вот именно! Да, так оно и есть.

I am of the same opinion. — Я того же мнения.

It goes without saying. — Само собой разумеется.

By all means. — Конечно; обязательно.

Let it be so. Very well then. — Пусть будет так. Так и быть.

Why not! I don't mind. — Почему бы и нет. Я не возражаю.

I have nothing against it. — Ничего не имею против.

I have no objections. — Не имею возражений.

Certainly / Decidedly not. — Конечно, нет. Безусловно, нет.

You are wrong. You are mistaken. — Вы не правы. Вы ошибаетесь.

I can't agree (I disagree) with you. — Не могу согласиться. Не согласен.

I'm of different opinion. — Я другого мнения.

I hold a different view. — Я иначе смотрю на это.
I am against it. I object to it. — Я против. Возражаю.
I refuse point blank. — Я отказываюсь наотрез.
That won't do! — Меня это не устраивает.
That won't work! It wouldn't work! — Из этого ничего не выйдет!
It's out of the question. — Об этом не может быть и речи.
By no means. On no account. — Ни в коем случае.
Under no circumstances. — Ни при каких обстоятельствах.
It isn't worth talking about. — Стоит ли говорить об этом!
Nothing of the kind! On the contrary! — Ничего подобного! Наоборот.
I see no reason to do it. — Не вижу оснований делать это.
Just the other way round. — Как раз наоборот.
Nonsense! Stuff & nonsense! Rubbish! — Чепуха! Ерунда! Вздор!

REGRET. SYMPATHY
(Сожаление. Сочувствие)

Come, come! / There, there! — Ну, довольно. Успокойся.
I'm so sorry for you (about it). — Мне вас так жаль. Я очень огорчен.
I sympathize with you. — Я вам очень сочувствую.
Poor thing! Poor me! — Бедняжка! Бедная я, несчастная.
What a pity! — Какая жалость.
How dreadful! How awful! — Какой ужас! Ужасно!
You don't say so! (You don't mean it!). — Да ну! Не может быть! Неужели!
Relax! Cheer up! — Не унывай. Выше голову.
I wish I could do smth. for you. — Я бы охотно ч.-н. сделал для вас.
Could I help you in anyway? — Могу ли я ч.-н. вам помочь?
Don't worry. Take it easy. — Не беспокойся. Смотри на вещи проще.
Don't be downhearted. — Не падайте духом.
Don't let that upset / distress you. — Пусть это вас не огорчает.
Calm down. — Успокойтесь.
Don't take it so much to heart. — Не принимайте все близко к сердцу.
Don't get upset. — Не расстраивайтесь.
Don't lose heart. — Не отчаивайтесь.
Don't lose your temper about nothing. — Не выходи из себя по пустякам.
Keep up courage. — Не отчаивайтесь.
Keep your temper. — Возьмите себя в руки.
Pull yourself together. — Возьмите себя в руки.
Things do happen. — Всякое бывает.

Things will come right. — Все обойдется. Все будет хорошо.
If I were you I shouldn't ... — На вашем месте я не стал бы ...
You'd better... — Вам бы лучше...
There is no getting a way from it. — От этого никуда не уйдешь.
It can't be helped. — Что ж, ничего не поделаешь.
You'll get over it. — Вы это переживете.
I'll do all in my power to help you. — Я сделаю все, что в моих силах, чтобы помочь вам.

WARNINGS, REPRIMANDS
(Предупреждения, выговоры)

Take care! Look out! Look ahead! — Берегись! Осторожно!
Keep your eyes open. — Не зевай. (Смотри в оба.)
Mind the steps. — Осторожнее, там ступеньки.
There, now. Didn't I tell you! — Вот видите. Разве я не говорил вам!
I must warn you. — Я должен предупредить вас.
It's too bad of you. — Это очень нехорошо с вашей стороны.
I won't have it. — Я этого не потерплю.
I won't hear it again. — Чтобы я этого больше не слышал.
You mustn't do such things! — Вы не должны этого делать.
You'd better watch out. — Ты у меня смотри!
None of your tricks! — Без фокусов!
You're looking for trouble, I see. — Вы напрашиваетесь на неприятности.
Mark my words. — Запомни мои слова.
Don't let me catch you do that again. — Чтобы больше ты этим не занимался.
Don't let me see your face again here. — Чтобы я тебя здесь больше не видел.
This is not to happen again. — Чтобы больше это не повторялось.
Be cautious and think twice. — Будьте осторожны и думайте хорошенько.
Don't you dare! If you dare! — Посмей только!
You'll get into trouble. — Вы когда-нибудь наживете себе беду.
Stop interfering into other people's affairs. — Прекрати вмешиваться в чужие дела.
Don't let your tongue loose. — Попридержи язык.
Don't what me. — Не приставайте ко мне с расспросами.
Don't let me down! — Не подводите меня.
Stop talking back. — Не дерзи.
I will teach him a lesson. — Я его проучу.

You'll better not or you'll regret. — Смотри, а то пожалеешь!
He will have to pay for it. — Ему это даром не пройдет.

ANGER. QUARREL
(Злоба. Ссора)

I'm angry with you. — Я на тебя сержусь.
I'm beside myself with rage. — Я вне себя от злости (гнева).
It made my blood boil. / *It made me see red.* — Это привело меня в бешенство.
It will drive me mad. — Это меня с ума сведет.
How awful (terrible, shocking)! — Ужасно!
It's ridiculous! — Это смешно.
How annoying! — Какая досада!
What a nuisance! — Какая досада!
What a shame! For shame! — Стыд! Позор!
Shame on you! — Как вам не стыдно!
How dare you! — Как вы смеете?
You've gone too far. — Вы забываетесь.
You're getting on my nerves. — Ты действуешь мне на нервы.
You always find fault with me. — Вы всегда придираетесь ко мне.
I'm fed up. — С меня хватит.
I'll tell you straight to your face. — Я скажу вам прямо в лицо.
I'll teach him a lesson. — Я его проучу.
I gave him a bit of my mind. — Я сказал ему, что я об этом думаю.
You'll catch it. — Ты еще получишь.
I like that! — Хорошенькое дело!
There it is! There you are! — Вот оно что! Ну и ну! Дожили!
Leave me alone! — Оставьте меня в покое!
What does it matter to you? — Какое вам дело?
It's none of your business! — Не ваше дело!
Mind your own business. — Не лезь в чужие дела.
Who do you take me for? — За кого вы меня принимаете?
That's the limit! — Это уж чересчур!
That was mean (dirty) of you. — Это подло с твоей стороны.
I've had enough of him. — Он мне надоел.
I can't stand him! — Я его терпеть не могу.
He was beside himself with anger. — Он был вне себя от злости.
He got mad. — Он рассвирепел.
I won't have any language here. — Прошу не ругаться.
Stop calling names. — Перестань ругаться (обзываться).
Control yourself. — Возьми себя в руки.
Keep your temper. — Возьми себя в руки.

КРАТКИЙ ГРАММАТИЧЕСКИЙ СПРАВОЧНИК

ГЛАГОЛ (THE VERB)

Глагол *to be*
в настоящем времени: I ***am***; he, she, it ***is***; we, you, they ***are***;
в прошедшем времени: I, he, she it ***was***, we, you, they ***were;***
в будущем времени: I, we ***shall be;*** he, she, it, you, they ***will be.***

Глагол to have
в настоящем времени: I, we, you, they ***have;*** he, she, it ***has;***
в прошедшем времени: I, he, she, it, we, you, they *had*;
в будущем времени: I, we ***shall have;*** he, she, it, you, they ***will have.***

Вопросы с глаголами ***to be*** и ***to have***:
1. ***Общие*** — ***Is*** Mike at home? ***Has*** he a computer?
2. ***Альтернативные*** — ***Is*** Mike at home *or* at school? **Has** he a bicycle *or* a computer?
3. ***Специальные*** — *Where* **is** Mike? *What* **has** he?
4. ***Разделительные*** — Mike **is** at home, **isn't he**? Mike **is not** at school, **is he**? Mike **has** a bicycle, **hasn't he**? Mike **has no** computer, **has he**?

ОБОРОТЫ *THERE IS, THERE ARE*

There is a new device here.

There are two more devices in the laboratory.

Is there a new device here?

Are there two more devices in the laboratory?

There is not any device here.

There are no devices in the lab.

ПОВЕЛИТЕЛЬНОЕ НАКЛОНЕНИЕ

1. Повеление для **2-го лица:**
Open the window — открой(те) окно; *Come in!* — входи(те).

2. Повеление для 1-го и 3-го лиц:
Let us (Let's) have a break. — Давай(те) сделаем перерыв.
Let Kate make some sandwiches. — Пусть Катя приготовит бутерброды.
Let them come in. — Пусть они войдут.

3. Отрицательная форма повелительного наклонения:
Don't be late! — Не опаздывай(те)!
Don't let him smoke here! — Пусть он здесь не курит.

ВРЕМЕНА ГРУППЫ SIMPLE (INDEFINITE)

The Present Simple Tense
(настоящее простое время)

I, we, you, they — V; he, she, it — V-s

Утвердительная форма	Вопросительная форма	Отрицательная форма
I work	***Do*** I work?	I ***do not*** work.
He work***s***	***Does*** he work?	He ***doesn't*** work.
She work***s***	***Does*** she work?	She ***doesn't*** work.
It work***s***	***Does*** it work?	It ***doesn't*** work.
We work	***Do*** we work?	We ***don't*** work.
You work	***Do*** you work?	You ***don't*** work.
They work	***Do*** they work?	They ***don't*** work.

1. Для Present Simple, выражающего обычное, постоянное действие, характерно употребление следующих слов: ***always*** — *всегда*, ***often, frequently*** — *часто*, ***seldom, rarely*** — *редко*, ***usually, generally*** — *обычно*, ***sometimes*** — *иногда*, ***every day (week, month, year)*** — *каждый день (неделю, месяц, год)*.

I usually get *up* at 7 o'clock. — Я обычно встаю в 7 часов.

He takes a shower in the morning. — Он принимает душ утром.

2. Для выражения действия в будущем вместо будущего времени употребляется настоящее в обстоятельственных придаточных предложениях времени и условия, которые вводятся союзами ***if*** — *если*, ***when*** — *когда*, ***till, until*** — *до тех пор, пока ... не*, ***as soon as*** — *как только*, ***as long as*** — *пока*, ***before*** — *прежде чем* и т. д.

If he comes I'll tell him this news. — Если он придет, я сообщу ему эту новость.

The Past Simple Tense
(прошедшее простое время)

Ved (правильный)
2 форма неправ. глагола

Утвердительная форма	Вопросительная форма	Отрицательная форма
I work***ed***	***Did*** I work?	I ***did not*** work
He work***ed***	***Did*** he work ?	He ***didn't*** work
She work***ed***	***Did*** she work?	She ***didn't*** work
It work***ed***	***Did*** it work?	It ***didn't*** work
We work***ed***	***Did*** we work?	We ***didn't*** work
You work***ed***	***Did*** you work?	You ***didn't*** work
They work***ed***	***Did*** they work?	They ***didn't*** work

Для Past Simple, выражающего совершившееся или совершавшееся действие в прошлом, характерно употребление следующих слов: ***yesterday*** *— вчера,* ***last week (month, year)*** *— на прошлой неделе (месяце, году),* ***an hour ago*** *— час тому назад,* ***at 7 o'clock*** *— в 7 часов,* ***the other day*** *— на днях,* ***on Monday*** *— в понедельник,* ***in 1945*** *— в 1945 году,* ***during the war*** *— во время войны и т. д.*

I **studied** at school *last year.* — Я учился в школе в прошлом году.

I **saw** him *yesterday.* — Я видел его вчера.

The Future Simple Tense
(будущее простое время)

Shall / will + V

Утвердительная форма	Вопросительная форма	Отрицательная форма
I ***shall*** work	***Shall*** I work?	I ***shall not*** work
He ***will*** work	***Will*** he work?	He ***will not*** work
She ***will*** work	***Will*** she work?	She ***will not*** work
It ***will*** work	***Will*** it work?	It ***will not*** work
We ***shall*** work	***Shall*** we work?	We ***shan't*** work
You ***will*** work	***Will*** you work?	You ***won't*** work
They ***will*** work	***Will*** they work?	They ***won't*** work

1. Для Future Simple, выражающего действие в будущем, характерно употребление следующих слов: ***tomorrow*** *— завтра,* ***the day after tomorrow*** *— послезавтра,* ***in a year (month, week)*** *— через год (месяц, неделю),* ***next week (year, month)*** *— на будущей неделе (году, месяце)* и др.

He ***will ring up*** *tomorrow.*	Он будет звонить (позвонит) завтра.
We ***shall not see*** her *till Sunday.*	Мы не увидим ее до воскресенья.

2. Future Simple ***не*** употребляется в придаточных предложениях времени и условия после союзов ***if*** *— если,* ***when*** *— когда,* ***as soon as*** *— как только,* ***after*** *— после того, как,* ***before*** *— прежде чем,* ***while*** *— в то время как,* ***till, until*** *— до тех пор пока ...не,* ***unless*** *— если только ...не.* В этих случаях *вместо* ***Future Simple*** *употребляется* ***Present Simple:***

If I can I shall talk to her.	Если я смогу, я поговорю с ней.

СТРАДАТЕЛЬНЫЙ ЗАЛОГ (PASSIVE VOICE)

be + P II

Simple (Indefinite) Tenses Passive		
Present	**Past**	**Future**
I ***am*** invited	I ***was*** invited	I ***shall be*** invited
He ***is*** invited	He ***was*** invited	He ***will be*** invited
She ***is*** invited	She ***was*** invited	She ***will be*** invited
It ***is*** invited	It ***was*** invited	It ***will be*** invited
We ***are*** invited	We ***were*** invited	We ***shall be*** invited
You ***are*** invited	You ***were*** invited	You ***will be*** invited
They ***are*** invited	They ***were*** invited	They ***will be*** invited

Действительный залог	**Страдательный залог**
People ***speak*** English all over the world.	English ***is spoken*** all over the world.
Mr. Smith ***taught*** English.	English ***was taught*** by Mr. Smith.
They **gave** me a letter.	1) *I* **was given** the letter. 2) *The letter* **was given** to me.

Непереходные глаголы, требующие предложного дополнения, сохраняют предлог в страдательном залоге:

They *laughed at* him.	He was laughed ***at***.
Они смеялись над ним.	Над ним смеялись.
We *shall send for* the doctor.	The doctor *will be sent for*.
Мы пошлем за доктором.	За доктором пошлют.

МОДАЛЬНЫЕ ГЛАГОЛЫ И ИХ ЭКВИВАЛЕНТЫ

Глагол ***can (could)*** — **to be able to** — выражает:
— *физическую или умственную способность* совершить действие;
— *удивление, сомнение* (в отрицательных и вопросительных предложениях).

I *can speak* English.	Я ***умею говорить*** по-английски.
Can he *speak* English?	***Может*** ли он (***неужели, разве*** он может) говорить по-английски?
He *cannot speak* English.	Он ***не может говорить (не может быть, чтобы он говорил)*** по-английски.
He *couldn't (was not able to) speak English.*	Он ***не мог (не умел, не был в состоянии говорить)*** по-английски.
He *will not be able to speak* English.	Он ***не сумеет (не в состоянии будет)*** говорить по-английски.

Глагол ***may (might)*** — **to be allowed to** — выражает:
— *разрешение;*
— *предположение.*

May I come in? — Yes, you *may.* — No, you *mustn't.*	***Можно*** войти? — Да, ***можно.*** — Нет, ***нельзя.***
She *will not be allowed to* go out, she is still ill.	Она ***не сможет (не разрешат)*** выходить, она все еще больна.
He *may know* her address.	Он, ***может быть (возможно),*** знает ее адрес.

Глагол ***must*** — **have to / be to** — выражает
— *необходимость* совершения действия;

— *приказание, совет;*
— *предположение.*

He *must go* there tomorrow.	Он ***должен (ему нужно)*** пойти туда завтра.
I *had to go* there.	Мне пришлось (нужно было) сходить туда.
He *will have to do* it.	Он ***должен будет (ему придется)*** сделать это.
Must I go there?	***Надо ли мне (должен ли я)*** идти туда?
— Yes, you *must.*	— Да, ***надо.***
— No, you *needn't.*	— Нет, ***не надо (нет необходимости).***
You *don't have to* go there.	Тебе не нужно ходить туда.
He *must* know her address.	Он, ***должно быть (вероятно),*** знает ее адрес.

Глаголы ***should, ought (to)*** выражают *моральный долг или совет.*

He *should /ought to/* help them.	Он должен (ему следует) помочь им.
You *ought to* have helped him.	Вам следовало бы ему помочь.

Глагол ***need*** выражает *необходимость* совершить действие и употребляется *только в вопросительных и отрицательных* предложениях.

