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БАЗОВЫЙ КУРС АНГЛИЙСКОГО ЯЗЫКА

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Состоит из четырех глав, каждая из которых включает в себя несколько параграфов. Аутентичные тексты снабжены словарём и развёрнутой системой упражнений, направленных на освоение специальной лексики, понимание текстов, стилистическое использование терминологии, освоение грамматики.

Предназначено для студентов 3 – 4-х курсов, обучающихся в Центре профессионального образования инвалидов по специальностям «Автоматизация технологических процессов и производств» и «Информационные системы».

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ПРЕДИСЛОВИЕ

Предлагаемое Вашему вниманию учебное пособие предназначено для использования в учебном процессе студентами Центра профессионального образования инвалидов на всех этапах обучения иностранному языку.

Данное учебное пособие имеет практическую направленность, основной целью которой является обучение лексике, развитие навыков чтения, перевода оригинальных технических текстов. В пособии используются современные материалы из оригинальных английских и американских источников, а также материал из интернет-ресурсов.

Лексика по общей тематике, информационным технологиям, программированию и автоматизации производства вводится тематически, закрепляется в разнообразных упражнениях.

Учебное пособие состоит из четырёх глав. В главах представлены тексты по компьютерным технологиям, программированию, автоматизации производственных процессов и грамматический материал.

Авторы благодарят кандидата филологических наук, доцента кафедры иностранных языков профессиональной коммуникации ВлГУ В. Л. Новикову, профессора, директора Центра профессионального образования инвалидов при ВлГУ И. Н. Егорова, специалиста по международным связям АНО ВПО Владимирского института бизнеса, старшего преподавателя кафедры русского и иностранных языков Н. В. Кудачкину за ценные замечания, высказанные ими в процессе работы над пособием.

Глава I. COMPUTER TECHNOLOGIES

Unit I. Computer

Text I. What is a computer?

The term computer is used to describe a device made up of a combination of electronic and electromechanical (part electronic and part mechanical) components. Computer has no intelligence by itself and is referred to as hardware. A computer system i s a combination of five elements:
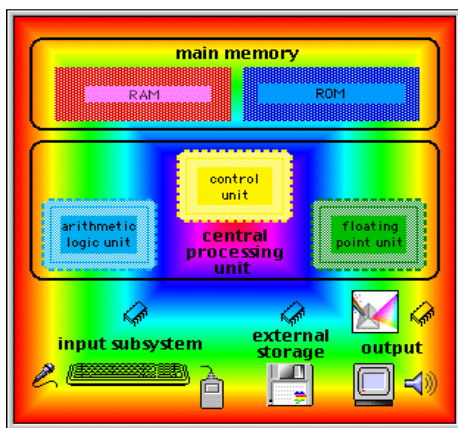
- ✓ Hardware
- ✓ Software
- ✓ People
- ✓ Procedures
- ✓ Data/information

When one computer system is set up to communicate with another computer system, connectivity becomes the sixth element. In another words, the manner in which the various individual systems are connected – for example, by phone lines, microwave transmission, or satellite – is an element of the total computer system.

Software is the term used to describe the instructions that tell the hardware how to perform a task. Without software instructions, the hardware doesn't know what to do. People are the most important component of the computer system: they create the computer software instructions and respond to the procedures that those instructions present.

The basic job of the computer is the processing of information. Computers accept information in the form of instruction called a program and characters called data to perform mathematical and logical operations, and then give the results. The data is raw material while information is organized, processed, refined and useful for decision making. Computer is used to convert data into information. Computer is also used to store information in the digital form.

Vocabulary

1. characters	[kærɪktə´z]	символы
2. data	[´deɪtə]	данные
3. decision	[dɪ´sɪʒn]	решение
4. device	[də´vaɪs]	устройство
5. hardware	[´had´wɛə]	аппаратное обеспечение, оборудование
6. instruction	[ɪnst´rʌkʃn]	команда
7. intelligence	[ɪn´tɛlɪʤəns]	разум
8. manner	[´mænə]	манера, способ
9. microwave	[´maɪkrəuweɪv]	микроволновая
10. procedures	[prə´si:ʤə]	процедуры, операции
11. purpose	[´pə:pəs]	цель
12. raw	[rɔ:]	необработанный, сырой
13. to come to life	[tɒ ka:m tɒ laɪf]	оживать
14. to connect	[tɒ kɒ´nəkt]	соединять
15. to convert	[tɒ kɒn´və:t]	превращать, преобразовывать
16. to create	[tɒ krɪ:´eɪt]	создавать
17. to evaluate	[tɒ ɪ´væljueɪt]	оценивать
18. to refer to as	[tɒ re´fə: tɒ əz]	называть что-либо
19. to refine	[tɒ rə´faɪn]	очищать
20. to respond	[tɒ rəs´pɒnd]	отвечать
21. software	[´sɒft´wɛə]	программное обеспечение
22. transmission	[trænz´mɪʃən]	передача
23. various	[´vɛərɪəs]	различные

Упражнение 1. Ответьте на вопросы по тексту.

1.What does the term "computer" describe? 2. Is computer intelligent? 3. What are five components of computer system? 4. What is connectivity? 5. What is software? 6. What is hardware? 7. What's the difference between hardware and software? 8. Why people are the most important component of a computer system? 9. In what way terms "data" and "information" differ? 10. How does computer convert data into information? 11. How is computer used for?

Упражнение 2. Какие из нижеприведённых терминов имеют эквиваленты на русском языке?

Computer, diskette, metal, processor, scanner, information, data, microphones, printer, modem, Internet.

Упражнение 3. Какое из утверждений соответствует содержанию текста, а какое нет (да / нет)?

1. Computer is made of electronic components so it is referred to as electronic device. 2. Computer has no intelligence until software is loaded. 3. There are five elements of computer system: hardware, software, people, diskette and data. 4. The manner in which computers are connected is the connectivity. 5. Without software instructions hardware doesn't know what to do.

Упражнение 4. Согласуйте слова в правой колонке с предложениями из левой колонки.

1. … doesn't come to life until it is connected to other parts of a system.	a) program
2. … is the term used to describe the instructions that tell the hardware how to perform a task.	b) information
3. … create the computer software instructions and respond to the procedures that those instructions present.	c) processing of information
4. Information in the form of instruction is called a … .	d) software
5. The manner in which the various individual systems are connected is … .	e) connectivity
6. … is organized, processed, refined and useful for decision making.	f) computer
7. The basic job of the computer is the … .	g) people

Text II. Application of computers

Задание. *Выполните письменный перевод текста по двум вариантам.*

I

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.

The use of computers in business, industry and communication services 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, and it would be impossible to make inquiries about the current status of customer accounts.

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, on-board environment and research.

II

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

It is interesting to note that computers are widely used in medicine. They became valuable medical diagnostic tools. Computers are used for optical scanning and image processing, ranging from pattern recognition to image processing. Technicians can operate computer tomography scanners which combine x-rays with computer technology to give sectional views of the body 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. Students spend more time with computer-aided instruction performing the assigned task, as compared with conventional classroom.

At last air traffic control is impossible without computer application. It fully depends upon computer-generated information.

Many other uses of computers that we cannot imagine at present will become commonplace in the transition from an industrial to post industrial, or information society.

Vocabulary and notes

1. to maintain records	*вести учёт*	10. weather forecasting	*прогноз погоды*
2. deposits and withdrawal	*вклады и изъятия*	11. medical diagnostic tools	*инструменты диагностики*
3. guidance	*наведение, управление, руководство*	12. technician	*специалист*

4. on-board environment	*бортовое окружение*	13. computer tomography scanner	*компьютерный томограф*
5. pattern recognition	*распознавание образов*	14. sectional views	*вид в разрезе*
6. commonplace	*общее место; что-либо обычное, привычное*	15. computer-aided instruction	*программированное обучение*
7. communication services	*услуги связи*	16. assigned task	*определённое задание*
8. to be widespread	*быть широко распространённым*	17. conventional classroom	*аудитория, удовлетворяющяя техническим условиям*
9. to improve	*улучшать*	18. computer-generated information	*информация, создаваемая компьютером*

Unit II. The parts of a computer system

In order to use computers effectively to solve problems in our environment, computer systems are devised. Computer systems may be discussed in two parts.

The first part is hardware – the physical, electronic, and electromechanical devices that are thought of and recognized as "computers". The hardware consists of Central Processing Unit (CPU), input devices and output devices.

The second part is software – the programs that control and coordinate the activities of the computer hardware and that direct the processing of data.

For the computer system to operate, computer programs are required. A computer program is a set of instructions for the CPU. These instructions tell the CPU where to find the input data in the system. The CPU is also instructed how to process the data and where to put the results. Programs are not hardware, as they have no electrical or mechanical components. They can be easily changed according to the needs of the user.

Computer software can be divided into two very broad categories – systems software and application software.

Text I. Hardware

Hardware is the mechanical, magnetic, electronic, and electrical devices composing a computer system. Computer hardware can be divided into four categories:

Input hardware   ✓   *Storage hardware*
Processing hardwar   ✓   *Output hardware*

*Input hardware.*The purpose of the input hardware is to collect data and convert it into a form suitable for computer processing. The most common input device is a keyboard. It looks very much like a typewriter. The mouse is a hand held device connected to the computer by small cable. As the mouse is rolled across the mouse pad, the cursor moves across the screen. When the cursor reaches the desired location, the user usually pushes a button on the mouse once or twice to signal a menu selection or a command to the computer.