Need he come so early?	Нужно ли ему приходить сюда?
You *needn't* come so early.	Вам не нужно приходить так рано.

ВРЕМЕНА ГРУППЫ CONTINUOUS (PROGRESSIVE)
(длительные времена)

Be + V-ing

The Present Continuous Tense **[*am/is/are* + *V-ing*]** выражает *длительное действие, происходящее в момент речи.*

He / she *is reading* a book now. Он/она *читает* книгу сейчас.

Утвердительная форма	Вопросительная форма	Отрицательная форма
I *am* work*ing*	*Am* I work*ing?*	I *am not* work*ing*
He *is* work*ing*	*Is* he work*ing?*	He *is not* work*ing*
She *is* work*ing*	*Is* she work*ing?*	She *is not* work*ing*
It *is* work*ing*	*Is* it work*ing?*	It *is not* work*ing*
We *are* work*ing*	*Are* we work*ing?*	We *aren't* work*ing*
You *are* work*ing*	*Are* you work*ing?*	You *aren't* work*ing*
They *are* work*ing*	*Are* they work*ing?*	They *aren't* work*ing*

The Past Continuous Tense **[*was / were* + *V-ing*]** выражает *прошедшее время в процессе его совершения, т.е. незаконченное длительное действие.*

He *was reading* a book at 5. Он *читал* книгу *в 5 часов.*

Утвердительная форма	Вопросительная форма	Отрицательная форма
I *was* work*ing*	*Was* I work*ing?*	I *wasn't* work*ing*
He *was* work*ing*	*Was* he work*ing?*	He *wasn't* work*ing*
She *was* work*ing*	*Was* she work*ing?*	She *wasn't* work*ing*
It *was* work*ing*	*Was* it work*ing?*	It *wasn't* work*ing*
We *were* work*ing*	*Were* we work*ing?*	We *weren't* work*ing*
You *were* work*ing*	*Were* you work*ing?*	You *weren't* work*ing*
They *were* work*ing*	*Were* they work*ing?*	They *weren't* work*ing*

The Future Continuous Tense **[*shall be / will be* + *V-ing*]** выражает *будущее действие в процессе его совершения, т.е. незаконченное длительное действие выражает будущее действие в процессе его совершения, т. е. незаконченное длительное действие.*

I *shall be working* when you come. *Я буду работать, когда ты придешь.*

Утвердительная форма	Вопросительная форма	Отрицательная форма
I *shall be* work*ing*	*Shall* I *be* work*ing*?	I *shan't be* work*ing*
He *will be* work*ing*	*Will* he *be* work*ing?*	He *will not (won't) be* work*ing*
She *will be* work*ing*	*Will* she *be* work*ing?*	She *won't be* work*ing*
It *will be* work*ing*	*Will* it *be* work*ing*?	It *won't be* work*ing*
We *shall be* work*ing*	*Shall* we *be* work*ing?*	We *shan't be* work*ing*

You *will be* work*ing*	*Will* you *be* work*ing?*	You *won't be* work*ing*
They *will be* work*ing*	*Will* they *be* work*ing?*	They *won't be* work*ing*

ВРЕМЕНА ГРУППЫ CONTINUOUS В СТРАДАТЕЛЬНОМ ЗАЛОГЕ

Be being + P II

Present Continuous Passive	Past Continuous Passive
The letter **is being typed (written) now.**	*The letter* was being typed (written) **from 5 to 6 o'clock.**
Письмо ***печатают (пишут)*** *сейчас.*	Письмо ***печатали (писали)*** *с 5 до 6 часов.*

ВРЕМЕНА ГРУППЫ PERFECT (Present, Past and Future Perfect Active Voice)

Have + P II

The Present Perfect Tense [have / has + P II] (настоящее совершенное время) выражает действие, совершившееся к настоящему моменту, результат которого имеется налицо в настоящем времени.

He *has* just *come.* Он только что *пришел.*

Утвердительная форма	Вопросительная форма	Отрицательная форма
I ***have*** work***ed***	***Have*** I work***ed***?	I ***haven***'t work***ed***
He ***has*** work***ed***	***Has*** he work***ed***?	He ***hasn***'t work***ed***
She ***has*** work***ed***	***Has*** she work***ed***?	She ***hasn***'t work***ed***
It ***has*** work***ed***	***Has*** it work***ed***?	It ***hasn***'t work***ed***
We ***have*** work***ed***	***Have*** we work***ed***?	We ***haven***'t work***ed***
You ***have*** work***ed***	***Have*** you work***ed***?	You ***haven***'t work***ed***
They ***have*** work***ed***	***Have*** they work***ed***?	They ***haven***'t work***ed***

1. Для Present Perfect характерно употребление наречий неопределенного вида: ***ever, never, already, yet, lately, just, recently*** и обстоятельственных слов, обозначающих еще не истекшие периоды времени: ***today, this week (month, year)*** и др., а также предлоги ***since, for.***

I *have never read* this book. — *Я никогда* не читал эту книгу.

Have you *read* the newspaper *today*? — Читал ли ты *сегодня* газету?

I *haven't seen* him *since* May. — Я не видел его *с* мая.

2. Present Perfect употребляется для выражения совершенного будущего действия (вместо Future Perfect) в обстоятельственных придаточных предложениях времени и условия, которые вводятся союзами ***after, when, as soon as, until, till.***

I'll give you the book *as soon as* I *have read* it. — Я дам тебе эту книгу, *как только я прочту* ее.

3. Сравните употребление Present Perfect и Past Simple в английском языке.

Вспомните еще раз слова, с которыми употребляются:

Present Perfect	**Past Simple**
Already, just, ever, never, yet, lately, recently, today, this week, this month, this year; since.	*Yesterda y, last week, last month, last year, an hour ago, on Sunday, at 5 o'clock, at that time.*

He ***has just written*** the letter. — Он *только что* ***написал*** письмо.

He ***wrote*** the letter *yesterday*. — Он ***написал*** письмо *вчера*.

THE PAST PERFECT TENSE [*had + P II*]

(прошедшее совершенное время)

Утвердительная форма	Вопросительная форма	Отрицательная форма
I ***had*** worked	***Had*** I worked?	I ***had***n't worked
He ***had*** worked	***Had*** he worked?	He ***had***n't worked
She ***had*** worked	***Had*** she worked?	She ***had***n't worked
It ***had*** worked	***Had*** it worked?	It ***had***n't worked
We ***had*** worked	***Had*** we worked?	We ***had***n't worked
You ***had*** worked	***Had*** you worked?	You ***had***n't worked
They ***had*** worked	***Had*** they worked?	They ***had***n't worked

Past Perfect выражает ***прошедшее*** действие, которое ***уже совершилось до определенного момента в прошлом.*** Момент, до которого завершилось действие в Past Perfect, может быть выражен:

а) следующими обозначениями времени: ***by 7 o'clock, by Sunday, by the end of the week (month, year), by that time*** и т. п., а также союзами: *after, before, when, hardly (scarcely) ... when, no sooner ... than.*

He hadn't finished reading that book *by 7 o'clock.*	Он не закончил чтение книги *до 7 часов.*

б) другим прошедшим действием, выраженным в Past Simple.

He had finished his work when *when came.*	Он закончил работу, *когда мы пришли.*

The Future Perfect Tense
(будущее совершенное время)

Shall / will have + P II

Утвердительная форма	Вопросительная форма	Отрицательная форма
I ***shall have*** worked	***Shall*** I ***have*** worked?	I ***shan't have*** worked
He ***will have*** worked	***Will*** he ***have*** worked?	He ***won't have*** worked
She ***will have*** worked	***Will*** she ***have*** worked?	She ***won't have*** worked
It ***will have*** worked	***Will*** it ***have*** worked?	It ***won't have*** worked
We ***shall have*** worked	***Shall*** we ***have*** worked?	We ***shan't have*** worked
You ***will have*** worked	***Will*** you ***have*** worked?	You ***won't have*** worked
They ***will have*** worked	***Will*** they ***have*** worked?	They ***won't have*** worked

Future Perfect употребляется для выражения *будущего* действия, которое *совершится до определенного момента в будущем.* Момент, до которого совершится действие, может быть указан:

а) обозначениями времени: ***by 6 o'clock, by Sunday, by the 7-th of December, by the end of the week (month, year), by that time*** и т. п.

I shall have finished my work *by 5.*	Я закончу свою работу *к 5 часам.*

б) другим будущим действием, выраженным глаголом в Present Simple, или в Present Perfect в придаточных предложениях времени и условия (в которых вместо будущего употребляется настоящее время).

The train will have left *by the time we get to the station.*	Поезд уже уйдет *к тому времени, как мы приедем на вокзал.*

ВРЕМЕНА ГРУППЫ PERFECT В СТРАДАТЕЛЬНОМ ЗАЛОГЕ

Present Perfect Passive	Past Perfect Passive	Future Perfect Passive
Have/has been + PII	*Had + P II*	Shall/will have + PII
The letter ***has*** just ***been typed.***	The letter ***had been typed*** by 5 o'clock.	The letter ***will have been typed*** by 5 o'clock.
Письмо только что напечатали.	Письмо напечатали до 5 часов.	Письмо напечатают до 5 часов.

ВРЕМЕНА ГРУППЫ PERFECT CONTINUOUS
(Present, Past and Future Perfect Continuous Active Voice)

Have been + V-ing

The Present Perfect Continuous Tense *[have / has been + V-ing]*
(настоящее совершенное длительное время)

Утвердительная форма	Вопросительная форма	Отрицательная форма
I ***have been*** work***ing***	***Have I been*** work***ing***?	I ***haven't been*** work***ing***
He ***has been*** work***ing***	***Has*** he ***been*** work***ing***?	He ***has not been*** work***ing***
She ***has been*** work***ing***	***Has*** she ***been*** work***ing***?	She ***has not been*** work***ing***
It ***has been*** work***ing***	***Has*** it ***been*** work***ing***?	It ***hasn't been*** work***ing***
We ***have been*** work***ing***	***Have*** we ***been*** work***ing***?	We ***have not been*** work***ing***
You ***have been*** work***ing***	***Have*** you ***been*** work***ing***?	You ***haven't been*** work***ing***
They ***have been*** work***ing***	***Have*** they ***been*** work***ing***?	They ***haven't been*** work***ing***

Present Perfect Continuous употребляется для выражения *длительного действия, которое началось в прошлом и еще совершается в настоящее время*. Present Perfect Continuous употребляется с такими обозначениями времени, как ***for an hour, for a month, for a long time, lately, since yesterday*** и т. п., а также в вопросах, начинающихся с ***how long?*** и ***since when?***

Since when have you *been working* at this plant?

С каких пор вы *работаете* на этом заводе?

I*'ve been* work*ing* here *since* I came to this town.

Я работаю здесь *с тех пор*, как приехал в этот город.

The Past Perfect Continuous Tense *[had been + V-ing]*
(прошедшее совершенное длительное время)

Утвердительная форма	Вопросительная форма	Отрицательная форма
I ***had been*** working	***Had*** I ***been*** working?	I ***hadn't been*** working
He ***had been*** working	***Had*** he ***been*** working?	He ***had not been*** working
She ***had been*** working	***Had*** she ***been*** working?	She ***had not been*** working
It ***had been*** working	***Had*** it ***been*** working?	It ***hadn't been*** working
We ***had been*** working	***Had*** we ***been*** working?	We ***had not been*** working
You ***had been*** working	***Had*** you ***been*** working?	You ***had not been*** working
They ***had been*** working	***Had*** they ***been*** working?	They ***hadn't been*** working

Past Perfect Continuous употребляется для выражения *длительного прошедшего действия, начавшегося ранее другого прошедшего действия,* выраженного Past Simple *и еще происходившего в момент его наступления.* Past Perfect Continuous употребляется, когда указан период времени, в течение которого действие уже совершалось, т.е. с такими обозначениями времени, как ***for two hours, for three months, for a long time*** и т.п.

I *had been* working *for 2 hours* when Mike came. — Я (уже) 2 часа работал, когда пришел Миша.

The Future Perfect Continuous *[shall /will have been + V-ing]*
(будущее совершенное длительное время)

Утвердительная форма	Вопросительная форма	Отрицательная форма
I ***shall have been*** working	***Shall*** I ***have been*** working?	I ***shall not have been*** working
He ***will have been*** working	***Will*** he ***have been*** working?	He ***will not have been*** working
She ***will have been*** working	***Will*** she ***have been*** working?	She ***will not have been*** working
It ***will have been*** working	***Will*** it ***have been*** working?	It ***will not have been*** working
We ***shall have been*** working	***Shall*** we ***have been*** working?	We ***shall not have been*** working
You ***will have been*** working	***Will*** you ***have been*** working?	You ***will not have been*** working
They ***will have been*** working	***Will*** they ***have been*** working?	They ***will not have been*** working

Future Perfect Continuous употребляется для выражения *длительного будущего действия, которое начнется ранее другого будущего действия* (или момента) *и будет еще совершаться в момент*

его наступления. Как и другие времена этой группы, Future Perfect Continuous употребляется, когда указан период времени, в течение которого действие будет совершаться.

By the next April he *will have been working* here for 20 years. — *К следующему апрелю* он *будет работать* здесь уже 20 лет.

СВОДНАЯ ТАБЛИЦА ВРЕМЕН В ДЕЙСТВИТЕЛЬНОМ ЗАЛОГЕ

Tense	PRESENT	PAST	FUTURE
Simple	I ***work*** — Я работаю He ***writes*** — Он пишет	I ***worked*** — Я работал He ***wrote*** — Он писал	I ***shall*** work — Я буду работать He ***will write*** — Он напишет, будет писать
Continuous	I ***am working*** — Я работаю He ***is writing*** — Он пишет	I ***was working*** — Я работал We ***were writing*** — Мы писали	I ***shall be working*** — Я буду работать He ***will be writing*** Он будет писать
Perfect	I ***have worked*** — Я отработал He ***has written*** — Он написал	I ***had worked*** — Я отработал He ***had written*** — Он написал.	I ***shall have worked*** — Я отработаю He ***will have written*** — Он напишет
Perfect Continuous	I ***have been working*** — Я работаю He ***has been writing*** — Он пишет	I ***had been working*** — Я работал He ***had been writing*** — Он писал	I ***shall have been working*** — Я буду работать He ***will have been writing*** — Он будет писать

СОПОСТАВЛЕНИЕ РУССКИХ И АНГЛИЙСКИХ ВРЕМЕН В ДЕЙСТВИТЕЛЬНОМ ЗАЛОГЕ

Все 12 английских глагольных времен действительного залога переводятся на русский язык тремя (настоящим, прошедшим и будущим) временами глаголов совершенного и несовершенного вида. При этом часто используются различные уточняющие слова: сейчас, уже, еще и т.д.

I. Настоящее время — *я читаю.*

1. Я ***читаю*** газеты *каждый день.* (Обычное действие.) — I ***read*** newspapers *every day. (Present Simple).*

2. Я ***читаю*** газету *сейчас.* (Длительное действие, совершающееся в момент речи.)	I ***am reading*** a newspaper *now. (Present Continuous).*
3. Я ***читаю*** газету *уже час.* (Длительное действие, совершающееся в момент речи, с указанием, как долго оно совершается.)	I ***have been reading*** the newspaper *for an hour. (Present Perfect Continuous).*

II. Прошедшее время — *я читал, я прочитал.*

1. Я ***читал (прочитал)*** эту книгу *вчера.* (Действие, совершившееся в истекшем отрезке времени.)	I ***read*** the book *yesterday. (Past Simple).*
2. Я ***читал*** книгу, *когда он пришел.* (Длительное действие, совершавшееся в определенный момент в прошлом.)	I ***was reading*** the book *when he came (Past Continuous).*
3. Я *уже* ***прочитал*** эту книгу. (Прошедшее действие, результат которого налицо в настоящем времени — могу рассказать вам ее содержание.)	I ***have already read*** the book. *(Present Perfect).*
4. Я ***прочитал*** эту книгу, *до того как он пришел.* (Действие, совершившееся до определенного момента в прошлом.)	I ***had read*** the book *before he came. (Past Perfect).*
5. Я **читал** книгу *уже час*, когда он пришел. (Длительное действие, совершавшееся в определенный момент в прошлом, с указанием как долго оно совершалось.)	I ***had been reading*** the book *for an hour* when he came. (*Past Perfect Continuous).*

III. Будущее время — *я буду читать, я прочитаю.*

1. Я ***буду читать (прочитаю)*** эту книгу *завтра.* (Действие, которое совершится в будущем.)	I ***shall read*** this book *tomorrow. (Future Simple).*
2. Я ***буду читать*** эту книгу, *когда он придет.* (Длительное действие, которое будет совершаться в определенный момент в будущем.)	I ***shall be reading*** the book when *he comes.* (*Future Continuous).*
3. Я ***уже прочитаю*** эту книгу, когда он придет. (Действие, которое совершится до оп ределенного момента в будущем.)	I ***shall have read*** the book when he comes. *(Future Perfect).*

4. К тому времени я ***буду читать*** книгу уже несколько часов. (Длительное действие, которое будет совершаться в определенный момент в будущем, с указанием, как долго оно будет продолжаться.)	I ***shall have been reading*** the book for some hours by that time. *(Future Perfect Continuous).*

СОПОСТАВЛЕНИЕ РУССКИХ И АНГЛИЙСКИХ ВРЕМЕН В СТРАДАТЕЛЬНОМ ЗАЛОГЕ

I. Настоящее время — *Газеты печатают.*

1. Газеты обычно ***печатают*** ночью. (Обычное действие.)	1. Newspapers ***are printed*** every day. *(Present Simple Passive).*
2. Газеты ***печатают*** сейчас. (Длительное действие в момент речи.)	2. Newspapers ***are being printed*** now. *(Present Continuous Passive).*
3. Газеты ***печатают вот уже 2 часа.*** (Длительное действие, совершающееся в момент речи с указанием как долго оно совершается.)	3. Newspapers ***have been printed for 2 hours.*** *(Present Perfect Passive).*

II. Прошедшее время — *Газеты печатали.*

1. Газеты ***напечатали вчера.*** (Действие, совершившееся в истекшем отрезке времени.)	1. Newspapers ***were printed*** *yesterday. (Past Simple Passive).*
2. Газеты ***печатали весь день.*** (Действие, совершавшееся в определенный момент в прошлом.)	2. Newspapers ***were being printed*** *all day long yesterday. (Past Continuous Passive).*
3. Газеты *только что* ***напечатали.*** (Совершившееся действие, результат которого налицо.)	3. Newspapers ***have just been printed.*** *(Present Perfect Passive).*

4. Газеты ***напечатали до нашего прихода***. Газеты ***печатали 5 часов до того, как мы пришли.*** (Действие, совершившееся до указанного момента в прошлом или совершавшееся в определенный момент в прошлом с указанием как долго оно совершалось.)

4. Newspapers ***had been printed*** (for five hours) *before we came. (Past Perfect Passive).*

III. Будущее время — *Газеты напечатают.*

1. Газеты ***напечатают завтра***. (Действие, которое будет совершаться в будущем.)

1. Newspapers ***will be printed*** *tomorrow. (Future Simple Passive).*

2. Газеты ***будут напечатаны к 6 часам утра***. (Действие, которое уже совершится к определенному моменту в будущем.)

2. Newspapers ***will have been printed*** *by 6 o'clock in the morning. (Future Perfect Passive).*

ПОСЛЕДОВАТЕЛЬНОСТЬ ВРЕМЕН
(Sequence of Tenses)

1. Если сказуемое главного предложения выражено ***настоящим или будущим*** временем, то сказуемое придаточного предложения может быть выражено *любым, требуемым по смыслу временем.*

I *believe* I'll be in time today. Думаю, я буду сегодня вовремя.

2. Но если сказуемое главного предложения выражено глаголом в одной из форм ***прошедшего времени***, то глагол-сказуемое придаточного предложения должен стоять ***в одной из форм прошедшего времени или будущего в прошедшем*** *(Future in the Past).*

Одновременное действие

Для выражения действия, одновременного с действием, выраженным глаголом-сказуемым главного предложения, ***глагол-сказуемое придаточного предложения*** употребляется обычно в *Past Simple* и *Past Continuous* (иногда в *Past Perfect Continuous* или в *Past Perfect).* В соответствующем русском предложении употребляется настоящее время.

I knew that Peter *lived* in Moscow. — Я знал, что Петр *живет* в Москве.

Предшествующее действие

Для выражения действия, предшествующего действию, выраженному глаголом-сказуемым главного предложения, ***глагол-сказуемое придаточного предложения употребляется*** в *Past Perfect* или *Past Perfect Continuous.* В соответствующем русском придаточном предложении употребляется ***прошедшее время.***

I knew that Peter *had lived* in Kiev. — Я знал, что Петр *жил* в Киеве.

Последующее действие

Для выражения последующего действия, т.е. действия, которое является будущим по отношению к действию, выраженному глаголом-сказуемым главного предложения, глагол-сказуемое придаточного предложения употребляется в одной из форм будущего в прошедшем (*Future in the Past).* В соответствующем русском предложении употребляется будущее время.

I thought he would ring. — Я думала, что он позвонит.

Формы Future in the Past

Simple	I said that I ***should write*** a letter to him.	Я сказал, что напишу ему письмо.
Continuous	I said I ***should be writing*** a letter at 5 o'clock.	Я сказал, что буду писать письмо в 5 часов.
Perfect	I said I ***should have written*** the letter by 5 o'clock.	Я сказал, что напишу письмо к 5 часам.
Perfect Continuous	I said I ***should have been writing*** the letter for an hour when you came.	Я сказал, что я (уже) буду писать письмо час, когда ты придешь.

ПРЯМАЯ И КОСВЕННАЯ РЕЧЬ
Direct and Indirect Speech

Прямая речь	***Косвенная речь***
He says, "I am clever".	He says *that he* is clever.
Он говорит: "Я умный".	Он говорит, что он умный.

1. Повествовательное предложение

При обращении повествовательного предложения из прямой речи в косвенную производятся следующие изменения:

— *Кавычки опускаются.* Косвенная речь вводится союзом *that* (или без него).

— Личные и притяжательные *местоимения* прямой речи *заменяются* по смыслу, как и в русском языке.

— *Указательные местоимения и наречия времени заменяются* в косвенной речи по смыслу другими словами, как и в русском языке, следующим образом:

this, these	заменяется	that, those
now / today	«	then / that day
tomorrow	«	the next day
the day after tomorrow	«	two days later
yesterday	«	the day before
the day before yesterday	«	two days before
last week / year	«	the previous week / year
ago	«	before
next year	«	the next year, the following year
here	«	there

— Действует правило согласования времен (см. выше)

He *says*, "I am a student". — He says that *he is* a student.

Если *глагол в главном предложении стоит в прошедшем времени, то время глагола прямой речи заменяется* в косвенной речи следующим образом:

Present Simple заменяется на *Past Simple*
Present Continuous заменяется на *Past Continuous*
Present Perfect заменяется на *Past Perfect*
Present Perfect Continuous заменяется на *Past Perfect Continuous*
Past Simple заменяется на *Past Perfect*
Past Continuous заменяется на *Past Perfect Continuous*
Future Simple, *Future Continuous*, *Future Perfect* } заменяются на *Future in the Past*

"***I am*** ill."		***he was*** ill.
"***I enjoy music.***"		***he enjoyed*** music.
"***I am watching*** TV."	*He said that*	***he was watching*** TV.
"***I went*** to Moscow in May."		***he had gone*** to Moscow in May.

"***I have*** never ***seen this*** film."	***he had*** never ***seen that*** film.
"***I was learning*** the poem."	***he had been learning*** the poem.
"***I shall call*** the doctor."	***he would call*** the doctor.
"***I can help*** you."	***he could help*** me.

2. Вопросительное предложение

— При обращении ***специальных вопросов*** в косвенные вопросительный порядок слов прямого вопроса *заменяется прямым порядком слов*, т.е. сказуемое ставится после подлежащего. Далее производятся те же изменения, как и при обращении в косвенную речь повествовательных предложений.

— При обращении ***общих вопросов*** в косвенные, косвенный вопрос присоединяется к главному предложению при помощи союзов *whether* или *if*, имеющих значение частицы ***ли***. Далее производятся те же изменения, как и при обращении в косвенную речь вопроса, начинающегося с вопросительного слова (т.е. *последовательность времен, прямой порядок слов в косвенном вопросе и изменение указательных местоимений и наречий времени*).

*"Where **is*** the shop?"		*where* the shop ***was.***
*"When **are you arriving?***"		***when I was arriving.***
"***How do you feel*** yourself?"		*how* I ***felt*** myself.
"***Do you speak*** English?"	*He asked me*	***if I spoke*** English.
"***Have you seen*** Fred?"		if I ***had seen*** Fred.
"***Will*** you ***come*** to see me?"		if I ***would come*** to see her.

3. Повелительное предложение

Когда прямая речь представляет собой повелительное предложение, то при обращении ее в косвенную речь:

— Глагол say (сказать) в словах, вводящих прямую речь, заменяется глаголами ***tell*** (велеть, сказать), ***ask*** (просить) или ***order*** (приказывать).

— Повелительное наклонение заменяется в косвенной речи неопределенной формой глагола. Отрицательная форма повелительного наклонения заменяется инфинитивом с частицей *not*.

"***Stop*** smoking!"	***He told me to stop*** smoking.
"***Don't worry!***"	***He asked me not to worry.***

НЕЛИЧНЫЕ ФОРМЫ ГЛАГОЛА

ПРИЧАСТИЕ (PARTICIPLE)

Причастие в английском языке соответствует русскому причастию и деепричастию (деепричастие как часть речи в английском языке отсутствует). Поэтому причастие обладает свойствами как прилагательного, выполняя в предложении функцию ***определения***, так и деепричастия, являясь в предложении ***обстоятельством***.

Существуют следующие формы причастий в действительном и страдательном залогах

Participle	Active	Passive
Present	*Using*	*Being used*
Past	—	*Used*
Perfect	*Having used*	*Having been used*

PARTICIPLE I

Participle I (Present Participle Active)

В функции ***определения*** Participle I (P I) соответствует русскому причастию с суффиксами: ***-ащ, -ящ, -ущ, -ющ, -вш.***

The man *reading* a newspaper was sitting at the window.	Мужчина, чита***ющ***ий газету, сидел у окна.

В функции ***обстоятельства*** P I соответствует русскому деепричастию с окончаниями: ***-ая, -яя*** и переводится на русский язык деепричастием или придаточным предложением времени (когда, в то время как ...), причины (так как ...) и др. Перед таким причастием могут стоять слова *when, while.*

When going home I met Mike.	Идя домой, я встретил Мишу.

Participle I (Present Participle Passive) соответствует русскому страдательному причастию на ***-мый, -щийся*** (в функции определения) и ***«будучи построенным»*** (в функции обстоятельства).

The large house *being built* in our street is a new school.
Большое здание, строя***щееся*** на нашей улице, новая школа.

Being built the new school looked very beautiful.	***Будучи построенной*** (когда ее построили), новая школа выглядела красиво.

PARTICIPLE II (Past Participle Passive)

Participle II соответствует русскому страдательному причастию настоящего времени, оканчивающемуся на ***-емый,*** и причастию прошедшего времени на ***-анный, -енный, -тый,*** а также действительным причастиям со страдательным значением, оканчивающимся на ***-щийся, -вшийся.***

В функции ***определения*** PII употребляется как перед существительным, так и после него.

A *broken* cup lay on the table.	***Разбитая*** чашка лежала на столе.
Books *published* for children are usually well illustrated.	Книги, ***издаваемые*** для детей, обычно хорошо иллюстрированы.

В функции ***обстоятельства*** PII употребляется в причастных оборотах для выражения обстоятельства причины, времени, условия и др. В этом случае перед причастием II иногда стоят ***союзы when, while, if, as, though, although.*** Такие причастные обороты переводятся на русский язык, как правило, придаточными предложениями (иногда сочетанием «будучи + причастие»).

Ice melts *when heated.*	Лед тает, ***будучи нагретым.***

PERFECT PARTICIPLE

Perfect Participle Active (перфектное причастие в действительном залоге) соответствует в русском языке ***деепричастию совершенного вида,*** оканчивающемуся на ***-в*** и ***-я***: *having done — сделав, having come — придя.*

Perfect Participle Active выражает действие, ***предшествующее*** действию, выраженному глаголом в личной форме и употребляется в функции обстоятельства в причастных оборотах для выражения обстоятельства времени и причины.

The designer left the office *having looked* through all the documents.	Конструктор ушел из конторы, ***просмотрев*** все документы.

Perfect Participle Passive

Perfect Participle Passive (перфектное причастие в страдательном залоге) употребляется в функции обстоятельства в причастных оборотах, выражая действие, ***предшествующее*** действию, выраженному глаголом в личной форме. На русский язык такое причастие переводится придаточным предложением времени или причины (после того, как ..., так как ...).

Having been regulated properly the equipment operated well.	*После того, как* оборудование как следует отрегулировали, оно хорошо работало.

САМОСТОЯТЕЛЬНЫЙ ПРИЧАСТНЫЙ ОБОРОТ
(Absolute Participle Construction)

Обороты, в которых причастие 1) выражает действие, не относящееся к лицу (предмету), обозначенному подлежащим предложения, и 2) имеет собственное подлежащее, стоящее непосредственно перед причастием, называются самостоятельными причастными оборотами.

Если такой оборот стоит в начале предложения, он переводится на русский язык придаточным предложением времени, причины, условия со словами: *так как, если, когда* (I). Если подобный оборот находится в конце предложения, он переводится самостоятельным предложением, перед которым стоит один из сочинительных союзов *(а, и, но, причем, следовательно)* (II).

I. *Electrons flowing in the conductor*, electric current is generated.	(Так как, если) ***Когда*** электроны передвигаются по проводнику, вырабатывается электрический ток.
II. Electrons flow in the conductor, *electric current being generated.*	Электроны протекают по проводнику ***и*** (причем, следовательно) вырабатывается электрический ток.

Оборот «Объектный падеж с причастием»

Оборот «Объектный падеж *с **причастием I*** и ***причастием II***» употребляется после глаголов, выражающих восприятие, желание — *to see, to hear, to watch, to observe, to notice, to feel* и др.

I saw him *crossing* the street.	Я видел, как он *переходил* улицу.
I had my hair *cut* yesterday.	Я вчера постригся (меня постригли).

ГЕРУНДИЙ (THE GERUND)

1. Герундий представляет собой неличную форму глагола и обладает как свойствами глагола, так и свойствами существитель-

ного. На русский язык герундий переводится существительным, глаголом, иногда — деепричастием или придаточным предложением.

Герундий имеет формы времени и залога.

Gerund	Active	Passive
Indefinite	*Reading*	*being read*
Perfect	*having read*	*having been read*

2. Наиболее часто герундий употребляется после предлогов в функции предложного косвенного дополнения, определения, обстоятельства:

You will improve your pronunciation *by reading* aloud. — Вы улучшите произношение, *читая (путем чтения)* вслух.

3. ***Герундиальный оборот*** — это сочетание притяжательного местоимения или существительного в притяжательном или общем падеже с герундием. Такие обороты переводятся на русский язык придаточными предложениями.

The teacher insisted on *our reading* that article. — Учитель настаивал на том, чтобы мы *прочли* эту статью.

ИНФИНИТИВ (THE INFINITIVE)

1. Инфинитив соответствует в русском языке неопределенной форме глагола, которая отвечает на вопрос «что делать?». Признаком инфинитива является частица ***to***: ***to*** read, ***to*** write. Формы инфинитива:

Infinitive	Active	Passive
Indefinite	*to ask*	*to be asked*
Continuous	*to be asking*	—
Perfect	*to have asked*	*to have been asked*
Perfect Continuous	*to have been asking*	—

2. Инфинитив употребляется ***без частицы to:***

после модальных глаголов ***can (could), may (might), must и need;*** после глаголов ***to let, to make, to help,*** а также в конструкции «Объектный падеж с инфинитивом» (см. ниже) после глаголов ***to see, to hear, to feel, to watch*** и др.

You *must read* this book. — Вам нужно прочесть эту книгу.

Let him *read* the note.	Пусть он прочтет записку
I *saw* him *read* the book.	Я видел, как он читал книгу.

ИНФИНИТИВНЫЕ КОНСТРУКЦИИ

Конструкция «For + существительное (местоимение) + инфинитив»

This is *for you to decide.*	Это вы должны решать.

Конструкция «Объектный падеж с инфинитивом» (Objective with the Infinitive)

Конструкция «Объектный падеж с инфинитивом», или «Сложное дополнение», представляет собой сочетание существительного в общем падеже или местоимения в объектном падеже с инфинитивом. На русский язык эта конструкция переводится дополнительным придаточным предложением.

Эта конструкция употребляется после ряда глаголов, выражающих:

а) желание: ***to want; to wish, to desire; should (would) like; to like; to hate.***

I like *people to tell* the truth.	Я люблю, *когда люди говорят правду.*

б) предположение: ***to expect; to think; to believe, to suppose; to consider; to find; to know.***

I suppose *her to be* in Kiev now.	Я полагаю, *что она в Киеве сейчас.*

в) приказание: ***to order, to command; to ask; to allow.***

He ordered *me to learn* the rule.	Он приказал, *чтобы я выучил правило.*

г) восприятие: ***to see; to hear; to watch, to observe; to feel; to notice*** (после этой группы глаголов частица «to» перед инфинитивом опускается).