The light pen uses a light sensitive photoelectric cell to signal screen position to the computer. Another type of input hardware is optic-electronic scanner that is used to input graphics as well as typeset characters. Microphone and video camera can be also used to input data into the computer. Electronic cameras are becoming very popular among the consumers for their relatively low price and convenience.

*Processing hardware.*The purpose of processing hardware is retrieve, interpret and direct the execution of software instructions provided to the computer. The most common components of processing hardware are the Central Processing Unit (CPU) and main memory.

The CPU is the brain of the computer. It reads and interprets software instructions and coordinates the processing activities that must take place.

The processor is the part of the computer that actually does the computations.

Memory is the system of component of the computer in which information is stored. There are two types of computer memory: Random Access Memory (RAM) and Read Only Memory (ROM).

RAM is the volatile computer memory used for creating loading, and running programs and for manipulating and temporarily storing data.

ROM is nonvolatile, nonmodifiable computer memory used to hold programmed instructions to the system. The more memory you have in your computer, the more operations you can perform.

Some processors (or variations within processor families) might have Registers and flags are a special kind of memory that exists inside a processor. Registers are usually fairly small (8, 16, 32, or 64 bits for integer data, address, and control registers; 32, 64, 96, or 128 bits for floating point registers).

Flags are single bit memory used for testing, comparison, and conditional operations (especially conditional branching).

Storage hardware.The purpose of storage hardware is to store computer instructions and data in a form that is relatively permanent and retrieve when needed for processing. The most common ways of storing data are: magnetic tape, hard disk, floppy disk, CD-ROM (compact disk read only memory) and USB (Universal Serial Bus).

Hard disk is a rigit disk coated with magnetic material for storing programs and relatively large amounts of data.

Floppy disk (diskette) – thin, usually flexible plastic disk coated with magnetic material, for storing computer data and programs. There are two formats for floppy disks: 5.25" and 3.5".

CD-ROM is a compact disk on which a large amount of digitized read-only data can be stored. CD-ROMs are very popular now because of the growing speed which CD-ROM drives can provide nowadays.

Output hardware.The purpose of output hardware is to provide the user with the means to view information produced by the computer system. Information is output in either hardcopy or softcopy form.

Monitor is a component with a display screen for viewing computer data, television programs, etc.

Printer is a computer output device that produces a paper copy of data or graphics.

Modem is an example of communication hardware – an electronic device that makes possible the transmission of data to or from computer via telephone or other communication lines.

Упражнение 1. Какое из утверждений соответствует тексту (true / false)?

1) Computer is an electronic device therefore hardware is a system of electronic devices. 2) The purpose of the input hardware is to collect data and convert it into a form suitable for computer processing. 3) Scanner is used to input graphics only. 4) The purpose of processing hardware is to retrieve, interpret and direct the execution of software instructions provided to the computer. 5) CPU reads and interprets software and prints the results on paper. 6) User is unable to change the contents of ROM. 7) 5.25'' floppy disks are used more often because they are flexible and have more capacity than 3.5'' disks. 8) Printer is a processing hardware because its purpose is to show the information produced by the system.

Упражнение 2. Что из перечисленного ниже относится к Hardware?

Program; mouse; CPU; printer; modem; command; port; cursor or the pointer; keyboard; character.

Упражнение 3. Ответьте на вопросы:

1. What is hardware? (дать определение) 2. What are the main categories of computer hardware? 3. What are the main components of input hardware? 4. What is the purpose of the input hardware?

Упражнение 4. Вместо пропусков вставьте нужные слова из рамки, данной внизу:

1. The hardware is the mechanical, …, …, and … devices composing a computer system. 2. The purpose of the input hardware is to … data and … it into a suitable form. 3. The most … input device is a … . 4. The … is connected to the computer by small cable. 5. The user pushes … on the mouse to … a menu selection. 6. The scanner is used to input … . 7. Microphone and … are used to input … .

magnetic, electronic, electrical; common, keyboard; a button, to signal; to collect, to convert; graphics; video camera, data; a mouse.

Text II. Software

Выполните письменный перевод следующего текста на русский язык и ответьте письменно на следующие вопросы:

1. What is software? 2. What does software determine? 3. What categories are programs usually divided into? 4. What does system software control?

5. What does applications software satisfie? 6. What does communications software do?

Software – programs for directing the operation of a computer or electronic data. It is a final computer system component. These computer programs instruct the hardware how to conduct processing. Computers can input, calculate, compare, and output data as information. Software determines the order in which these operations are performed.

Programs are usually divided into several categories: *system software, applications software, communications software.*

System software controls standard internal computer activities. When a computer is first turned on, one of the systems programs is booted or loaded into the computer's memory. This software contains information about memory capacity, the model of the processor, the disk drives to be used. System programs are designed for the specific pieces of hardware. These programs are called *drivers* and coordinate peripheral hardware and computer activities. User needs to install a specific driver in order to activate a peripheral device. By installing the driver you "teach" your mainboard to "understand" the newly attached part.

Applications software satisfies your specific need. These class of programs is the most numerous and perspective from the marketing point of view.

Communications software transfers data from one computer system to another. These programs provide users with data security and error checking along with physically transferring data between the two computer's memories. The developing electronic network communication has stimulated more and more companies to produce various communication software, such as Web-Browsers for Internet.

Vocabulary

to attach	присоединять	mainboard	материнская плата
to boot	загружать	memory capacity	вместимость памяти
to check	проверять	peripheral	периферийный
to complete	завершать	to provide with	обеспечивать чем-либо
to conduct	проводить	to require	требовать
control	управление	security	безопасность
to install	устанавливать	specific	определённый
internal	внутренний	to transfer	переносить, передавать

Упражнение 1. Какое из утверждений соответствует содержанию текста, а какое нет (true / faulse)?
1. Computer programs only instruct hardware how to handle data storage.
2. System software controls internal computer activities. 3. The information about memory capacity, the model of the processor and disk drives are unavailable for system software. 4. The driver is a special device used by car drivers for Floppy-disk driving. 5. Communication software is in great demand now because of the new advances in communication technologies. 6. Application software is a general-purpose instrument.

Упражнение 2. Что из перечисленного ниже относится к Software?
Program; mouse; CPU; drivers; modem; web-Browser; scanner; operating system; display; programming tool.

Unit III. Operating systems

Text I. Operating systems and performing tasks

Выполните письменный перевод следующего текста на русский язык.
An operating system (OS) is a set of programs that manages computer hardware resources, and provides common services for application software. The operating system is the most important type of system software in a computer system. Without an operating system, a user cannot run an application program on their computer, unless the application program is self booting.

Disk operating system or DOS is the most commonly used PC operating system. It was developed by Microsoft Company. The vertion of DOS release in 1981 was 1.0. Over decades DOS has undergone several changes. Each time the DOS developers release a new version, they increase the version number.

Time-sharing operating systems schedule tasks for efficient use of the system and may also include accounting for cost allocation of processor time, mass storage, printing, and other resources.

For hardware functions such as input and output and memory allocation, the operating system acts as an intermediary between application programs and the computer hardware, although the application code is usually executed directly by the hardware and will frequently call the OS or be interrupted by it. Operating systems are found on almost any device that con-

tains a computer – from cellular phones and video game consoles to super-computers and web servers.

Examples of popular modern operating systems include Linux, Android, iOS, Mac OS X, and Microsoft Windows.

Operating systems must accomplish the following tasks:

1. Processor management. The operating system needs to allocate enough of the processor's time to each process and application so that they can run as efficiently as possible. This is particularly important for multitasking. When the user has multiple applications and processes running, it is up to the operating system to ensure that they have enough resources to run properly.

2. Memory storage and management. The operating system needs to ensure that each process has enough memory to execute the process, while also ensuring that one process does not use the memory allocated to another process. This must also be done in the most efficient manner. A computer has four general types of memory. In order of speed, they are: high-speed cache, main memory, secondary memory, and disk storage. The operating system must balance the needs of each process with the different types of memory available.

3. Device management. Most computers have additional hardware, such as printers and scanners, connected to them. These devices require drivers, or special programs that translate the electrical signals sent from the operating system or application program to the hardware device. The operating system manages the input to and output from the computer. It often assigns high-priority blocks to drivers so that the hardware can be released and available for the next use as soon as possible.

4. Application interface. Programmers use application program interfaces (APIs) to control the computer and operating system. As software developers write applications, they can insert these API functions in their programs. As the operating system encounters these API functions, it takes the desired action, so the programmer does not need to know the details of controlling the hardware.

5. User interface. The user interface sits as a layer above the operating system. It is the part of the application through which the user interacts with the application. Some operating systems, such as Microsoft Windows and Apple Macintosh, use graphical user interfaces. Other operating systems, such as Unix, use shells.

Components of the operating system

The operating system comprises a set of software packages that can be used to manage interactions with the hardware. The following elements are generally included in this set of software: the **kernel**, which represents the operating system's basic functions such as management of memory, processes, files, main inputs/outputs and communication functionalities; the **shell**, allowing communication with the operating system via a control language, letting the user control the peripherals without knowing the characteristics of the hardware used, management of physical addresses, etc; the **file system**, allowing files to be recorded in a tree structure.

Vocabulary

operating system (OS)	операционная система	enough	достаточно
to manage	управлять	properly	тщательно
to provide	обеспечивать	high-speed cache	сверхоперативная / быстродействующая буферная память (кэш)
to run	работать	assign	присваивать
to boot	загружать	Interface	интерфейс (область взаимодействия)
to release	освобождать, сбрасывать	Application program interface (API)	интерфейс прикладного программирования
developer	разработчик	to insert	встраивать, вставлять, внедрять
version number	номер версии	encounter	контакт
to increase	увеличивать	user interface	окно пользователя, интерфейс работы с системой
time-sharing OS	операционная система разделения времени	to comprise	составлять
an intermediary	посредничество	software packages	пакеты программного обеспечения
to execute	выполнять	kernel	ядро (набор структурных данных и непрерываемых процедур)
to be interrupted	прерывать	shell	оболочка
device	устройство	file system	файловая система
to contain	содержать	Real-time operating systems (RTOS)	операционная система реального времени

cellular phone	мобильный телефон	Single-user	отдельный пользователь
video game console	игровая приставка	Multi-user operating systems	операционная система параллельного доступа
to accomplish	выполнять, завершать	personal digital assistants (PDAs)	персональные цифровые помощники
to ensure	убеждать	a workstation	рабочая станция
multiple application	многократное применение	information measuring system	информационно-измерительная система

Упражнение 1. Ответьте на вопросы к тексту.

1. What is an operating system (OS) and what does it provide? 2. What is disk operating system or DOS? 3. What tasks does time-sharing operating systems schedule? 4. Where can we find operating systems? 5. What are the popular modern operating systems? 6. What tasks must operating systems accomplish? 7. What are the main components of the operating system?

Упражнение 2. Какое из утверждений соответствует содержанию текста, а какое нет (true/faulse)?

1. The operating system is not very important type of system software in a computer system. 2. The vertion of DOS release in 1981 was 2.0. 3. Operating systems are found on almost any device that contains a computer – from cellular phones and video game consoles to supercomputers and web servers. 4. A computer has six general types of memory. 5. Programmers use application program interfaces (APIs) to control the computer and operating system. 6. Some operating systems, such as Microsoft Windows and Apple Macintosh, don't use graphical user interfaces. 7. The operating system comprises a set of software packages that can be used to manage interactions with the hardware.

Text II. Types of Operating Systems

Выполните письменный перевод следующего текста на русский язык.

There are hundreds of operating systems available; the most popular by far are the Microsoft Windows family of operating systems, the Macintosh operating system, and the UNIX family of operating systems. There are four general types of operating systems. Their use depends on the type of computer and the type of applications that will be run on those computers.

1. *Real-time operating systems (RTOS)* are used to control machinery, scientific instruments, and industrial systems. In general, the user does not have much control over the functions performed by the RTOS. 2. *Single-user, single task operating systems* allow one user to do one thing at a time. And example of a single-user, single task operating system is the operating system used by personal digital assistants (PDAs), also known as handheld computers. 3. *Single-user, multi-tasking operating systems* allow a single user to simultaneously run multiple applications on their computer. This is the type of operating system found on most personal desktop and laptop computers. The Windows (Microsoft) and Macintosh (Apple) platforms are the most popular single-user, multi-tasking operating systems. 4. *Multi-user operating systems* allow multiple users to simultaneously use the resources on a single computer. Unix is an example of a multi-user operating system.

There are other worthwhile types of operating systems not made by Microsoft. The greatest problem with these operating systems lies in the fact that not as many application programs are written for them. However if you can get the type of application programs you are looking for, one of the systems listed below may be a good choice.

• *UNIX* – a system that has been around for many years and it is very stable. It is primary used to be a server rather than a workstation and should not be used by anyone who does not understand the system. It can be difficult to learn. Unix must normally run an a computer made by the same company that produces the software.

• *Linux* – Linux is similar to Unix in operation but it is free. It also should not be used by anyone who does not understand the system and can be difficult to learn.

• *Apple MacIntosh* – Most recent versions are based on Unix but it has a good graphical interface so it is both stable (does not crash often or have as many software problems as other systems may have) and easy to learn. One drawback to this system is that it can only be run on Apple produced hardware.

Упражнение 1. Ответьте на следующие вопросы.

1. What operating systems are the most popular by far? 2. How many general types of operating systems are there? 3. What are Real-time operating systems (RTOS) used to? 4. What do single-user, single task operating systems allow? 5. What do single-user, multi-tasking operating systems allow? 6. What are the most popular single-user, multi-tasking operating systems? 7. What do multi-user operating systems allow?

Упражнение 2. Дайте определения следующим словам и аббревиатурам, используя лексику из текста.

RTOS; PDAs; UNIX; Linux; MacIntosh

Упражнение 3. Вставьте необходимые слова вместо пропусков.

1. The use of four general types of ……. depends on the type of computer and the type of applications that will be run on those computers. 2. The user does not have much control over ……. performed by the RTOS. 3. Single-user, …….. allow a single user to simultaneously run multiple applications on their computer. 4. Unix must normally run on a computer made ……. that produces the software. 5. Linux is similar to ……. in operation but it is free. 6. One drawback to …….. is that it can only be run on Apple produced hardware.

> *Unix; operating systems; the functions; Apple MacIntosh; by the same company; multi-tasking operating systems*

Глава II. PROGRAMMING

Unit I. Programms and programmers

Vocabulary

1. Computer programming	*компьютерное программирование*	21. self-governed	*свободный, самоуправляемый*
2. source code	*программный код*	22. accredited institution	*авторитетное заведение*
3. to create	*создавать*	23. illegal	*недопустимый, незаконный*
4. to exhibit	*показывать*	24. ongoing debate	*продолжительные обсуждения*
5. application domain	*домен приложения / прикладная область*	25. habitual thought	*общепринятое мнение*

6. to be regarded	*принимать во внимание, относиться*	26. to challenge	*требовать*
7. goal	*цель*	27. to influence	*влиять*
8. to be licensed	*давать разрешение*	28. yield	*создавать*
9. artificial language	*язык программирования*	29. a notation	*обозначение*
10. computations	*вычисления*	30. restrict	*ограничение*
11. human communication	*социальные коммуникации*	31. traits	*свойства, особенность*
12. predate the invention	*предшествовать изобретению*	32. PostScript programs	*язык написания страниц печатных документов*
13. Jacquard looms	*ткацкий станок*	33. practical contexts	*контекст (общее положение) практического применения*
14. an imperative style	*императивный стиль*	34. consequently	*последовательно*
15. a sequence of commands	*последовательность команд*	35. abstractions	*абстрактные понятия*
16. split	*расщепление*	36. manipulating	*обработка*
17. syntax (form)	*структура (форма)*	37. execution	*режим выполнения (работы)*
18. semantics (meaning)	*семантика (значение)*	38. all Turing complete languages	*язык полного преобразования кодов*
19. the C programming language	*язык программирования C++*	39. ANSI/ISO SQL and Charity	*Международный стандартный язык для определения и доступа к реляционным базам доступа и язык обеспечения, используемые Американским национальным институтом стандартов / Международной организацией по стандартизации*
20. ISO Standard	*стандарт ISO (Международной организации по стандартизации)*		

Text I. Computer programming

Выполните письменный перевод следующего текста на русский язык.

Computer programming (often shortened to **programming** or **coding**) is the process of designing, writing, testing, debugging, and maintaining the source code of computer programs. This source code is written in a programming language. The purpose of programming is to create a program that exhibits a certain desired behavior. The process of writing source code often requires expertise in many different subjects, including knowledge of the application domain, specialized algorithms and formal logic.

Within software engineering, programming (the *implementation*) is regarded as one phase in a software development process.

There is an ongoing debate on the extent to which the writing of programs is an art, a craft or an engineering discipline. In general, good programming is considered to be the measured application of all three, with the goal of producing an efficient and evolvable software solution (the criteria for "efficient" and "evolvable" vary considerably). The discipline differs from many other technical professions in that programmers, in general, do not need to be licensed or pass any standardized (or governmentally regulated) certification tests in order to call themselves "programmers" or even "software engineers." Because the discipline covers many areas, which may or may not include critical applications, it is debatable whether licensing is required for the profession as a whole. In most cases, the discipline is self-governed by the entities which require the programming, and sometimes very strict environments are defined (e.g. United States Air Force use of AdaCore and security clearance). However, representing oneself as a "Professional Software Engineer" without a license from an accredited institution is illegal in many parts of the world.

Another ongoing debate is the extent to which the programming language used in writing computer programs affects the form that the final program takes. This debate is analogous to that surrounding the Sapir–Whorf hypothesis in linguistics, which postulates that a particular spoken language's nature influences the habitual thought of its speakers. Different language patterns yield different patterns of thought. This idea challenges

the possibility of representing the world perfectly with language, because it acknowledges that the mechanisms of any language condition the thoughts of its speaker community.

Упражнение 1. Ответьте на следующие вопросы.

1. What is computer programming? 2. What is the purpose of programming? 3. How does the discipline differ from many other technical professions? How do we call these specialists? 4. How is the issue debated? 5. How does this idea challenge the possibility of representing the world perfectly with language?

Упражнение 2. Вставьте необходимые слова вместо пропусков.