I heard *Ann play* the piano.	Я слышал, *как Анна играла на пианино.*

Конструкция «Именительный падеж с инфинитивом» (Nominative with the Infinitive)

1. Сложноподчиненное предложение, в котором главное предложение представляет собой безличный оборот типа it is said — говорят, it is reported — сообщают и т. д., в английском языке обычно заменяется простым предложением. В простом предложении подлежащим являются два слова: Ann + to speak, (а сказуемым — is said). Такое сложное подлежащее представляет собой конструкцию «Именительный падеж с инфинитивом», или «Сложное подлежащее».

It is said that Ann speaks English well. — Говорят, что Анна хорошо говорит по-английски.

Ann is said to speak English well.

2. *Indefinite Infinitive* в этой конструкции выражает действие ***одновременное*** с действием, выраженным глаголом в личной форме и переводится на русский язык ***настоящим временем.***

He is supposed *to live* here. — Полагают, что он живет здесь.

3. *Perfect Infinitive* выражает действие, ***предшествующее*** действию, выраженному глаголом в личной форме и, следовательно, переводится на русский язык ***прошедшим временем.***

He is supposed *to have lived* in Moscow. — Полагают, что он жил в Москве.

4. Конструкция «Именительный падеж с инфинитивом» употребляется со сказуемыми, выраженными следующими

а) глаголами в страдательном залоге:

is/are said — говорят;	*was/were said* — говорили;
is/are stated — утверждают;	*was/were stated* — утверждали;
is/are reported — сообщают;	*w as/were reported* — сообщили;
is/are considered — считают;	*was/were considered* — считали;
is/are expected — ожидают;	*was/were expected* — ожидали;
is/are supposed — полагают;	*was/were supposed* — полагали;
is/are believed — полагают;	*was/were believed* — полагали;
is/are thought — думают;	*was/were thought* — думали;
is/are known — известно;	*was/were known* — было известно;

Nanotechnologies are expected to have a great future. — Полагают, что нанотехнологии имеют большое будущее.

b) глаголами в действительном залоге:

seems, appears — кажется; *proves, turns out* — оказывается; *happens* — случается, оказывается;	*seemed, appeared* — казалось; *proved, turned out* — оказалось; *happened* — случилось, оказалось.

They seemed to have known about it.	Они, казалось, знали об этом.

c) прилагательными с глаголом-связкой:
is / are likely — вероятно; *is / are unlikely* — маловероятно; *is / are certain* — наверно; *is / are sure* — непременно.

He is unlikely to come today.	Он, ***вероятно, не*** придет сегодня.

СОСЛАГАТЕЛЬНОЕ НАКЛОНЕНИЕ
(The Subjunctive Mood)

Форма сослагательного наклонения в русском языке (*сделал бы, прочитал бы*) выражается несколькими формами в английском языке.

	Главное предложение	**Придаточное предложение**
Действие, относящееся к **настоящему**	I / we **should + Inf** He/ she/ **would + Inf** you / they	a) **be, have, know** b) **were, had, knew**
Действие, относящееся к **прошлому**	**should + Perf. Inf** **would + Perf. Inf**	**had been** **had known**

Сослагательное наклонение употребляется:
1. В простых предложениях.

I *should like* to become a designer.	*Я хотел бы* стать дизайнером.

2. В сложноподчиненных предложениях.
а) ***в придаточных предложениях подлежащих*** после безличных оборотов типа: ***It is necessary*** *— необходимо;* ***It is important*** *— важно;* ***It is desirable*** *— желательно;* ***It is (im)possible*** *— (не)возможно;* ***It is probable*** *— вероятно;* ***It is required*** *— требуется* и т. д.

It is necessary that the device *should be repaired* immediately.	*Необходимо, чтобы* прибор немедленно *отремонтировали.*

б) ***в дополнительных придаточных предложениях*** после глаголов ***to order — приказывать; to insist — настаивать; to demand — требовать; to suggest, to propose — предлагать; to recommend — рекомендовать; to advise — советовать; to desire, to wish — желать.***

I wish he were here now. *Жаль, что его* здесь *нет* сейчас.

в) ***в придаточных предложениях цели*** с союзами ***that — чтобы; so that — так чтобы; lest — чтобы не; in order that — для того чтобы.***

Write down my address *lest* you *should forget it.* Запишите мой адрес, *чтобы* вы *не забыли его.*

г) ***в придаточных предложениях сравнения*** с союзами ***as if, as though — как будто, как если бы.***

He speaks English *as if he were a real Englishman.* Он говорит по-английски, *как будто он настоящий англичанин.*

д) ***в придаточных уступительных*** с союзами ***though, although — хотя; even if, even though — даже если; whoever, no matter who — кто бы ни; whatever, no matter what — что бы ни; wherever, no matter where — где бы ни, куда бы ни; whenever — когда бы ни; however — как бы ни.***

However busy he (is, may be) should be he always helps us. *Как бы занят он ни был,* он всегда помогает нам.

е) ***в придаточных предложениях условия.***

If he *had been there yesterday,* he *would have helped* us. *Если бы он был там вчера, он бы* нам помог.

УСЛОВНЫЕ ПРЕДЛОЖЕНИЯ
(Conditional Sentences)

Придаточные предложения условия в сложноподчиненных предложениях бывают трех типов.

1. Первый тип условных предложений выражает *осуществимое условие*, относящееся к ***будущему времени.***

If I am free I'll ring you up. *Если я буду свободен,* я позвоню тебе.

2. Второй тип условных предложений выражает *маловероятное условие*, относящееся к ***настоящему или будущему времени.***

If he had the book he would give it to you. — *Если бы у него была эта книга,* он бы дал ее тебе.

3. Третий тип условных предложений составляют предложения, выражающие ***неосуществимые предположения,*** относящиеся ***к прошедшему времени.***

If I had been free yesterday, *I should have rung* you up. — *Если бы я был свободен вчера, я бы* позвонил тебе.

Типы предложений	Главное предложение. Придаточное предложение
Сложное предложение *реального* условия	You **will pass** your exam if you *study* very hard. Ты сдашь экзамен, если будешь прилежно учиться.
Сложное предложение *нереального условия в настоящем и будущем* времени	You **would pass** your exam if you **studied** hard. Ты бы сдал экзамен, если бы прилежно учился.
Сложное предложение *нереального условия в прошедшем* времени	You **would have passed** your exam yesterday if you **had studied** hard during the term. Ты бы сдал экзамен вчера, если бы прилежно учился в семестре.

НАРЕЧИЕ (THE ADVERB)

Наречия классифицируются по значению следующим образом:

К наречиям места относятся: *here* — здесь, сюда; *there* — там, туда; *where* — где, куда; *somewhere, anywhere* — где-то, где-нибудь; *nowhere* — нигде, никуда; *elsewhere* — где-нибудь (в другом месте), *far, far away, far off* — далеко; *near* — близко; *inside* — внутрь, внутри; *outside* — снаружи; *below* — внизу и др.

Is the station *far away?* — Вокзал *далеко?*

К наречиям времени относятся *when* — когда; *now* — сейчас; *then* — тогда, потом, затем; *before* — прежде, раньше; *after* — потом, после; *ever* — когда-либо; *never* — никогда; *just* — только что; *always* — всегда; *often* — часто; *seldom* — редко; *usually* — обычно; *sometimes* — иногда; *already, yet* — уже; *yet* — еще, пока еще; *early* — рано; *late* — поздно; *soon* — скоро, вскоре; *lately* — (за) последнее время; *recently* — недавно; *since* — с тех пор; *long* — давно, долго; *ago* — тому назад; *today* — сегодня; *tomorrow* — завтра; *yesterday* — вчера и др., а также некоторые составные наречия: *before now* — раньше, до сих пор; *before long* — вскоре; *by now* — к настоящему времени; *since then* — с того времени; *up to now* — до

настоящего времени; *long ago* — давно; *long before* — задолго до этого; *just now* — только что; *how long* — как долго; *long before* — задолго до этого; *later on* — позже и др.

They haven't come back *yet.* Они *еще* не вернулись.

К наречиям образа действия относятся: *fast, quickly* — быстро; *slowly* — медленно; *quietly* — спокойно, тихо; *easily* — легко; *well* — хорошо и др. Большинство этих наречий стоят, как правило, после глагола.

Have you rested *well*? ***Хорошо*** ли вы отдохнули?

К наречиям меры и степени относятся: *much* — много, намного, гораздо, значительно; *little* — мало; *very* — очень; *too* — слишком; *so* — так; *rather* — довольно; *enough* — достаточно; *quite* — совсем, вполне; *not at all* — совсем не; *hardly, scarcely* — едва; *nearly, almost* — почти и др.

He reads *very much.* Он *очень много* читает.

3. Степени сравнения наречий образуются так же, как и степени сравнения прилагательных: fast — fast*er* — fast*est* быстро — быстрее — быстрее всего; clearly — *more* clearly — *most* clearly ясно — более ясно — яснее всего;

Исключения: *well — better — (the) best; much — more — (the) most; badly — worse — (the) worst; little — less — (the) least; far — farther (further) — (the) farthest (furthest).*

ПРЕДЛОГ (THE PREPOSITION)

Предлоги — это служебные слова, которые показывают отношение существительного (или местоимения) к другим словам в предложении. Так как в современном английском языке падежные окончания отсутствуют, ***предлоги играют исключительно важную роль,*** выражая разнообразные — пространственные, временные, причинные и пр. — отношения.

Ряд английских предлогов соответствуют в русском языке падежам:

of — родительному, to — дательному, ***with*** *— творительному.*

Предлог in употребляется для обозначения ***места*** со значением ***в (внутри)***: *in the room* — ***в*** комнате; и для обозначения ***времени*** а) со значением: ***в*** *in* October — ***в*** октябре, б) со значением: ***через*** *in* 20 minutes — ***через*** 20 минут.

Предлог on употребляется для обозначения ***места*** со значением ***на (поверхности)***: *on the table* — на столе и для обозначения ***времени***

перед названиями дней и датами: *on Sunday* — *в* воскресенье; *on the first of May* — первого мая.

Предлог at употребляется для обозначения ***места*** а) со значением ***у, возле, около: at the window*** — ***у*** окна; б) со значением ***в, на: at the theatre*** — ***в*** театре, а также для обозначения ***времени: at 5 o'clock*** — ***в*** 5 часов.

Предлог for употребляется а) со значением ***для: for you*** — ***для*** вас; б) со значением ***за: Pay for the book*** — заплати ***за*** книгу; в) со значением ***в течение: for a week*** — ***в течение*** недели; г) со значением ***так как, ибо*** (в качестве союза): Pay *for* the book, please, *for* I haven't got money about me — заплати, пожалуйста, за книгу, ***так как*** у меня нет с собой денег.

Предлог to употребляется: а) для выражения ***направления действия*** в сторону какого-нибудь предмета или лица (на вопрос ***куда***?); а также в сочетании с существительным (или местоимением) предлог *to* соответствует в русском языке ***дательному*** падежу (***кому?***)

Give the book *to* Mike when you go *to* school.	Передай книгу ***Мише***, когда пойдешь ***в школу***.

Предлог into употребляется со значением ***в*** и обозначает направление действия ***внутрь*** чего-либо (на вопрос ***куда?***).

Put the money *into* the pocket.	Положи деньги ***в*** карман.

Предлог from употребляется для обозначения ***направления*** со значением ***от, из, у*** (***откуда? от кого?***): *from* Moscow — ***из*** Москвы; и со значением ***от, с*** (для указания времени): *from 3 to 5* o'clock — ***с*** 3 ***до*** 5 часов.

Предлог out of — ***из*** употребляется для обозначения направления действия ***изнутри, из чего-либо*** и соответствует в русском языке глаголам с приставкой ***вы***.

He is walking *out of* the house.	Он ***вы***ходит из дому.

Предлоги between, among употребляются со значением ***между***. *Between* относится ***к двум*** лицам или предметам, *among* (***между, среди***) относится к ***трем или более*** лицам или предметам.

He is sitting *between* two girls.	Он сидит ***между*** двумя девочками.
Divide the cake *among* all the children.	Разделите торт ***между*** всеми детьми.

Предлоги except, besides соответствуют русскому предлогу ***кроме***. При этом *except* употребляется со значением ***кроме (за исключением)***, а *besides* употребляется со значением ***кроме (в дополнение, сверх)***.

He doesn't know any foreign language *except* English.	Он не знает ни одного иностранного языка, *кроме (за исключением)* английского.
He knows two foreign language *besides* English.	Он знает два иностранных языка *кроме (в дополнение)* английского.

Предлоги above, below противоположны по значению.

Above употребляется со значением: ***над, выше; больше чем, свыше; выше, наверху***.

The temperature is *below* zero.	Температура *ниже* нуля.
I hear a noise from somewhere *above*.	Я слышу шум откуда-то *сверху*.

Предлоги over, under противоположны по значению.

Over употребляется со значением: ***над***: *over* the table — ***над*** столом; ***свыше, сверх***: *over* a hundred people — ***свыше*** сотни людей; ***на протяжении, за*** (с обозначением времени): *over* the past two years — ***за*** последние два года; ***через*** (с глаголами движения, которые соответствуют в русском языке глаголам с приставкой ***пере-***): to climb *over* the wall — ***пере***лезать ***через*** стену.

Under употребляется со значением: ***под*** для обозначения места: *under* the table — *под* столом; ***меньше*** — He is *under* 40 — ему ***меньше*** сорока.

Предлог about употребляется со значением ***о, об, относительно; вокруг, кругом, по; приблизительно***.

It is *about* 7 o'clock now.	Сейчас *приблизительно* 7 часов.
Let's walk about the park.	Давай прогуляемся по парку.

Предлог after употребляется для обозначения ***времени*** со значением ***после;*** для обозначения ***места*** со значением ***за, вслед за;*** в качестве наречия со значением ***после, потом, впоследствии*** и в качестве союза со значением ***после того как***.

He returned home *after* 3, *after* the classes were over.	Он возвратился домой *после* 3, *после того* как закончились занятия.

Предлог before употребляется для обозначения ***времени*** со значением ***до, перед;*** в качестве наречия со значением ***раньше, прежде*** и в качестве союза со значением ***прежде чем:***

I haven't seen this park *before*, let's have a walk here *before* dinner.	Я не видел этого парка *прежде*, давай прогуляемся здесь *перед* обедом.

Предлоги till и ***until*** употребляются для обозначения времени со значением ***до, вплоть до*** и в качестве союзов ***(до тех пор) пока ... не:***

I'll stay here *till (until)* Saturday.	Я останусь здесь *до* субботы.

Предлог by употребляется для обозначения действующего лица или действующей силы после глагола в страдательном залоге (в этом случае он соответствует творительному падежу); для обозначения места со значением ***у, возле, около;*** при обозначении средства или способа совершения действия (***путем, с помощью, посредством***); а также для обозначения срока, к которому совершается действие.

She was sitting *by* the window reading the novel written by Tolstoi.	Она сидела *у* окна, читая роман, написанный Толстым.

Предлог with употребляется со значением ***с,*** а также для обозначения предмета, при помощи которого совершается действие. (*With* как и *by* в сочетании с существительным соответствует в русском языке творительному падежу.) Следует отметить, что *by* употребляется для выражения ***действующего лица или действующей силы*** после глагола в страдательном залоге, а *with* употребляется для обозначения ***предмета***, при помощи которого совершается действие.

The dishes were washed *by* Kate. She washed them *with* warm water.	Тарелки вымыты Катей. Она вымыла их теплой водой.

Предлоги up и ***down*** употребляются со значением ***вверх по / вниз по*** после глаголов движения; ***вверх, наверх / вниз, внизу*** в качестве наречия, а также в сочетании с глаголами движения для обозначения приближения к к.-л. или ч.-л. В этом случае сочетания глаголов с *up* соответствуют в русском языке глаголам с приставкой ***под-***: *to come (go, walk) up* — подходить, *to run up* — подбегать, *to swim up / to sail up* — подплывать и др.; а сочетания глаголов

с *down* соответствуют в русском языке глаголам с приставкой *с-* (движение сверху вниз): *to come (go, get, walk) down* — сходить, спускаться, *to run down* — сбегать, *to jump down* — спрыгивать, *to throw down* — сбрасывать и др.

I looked *down* and saw the steamer sailing *up* the river.

Я опустил голову и увидел теплоход, плывущий *вверх по* реке.

Предлог through употребляется со значением ***через, сквозь; из-за, вследствие.***

She was walking *through* the forest and fell *through* weakness.

Она шла *через* лес и упала *от* усталости.