1. This ……. is written in a programming language. *a) programming code; b) source code; c) special code.* 2. Within software engineering, programming (the implementation) ……. as one phase in a software development process. *a) is taken into consideration; b) is thought; c) is regarded.* 3. ……. differs from many other technical professions in that programmers. *a) The discipline; b) The profession; c) The position.* 4. Different language patterns …… different patterns of thought. *a) create; b) make; c) yield.* 5. ……. challenges the possibility of representing the world perfectly with language. *a) This issue; b) This idea; c) This problem.*

Text II. Programming languages

Выполните письменный перевод следующего текста на русский язык.

A **programming language** is an artificial language designed to express computations that can be performed by a machine, particularly a computer. Programming languages can be used to create programs that control the behavior of a machine, to express algorithms precisely, or as a mode of human communication.

The earliest programming languages predate the invention of the computer, and were used to direct the behavior of machines such as Jacquard looms and player pianos. Most programming languages describe computation in an imperative style, i.e., as a sequence of commands, although some languages, such as those that support functional programming or logic programming, use alternative forms of description.

A programming language is usually split into the two components of syntax (form) and semantics (meaning). Some languages are defined by a specification document (for example, the C programming language is specified by an ISO Standard), while other languages, such as Perl, have a dominant implementation that is used as a reference.

A programming language is a notation for writing programs, which are specifications of a computation or algorithm. Traits often considered important for what constitutes a programming language include: 1) *Function and target:* A *computer programming language* is a language used to write computer programs, which involve a computer performing some kind of computation or algorithm and possibly control external devices such as printers, disk drives, robots, and so on. For example PostScript programs are frequently created by another program to control a computer printer or display. In most practical contexts, a programming language involves a computer; consequently programming languages are usually defined and studied this way. Programming languages differ from natural languages in that natural languages are only used for interaction between people, while programming languages also allow humans to communicate instructions to machines. 2) *Abstractions:* Programming languages usually contain abstractions for defining and manipulating data structures or controlling the flow of execution. The practical necessity that a programming language support adequate abstractions is expressed by the abstraction principle; this principle is sometimes formulated as recommendation to the programmer to make proper use of such abstractions. 3) *Expressive power:* The theory of computation classifies languages by the computations they are capable of expressing. All Turing complete languages can implement the same set of algorithms. ANSI/ISO SQL and Charity are examples of languages that are not Turing complete, yet often called programming languages.

Упражнение 1. Ответьте на следующие вопросы.
1. What is a programming language? 2. What were the earliest programming languages used for? 3. What is the function of most programming languages? 4. What are the components of a programming language? 5. What traits are constituted a programming language ?

Упражнение 2. Какое из утверждений соответствует тексту (true / false)?

1. Programming languages can be used to create programs that control the behavior of a machine, to express algorithms precisely. 2. The earliest programming languages predate the invention of the computer. 3. A programming language is usually split into the three components. 4. Programming languages do not differ from natural languages in that natural languages are only used for interaction between people. 5. The practical necessity that a programming language support adequate abstractions is expressed by the principle is sometimes formulated as recommendation to the programmer to make proper use of abstractions. 6. All Turing complete languages can implement the different set of algorithms.

Unit II. Computer specialists

Vocabulary

1. generalist	*универсал*	17. applications engineer	*инженер программного обеспечения*
2. profess	*преподавать*	18. systems engineer	*системный инженер*
3. prefix	*устанавливать*	19. customized application	*специальная программа*
4. web environment	*Интернет, веб-среда*	20. databases	*базы данных*
5. insulting	*вредоносный*	21. ordering	*упорядочение*
6. derogatory	*вредоносный*	22. inventory	*кадастр*
7. simplification	*упрощение*	23. billing	*формирование счетов*
8. sparked	*воодушевлённый*	24. payroll recordkeeping	*ведение записей / бух. учёт*
9. puzzled	*усложнённый*	25. intranets	*внутренние сети*
10. subtle	*трудно находимый*	26. ease	*удобство в работе*
11. configuring		27. to convert	*преобразовывать*
12. updating	*выбор/ планирование конфигурации*	28. computer-assisted software engineering (CASE) tools	*инструменты автоматизированной программной инженерии*

13. encompassing	*охватывающий*	29. code walk-through	*разбор программы*
14. newness	*новизна*	30. code generation	*процесс генерализации кода*
15. evolve	*развиваться*	31. test data generation	*формирование тестовых данных*
16. employers	*работодатели*	32. consistent	*единообразный*

Text I. Programmer

Выполните письменный перевод следующего текста на русский язык.

A **programmer**, **computer programmer** or **coder** is someone who writes computer software. The term *computer programmer* can refer to a specialist in one area of computer programming or to a generalist who writes code for many kinds of software. One who practices or professes a formal approach to programming may also be known as a programmer analyst. A programmer's primary computer language (C, C++, Java, Lisp, Delphi etc.) is often prefixed to the above titles, and those who work in a web environment often prefix their titles with *web*. The term *programmer* can be used to refer to a software developer, software engineer, computer scientist, or software analyst. However, members of these professions typically possess other software engineering skills, beyond programming; for this reason, the term *programmer* is sometimes considered an insulting or derogatory over simplification of these other professions. This has sparked much debate amongst developers, analysts, computer scientists, programmers, and outsiders who continue to be puzzled at the subtle differences in the definitions of these occupations.

Text II. Computer Programmers

Выполните письменный перевод следующего текста на русский язык.

A **computer repair technician** is a person who repairs and maintains computers and servers. The technician's responsibilities may extend to include building or configuring new hardware, installing and updating software packages, and creating and maintaining computer networks. Computer

repair technicians work in a variety of settings, encompassing both the public and private sectors. Because of the relative newness of the profession, institutions offer certificate and degree programs designed to prepare new technicians, but computer repairs are frequently performed by experienced and certified technicians who have little formal training in the field.

Computer Software Engineers and Computer Programmers.

Computer software engineers design and develop software. They apply the theories and principles of computer science and mathematical analysis to create, test, and evaluate the software applications and systems that make computers work. The tasks performed by these workers evolve quickly, reflecting changes in technology and new areas of specialization, as well as the changing practices of employers.

Computer software engineers can generally be divided into two categories: applications engineers and systems engineers. *Computer applications software engineers* analyze end users' needs and design, construct, deploy, and maintain general computer applications software or specialized utility programs. These workers use different programming languages, depending on the purpose of the program and the environment in which the program runs. The programming languages most often used are C, C++, Java, and Python. Some software engineers develop packaged computer applications, but most create or adapt customized applications for business and other organizations. Some of these workers also develop databases.

Computer systems software engineers coordinate the construction, maintenance, and expansion of an organization's computer systems. Working with the organization, they coordinate each department's computer needs—ordering, inventory, billing, and payroll recordkeeping, for example—and make suggestions about its technical direction. They also might set up the organization's intranets—networks that link computers within the organization and ease communication among various departments. Often, they are also responsible for the design and implementation of system security and data assurance.

Computer programmers write programs. After computer software engineers and systems analysts design software programs, the programmer

converts that design into a logical series of instructions that the computer can follow (A section on computer systems analysts appears elsewhere in the *Handbook*.). The programmer codes these instructions in any of a number of programming languages, depending on the need. The most common languages are C++ and Python.

Computer programmers also update, repair, modify, and expand existing programs. Some, especially those working on large projects that involve many programmers, use computer-assisted software engineering (CASE) tools to automate much of the coding process. These tools enable a programmer to concentrate on writing the unique parts of a program. Programmers working on smaller projects often use "programmer environments," applications that increase productivity by combining compiling, code walk-through, code generation, test data generation, and debugging functions. Programmers also use libraries of basic code that can be modified or customized for a specific application. This approach yields more reliable and consistent programs and increases programmers' productivity by eliminating some routine steps.

Упражнение 1. Ответьте на следующие вопросы.

1. Who is a computer repair technician? 2. Where do computer repair technicians work? 3. What do computer software engineers do? 4. What categories can be computer software engineers divided into? 5. What do computer applications software engineers do? 6. What do computer systems software engineers do? 7.What is the work of computer programmers?

Упражнение 2. Какое из утверждений соответствует тексту (true / false)?

1. Computer software engineers apply the theories and principles of computer science and mathematical analysis to create, test, and evaluate the software applications. 2. The programming languages most often used are COBOL and Perl. 3. Working with the organization, they coordinate each department's computer needs. 4. The programmer codes the instructions in any of a number of programming languages. 5. Programmers working on smaller projects use only coded systems.

Глава III. PRODUCTION PROCESSE AUTOMATION

Unit I. Industrial systems

Vocabulary

1. automation	*автоматизация*	22. to adopt	*принимать*
2. performing certain task	*выполняя определённую работу*	23. feedback principle	*принцип обратной связи*
3. previously	*ранее*	24. automatic-control mechanism	*автоматиче-ски-управляемое устройство*
4. nonmanufactur-ing systems	*непроизводственные системы*	25. flyball governor	*центробежный регулятор*
5. automatic devices	*автоматические устройства*	26. to invent	*изобретать*
6. to operate	*работать*	27. steam engine	*паровой двигатель*
7. independently	*независимо*	28. household thermostat	*бытовой термостат*
8. human control	*управление, осуществляемое человеком-оператором*	29. to facilitate	*способствовать*
9. automated manufacturing	*автоматизирован-ное производство*	30. numerically controlled machines	*станки с числовым программным управлением (ЧПУ)*
10. simplification	*упрощение*	31. machine tools	*станки*
11. to design	*проектировать, конструировать*	32. computer-aided manufacture (CAM)	*автоматизиро-ванное произ-водство*
12. to build	*монтировать*	33. computer-aided design (CAD)	*компьютерное конструирование*
13. machines	*станки*	34. a designer	*конструктор*
14. to resemble	*походить*	35. to draw	*чертить*
15. motorized	*механизировонный*	36. drawing	*чертёж*
16. production efficiency	*производственная эффективность*	37. a part	*деталь*
17. to transfer	*перемещать*	38. to indicate	*определять*
18. to manipulate	*производить действия; регулировать*	39. dimensions	*размеры*

19. to position	*устанавливать в заданное положение*	40. to machine	*обрабатывать*
20. light and heavy work-pieces	*лёгкие и тяжёлые детали*	41. flexible manufacturing systems (FMS)	*гибкие производственные системы*
21. an integrated system of production	*комплексная система производства*	42. to monitor	*просматривать*

Text I. Automation

1. Выполните письменный перевод следующего текста на русский язык.
2. Напишите аннотацию к тексту на английском языке.