Предлог since употребляется а) со значением *с* при указании на начальный момент действия, начавшегося в прошлом и продолжающегося в момент речи. При наличии *since* глагол стоит в Present Perfect или Present Perfect Continuous; б) со значением ***с тех пор*** в качестве наречия и в) со значением ***с тех пор как, поскольку, так как*** в качестве союза.

I haven't seen him *since* he left our town.

Я не видел его *с тех пор, как* он уехал из нашего города.

Since the girl is ill, we'll send for the doctor.

Поскольку девочка больна, мы вызовем врача.

Составные предлоги

According to *— согласно ч.-н.;* ***as far as*** *— до;* ***as to (as for)*** *— что касается;* ***because of*** *— из-за;* ***by means of*** *— посредством, при помощи;* ***but for*** *— если бы не;* ***due to*** *— из-за, благодаря;* ***except for*** *— за исключением, если не считать;* ***in accordance with*** *— в соответствии;* ***in addition to*** *— в дополнение к;* ***in case of*** *— в случае;* ***in front of*** *— перед, напротив;* ***in spite of*** *— несмотря на;* ***instead of*** *— вместо;* ***on account of*** *— из-за, вследствие;* ***irrespective of*** *— независимо, безотносительно к;* ***owing to*** *— из-за, благодаря;* ***thanks to*** *— благодаря.*

Mike saw me *as far as* the station. Kate didn't go with us *because of* the rain.

Миша проводил меня *до* станции. Катя не пошла с нами *из-за* дождя.

We acted *in accordance with* your rules.

Мы действовали *в соответствии с* вашими правилами.

СОЮЗ (THE CONJUNCTION)

Союзы — это служебные слова, которые употребляются для соединения членов предложения и предложений.

По своей функции в речи союзы бывают *сочинительные* и *подчинительные.*

Сочинительные союзы: ***and*** *— и, а;* ***but*** *— но, а;* ***or*** *— или, иначе;* ***while*** *— в то время как, тогда как;* ***whereas*** *— тогда как, а;* ***both ... and*** *— и ... и, как ... так и;* ***as well as*** *— так же как (и);* ***not only ... but also*** *— не только ... но и;* ***either ... or*** *— или ...или;* ***neither ... nor*** *— ни ... ни.*

We have received your telegram *as well as* your letter.	Мы получили вашу телеграмму, *так же как и* ваше письмо
Ann has been *neither* in Moscow *nor* in St. Petersburg.	Аня не была *ни* в Москве, *ни в* Санкт-Петербурге.

Подчинительные союзы.

1) Союзы (союзные слова), вводящие *придаточные предложения подлежащие, сказуемые, дополнительные, определительные:* ***that*** *— что, который;* ***if, whether*** *— ли;* ***who (whom), which*** *— который;* ***whose*** *— чей.*

I know the man *whom* you mean.	Я знаю человека, *которого* вы имеете в виду.

2) Союзы (союзные слова), вводящие *обстоятельственные придаточные* предложения

• **времени:** ***when*** *— когда;* ***while*** *— в то время как;* ***after*** *— после того как;* ***before*** *— прежде чем, до того как;* ***as*** *— в то время как, когда, по мере того как;* ***as soon as*** *— как только;* ***as long as*** *— пока, до тех пор пока;* ***since*** *— с тех пор как;* ***until (till)*** *— до тех пор пока (не);* ***no sooner ... than*** *— едва только ... как, не успел ... как;* ***hardly (scarcely) ... when*** *— едва только ... как.*

I shall stay *until* I have finished my work.	Я останусь здесь *до тех пор, пока* закончу свою работу.

• **причины:** ***as*** *— так как;* ***because*** *— потому что, так как;* ***for*** *— ибо, так как;* ***since*** *— так как, поскольку;* ***now that*** *— теперь когда.*

He walked quickly *for (because)* he was in a great hurry.	Он шел быстро, *так как* очень спешил.

• **образа действия:** ***as*** *— как;* ***as if, as though*** *— как будто, как если бы;* ***so ... that*** *— так (такой) что;* ***such ... that*** *— такой ... что,*

а также сравнения: ***as ... as*** *— так (такой) же ... как;* ***not so ... as*** *— не так (такой) ... как;* ***than*** *— чем.*

The sea was *so* stormy *that* the boat couldn't leave the port.	Море было *такое* бурное, *что* пароход не мог выйти из порта.

• **следствия**: ***so, so that*** *— так*

He sat far away *so that* I couldn't see him.	Он сидел далеко, ***так что*** я не мог его видеть.

• **условия**: ***if*** *— если;* ***in case*** *— в случае, если;* ***provided (that), on condition (that)*** *— при условии, если;* ***unless*** *— если только ... не, разве только.*

In case you see him ask him about it.	*Если* вы его увидите, спросите его об этом.

ТАБЛИЦА НЕПРАВИЛЬНЫХ ГЛАГОЛОВ

№	Infinitive (Что делать?)	Past Simple (Что делал?)	Past Participle (Какой?)
1	arise — *возникать*	arose	arisen
2	awake — *просыпаться*	awoke	awoken
3	be — *быть*	was, were	been
4	become — *становиться*	became	become
5	begin — *начинать*	began	begun
6	bind — *связывать*	bound	bound
7	bite — *кусать*	bit	bitten
8	blow — *дуть*	blew	blown
9	break — *разбивать*	broke	broken
10	bring — *приносить*	brought	brought
11	build — *строить*	built	built
12	burn — *гореть, жечь*	burnt	burnt
13	buy — *покупать*	bought	bought
14	catch — *ловить*	caught	caught
15	choose — *выбирать*	chose	chosen
16	come — *приходить*	came	come
17	cost — *стоить*	cost	cost
18	cut — *резать*	cut	cut
19	deal — *иметь дело*	dealt	dealt
20	dig — *копать*	dug	dug
21	do — *делать*	did	done
22	draw — *рисовать*	drew	drawn
23	dream — *мечтать, сниться*	dreamt	dreamt
24	drink — *пить*	drank	drunk
25	drive — *везти, ехать*	drove	driven
26	eat — *кушать*	ate	eaten
27	fall — *падать*	fell	fallen
28	feed — *кормить*	fed	fed
29	feel — *чувствовать*	felt	felt
30	fight — *бороться*	fought	fought
31	find — *находить*	found	found
32	fly — *летать*	flew	flown
33	forget — *забывать*	forgot	forgotten

№	Infinitive (Что делать?)	Past Simple (Что делал?)	Past Participle (Какой?)
34	freeze — *замерзать*	froze	frozen
35	get — *получать*	got	got
36	give — *давать*	gave	given
37	go — *идти, ехать*	went	gone
38	grow — *расти*	grew	grown
39	hang — *висеть*	hung	hung
40	have — *иметь*	had	had
41	hear — *слышать*	heard	heard
42	hide — *прятать*	hid	hid (hidden)
43	hit — *ударять*	hit	hit
44	hold — *держать*	held	held
45	hurt — *ушибить*	hurt	hurt
46	keep — *держать*	kept	kept
47	know — *знать*	knew	known
48	lay — *класть*	laid	laid
49	lead — *вести*	led	led
50	learn — *учиться*	learnt, learned	learnt, learned
51	leave — *уезжать*	left	left
52	let — *позволять*	let	let
53	lie — *лежать*	lay	lain
54	light — *освещать*	lit, lighted	lit, lighted
55	lose — *терять*	lost	lost
56	make — *делать*	made	made
57	mean — *значить*	meant	meant
58	meet — *встречать*	met	met
59	pay — *платить*	paid	paid
60	put — *класть*	put	put
61	read [ri:d] — *читать*	read [red]	read [red]
62	ride — *ездить верхом*	rode	rode
63	ring — *звонить*	rang	rung
64	rise — *подниматься*	rose	risen
65	run — *бегать*	ran	run
66	say — *сказать*	said	said
67	see — *видеть*	saw	seen
68	sell — *продавать*	sold	sold
69	send — *посылать*	sent	sent
70	shake — *трясти*	shook	shaken
71	shave — *бриться*	shaved	shaven

№	Infinitive (Что делать?)	Past Simple (Что делал?)	Past Participle (Какой?)
72	shine — *светить*	shone	shone
73	shoot — *стрелять*	shot	shot
74	show — *показывать*	showed	shown
75	shut — *закрывать*	shut	shut
76	sing — *петь*	sang	sung
77	sit — *сидеть*	sat	sat
78	sleep — *спать*	slept	slept
79	smell — *пахнуть*	smelt	smelt
80	speak — *разговаривать*	spoke	spoken
81	spend — *тратить*	spent	spent
82	spread — *распространять*	spread	spread
83	spring — *прыгать*	sprang	sprung
84	stand — *стоять*	stood	stood
85	steal — *красть*	stole	stolen
86	strike — *ударять*	struck	struck
87	strive — *стремиться*	strove	striven
88	sweep — *мести*	swept	swept
89	swim — *плавать*	swam	swum
90	take — *брать, взять*	took	taken
91	teach — *обучать*	taught	taught
92	tear — *рвать*	tore	torn
93	tell — *рассказывать*	told	told
94	think — *думать*	thought	thought
95	throw — *бросать*	threw	thrown
96	understand — *понимать*	understood	understood
97	wear — *носить*	wore	worn
98	weep — *плакать*	wept	wept
99	win — *выигрывать*	won	won
100	write — *писать*	wrote	written

АНГЛО-РУССКИЙ СЛОВАРЬ

A

ability — способность, возможность
above-mentioned — вышеупомянутый
abroad — за рубежом
absorb — впитывать, поглощать
absorption — всасывание, впитывание, поглощение
accelerate — ускорять(ся)
accelerator — ускоритель
accept — принимать, допускать
accident — сбой, отказ; авария; несчастный случай
accomplish — завершать, заканчивать; выполнять
accommodate — вмещать, размещать
accompany — сопровождать
according to — в соответствии с
account — счет; учитывать, подсчитывать
accumulate — накапливать, суммировать, собирать
accumulation — накопление, суммирование
accuracy — точность, правильность, четкость
accurate — точный, правильный
accurately — точно
accuse — обвинять
accusation — обвинение
achieve — достигать, завершать
achievement — достижение
acid — кислота
  nucleonic ~ нуклеиновая кислота
acquaint — знакомить
acquaintance — знакомство
  make ~ познакомиться
acquire — приобретать, получать
across — сквозь, через, поперек
action — поступок; действие; воздействие
  reciprocal ~ взаимодействие
actual — действительный, фактический
actually — в действительности
actuate — воздействовать; приводить в действие
actuation — срабатывание (устройства); приведение в действие
actuator — привод; исполнительный механизм

adapt — приспосабливать; прилаживать; переделывать
add — складывать; суммировать; добавлять
addition — сложение; добавление
    in ~ to — в дополнение к; помимо
adjust — приспосабливать; регулировать
administration — управление
admission — доступ; вход
admit — принимать; допускать
adopt — принимать; усваивать
adult — взрослый
advance — продвигать(ся); продвижение; успех
advantage — преимущество; достоинство; выгода
advocate — отстаивать, поддерживать; пропагандировать
agent — фактор; вещество; действующая сила
aid — помощь; помогать
aids — вспомогательные средства; приспособления
aim — цель
    to ~ guns — наводить орудия на цель
aircraft — летательный аппарат; самолет
alarm — тревога; страх; смятение
align — выравнивать, выстраивать в линию; выпрямлять
alter — (из)менять(ся)
although — хотя; несмотря на то, что
always — всегда
amber — янтарь
amplification — усиление
amplifier — усилитель
amplify — усиливать(ся)
amount — количество; величина; составлять; насчитывать
ancient — древний; античный
annihilation — уничтожение; истребление; упразднение
anniversary — годовщина
anti-aircraft — противовоздушный, зенитный
    ~ guns — зенитные орудия
aperture — отверстие
apparently — явно; очевидно
appear — появляться; возникать; оказываться
appearance — появление; вид
appetizer — закуска
application — приложение; применение; употребление

apply — применять(ся); использовать
appoint — назначать
appreciate — оценивать
apprentice — ученик, подмастерье
approach — подход; метод; приближаться; подходить
appropriate — подходящий; соответствующий; свойственный
arc — дуга; арка
argue — спорить; обсуждать; убеждать
armature — якорь
arrange — размещать; устанавливать; монтировать
arrangement — размещение; расположение; устройство
artificial — искусственный
~ **intelligence** — искусственный интеллект
as — как; так как
as far back as (1991) — еще в 1991 г.
as concerns — что касается
as well as — а также
assemble — собирать; монтировать
assembly — сборка; монтаж; агрегат; узел; блок
assist — помогать
assistance — помощь
assume — принимать; допускать
assure — убеждать; уверять; обеспечивать; гарантировать
at rest — в покое
attempt — попытка
attend — посещать
attention — внимание
attract — привлекать; притягивать
~ **attention** — привлекать внимание
attraction — притяжение
available — доступный; имеющийся (в наличии)
award — награждать; награда
aware — сознающий; осведомленный
be ~ **of** — сознавать; понимать

B

base — основание; основа; база; основываться, базироваться
basic — основной
basically — в основном
battle — битва, сражение

beam — луч, пучок лучей; излучать
bearing — подшипник
    ball ~ шариковый подшипник
    roll ~ подшипник валка
beauty — красота
because — потому что; так как
    ~ **of** — из-за, вследствие
before — раньше, прежде; перед, до; прежде чем
    ~ **long** — скоро, вскоре
    long ~ задолго до
behavior — поведение, манеры; режим (работы)
believe — верить, полагать, считать
belong — принадлежать, относиться
benefit — благо; выгода; польза
beverage — напиток
beyond — вне; сверх; выше; за (пределами)
binary — двоичный
bind (bound) — связывать; притягивать
body — тело; корпус; кузов; учреждение; орган
boil — кипеть, кипятить
bond — связь, соединение
bookbinder — переплетчик
both ... and — и...и; как ... так и
boundary — граница; пограничный
brainy — умный, мозговитый, способный
brake — тормоз
branch — ветвь; отрасль; раздел
bravery — храбрость; смелость
break (broke, broken) — ломать; разрушать; прерывать
brilliant — блестящий
brittleness — ломкость, хрупкость
broad — широкий; просторный
broadcast — передавать (сообщение); ретранслировать; вещание
browse — просматривать (содержимое)
browser — программа просмотра; окно просмотра
browsing — просмотр
    web ~ просмотр информационной сети
burn — сжигать, гореть

cable — кабель, трос, канат
calculate — вычислять, рассчитывать
calculation — вычисление
calculator — калькулятор, вычислительное устройство
call — вызов; обращение; вызывать; называть
so-called — так называемый
cam — кулачок
can (could) — мочь, уметь, быть в состоянии
cancel — отменять; аннулировать; отмена
candle — свеча
capability — способность; возможность
capacitance — емкость; емкостное сопротивление
capacitor — конденсатор
capacity — вместимость; емкость; способность: мощность; производительность
capture — захватывать; улавливать; собирать (данные)
carbon — углерод; угольный электрод
carriage — суппорт, каретка, шасси, рама
carry out — выполнять; проводить
casting — литье, отливка
cause — заставлять; вынуждать; быть причиной; причина; основание
cavity — полость
~ **resonator** — объемный резонатор
celebrated — знаменитый, прославленный
cell — элемент; секция; отсек
fuel ~ топливный бак
cellular — сотовый; сотовый телефон
~ **network** — сеть сотовой связи
centripetal force — центробежная сила
certain — определенный; некоторый
change — изменение, перемена; изменять, преобразовывать
challenge — трудность, препятствие; представлять трудность
channel — канал; дорожка; прокладывать путь
character — символ; знак; буква
characteristic — характерная черта, свойство; характеристика
charge — заряд; заряжать
cheap — дешевый
chemistry — химия
chip — чип, кристалл

choose (chose, chosen) — выбирать
chuck — зажимной патрон; планшайба
chunk of data — порция информации
circuit — цепь; контур; схема
completed ~ замкнутая цепь
control ~ цепь регулирования
open ~ разомкнутая цепь
short ~ короткое замыкание
series ~ последовательная цепь
shunt ~ параллельная цепь
circular — круговой, круглый
citizen — гражданин
clamp — зажим, тиски, крепежная скоба
clean — чистый; очищать
clear — ясный, светлый, понятный; проясняться; очищать
clever — умный
close — тесный, близкий; закрывать; замыкать
cluster — группа; групповой; скопление; концентрация
clutch — муфта сцепления; сцепление
clutter — беспорядок; хаос
coherent — когерентный, связный
coal — уголь
coastal — прибрежный
coherer — когерер
coin — измышлять, создавать новые слова
collaboration — сотрудничество; совместная работа
combat rocket — боевая ракета
combine — объединять(ся); соединять(ся)
combined with — совместно, в сочетании
combustion — горение, сгорание
internal ~ **engine** — двигатель внутреннего сгорания
commission — поручать; уполномочивать
common — общий; обычный
communication — связь, коммуникация; сообщение; передача (данных)
emergency ~ аварийная связь
facsimile ~ фототелеграфная связь
network on-line ~ связь через компьютерную сеть
tele ~ дальняя связь
visual ~ видеосвязь
wireless ~ беспроводная связь