Automation is the use of control systems and information technologies to reduce the need for human work in the production of goods and services. In the scope of industrialization, automation is a step beyond mechanization. Whereas mechanization provided human operators with machinery to assist them with the muscular requirements of work, automation greatly decreases the need for human sensory and mental requirements as well. Automation plays an increasingly important role in the world economy and in daily experience.

Automation has had a notable impact in a wide range of industries beyond manufacturing (where it began). Once-ubiquitous telephone operators have been replaced largely by automated telephone switchboards and answering machines. Medical processes such as primary screening in electrocardiography or radiography and laboratory analysis of human genes, sera, cells, and tissues are carried out at much greater speed and accuracy by automated systems. Automated teller machines have reduced the need for bank visits to obtain cash and carry out transactions. In general, automation has been responsible for the shift in the world economy from industrial jobs to service jobs in the 20th and 21st centuries.

Advantages and disadvantages

The main **advantages** of automation are:

✓ **Replacing human operators in tasks that involve hard physical or monotonous work.**

✓ **Replacing humans in tasks done in dangerous environments** (i.e. fire, space, volcanoes, nuclear facilities, underwater, etc.)
✓ **Performing tasks that are beyond human capabilities of size, weight, speed, endurance, etc.**
✓ **Economy improvement**: Automation may improve in economy of enterprises, society or most of humanity. For example, when an enterprise invests in automation, technology recovers its investment; or when a state or country increases its income due to automation like Germany or Japan in the 20th Century.

The main **disadvantages** of automation are:

✓ **Unemployment rate increases due to machines replacing humans and putting those humans out of their jobs.**
✓ **Technical Limitation**: Current technology is unable to automate all the desired tasks.
✓ **Security Threats/Vulnerability**: An automated system may have limited level of intelligence, hence it is most likely susceptible to commit error.
✓ **Unpredictable development costs**: The research and development cost of automating a process may exceed the cost saved by the automation itself.
✓ **High initial cost**: The automation of a new product or plant requires a huge initial investment in comparison with the unit cost of the product, although the cost of automation is spread in many product batches.

Text II. Industrial control system

Vocabulary

1. Industrial Control System (ICS)	*промышленные системы управления*	27. water and wastewater	*водоочистка и водоподготовка*
2. to encompass	*включать, охватывать, содержать*	28. pulp and paper	*целлюлозно-бумажный*
3. supervisory control and data acquisition (SCADA) system	*система диспетчерского контроля и сбора данных*	29. utility power	*энергоснабжение*
4. distributed control systems (DCS)	*система распределения управления*	30. mining	*горнодобывающая промышленность*

5. control system configurations	*варианты системы управления*	31. loop controls	*фотоэлектрический регулятор скорости движения ленточного конвейера*
6. skid-mounted	*смонтированный на полозьях; смонтированный на салазках; рамный; блочный*	32. to extend	*распространять, расширять, увеличивать*
7. programmable logic controllers (PLC)	*программируемый логический микропроцессор*	33. pneumatic control systems	*пневматическая система управления*
8. critical infrastructures	*ключевая инфраструктура*	34. racks of relays	*стойки реле*
9. remote stations	*(пульт) дистанционное управление*	35. ladder form	*многозвенная схема*
10. to be pushed to	*быть вставленным*	36. high-speed binary controls	*высокоскоростное двоичное управление*
11. field devices	*периферийное устройство*	37. rudimentary analog controls	*простейшее управление с помощью моделирующего устройства*
12. control devices	*регулировочное устройство*	38. to be rooted in	*лежать в основе*
13. valves	*клапан*	39. water pipelines	*водопровод*
14. breakers	*разъединитель*	40. intermittent	*периодического/прерывистого действия*
15. sensor systems	*сенсорная система; система с датчиками*	41. low-bandwidth / high-latency links	*Низкоскоростные соединения с большой задержкой*
16. local environment	*окружающая местность*	42. open-loop control	*регулирование без обратной связи/ управление в разомкнутой системе/ регулирование с разомкнутым контуром (цепью)*
17. alarm conditions	*аварийная ситуация*	43. RTUs (remote terminal units / remote telemetry units)	*пульт дистанционного управления/ дистанционный телеметрический блок*
18. to evolve	*выявлять*	44. master station	*центральная станция*
19. particular	*определённый*	45. boundaries	*контуры территории*
20. functional distributed control system	*структурная система распределения управления*	46. to blur	*размытые изображения*

21. to exist	находиться	47. telecommunica-tions infrastructure	телекоммуникационная инфраструктура
22. industrial process plants	механизмы (оборудование), задействованные в производственном процессе	48.PLC-like subsystems	подсистема программируемого логического контроллера
23. high-bandwidth, low-latency data networks	высокоскоростные сети передачи данных с низкой задержкой	49. amalgamation	объединение, соединение
24. refining	переработка нефти	50. confusion	неопределённость, непоследовательность
25. pharmaceutical	фармакологический	51. to surround	обволакивать, блокировать
26. food and beverage	предприятия питания	52. a large campus	большой комплекс

Industrial control system (ICS) is a general term that encompasses several types of control systems used in industrial production, including supervisory control and data acquisition (SCADA) systems, distributed control systems (DCS), and other smaller control system configurations such as skid-mounted programmable logic controllers (PLC) often found in the industrial sectors and critical infrastructures.

ICSs are typically used in industries such as electrical, water, oil, gas and data. Based on information received from remote stations, automated or operator-driven supervisory commands can be pushed to remote station control devices, which are often referred to as field devices. Field devices control local operations such as opening and closing valves and breakers, collecting data from sensor systems, and monitoring the local environment for alarm conditions.

Industrial control system technology has evolved over the past three to four decades. DCS systems generally refer to the particular functional distributed control system design that exist in industrial process plants (e.g., oil and gas, refining, chemical, pharmaceutical, some food and beverage, water and wastewater, pulp and paper, utility power, mining, metals). It is common for loop controls to extend all the way to the top level controllers in a DCS, as everything works in real time. These systems evolved from a need to extend pneumatic control systems beyond just a small cell area of a refinery.

The PLC (programmable logic controller) evolved out of a need to replace racks of relays in ladder form. The latter were not particularly reliable, were difficult to rewire, and were difficult to diagnose. PLC control tends to be used in very regular, high-speed binary controls, such as controlling a high-speed printing press.

SCADA's history is rooted in distribution applications, such as power, natural gas, and water pipelines, where there is a need to gather remote data through potentially unreliable or intermittent low-bandwidth/high-latency links. SCADA systems use open-loop control with sites that are widely separated geographically. A SCADA system uses RTUs (remote terminal units, also referred to as remote telemetry units) to send supervisory data back to a control center. However, over the years RTU systems have grown more and more capable of handling local controls.

The boundaries between these system definitions are blurring as time goes on. Many PLC platforms can now perform quite well as a small DCS, using remote I/O and analog control loops, and are able to communicate supervisory data. It is not uncommon to have telecommunications infrastructure that is so responsive and reliable that some SCADA systems actually manage closed loop control over long distances. With the increasing speed of today's processors, many DCS products have a full line of PLC-like subsystems that weren't offered when they were initially developed.

This led to the concept of a PAC (programmable automation controller or process automation controller), that is an amalgamation of these three concepts. Time and the market will determine whether this can simplify some of the terminology and confusion that surrounds these concepts today.

Упражнение 1. Ответьте на вопросы по тексту.
1. What is Industrial control system (ICS)? 2. Where are ICSs typically used? 3. What do DCS systems generally refer to? 4. What does PLC control tend to? 5. What does SCADA system uses RTUs (remote terminal units, also referred to as remote telemetry units) for? 6. What do SCADA systems use? 7. What do DCS products have? 8.What is PAC refer to?

Упражнение 2. Найдите в тексте английские эквиваленты следующим русским словосочетаниям:
система диспетчерского контроля и сбора данных ; система распределения управления; программируемый логический микропроцессор;

виды производств как электричество, переработка воды, нефти, газа и обработка данных; может быть встроен в устройства дистанционного управления; исследовать местность для определения опасных зон; водоочистка и водоподготовка; целлюлозно-бумажный ; собирать данные и управлять системами; системы дистанционного управления; программируемая автоматическая система управления.

Упражнение 3. Какое из утверждений соответствует содержанию текста, а какое нет (да / нет)?

1. ICSs are typically used in industries such as electrical, water, oil, gas and data. 2. Field devices don't control local operations such as opening and closing valves and breakers, collecting data from sensor systems, and monitoring the local environment for alarm conditions. 3. DCS systems generally refer to the promoting control system. 4. The PLC (programmable logic controller) evolved out of a need to replace different blocks. 5. SCADA systems use close-loop control with sites that are widely separated geographically. 6. However, over the years RTU systems have grown more. 7. It is common to have telecommunications infrastructure that is so responsive and reliable that some SCADA systems actually manage closed loop control over long distances. 8. This led to the concept of a PAC (programmable automation controller or process automation controller).

Упражнение 4. Переведите слова, данные в скобках.

1. Based on information received from (*пульт дистанционного управления)*, automated or operator-driven supervisory commands can be pushed to remote station control devices. 2. It is common for (*фотоэлектрический регулятор скорости движения ленточного конвейера*) to extend all the way to the top level controllers in a (*система распределения управления*), as everything works in real time. 3. These systems (*выявлять)* from a need to extend (*пневматическая система управления*) beyond just a small cell area of a refinery. 4. (*Программируемый логический микропроцессор*) tends to be used in very regular, high-speed binary controls, such as controlling a high-speed printing press. 5. However, over the years (*системы дистанционного управления*) have grown more and more capable of handling local controls. 6. With the increasing speed of today's processors, many DCS products have a full line of (*подсистема программируемого логического контроллера)* that weren't offered when they were initially developed. 7. This led to the concept of a *(программируемая автоматическая система управления)* that is an amalgamation of these three concepts.

Unit II. Flexible Manufacturing Systems

Vocabulary

flexible manu-facturing system (FMS)	гибкие производ-ственные системы	Numerical controlled machines (CNC)	станки с числовым программ-ным управлением (ЧПУ)
industrial process	промышленное производство	inspection machines	контрольно-сортировочный автомат
entirely automated process	полностью автома-тизированный процесс	production segment	производственный сектор
withmarket conditions	условия внутреннего использования	manufacturing nodes	производственные узлы (сети)
retrofit	модернизация	FMS data traffic	информационная нагрузка / поток данных ГПС (гибкие производственные системы)
outset	начальный этап	bytes	байты
pieces	детали	deterministic time delay	обусловленное время задержки
facilities	средства, оборудование	instantaneous	быстродействующий/скоростной
overhead	перерасход	reliable FMS protocol	действующее приложение ГПС
start-up costs	затраты на запуск в производство	urgent	крайне необходимый
attach	присоединять	IEEE standard protocols	приложения стандарта пред-ставления логических элементов
adjustments	регулирования	CSMA/CD Carrier Sense Multiple Access with Collision Detection	множественный доступ с контро-лем носителя и обнаружением конфликтов
sport utility vehicle	спортивный автомобиль	message collisions	предупреждение возникновения аварии
switchover	переключение	deterministic message delay	обусловленная задержка предупреждения
disruption	сбой	Token Ring	кольцо с маркерами
shift	сдвиг, сбой	machine tool	станочная система, металлорежущий станок
Scheduling	планирование	machining	механическая обработка
machine flexibility	гибкость станка	selective removal	избирательное удаление

routing flexibility	гибкость маршрутизации	capture	собирать, захватывать
to absorb	поглощать	gear	привод, зубчатая передача, шестерёнка
mass production	массовое производство	lever	рычаг
Computer-controlled Machines	станки с программным управлением	rapid prototyping machines	станки быстрого создания прототипов

Text I. FMS

Выполните письменный перевод следующего текста на русский язык.

A flexible manufacturing system (FMS) is a type of industrial process that allows equipment to be used for more than one purpose, though they may be somewhat related. The equipment is often used to make customized parts, or make different parts for different models of product. This type of flexible manufacturing system may be changed by hand, but is more likely to be controlled by a computer, and changed through an entirely automated process.

The main goal of a flexible manufacturing system is to offer the speed needed to change withmarket conditions quickly, but not sacrifice any quality. Equipment that does this most effectively is likely designed for two or more purposes. While it may be possible to modify or retrofit some types of industrial equipment to do a job adequately, most flexible manufacturing systems are designed for more than one purpose from the very outset.

Though the equipment for a flexible manufacturing system may initially be more expensive than traditional equipment, the overall goal is to reduce expenses. Manufacturers can save money by using the same equipment to essentially perform two or more functions. With traditional equipment, manufacturing two different products may not only require different pieces of equipment, but also two different lines and perhaps two different facilities. Therefore, a flexible manufacturing system may reduce overhead, despite higher start-up costs initially.

One of the most common examples of a flexible manufacturing system can be seen in the manufacturing of automobiles. Certain equipment is used to attach doors to a sedan. With just a few simple adjustments, that same line

and equipment may be used to attach doors to a sport utility vehicle or some other type of vehicle. Often, the switchover can take place with very little disruption to the line, and may even happen during shifts.

Упражнение 1. Ответьте на следующие вопросы.
1. What process is a flexible manufacturing system (FMS)? 2. How may be this type of flexible manufacturing system changed? 3. What are the main goals of a flexible manufacturing system? 4. What is one of the most common examples of a flexible manufacturing system?

Упражнение 2. Постройте предложения, соединив их части, приведённые в колонках.

A	B
1. The equipment is often used to make customized parts,	a) to offer the speed needed to change withmarket conditions quickly
2. Manufacturers can save money	a) and may even happen during shifts.
3. One of the most common examples of a flexible manufacturing system	a) by using the same equipment to essentially perform two or more functions.
4. The main goal of a flexible manufacturing system is	a) or make different parts for different models of product.
5. Often, the switchover can take place with very little disruption to the line,	a) can be seen in the manufacturing of automobiles.

Упражнение 3. Найдите в тексте английские эквиваленты следующим словам и словосочетаниям:
гибкие производственные системы; полностью автоматизированный процесс; затраты на запуск в производство; быстро изменить условия внутреннего использования; ГПС могут снизить перерасход; прикрепить дверь к седану.

Text II. Traditional FMS

1. Выполните письменный перевод следующего текста на русский язык.
2. Напишите аннотацию к тексту на английском языке.

A flexible manufacturing system (FMS) is an arrangement of machines.... interconnected by a transport system. The transporter carries work to the machines on pallets or other interface units so that work-machine registration is accurate, rapid and automatic. A central computer controls both machines and transport system... National Bureau of Standards. The key

idea in FMS is that the co-ordination of the flow of work is carried out by a central control computer. This computer performs functions such as: *Scheduling jobs onto the machine tools; Downloading part-programs (giving detailed instructions on how to produce a part) to the machines; Sending instructions to the automated vehicle system for transportation.*

A **flexible manufacturing system (FMS)** is a manufacturing system in which there is some amount of flexibility that allows the system to react in the case of changes, whether predicted or unpredicted. This flexibility is generally considered to fall into two categories, which both contain numerous subcategories.

The first category, *machine flexibility*, covers the system's ability to be changed to produce new product types, and ability to change the order of operations executed on a part. ***The second category*** is called *routing flexibility*, which consists of the ability to use multiple machines to perform the same operation on a part, as well as the system's ability to absorb large-scale changes, such as in volume, capacity, or capability.

Most **FMS systems** consist of three main systems. The work machines which are often automated CNC machines are connected by a material handling system to optimize parts flow and the central control computer which controls material movements and machine flow.

The main advantage of an FMS is its high flexibility in managing manufacturing resources like time and effort in order to manufacture a new product. The best application of an FMS is found in the production of small sets of products like those from a mass production.

An Industrial Flexible Manufacturing System (FMS) consists of robots, Computer-controlled Machines, Numerical controlled machines (CNC), instrumentation devices, computers, sensors, and other stand alone systems such as inspection machines. The use of robots in the production segment of manufacturing industries promises a variety of benefits ranging from high utilization to high volume of productivity. Each Robotic cell or node will be located along a material handling system such as a conveyor or automatic guided vehicle. The production of each part or work-piece will require a different combination of manufacturing nodes. The movement of parts from one node to another is done through the material handling sys-

tem. At the end of part processing, the finished parts will be routed to an automatic inspection node, and subsequently unloaded from the Flexible Manufacturing System.

The FMS data traffic consists of large files and short messages, and mostly come from nodes, devices and instruments. The message size ranges between a few bytes to several hundreds of bytes. Executive software and other data, for example, are files with a large size, while messages for machining data, instrument to instrument communications, status monitoring, and data reporting are transmitted in small size.

The demands for **reliable FMS protocol** that support all the FMS data characteristics are now urgent. The existing IEEE standard protocols do not fully satisfy the real time communication requirements in this environment. The delay of CSMA/CD is unbounded as the number of nodes increases due to the message collisions. Token Bus has a deterministic message delay, but it does not support prioritized access scheme which is needed in FMS communications. Token Ring provides prioritized access and has a low message delay, however, its data transmission is unreliable. A single node failure which may occur quite often in FMS causes transmission errors of passing message in that node. In addition, the topology of Token Ring results in high wiring installation and cost.

Упражнение 1. Ответьте на следующие вопросы.
1. What is a flexible manufacturing system (FMS)? 2. What categories is this flexibility is generally considered to fall? 3. What does the first category, machine flexibility, cover? 4. How does the second category called? 5. What systems do most FMS consist of? 6. What is the main advantage of an FMS? 7. What does an Industrial Flexible Manufacturing System (FMS) consist of? 8. What is Token Bus? 9. What is Token Ring?