community — сообщество; общность
comparatively — сравнительно
compare — сравнивать
comparison — сравнение
compatible — совместимый
compatibility — совместимость
compelling — неотразимый; непреодолимый
complain — жаловаться; выражать недовольство
complete — завершать, заканчивать; полный, завершенный
compose — составлять; компоновать
composite — смесь; ч.-л. составное
composition — структура, строение, состав
compute — вычислять; рассчитывать
computation — вычисление; расчет
conceal — скрывать; утаивать; умалчивать
concern — касательство; отношение; значение; важность; аспект
concerned — касающийся; относящийся к; связанный с
concept — идея; понятие; концепция
conclusion — вывод; заключение
    come to ~ прийти к заключению
condition — состояние; условие
conduct — проводить; сопровождать
conductivity — проводимость
    thermal ~ теплопроводность
conductor — проводник
confine — ограничивать
confront — ставить перед; сталкиваться
connect — соединять; связывать
connection — связь; соединение
conquer — завоевывать; покорять; подчинять
conquest — завоевание; покорение
consequence — (по)следствие; вывод; заключение
consider — рассматривать; полагать; считать; учитывать
considerable — значительный; важный
considering — относительно; учитывая; принимая во внимание
consist of — состоять из
console — консоль; пульт
constant — постоянная (величина)
constantly — постоянно; часто
constitute — составлять; учреждать

consume — потреблять; расходовать
consumer — потребитель; абонент
consumption — потребление; расход
contain — содержать; вмещать
contamination — загрязнение; порча; заражение
contemporary — современный
continue — продолжать
contribute — содействовать; способствовать
control — управлять; регулировать
controller — регулятор
convenient — удобный; подходящий; пригодный
conventional — обычный; традиционный; общепринятый
conversation — разговор; беседа
convert — преобразовывать
converter — преобразователь; конвертор
conversion — преобразование
convey — передавать; сообщать
convince — убеждать; уверять
cooperation — сотрудничество; совместные действия
copper — медь; медный
core — сердечник; суть; основная часть
correct — верный; правильный; исправлять
corrode — разъедать, подвергаться коррозии
cost — цена, стоимость; стоить
council — совет
country-man — соотечественник
couple — пара; соединять; спаривать
coupling — соединение, сцепление
courage — храбрость, смелость
cover — охватывать; покрывать
crack — трещина; щель
crankshaft — коленчатый вал
create — создавать; формировать
creative — творческий; созидательный
crew — экипаж; команда
crisps — чипсы
cross slide — поперечный суппорт
curiosity — любопытство; любознательность
current — электрический ток
    alternating ~ переменный ток

continuous ~ постоянный ток
direct ~ постоянный ток
curved — кривой, искривленный
customer — потребитель; клиент
cybernetics — кибернетика
cycle — цикл; период

D

damage — повреждать; наносить вред, ущерб
danger — опасность; угроза
dangerous — опасный; рискованный
date back — восходить, относиться
data — данные, информация
database — база данных
deal with — иметь дело с; работать
decay — распад; разрушение
decide — решать; принимать решение
decision — решение; заключение
make ~ принимать решение
decisive — решительный; убедительный
decoder — дешифратор
decrease — уменьшать; снижать; уменьшение; снижение
dedication — посвящение; преданность
deduce — проследить; установить; преобразовать
degree — степень, градус
defense — оборона, защита
define — определять; обозначать; задавать
definite — определенный; точный; ясный
deformable — деформируемый
delay — задержка, запаздывание; задерживаться
delayed — задержанный, отсроченный
deliberate — преднамеренный; умышленный
delicious — вкусный
delight — восхищать(ся); удовольствие; наслаждение
deliver — доставлять; передавать
demand — требовать; запрашивать; требование
demodulate — демодулировать
denote — значить, обозначать
density — плотность, густота
packing ~ плотность упаковки

depend — зависеть, полагаться на
dependence — зависимость
deploy — разворачивать; устанавливать
deployment — развертывание; установка
deposit — наносить, напылять
descent — спускаться, сходить
  ~ **from** — передаваться по наследству
describe — описывать, изображать
description — описание
design — проектирование; конструирование; разработка
  application ~ проектирование прикладных программ
  database ~ создание базы данных
  software ~ проектирование программного обеспечения
  structural ~ строительное проектирование
designation — (пред)назначение, цель
desirability — желательность
despite — несмотря на
destroy — разрушать
destructive — разрушительный, пагубный
destructiveness — разрушительность, пагубность
detect — обнаруживать, выявлять
detection — обнаружение, выявление
detector — датчик; средство обнаружения
determine — определять
device — прибор, устройство; аппарат
devote — посвящать
differ — различать(ся), отличать
difference — отличие, различие; разница
different — разный; другой, непохожий
difficulty — трудность
digit — цифра; разряд (числа); знак
  binary ~ двоичная цифра
diligence — прилежание; усердие; старание
diligently — прилежно; старательно
dimension — размер; измерение
direct — направлять; управлять; прямой
direction — направление; руководство; указание
dirt — грязь, сор
discharge — разряд; разгрузка; выхлоп
discovery — открытие; обнаружение; выявление

discrete — дискретный, отдельный
dishonest — нечестный, недобросовестный
disinterested — бескорыстный, беспристрастный
disperse — рассеивать, разбрасывать, распространять
displace — перемещать; смещать
displacement — смещение, сдвиг, перемещение
display — дисплей, устройство отображения; показывать
disposal — расположение; размещение
    have at one's ~ иметь в распоряжении
disseminate — распространять
dissemination — распространение
distinct — отдельный; особый; отличительный
distinction — различение; распознавание; различие
distinctly — ясно; отчетливо; определенно
distinctive — отличительный, характерный
distinguish — различать, отличаться
distinguishable — различимый
distinguising — отличительный; характерный; распознавание
distribute — распределять; распространять; классифицировать
distribution — распределение; распространение
diverge — расходиться; отклоняться
divergence — расходимость; отклонение
divergent — отклоняющийся
divide — делить, разделять
domestically — в домашней жизни
drafting — проектирование
dramatically — чрезвычайно
draw — рисовать, чертить
dream — мечта; мечтать; воображать
drive — водить; приводить в действие
droplet — капелька
drug — лекарство; медикамент
ductility — вязкость; текучесть
due to — благодаря
durability — прочность; стойкость; долговечность
during — в течение, в продолжение; во время
duty — обязанность, долг; работа, режим работы
dwarf — гном, карлик
dynamics — динамика

E

early — ранний; древний
earphones — наушники
ease — легкость, удобство (использования)
easy — легкий; непринужденный; спокойный
effect — действовать; оказывать воздействие, влияние
efficiency — эффективность; коэффициент полезного действия
elasticity — эластичность, упругость
eliminate — устранять; удалять; отменять; ликвидировать
elimination — устранение; отмена
embody — воплощать; олицетворять; заключать в себе
embrace — охватывать; включать (в себя); содержать
emerge — появляться, выходить
emergence — выход, появление
emergency — авария, чрезвычайная ситуация
emission — эмиссия; испускание; излучение; выброс
emphasis — значение; особое внимание; выделение
employ — использовать, употреблять; нанимать на службу
employment — применение; служба, занятость
employee — служащий
empty — пустой, незанятый
encoder — кодирующее устройство, шифратор
encompass — окружать; заключать; охватывать
encourage — ободрять; поддерживать; поощрять
endure — выносить, терпеть; длиться, продолжаться
enemy — враг, противник
energize — активизировать; подавать напряжение; питать
engine — машина, двигатель
engineer — инженер; придумывать, изобретать, создавать
engineering –техника, машиностроение
  civil ~ гражданское строительство
  electrical ~ электротехника
  mechanical ~ машиностроение
  nuclear ~ ядерная техника
  power ~ энергетика
  radio ~ радиотехника
  structural ~ строительная техника
enjoy — получать удовольствие, наслаждаться
  ~ **popularity** — пользоваться популярностью
enormous — огромный, громадный

enough — достаточный; довольно, достаточно
ensure — обеспечивать, гарантировать
enter — входить; поступать
entertainment — развлечения, увеселения
entire — целый; полный; весь
entirely — целиком; полностью
entitle — называть, озаглавливать
entity — сущность; существо
environment — окружение, окружающая среда
envisage — рассматривать (вопрос)
equal — равный; одинаковый
equality — равенство
equation — уравнение
  differential ~ дифференциальное уравнение
equilibrium — равновесие
equip — снаряжать, оборудовать
equipment — оборудование; оснащение; техника
  industrial ~ промышленное оборудование
errand boy — рассыльный; мальчик на побегушках
eraser — ластик, резинка
erect — воздвигать; сооружать; создавать
error — ошибка, отказ, сбой; погрешность
escape — истекать; ускользать
especially — особенно; главным образом
essence — суть; сущность; существо
essential — важный, существенный, значительный, неотъемлемый
establish — основывать, учреждать; устанавливать
establishment — основание, введение; учреждение, заведение
evaluate — оценивать; выражать в числах
evolve — развивать(ся); усовершенствовать; разрабатывать
exact — точный, верный
exactly — точно; совершенно; как раз
exaggerate — преувеличивать; излишне подчеркивать
example — пример; образец
exceed — превышать, превосходить
exceeding — безмерный, чрезвычайный
exceedingly — чрезвычайно
except — исключать; за исключением; кроме
exception — исключение; исключительная ситуация
exceptional — исключительный

exchange — обмен; замена; обменивать
exert — оказывать давление; вызывать напряжение
exist — существовать
existence — существование
expand — расширять(ся); увеличивать; наращивать (возможности)
expansion — расширение, увеличение
  coefficient of ~ коэффициент расширения
expensive — дорогостоящий
explain — объяснять, толковать
explanation — объяснение, пояснение, толкование
explode — взрывать
explosion — взрыв
exploration — исследование, развертка (изображения)
explore — исследовать; обследовать
exponentiation — возведение в степень
expression — выражение; представление
extend — расширять; удлинять
extension — расширение; дополнение;
external — внешний; наружный
extremely — чрезвычайно; крайне; очень

F

fabricate — изготовлять
fabrication — изготовление; производство
fail — сбой, отказ, повреждение; выходить из строя
failure — поломка; отказ; неисправность
  fatique ~ усталостное разрушение
  ultimate ~ окончательная поломка
fall (fell, fallen) — падать; опускаться
familiar — знакомый; близкий
famous — выдающийся, знаменитый
fast — быстрый, быстро
fatality — рок; обреченность
fault — ошибка, неисправность, дефект, отказ, сбой
faultless — безотказный; исправный
feasible — возможный, вероятный
feasibility — возможность
feature — черта, свойство
feed (fed) — вводить; подавать; питать; подача; ввод
  ~ **forward** — прямая связь

feedback — обратная связь
fibre — волокно, нить
fiction — вымысел, выдумка
  science ~ научная фантастика
fictional — вымышленный
fidelity — верность воспроизведения
field — область, сфера деятельности; поле действия
fight (fought) — сражаться; драться; борьба
figure out — вычислять; понимать; постигать
fill — наполнять(ся); заполнять
fire — запускать, выстреливать; увольнять
fission — расщепление, деление (атомного ядра)
flight — полет
flow (flew, flown) — течь, литься; поток; ход выполнения (программы)
fluid — жидкость
fluidmechanics — гидромеханика
follow — следовать; следить
following — следующий; последующий
  in the ~ way — следующим образом
force — сила; принуждать; заставлять; форсировать
  electromotive ~ электродвижущая сила
foretell — предсказывать
forging — ковка
form — создавать, формировать
former — бывший, предшествующий
  the ~ первый (из двух)
found — основывать, обосновывать
foundation — основа, основание
founder — основатель; учредитель
fraction — доля; часть; дробь
frame — система координат; рама, станина; создавать; составлять
  reference ~ система отсчета
frequency — частота
  ~ modulation — частота модуляции
friction — трение; фрикционная муфта
from now on — отныне, с этих пор
front-rank — передовой, первоклассный
fuel — топливо
  ~ system — система питания
  ~ consumption — расход топлива

functionality — (функциональные) возможности; набор средств
fuse — предохранитель
fusion — плавка, расплавление; синтез

G

gain — выгода, выигрыш; получать, приобретать, выигрывать, извлекать пользу
gap — щель, зазор
gaseous — газообразный, газовый
gasoline — бензин, газолин
gear — прибор, механизм, зубчатая передача
  running ~ ходовая часть
  steering ~ рулевое управление
general — общий, всеобщий
  in ~ вообще
generate — генерировать, производить, вырабатывать
generation — выработка; создание; поколение
get along — ладить; уживаться
giant — гигант, великан, исполин
give (gave, given) — давать, отдавать, передавать
  ~ **birth** — породить
goal — цель, задача
goldsmith — золотых дел мастер, ювелир
gourment ['guəmei] — гурман
govern — управлять; регулировать; направлять
governance — управление, власть; руководство
government — правительство; управление
graduate — заканчивать (учебу); градуировать, калибровать
greatful — благодарный
gravity — притяжение, тяготение, сила тяжести
  specific ~ удельный вес
grease — смазка; смазывать
grinding — шлифовка, полировка
guidance — руководство; наведение (орудия на цель)
  ~ **system** — система наведения
  fire control ~ система управления огнем
  under the ~ под руководством
guide — руководить, направлять; гид, проводник

H

handle — обращаться; иметь дело с

hardly — вряд ли, едва
hardware — аппаратное обеспечение; аппаратура
harmful — вредный, пагубный
head — голова; возглавлять
health — здоровье
heavy — тяжелый, трудный; сильный
hence — следовательно, поэтому; отсюда, по этой причине
heritage — наследство; наследие
hierarchy — иерархия
hip implant — протез (имплантант) бедра
hide (hid, hidden) — прятать, скрывать
historian — историк
hollow — пустой, полый; пустота; полость
honour — честь, слава; почитать, чтить; удостаивать
honourable — почетный, уважаемый
human — человеческий, свойственный человеку
~ **being** — человек, человеческое существо
~ **related** — связанный с человеком
~ **independent** — не связанный с человеком
humidity — сырость, влажность; влага
however — однако, тем не менее
hydrogen — водород

I

icebreaker — ледокол
identity — идентичность; подлинность
idle run — холостой ход
ignition — зажигание, воспламенение
in accordance with — согласно, в соответствии с
image –изображение; формат
visual ~ наглядное изображение
imagine — воображать, представлять себе
immediate — немедленный; неотложный
imperfection — несовершенство; недостаток, дефект
impetus — побуждение, толчок, импульс, стимул
implement — выполнять; осуществлять
implementation — реализация; осуществление; разработка; внедрение
implication — вовлечение; причастность
imply — заключать в себе; подразумевать; значить
importance — важность, значение

be of ~ иметь значение
important — важный, значительный
impose — налагать, накладывать; задавать (правила)
impress upon — прилагать
impressive — впечатляющий, выразительный
improve — улучшать; совершенствовать; уточнять (данные)
improvement — улучшение, усовершенствование
in addition to — в дополнение к
incandescent lamp — лампа накаливания
incapable — неспособный
in connection with — в связи с
incorporate — включать; содержать; встраивать; внедрять
increase — увеличивать, возрастать; повышение, увеличение
incredible — невероятный, неправдоподобный
independent — независимый; самостоятельный
induce — вызывать; побуждать; наводить, индуцировать
inductance — индуктивность
induction — индукция
~ coil — катушка индуктивности
include — включать, содержать
influence — влияние, воздействие; оказывать влияние
information — информация, данные; сведения
availability ~ информация о наличии
bookkeeping / service ~ служебная информация
extra ~ дополнительная информация
free ~ бесплатная информация
help ~ справочная информация
up-to-date ~ обновленная, свежая информация
initial — исходный; первоначальный
inject — вносить; вводить
inner — внутренний
input — ввод; входное устройство; вводить
inquire — спрашивать, узнавать, наводить справки
inscribe — вписывать, вырезать; начертать
inscription — надпись; краткое посвящение
insert — вводить; включать; вставлять
insertion — введение; включение; вставка
inspiration — вдохновение; стимулирование
inspire — вдохновлять; воодушевлять
in spite of — несмотря на

install — устанавливать; монтировать
installation — установка; размещение; монтаж
instantly — немедленно; тотчас
instead of — вместо ч.-л.
instruction — команда; указание
insulate — изолировать
insulation — изоляция; обособление
insulator — изолятор; изоляционный материал
insurance — страхование
intake system — система включения
integrate — интегрировать; объединять
integrated circuit (IC) — интегральная схема
    large-scale ~ большая ИС
    medium-scale ~ средняя ИС
    microwave ~ микроволновая ИС
    small-scale ~ малая ИС
integration — интеграция; объединение
intelligence — информация, сведения; ум, интеллект
intelligible — понятный, вразумительный
interact — взаимодействовать
interaction — взаимодействие; взаимосвязь
    resulting ~ возникающее взаимодействие
interactive — интерактивный, диалоговый
interactively — в режиме диалога
interactivity — интерактивность; взаимодействие
interchangeable — взаимозаменяемый; равнозначный
interconnection — соединение; связь
interface — интерфейс; место стыковки; сопряжение
    input ~ интерфейс ввода
internal — внутренний
    ~ **memory** — внутреннее запоминающее устройство
interoperation — взаимодействие; совместная работа
interrupt — прерывать
intersection — пересечение
intervention — вмешательство
intricate — запутанный, сложный
introduce — вводить; представлять, знакомить
introduction — введение; предисловие; представление
invent — изобретать; выдумывать; сочинять
invention — изобретение; выдумка

inventor — изобретатель
investigate — исследовать; расследовать
investigation — исследование
investment — вложение; вклад
invisible — невидимый
involve — включать; вовлекать; вызывать
irrespective of — независимо от
island — остров
issue — выпускать, издавать; выходить
~ **commands** — подавать команды