Упражнение 2. Выберите вариант, который лучше всего выражает главную идею текста.

1. A flexible manufacturing system (FMS) is a manufacturing system in which there is some amount of flexibility that allows the system to react in the case of changes, whether predicted or unpredicted.

2. An Industrial Flexible Manufacturing System (FMS) consists of robots, Computer-controlled Machines, Numerical controlled machines (CNC), instrumentation devices, computers, sensors, and other stand alone systems such as inspection machines.

3. A flexible manufacturing system (FMS) is generally considered to fall into two categories, which both contain numerous subcategories.

Unit III. Numerical control

Vocabulary

Numerical control (NC)	числовое програмное управление	Computer-aided manufacturing (CAM)	автоматизированная система производства
abstractly programmed commands	спонтанные программируемые команды	to assist	помогать, содействовать
storage medium	информационный носитель	dimensions	размеры
manually controlled	ручное управление	material consistency	плотность материала
cams	бегунок	computer-aided design (CAD)	компьютерное конструирование
existing tools	существующие инструменты	computer-aided engineering (CAE)	автоматизированная подготовка производства
punched tape	перфолента	verify	проверять
servomechanisms	сервосистема	leverages	нагрузки

Text I. Numerical control

Выполните письменный перевод следующего текста на русский язык.

Numerical control (**NC**) refers to the automation of machine tools that are operated by abstractly programmed commands encoded on a storage medium, as opposed to manually controlled via handwheels or levers, or mechanically automated via cams alone. The first NC machines were built in the 1940s and 1950s, based on existing tools that were modified with motors that moved the controls to follow points fed into the system

on punched tape. These early servomechanisms were rapidly augmented with analog and digital computers, creating the modern **computer numerical control** (**CNC**) machine tools that have revolutionized the machining processes.

Text II. Computer-aided manufacturing

1. *Выполните письменный перевод следующего текста на русский язык.*
2. *Напишите аннотацию к тексту на английском языке.*

Computer-aided manufacturing (**CAM**) is the use of computer software to control machine tools and related machinery in the manufacturing of workpieces. This is not the only definition for CAM, but it is the most common; CAM may also refer to the use of a computer to assist in all operations of a manufacturing plant, including planning, management, transportation and storage. Its primary purpose is to create a faster production process and components and tooling with more precise dimensions and material consistency, which in some cases, uses only the required amount of raw material (thus minimizing waste), while simultaneously reducing energy consumption.

CAM is a subsequent computer-aided process after computer-aided design (CAD) and sometimes computer-aided engineering (CAE), as the model generated in CAD and verified in CAE can be input into CAM software, which then controls the machine tool.

Traditionally, CAM has been considered as a numerical control (NC) programming tool, wherein two-dimensional (2-D) or three-dimensional (3-D) models of components generated in CAD software are used to generate G-code to drive computer numerically controlled (CNC) machine tools. Simple designs such as bolt circles or basic contours do not necessitate importing a CAD file.

As with other "Computer-Aided" technologies, CAM does not eliminate the need for skilled professionals such as manufacturing engineers, NC programmers, or machinists. CAM, in fact, leverages both the value of the most skilled manufacturing professionals through advanced productivity tools, while building the skills of new professionals through visualization, simulation and optimization tools.

Упражнение 1. Ответьте на следующие вопросы.

1. What does Numerical control (NC) refer to? 2. When were the first NC machines built? 3. What does Computer-aided manufacturing (CAM) use? 4. Where may CAM also refer to? 5. How has CAM been considered? 6. What does CAM eliminate?

Упражнение 2. Вставьте необходимые слова вместо пропусков, из рамки, данной внизу:

1. The first …… were built in the 1940s. 2. These early ……. were rapidly augmented with analog and digital computers. 3. …….. is the use of computer software to control machine tools and related machinery in the manufacturing of workpieces. 4. CAM is a subsequent computer-aided process after computer-aided design (CAD) and sometimes …….. 5. As with other "Computer-Aided" technologies, CAM does not eliminate the need for skilled professionals such as ……, ……., or …….

> *servomechanisms; manufacturing engineers, NC programmers, or machinists; NC machines; computer-aided engineering (CAE); Computer-aided manufacturing (CAM)*

Упражнение 3. Постройте предложения, соединив их части, приведённые в колонках.

A	B
These early servomechanisms were rapidly augmented	as a numerical control (NC) programming tool.
CAM may also refer to the use of a computer	manufacturing professionals through advanced productivity tools.
Its primary purpose is to create a faster production process and	with analog and digital computers.
Traditionally, CAM has been considered	components and tooling with more precise dimensions and material consistency.
CAM, in fact, leverages both the value of the most skilled	to assist in all operations of a manufacturing plant.

Упражнение 4. Найдите в тексте английские эквиваленты следующим словам и словосочетаниям:

автоматизированная подготовка производства; числовое программное управление; ручное управление; компьютерное конструирование; сервосистема.

Unit IV. Robotics

Vocabulary

structural disposition	структурное расположение	Artificial intelligence	интеллектуальная система
steady rise	устойчивый рост	end effectors	конечное звено
palletizing	укладка на поддоны	manipulator	робот; механическая рука робота
endurance	срок службы	replaceable effectors	автоматическое управление
precision	точность	humanoid hand	механизм, напоминающий руку человека
configuration	форма	gripper	присос, захватное устройство
SCARA robots	робот типа SCARA (кинематическая схема)	manifestation	измерение
Cartesian coordinate robots	роботы, работающие в прямоугольной системе координат	prehension surface	поверхность (площадь) захвата
inherent	свойственный	suction	всасывание
autonomy	независимый, автономный	joints or its end effector	конечное звено
repetitive actions	повторяющиеся действия	actuators (motors)	приводы
accuracy	точность	"cognitive" model	"познавательная модель"
velocity	скорость	to track	маршрутизировать
deceleration	торможение, снижение числа оборотов	Mapping techniques	методы картирования
precise guidance	точное наведение / направление	hitting obstacles	обход препятствий

Text I. What is robotics?

Выполните письменный перевод следующего текста на русский язык.

Robotics is the branch of technology that deals with the design, construction, operation, structural disposition, manufacture and application of robots.

Robotics is related to the sciences of electronics, engineering, mechanics, and software. Robots recently became a popular tool in raising interests in computing for middle and high school students. First year computer sci-

ence courses at several universities were developed which involves the programming of a robot instead of the traditional software engineering based coursework.

Robotics is an essential component in any modern manufacturing environment. As factories increase their use of robots, the number of robotics related jobs grow and have been observed to be on a steady rise.

Text II. Industrial robot

Выполните письменный перевод следующего текста на русский язык.

An **industrial robot** is defined by ISO as an *automatically controlled, reprogrammable, multipurpose manipulator programmable in three or more axes.* The field of robotics may be more practically defined as the study, design and use of robot systems for manufacturing (a top-level definition relying on the prior definition of *robot*).

Typical applications of robots include welding, painting, assembly, pick and place, packaging and palletizing, product inspection, and testing, all accomplished with high endurance, speed, and precision.

Robot types, features

The most commonly used robot configurations are articulated robots, SCARA robots and Cartesian coordinate robots. In the context of general robotics, most types of robots would fall into the category of robotic arms (inherent in the use of the word *manipulator* in the above-mentioned ISO standard). Robots exhibit varying degrees of autonomy: 1. *Some robots* are programmed to faithfully carry out specific actions over and over again (repetitive actions) without variation and with a high degree of accuracy. These actions are determined by programmed routines that specify the direction, acceleration, velocity, deceleration, and distance of a series of coordinated motions. 2. *Other robots* are much more flexible as to the orientation of the object on which they are operating or even the task that has to be performed on the object itself, which the robot may even need to identify. For example, for more precise guidance, robots often contain machine vision sub-systems acting as their "eyes", linked to powerful computers or controllers. Artificial intelligence, or what passes for it, is becoming an increasingly important factor in the modern industrial robot.

Упражнение 1. Ответьте на следующие вопросы.

1. What is Robotics? 2. What is **an industrial robot** defined by? 3. What do applications of robots include? 4. What are the most commonly used robot configurations? 5. What degrees of autonomydo robots exhibit?

Упражнение 2. Какое из утверждений соответствует тексту (true / false)?

1. Robotics is a secondary component in any modern manufacturing environment. 2. The field of robotics may be more practically defined as the study, design and use of robot systems for manufacturing. 3. Typical applications of robots include welding, painting, assembly, pick and place, packaging and palletizing, product inspection, and testing, all accomplished with high endurance, speed, and precision. 4. Some robots are programmed to faithfully carry out specific actions over and over again (repetitive actions) with variation and with a low degree of accuracy. 5. Artificial intelligence, or what passes for it, is becoming not very important factor in the modern industrial robot.

Упражнение 3. Постройте предложения, соединив их части, приведённые в колонках.

A	B
First year computer science courses at several universities were developed which involves	articulated robots, SCARA robots and Cartesian coordinate robots.
The field of robotics may be more practically defined as the study,	the direction, acceleration, velocity, deceleration, and distance of a series of coordinated motions.
The most commonly used robot configurations are	the programming of a robot instead of the traditional software engineering based coursework.
These actions are determined by programmed routines that specify	linked to powerful computers or controllers.
Robots often contain machine vision subsystems acting as their "eyes",	design and use of robot systems for manufacturing.