J

join — соединение; соединять
junction — узел; соединение; стык
journey — путешествие
justify — оправдывать; доказывать; обосновывать

K

keep (kept) — держать; хранить; удерживать
key — клавиша; кнопка; переключатель; ключ; шпонка
~ **concept** — ключевое понятие
delete ~ клавиша удаления
end ~ клавиша перехода в конец
enter ~ клавиша ввода
escape ~ клавиша выхода
insert ~ клавиша вставки
shift ~ клавиша переключения регистров
keyboard — клавиатура; клавишный
knock out — выбивать
know (knew, known) — знать; уметь
knowledge — знания; осведомленность
know-how — технология; методика; знания; приемы; *жарг.* ноу-хау

L

lack — недостаток; нехватка
land — земля; высаживаться; приземляться
language — язык
all-purpose / general-purpose ~ универсальный язык
high / low-level ~ язык высокого / низкого уровня
programming ~ язык программирования
lathe — токарный станок

latter — недавний; последний
  the ~ последний (из двух)
launch — запуск; запускать
launcher — пусковая установка
law — закон; право; юриспруденция
lay foundation — заложить основу
lead (led) — вести; приводить
leave (left) — покинуть; оставить; уехать
length — длина
level — уровень; степень; мера; выравнивать
lever — рычаг
light — свет; легкий
lightning — молния
  ~ **flash** — вспышка молнии
  ~ **conductor** — молниеотвод
lightweight — легкий, легковесный
like — подобно, похоже; подобный, похожий; нравиться, любить
likelihood — вероятность
limitation — ограничение
liquid — жидкость; жидкий
literal — буквальный, дословный; буквенный
literacy — грамотность
literate — грамотный, образованный
load — нагрузка
loading capacity — емкостная нагрузка
locate — размещать(ся); определять местоположение
location — местоположение; ячейка (памяти); узел (сети)
lock(up) — запирать; затвор
long-lasted — с длительным сроком службы
long-lived — долговечный
loom over — нависнуть
loop — петля; виток; контур; цикл
  closed ~ замкнутый контур
  open ~ разомкнутый контур
lose (lost) — терять, лишаться; упустить; проигрывать
loss — потеря; затраты
loudspeaker — громкоговоритель
low — низкий
lower — понижать; уменьшать
lubrication — смазка, смазывание

machine — машина, станок
  broaching ~ протяжная машина
  drilling ~ сверлильный станок
  milling ~ фрезерный станок
  planing ~ строгальный станок
  sewing ~ швейная машина
  shaping ~ поперечно-строгальный станок
machine building — машиностроение
machine-tool — станок
machinery — машинное оборудование
magnetize — намагничивать
mainframe — большая ЭВМ; основной, главный
mainly — главным образом; большей частью
maintain — обслуживать; содержать; эксплуатировать
maintenance — техобслуживание; эксплуатация; ремонт
make (made) — делать; заставлять
mammal — млекопитающее
manage — управлять; организовывать
management — управление; регулирование; организация
  data ~ работа с данными
manipulate — управлять; манипулировать; обрабатывать
manipulation — управление; работа; обработка; преобразование
mankind — человечество
man-made — искусственный
manual — ручной; руководство; справочник
manufacture — изготовлять; производить; разрабатывать
marble — мрамор; мраморный
match — подходить; соответствовать
matter — вещество; материя; сущность; вопрос; дело
maxim — принцип; правило поведения
mean (meant) — означать; подразумевать; иметь в виду
means — средство; способ
  by ~ of — путем, посредством, с помощью
meanwhile — между тем; тем временем
measure — измерять; мера; критерий
mechanize — механизировать
mechanic — механик, техник
mechanics — механика
  ~ of fluids — гидромеханика

applied ~ прикладная механика
classical ~ классическая механика
quantum ~ квантовая механика
structural ~ строительная механика
theoretical ~ теоретическая механика
medium — среда; носитель; средство; способ
storage ~ носитель запоминающего устройства
meet (met) — встречать; удовлетворять (условию); соответствовать
~ **requirements** — удовлетворять потребности
memory — память, запоминающее устройство
primary ~ первичная память
menace — угроза, опасность; угрожать
mental — умственный; мысленный
mention — упоминать; ссылаться на
merely — просто; только
message — сообщение; запрос; посылать сообщение
milk shake — молочный коктейль
mind — ум, разум; мнение, взгляд
mine — рудник, шахта; мина
mining — горное дело
minute — крошечный; минута
mirror — зеркало
~ **galvanometer** — зеркальный гальванометр
missile — ракета, снаряд
mode — способ; метод; режим
modest — скромный; сдержанный
modify — модифицировать; изменять; преобразовывать
modulation envelope — огибающая модуляция
moisture — влажность, сырость
~ **content** — содержимое влаги
monitor — следить; наблюдать; контролировать; монитор, дисплей
monochromatic — одноцветный
monochromaticity — одноцветность
monstrous — чудовищный
moon of Jupiter — спутник Юпитера
moreover — сверх того, более того
motion — движение
move — ход, движение; двигать(ся); перемещать; переходить
movement — движение, перемещение
multiplication — умножение; усиление

multiply — умножать; усиливать; увеличивать
multi-stage — многоступенчатый
multitask — многоцелевой
mutual — обоюдный, взаимный

N

narrow — узкий
neither — ни один, никто
  ~... **nor** — ни ... ни ...
network — сеть; схема; контур
neurology — неврология
nevertheless — несмотря на; однако; тем не менее
nobleman — дворянин
noise — помехи, шумы
  additive ~ аддитивные (дополнительные) помехи
notion — понятие; идея; мнение; точка зрения
nourishing — питательный
novel — роман; новый, неизведанный
nozzle — сопло
  exhaust ~ выхлопное сопло
nuclear — ядерный
nucleus — центр; атомное ядро
number — число; количество; цифра
numerically — в числовом отношении
numerous — многочисленный

O

objective — цель; целевая функция; требование
observation — наблюдение; отслеживание
observe — наблюдать; следить; соблюдать
obtain — получать; достигать
obvious — очевидный; явный; ясный
occur — происходить; случаться
offer — предложение; предлагать
oil — масло; нефть
once — один раз; однократно
  at ~ сразу; одновременно; вместе с тем
operate — работать; действовать; функционировать
operating — работающий; действующий
operation — работа; действие
  put into ~ вводить в действие

opportunity — возможность
opposite — противоположный; обратный
orbit the earth — облететь Землю
origin — источник; происхождение
original — подлинник, оригинал; первоначальный
originate — происходить; возникать; брать начало
oscillate — колебать(ся)
oscillation — колебание; генерация
oscillator — генератор
oscillatory circuit — колебательный контур
otherwise — иначе, в противном случае
outbreak — (внезапное) начало; взрыв; вспышка
outline — обрисовывать в общих чертах; наметить
outer — внешний; наружный
output — вывод; выход; устройство вывода; выводить
outstanding — выдающийся, знаменитый
overcome — преодолеть; побороть
overtake — догнать, наверстать; овладевать
overtime — сверхурочно; передержать
owe — быть обязанным
owing to — по причине, вследствие, благодаря
oxygen — кислород

P

participation — участие, соучастие
particle — частица; крупица
particular — специфический, особый, конкретный
particularity — особенность; специфика
particularly — в особенности
path — путь, траектория
patient — больной, пациент
pave way — проложить путь
peace — мир, тишина
peaceful — мирный, спокойный
peasant — крестьянин; крестьянский
pellet — бак, контейнер
penetrate — проникать; проходить; пропитывать
perfect — совершенный, идеальный; совершенствовать, улучшать
perfectly — совершенно, вполне, отлично
perform — выполнять; осуществлять; действовать

performance — (рабочая) характеристика; производительность; быстродействие; режим работы
permanent — постоянный; неизменный; долговременный
petrol — бензин
phenomenon — явление
photocell — фотоэлемент
psychology — психология
physician — врач, доктор
physicist — физик
pick up — собирать, улавливать
piece — кусочек, кристалл
piercing — проколка отверстий, пробивка
pipeline — конвейер
~ **processor** — конвейерный процессор
piston — поршень
plane — плоскость; самолет
plaque — дощечка с надписью; почетный знак
plasticity — пластичность, гибкость
point — точка; пункт; суть; смысл
~ **of junction** — точка соединения
~ **of view** — точка зрения
pointer — указатель
polite — вежливый, любезный, благовоспитанный
pollution — загрязнение
possess — обладать; владеть
possibility — возможность, вероятность
possible — возможный, вероятный
potential — потенциал, напряжение; возможность
poverty — нищета, бедность
power — сила; мощь; энергия; приводить в действие; вращать
powder — порох; порошок
precede — предшествовать
precise — точный; аккуратный; тщательный; подробный
precisely — точно; именно; совершенно верно
precision — точность; меткость
predecessor — предшественник; предок
predict — предсказывать; прогнозировать
prepare — подготавливать; составлять
presence — наличие; присутствие
pressure — давление

prevent — предотвращать; предохранять; препятствовать
previous — предыдущий; предшествующий
primarily — главным образом, прежде всего
principal — главный, основной
print — печатать; отпечаток; след
probability — вероятность; правдоподобие
process — процесс, обработка; обрабатывать (данные)
processor — процессор; программа обработки
produce — производить; вырабатывать
production — производство; выработка
productivity — производительность
prominent — выдающийся, известный
promise — обещать, уверять; обещание
proof — доказательство
propel — двигать, приводить в движение
propellant — (ракетное) топливо
propeller — двигатель
    ~ **shaft drive** — карданная передача
propulsion — движение вперед; двигатель; силовая установка
proper — правильный; подходящий; свойственный
properly — правильно; должным образом; как следует
property — свойство; качество; *pl.* параметры; характеристика
proportional — пропорциональный
    directly ~ прямо пропорциональный
    inversely ~ обратно пропорциональный
propose — предлагать; предполагать
prove — доказывать; удостоверять
publish — издавать; печатать
pull — тяга; натяжение
pulley — шкив, блок, ворот
    drive ~ ведущий шкив
pump — насос; качать, перекачивать
punched card — перфокарта
pure — чистый; отчетливый; безупречный
purify — очищать(ся)
purification — очищение, очистка
purity — чистота
purpose — цель; (пред)назначение
    general ~ универсальный

push — толкать; продвигать
~ **boundaries** — расширять границы

Q

quality — качество; свойство; характеристика
qualitative — качественный
quantitative — количественный
quantity — количество

R

race — мчаться, состязаться в скорости
rain cats and dogs — лить как из ведра
raise — поднимать, повышать; увеличивать; повышение
random — случайный; произвольный
~ **access** — произвольный доступ
range — диапазон; область; интервал
rapid — быстрый, скорый
rasterization — представление в виде растра
rate — темп; степень; коэффициент; скорость
rather — скорее, предпочтительно, охотнее
ray — луч; радиус; излучать
reach — достигать; доезжать до, доходить
realize — понимать; представлять себе; осуществлять
reason — причина; разум, рассудок
reasonable — (благо)разумный; приемлемый
receive — принимать; получать
receiver — приемное устройство; приемник
broadcast ~ радиовещательный приемник
reception — получение; прием
receiving coil — принимающая катушка
recently — недавно; на днях
reciprocate — двигаться взад и вперед; иметь возвратно-поступательное движение
recognize — узнавать, признавать; распознавать
recognition — узнавание; распознавание
record — запись; регистрация; записывать; регистрировать
recover — восстанавливать
rectification — выпрямление (тока); (радио) детектирование
rectifier — выпрямитель; детектор
reduce — уменьшать; сокращать; понижать

reduction — уменьшение; сокращение; понижение
reel — катушка; бобина; барабан
re-entry — возвращение
refer — ссылаться; говорить о; иметь отношение, относиться
reference frame — система отсчета
refine — очищать; повышать качество; усовершенствовать
reflect — отражать, отображать
reflection — отражение, отображение
refuse — отказывать; отвергать; отрицать
~ **admission** — отказать в приеме
regain — вновь приобрести; снова достичь
regard — учет; принятие во внимание; считать, рассматривать
in ~ **to** — что касается; в отношении
without ~ не учитывая; без учета
regardless — невзирая на; не считаясь с
reinforce — усиливать; укреплять
reject — отвергать, отклонять
relate — устанавливать отношения, связывать
related — смежный; (взаимо)связанный; относящийся
relation — отношение; соотношение; зависимость; связь
relationship — отношение; связь
relatively — относительно
relay — реле; передавать, транслировать
release — высвобождать; выпускать
relevance — уместность
relevant — уместный; относящийся к делу
reliability — надежность; прочность; достоверность
reliable — надежный
relieve — освобождать; облегчать
remain — оставлять; оставаться
remarkable — замечательный
remember — помнить; вспоминать
remote — дистанционный; удаленный
remove — удалять; устранять; убирать
renewable — возобновляемый; восстанавливаемый
renowned — известный, знаменитый, прославленный
repel — отталкивать; отвергать; отклонять
replace — заменять; замещать; сменять
represent — представлять
representative — представительный

reproduce — воспроизводить; делать копию; восстанавливать
reproduction — воспроизведение; репродукция
require — требовать; нуждаться
requirement — требование; потребность
    meet ~ удовлетворять потребности
research — исследование; изучение; исследовать
resistance — сопротивление; противодействие; устойчивость
respect — уважение; почтение; отношение; уважать
    with ~ **to** — по отношению к
respond — реагировать; отвечать
response — отклик; реакция; ответ
responsibility — ответственность; обязательства
    sense of ~ чувство ответственности
responsible — ответственный
result — результат; следствие; итог
    ~ **from** — возникать из-за ч.-л.
    ~ **in** — приводить к ч.-л.
resulting — итоговый, суммарный, приводящий к
retard — замедлять; тормозить; задерживать; отставать
retrieve — извлекать; выбирать (данные); восстанавливать (файлы)
reverse — возвращать, двигать в обратном направлении; обратный ход
ride — езда; поездка; полет
rigid — твердый; жесткий; устойчивый
ring — кольцо; обруч; хомут
    piston ~ поршневое кольцо
rise — поднимать(ся)
road — путь; дорога
rocketry — ракетостроение
rod — стержень, брус; шатун
rolling — прокатка, прокатывание
rotary — вращательный; ротационный
rotate — вращать(ся)
rotation — вращение; чередование
route — маршрут; путь; направлять; адресовать; соединять
routing — маршрутизация; схема соединений
rub — тереть, натирать
rule — правило; править
ruinous — разрушительный
run out — истекать, вытекать; истощить запас
run program — запускать программу

saddle — салазки; суппорт
safe — безопасный; надежный
safety — безопасность; надежность
satellite — спутник
saturate — насыщать; пропитывать
saturation — насыщение
save — сохранять; сберегать
scale — шкала; масштаб
scan — просмотр; сканирование; развертка; просматривать
scanner — сканер; устройство оптического считывания
  bar-code ~ устройство считывания штрих-кода
scatter — разбрасывать; рассеивать
science — наука; теория
scientific — научный
scientist — ученый
scores — десятки; множество
screw — винт, болт, шуруп, червяк; привинчивать
search — поиск; исследование
searchlight — прожектор
secure — безопасный; защищенный
securely — надежно; безопасно
security — безопасность; сохранность; защита
seek — искать; пытаться; поиск
select — выбирать; отбирать; выделять (на экране)
selectivity — избирательность
self-taught — самоучка, выучившийся самостоятельно
self-determination — самоопределение
semiconductor — полупроводник
sense — чувство; сознание
  in a ~ в известном смысле
  in general ~ в общем смысле
sensitive — чувствительный
sensitivity — чувствительность
sequence — последовательность
serve — служить; обслуживать
service — обслуживание; услуги; сервис
servomechanism — сервомеханизм, следящая система
set of rules — набор правил
shaft — вал; ось; шпиндель; штырь; рукоятка; ручка

shape — форма; вид; очертание; вид; конфигурация
share — делить, разделять; совместно использовать
shift — сдвигать; переключать; переводить
shipbuilding — кораблестроение
shower — ливень, проливной дождь
sick — больной
significance — значение, важность
significant — значительный, важный, существенный
signify — значить, означать
silent — молчаливый
silicon — кремний
silver — серебро
similar — подобный, похожий
similarity — сходство, подобие
similarly — подобным образом; так же
simple — простой, элементарный
simplicity — простота; простодушие; наивность
simplify — упрощать
simulate — моделировать; имитировать
simultaneously — одновременно
single — один; единственный
single-phase — однофазный
size — размер; величина; объем
skill — мастерство; умение; ловкость
slide up and down — скользить вверх и вниз
slightly — слегка; немного
slow down — замедлять
slushing — антикоррозийная смазка
smash — разбивать (вдребезги)
small-dimensioned — малогабаритный
software — программное обеспечение
solar — солнечный
solid — твердое тело; твердый
solid-state — твердотельный; в твердотельном состоянии
solution — решение, разрешение (вопроса)
solve — решать, разрешать (проблему); находить выход
soon — скоро; вскоре; быстро
    as ~ as — как только; не позже
source — источник; исходное устройство; исток
spacecraft — космический летательный аппарат

specific heat — удельная теплоемкость
specified load — расчетная нагрузка
specification — техническая характеристика
specify — точно устанавливать; определять технические условия
speed — спешить; ускорять; скорость
spend (spent) — проводить; тратить
spin — крутиться; описывать круги
splinter — расщеплять; раскалывать; осколок
split — разбивать; расщеплять; раскалывать
spread — распространять(ся); развертывать; простираться
spontaneous — самопроизвольный, спонтанный, стихийный
spur — побуждать, подстрекать; стимул, побуждение
square — квадрат; площадь
state — состояние; положение; заявлять, констатировать
    excited ~ возбужденное состояние
stated — сформулированный, высказанный
statement — утверждение; заявление; формулировка
steadily — постоянно, равномерно
steam engine — паровой двигатель
steering gear — рулевое управление
steersman — рулевой
stem (from) — происходить (от ч.-л.); основа, стержень
step-by-step — пошаговый
storage — память, ЗУ; хранение; запоминание
store — хранить; запоминать
straight — прямой; прямо
strain — натяжение, растяжение, деформация
strange — странный, необыкновенный; неизвестный
stream — поток; струя; течь, вытекать
strength — сила, прочность, напряженность; сопротивление
    ~ **of materials** — сопротивление материалов
stress — напряжение, усиление, нагрузка
strictly — строго; точно; определенно
strike — ударять; наткнуться
stroke — ход поршня
strong — сильный; прочный: крепкий; выносливый
subject — предмет, дисциплина; тема; подчинять; подвергать
submarine — подводная лодка
submerge — погружать(ся); затоплять
subsequence — последовательность

subsequent — последующий; дальнейший
subsequently — в дальнейшем; затем; впоследствии
substance — материя; вещество
succeed — преуспевать; выдвинуться; иметь успех
success — успех, удача
successful — успешный, удачный; преуспевающий
successor — преемник, наследник
such as — такой, как; как например
sufficient — достаточный
sufficiently — достаточно, в достаточной степени
suggest — предлагать, предполагать
suit — подходить, приспосабливать; набор, комплект
summarize — суммировать, подводить итог
superiority — превосходство
supply — подача; питание; поставлять, снабжать
  power ~ источник питания
support — поддержка; обеспечение; подавать; обеспечивать
suppose — полагать, предполагать
surface — поверхность
surpass — превосходить, превышать
surround — окружать, обступать
surrounding — близлежащий, соседний; окружающий
suspension — подвеска; подвешивание
  front ~ передняя подвеска
  rear ~ задняя подвеска
switch — переключать; коммутатор
switchgear — распределительное устройство
syrup — напиток

T

tail — хвост; оконечность
take (took, taken) — брать, взять; принимать (вид, значение)
  ~ **into account** — учитывать; принимать во внимание
  ~ **place** — происходить, состояться
target — цель, мишень
teach (taught) — учить, обучать
teacher's training institute — педагогический институт
team — команда; группа
technique — метод, способ; техника; оборудование
  common ~ общепринятая методика

computing ~ вычислительная техника
hardware ~ методы аппаратного решения
modelling ~ методы моделирования
programming ~ методика программирования
software ~ методы программного решения
technology — техника; технология
telecommunication — техническая организация дальней связи
term — термин; семестр
in terms of — на языке; с точки зрения
terminal — терминал; конец; зажим, вывод
data ~ терминал сети передачи данных
tension — напряжение; натяжение; упругость
therefore — поэтому, следовательно, вот почему
thickness — плотность; толщина
through — через, сквозь; по причине, вследствие; насквозь, совершенно
throughout — через; по всему
throttle — дроссель
thrust — тяга; осевое давление; нажим
thunderstorm — гроза
thus — так; таким образом; поэтому
tide — прилив; поток; течение
tolerance — допуск; терпимость, толерантность
total — общий; полный; весь; целый; совокупный
tough — крепкий, стойкий, упругий, жесткий
track — след; направляющее приспособление; следить
traffic — транспорт
~ **flow** — поток транспорта
transfer — передавать, переносить; передача; переход
transformer — трансформатор
transition — переход; перемещение; превращение; модификация
transmission — передача; пересылка; пропускание
transmit — передавать; посылать; пропускать
transmitter — передатчик; датчик; преобразователь
transparency — прозрачность
transparent — прозрачный; незаметный; очевидный
treat — обращаться; лечить
treatment — обращение; обработка; лечение
tremendous — огромный, громадный
tributary — приток; подчиненный, второстепенный
~ **station** — подстанция

trip — поездка; полет
truly — искренне; верно; поистине; точно
tube — трубка; лампа
  vacuum ~ электронная лампа
tune — настраивать; приспосабливать; налаживать
turn — оборот, поворот, виток; вращать, поворачивать
  in its ~ в свою очередь
tyre — шина, покрышка; обод колеса

U

undergo (underwent, undergone) — подвергаться; испытывать; переносить
understand (understood) — понимать
unfair — несправедливый; нечестный
unfavourable — неблагоприятный
unfortunately — к сожалению; к несчастью
unique — уникальный; отличный от других; особенный
unison — унисон, согласие
unit — единица; блок, устройство; модуль
  ~ **of memory** — блок памяти, запоминающее устройство
  arithmetic ~ арифметическое устройство
  central-processing ~ центральный процессор
  control ~ устройство управления
  input-output ~ блок ввода-вывода
unite — соединяться, объединяться
universal — всеобщий, универсальный
Universe — вселенная
unload — разгружать, выгружать; удалять из памяти
unprecedented — беспрецедентный
unstable — неустойчивый; изменчивый; нестойкий
unsuitable — неподходящий; непригодный
upset — расстраивать; огорчать
usage — употребление
use — употреблять, применять; польза, толк
useful — полезный, пригодный
user — пользователь
utilization — использование, утилизация
utilize — использовать, утилизировать

V

valuable — ценный; полезный
value — значение; величина; значимость

vaporize — испарять
variety — разнообразие, разновидность; ряд; множество
various — различный, разнообразный
vary — менять(ся), изменять(ся); разнообразить
vast — огромный, громадный
vehicle — летательный аппарат
velocity — скорость
Venus — Венера
vessel — сосуд (бак, котел)
versatile — универсальный, разносторонний; многофункциональный
vice versa — наоборот
vicinity — окрестность; соседство; близость
view — рассматривать; вид, взгляд; кругозор
    in ~ of — ввиду; учитывая, принимая во внимание
    point of ~ точка зрения
virtual — виртуальный; нереальный; несуществующий
visible — видимый; явный; очевидный
visualize — рассматривать; обозревать
voice wave — голосовая волна
voltage — (электрическое) напряжение

W

wafer — пластина; подложка
warfare — война, военные действия
    conduct ~ вести войну
watercraft — средство передвижения на воде
waveguide — волновод
weapon — оружие
    nuclear ~ ядерное оружие
wearproof — износоустойчивый
weather — погода
weigh — взвешивать; весить
weight — вес; тяжесть; груз
weightlessness — невесомость
welding — сварка; сваривание
well — хорошо; как следует; ну
    as ~ кроме того, вдобавок; а также
well-built — хорошо сложенный; крепкий
wet — мокрый, влажный; дождливый
    ~ through — промокнуть до костей

get ~ to the skin — промокнуть до костей
whatever — какой бы ни; любой; что бы ни
wheel — колесо; штурвал
~ gear — зубчатое колесо
~ worm — червячное колесо
whereas — тогда, как
wherever — где бы ни; куда бы ни
width — ширина; пролет; расстояние
win (won) — побеждать; выигрывать
winner — победитель; лауреат; призер
winding — обмотка
primary ~ первичная обмотка
secondary ~ вторичная обмотка
wireless — радио; радиоприемник; беспроволочный
wiring — электропроводка
withdraw — удалять; убирать; вынимать
without — без; без того, чтобы; вне; за
it goes ~ saying — само собой разумеется
withstand (withstood) — выдержать; противостоять
witness — свидетельствовать; свидетель; очевидец
wonder — удивление, изумление; чудо
wonderful — удивительный, замечательный
work out — разрабатывать
workpiece — деталь
world-wide — всемирный (об информационной сети)

X

X-ray — рентгеновы лучи; рентгеновский
X-shaped — крестообразный

Y

yet — тем не менее; все же; еще
yield — выход (результатов); выпуск; выдача; выдавать

Z

zero — нуль; нулевой; обнулять
zone — зона; область; полоса

СОКРАЩЕНИЯ И УСЛОВНЫЕ ОБОЗНАЧЕНИЯ (С ЭЛЕМЕНТАМИ ТОЛКОВАНИЯ)

A

ACS — atomatic control system — автоматизированная система управления (АСУ)

AFM — atomic force microscope — атомно-силовой микроскоп

ALD — atomic layer deposition — осаждение атомного слоя

ALU — arithmetic-logical unit — арифметико-логическое устройство *(блок центрального процессора, который выполняет все действия микропроцессора на основе математических и логических операций)*

APL — **A Programmable language** — высокоуровневый язык программирования

AU — **arithmetic unit** — арифметическое устройство

B

BASIC — **(сокр. от Beginner's All-Purpose Symbolic Instruction Code)** — простой в употреблении язык программирования высокого уровня, разработанный в 1964 г.

C

CD — **compact-disk** — компакт-диск

CDD — **compact-disk drive** — дисковод для компакт-дисков

CD-ROM — **compact disk, read only memory** — неперезаписываемый компакт-диск

CMOS — **complementary metal-oxide-semiconductor** — комплементарная структура металл-оксид-полупроводник (*носитель КМОП-памяти*)

COBOL — **Common Business Oriented Language** — Кобол — Всеобщий бизнес-ориентированный язык *(язык программирования высокого уровня, специально разработанный для бизнес-приложений в 1964 г.)*

CPU — **central processing unit** — центральный процессор (ЦП)

CRT — **cathode-ray tube** — электронно-лучевая трубка (дисплея)

CU — **control unit** — устройство управления

D

DB — **database** — база данных

DEL — **delete** — символ удаления

DNA — **deoxyribonucleic acid** — дезоксирибонуклеиновая кислота

DOS — **disk operating system** — дисковая операционная система

DVD — **digital video disk** — цифровой видеодиск

E

ECC — **error-correction code** — код с исправлением ошибок

EDI — **electronic data interchange** — электронный обмен данными

EDP — **electronic data processing** — электронная обработка данных

ENIAC — **Electronic Numerical Integrator and Calculator** — электронно-числовой интегратор и калькулятор

EPROM — **erasable programmable read-only memory** — стираемое программируемое постоянное запоминающее устройство (ППЗУ)

F

FDD — **floppy-disk drive** — дисковод для гибких дисков

FORTRAN — сокр. от **for**mular **tran**slation — Фортран *(первый компилирующий язык программирования высокого уровня, ориентированный на решение задач математического характера)*

G

GB, Gb — **gigabyte** — гигабайт

Gc — **gigacycle** — гигацикл

GP — **general purpose** — общего назначения

H

HD — **high density** — высокая плотность

HDD — **hard-disk drive** — дисковод для жесткого диска

Hi-Fi — **high fidelity** — высоконадежный; с высокой точностью воспроизведения

HF — **high frequency** — высокочастотный

HW, hw — **hardware** — аппаратура; оборудование; аппаратные средства

I

IAB — **Internet Activities Board** — Управляющий совет по вопросам деятельности Internet

IBM — **International Business Machine** — фирма по производству компьютеров

IC — **integrated circuit** — интегральная схема

I/O — **input/output** — устройство ввода-вывода

Intel — самая большая в мире корпорация по производству микропроцессоров (США)

Internet — **Intercontinental Network** — система соединенных компьютерных сетей мирового масштаба

IP — **Internet Protocol** — протокол маршрутизации

ISOC — Internet Society — Общество Internet

IT — information technology — информационная техника / технология

K

KB, Kbyte — килобайт

K/B, KBD, kbd — keyboard — клавиатура

Kc — kilocycle — килоцикл

KHz — kilohertz — КГц, килогерц

L

LAN — local-area network — локальная сеть

LCD — liquid-crystal display — жидкокристаллический дисплей

LSI — large-scale integration — высокий уровень интеграции

M

MB, Mb — megabyte — мегабайт

M/B — motherboard — материнская плата

MBE — molecular beam epitaxy — устройство молекулярного луча

MCB — memory control block — блок управления памятью

MEMS — microelectro-mechanical system — микроэлектромеханическая система

MIS — management information system — управленческая информационная система

MMCD — Multimedia Compact Disk — мультимедийный компакт-диск

MP — microprocessor — микропроцессор

MPU — microprocessor unit — микропроцессорное устройство

MS DOS — Microsoft Disk Operational System — стандартная операционная система для IBM и IBM-совместимых компьютеров, рассчитанная на одного пользователя

MSI — medium-scale integrated circuit — средняя интегральная схема

N

NEMS — nanoelectro-mechanical system — наноэлектромеханическая система

NetBIOS — Network Basic Input/Output System — базовая система ввода-вывода сети

O

OCR — optical character reader — оптическое устройство считывания (распознавания) знаков

OR — ИЛИ (логическая операция)

OS — operating system — операционная система

P

PC — personal computer — персональный компьютер

PFM — pulse-frequency modulation — частотно-импульсная модуляция

PIF — program information file — информационный файл программы

PILOT — сокр. от Programmed Inquiry Learning Or Teaching — авторизованный язык для машинного обучения, разработанный Дж. Старквезером в Калифорнийском Университете в 1968 г.

PL — Programming Language PL — язык программирования

PROLOG — PROgramming in LOGic — язык программирования высокого уровня, используемый в исследованиях, связанных с искусственным интеллектом

PROM — programmable read-only memory — программированное постоянное запоминающее устройство

R

RAM — random-access memory — оперативное запоминающее устройство

r.c. — remote control — дистанционное управление

r.mt. — reverse motion — обратное движение

ROM — read-only memory — постоянное запоминающее устройство

RTG — Radioisotop Thermoelectric Generator — радиоизотопный термоэлектрический генератор

R/W — read/write — чтение — запись

S

SATAN — Sequrity Administrator Tool for Analysing Networks — программа, предназначенная для оценки состояния безопасности компьютера или локальной сети, подключенной к Internet

SNOBOL — String-Oriented Symbolic Language — язык программирования высокого уровня, ориентированный на обработку символьных последовательностей

SOM — start of message — начало сообщения

SP — space character — символ пробела

SSI — small-scale integration — интеграция малого уровня

STM — scanning tunneling microscope — сканирующий туннельный микроскоп

T

TCP — Transmission Control Protocol — транспортный протокол

TF — time factor — коэффициент времени

Turbo Pascal — быстродействующий компилятор для языка Pascal (1984 г.)

U

ULSI — ultralarge-scale integration — интеграция ультравысокого уровня

UNIX — операционная система, используемая во многих компьютерах (от персональных до мэйнфреймов)

UPS — uninterrupted power supply — бесперебойный источник питания

V

VDT — visual display terminal — видеотерминал

v.f. — video frequency — видеочастота

v.f. — velocity factor — коэффициент скорости

VLSI — very large-scale integration — интеграция сверхвысокого уровня

VR — virtual reality — виртуальная реальность

v.r. — voltage regulator — регулятор напряжения

W

WAN — wide-area network — глобальная сеть

WWW — World Wide Web — Всемирная информационная сеть

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