Упражнение 4. Вместо пропусков вставьте нужные слова из рамки, данной ниже:

1. An **industrial robot** is defined by …… as an *automatically controlled, reprogrammable, multipurpose manipulator programmable in three or more axes*. 2. Robots exhibit varying degrees of …… 3. Some robots are programmed to carry out ……. over and over again without variation and with a high degree of accuracy. 4. Other robots are much …… as to the

orientation of the object on which they are operating or even the task that has to be performed on the object itself, which …… may even need to identify. 5. ……. , or what passes for it, is becoming an increasingly important factor in the modern ……..

ISO; autonomy; specific actions; more flexible, the robot; Artificial intelligence, industrial robot

Упражнение 5. Найдите в тексте английские эквиваленты следующим словам и словосочетаниям:

интеллектуальная система; робот типа SCARA (кинематическая схема); методы картирования; роботы, работающие в прямоугольной системе координат; механизм, напоминающий руку человека.

Unit V. Conveyors

Vocabulary

pulleys / idler	*ролик*	bulky material	*сыпучий материал*
continuous loop of material	*непрерывный поток сырья (материала)*	chain conveyor	*цепной конвейер*
rotate	*вращать*	enclosed track	*закрытая дорожка*
drive pulley	*ведущий ролик*	I-Beam	*двутавровый профиль*
belt conveyor	*ленточный транс-портёр/конвейер*	towline	*буксир*
bulk material	*вещество основы*	power & free	*включённый, выключенный*
outdoor location	*наружное расположение*	hand pushed trolleys	*ручная тележка*
grocery store	*продовольственный магазин*	apparel industry	*швейная промышленность*
rubber	*резина*	strenuous	*напряжённый*
a carcass	*каркас, оболочка*	forklift	*погрузчик с вильчатым захватом*
web/mesh	*сетка, решётка*	pharmaceutical	*фармацевтический*
plastic compounds	*пластическая масса, пластикат*	scrap metal	*металлический лом, скрап*
silicone	*кремний*	beforehand	*заранее, предварительно*
gum rubber	*ненаполненная резиновая смесь*	pipe/duct	*трубопровод*

a beltweigher	конвейерные / ленточные весы	transportation lines	линия транспортировки
partitions	зазоры, интервалы	dry pulverized	сухое распыление
elevator belt	элеваторная лента	fly ash	копоть
freighters	отправители грузов	extra vertical versatility	дополнительная функциональная стойка
live bottom truck	фаза	dilute-phase system	система пневматической транспортировки
sidewalk/ escalator	эскалатор, ступен-чатый элеватор	a bank drive-thru window	накопитель канала прямого доступа
assembly line	линия сборки	a trough	лоток, поддон
check-out counter	расчётный узел, котрольно-кассовый пункт	harsh	неблагоприятный
conveyance	транспортировка	conveying pan	транспортировоч-ная вагонетка
screw conveyor	винтовой (шнеко-вый) транспортёр	obstacles	препятствия
vibrating conveyor	виброконвейер	freight lift	грузовой лифт
pneumatic conveyor	пневматический транспортёр	material lift	грузовой лифт
reciprocating slat	пластинчатый конвейер поступательного движения	a cohesive material	вещество, повыша-ющее когезионную прочность
cargo	груз	spiral conveyor	винтовой конвейер

Text I. Conveyor system

Выполните письменный перевод следующего текста на русский язык.

A **conveyor system** is a common piece of mechanical handling equipment that moves materials from one location to another. Conveyors are especially useful in applications involving the transportation of heavy or bulky materials. Conveyor systems allow quick and efficient transportation for a wide variety of materials, which make them very popular in the material handling and packaging industries. Many kinds of conveying systems are available, and are used according to the various needs of different industries. There are chain conveyors as well. Chain conveyors consist of enclosed tracks, I-Beam, towline, power & free, and hand pushed trolleys.

Conveyor systems are used widespread across a range of industries due to the numerous benefits they provide: 1) Conveyors are able to safely transport materials from one level to another, which when done by human labor would be strenuous and expensive. 2) They can be installed almost anywhere, and are much safer than using a forklift or other machine to move materials. 3) They can move loads of all shapes, sizes and weights. Also, many have advanced safety features that help prevent accidents. 4) There are a variety of options available for running conveying systems, including the hydraulic, mechanical and fully automated systems, which are equipped to fit individual needs.

Conveyor systems are commonly used in many industries, including the automotive, agricultural, computer, electronic, food processing, aerospace, pharmaceutical, chemical, bottling and canning, print finishing and packaging. Although a wide variety of materials can be conveyed, some of the most common include food items such as beans and nuts, bottles and cans, automotive components, scrap metal, pills and powders, wood and furniture and grain and animal feed. Many factors are important in the accurate selection of a conveyor system. It is important to know how the conveyor system will be used beforehand. Some individual areas that are helpful to consider are the required conveyor operations, such as transportation, accumulation and sorting, the material sizes, weights and shapes and where the loading and pickup points need to be.

Упражнение 1. Ответьте на следующие вопросы.
1. What is a conveyor system? 2. How are conveyor systems used? 3. What do chain conveyors consist of? 4. What benefits do conveyor systems provide? 5. In what industries are conveyor systems used?

Упражнение 2. Какое из утверждений соответствует тексту (true/false)?
1. Conveyors are useful in applications involving the transportation of light materials. 2. Many kinds of conveying systems are available, and are used according to the various needs of different industries. 3. Conveyor systems are used only in certain kind of industries. 4. It needn't know how the conveyor system will be used beforehand. 5. They can be installed almost anywhere, and are much safer than using a forklift or other machine to move materials.

Text II. Types of Conveyor Systems

Выполните письменный перевод следующего текста на русский язык.

Pneumatic Conveyor Systems. Every pneumatic system, makes use of pipes or ducts called transportation lines that carry mixture of materials and a stream of air. These materials are such as dry pulverised or free flowing or light powdery materials like cement, fly ash etc. These materials can be transported conveniently to various destinations by means of a stream of high velocity air through pipe lines. Products are moved through various tubes via air pressure, allowing for extra vertical versatility. Pneumatic conveyors are either carrier systems or dilute-phase systems; carrier systems simply push items from one entry point to one exit point, such as the money exchanging tubes used at a bank drive-thru window. Dillute-phase systems use push/pull pressure to guide materials through various entry and/or exit points. Three basic systems that are used to generate high velocity air stream: 1. Suction or Vacuum systems. 2. Pressure Type systems. 3. Combination systems: in which a suction system is used to convey material from a number of loading points and a pressure system is employed to deliver it to a number of unloading points.

Vibrating Conveyor Systems. A Vibrating Conveyor is a machine with a solid conveying surface which is turned up on the side to form a trough. They are used extensively in food grade applications where sanitation, washdown, and low maintenance are essential. Vibrating conveyors are also suitable for harsh, very hot, dirty, or corrosive environments. Due to the fixed nature of the conveying pans vibrating conveyors can also perform tasks such as sorting, screening, classifying and orienting parts.

Flexible Conveyor Systems. The flexible conveyor is based on a conveyor beam in aluminium or stainless steel, with low friction slide rails guiding a plastic multi-flexing chain. Products to be conveyed travel directly on the conveyor, or on pallets/carriers. These conveyors can be worked around obstacles and keep production lines flowing. They are made at varying levels and can work in multiple environments. They are used in food packaging, case packing, and pharmaceutical industries but also in retail stores.

Vertical Conveyor Systems And Spiral Conveyors. Vertical conveyors - also commonly referred to as freight lifts and material lifts - are conveyor systems used to raise or lower materials to different levels of a facility during the handling process. Examples of these conveyors applied in the industrial assembly process include transporting materials to different floors.

While similar in look to freight elevators, vertical conveyors are not equipped to transport people, only materials.

Vertical lift conveyors can be manually or automatically loaded and controlled. Almost all vertical conveyors can be systematically integrated with horizontal conveyors, since both of these conveyor systems work in tandem to create a cohesive material handling assembly line.

Just like spiral conveyors also vertical lift conveyors that use forks are able to transport material loads in a continuous flow. Conventional vertical conveyors have the restriction that the input and output of material loads must have the same direction. Compared to a spiral conveyor a vertical conveyor - with or without forks - takes up less space.

Упражнение 1. Ответьте на следующие вопросы.
1. What is pneumatic system? 2. What are the types of pneumatic conveyors? 3. What systems that are used to generate high velocity air stream? 4. What is a Vibrating Conveyor? 5. How are Vibrating Conveyor used? 7. What is the flexible conveyor based on? Where can these conveyors be worked? 8. What are Vertical conveyors referred to? How are conveyor systems used?

Упражнение 2. Переведите выделенные слова.
1. Every ***пневматическая система*** makes use of ***турбопроводов*** called transportation lines that carry mixture of materials and a stream of air. 2. ***Виброконвейеры*** are also suitable for harsh, very hot, dirty, or corrosive environments. 3. Products to be conveyed travel directly on the conveyor, or on ***тележки***. 4. While similar in look to ***грузовой лифт***, ***вертикальный конвейер*** are not equipped to transport people, only materials. 5. Just like ***винтовой конвейер*** also vertical lift conveyors that use forks are able to transport material loads in a continuous flow.

Глава IV. GRAMMAR REFERENCES

Unit I. Infinitive

Инфинитив (The Infinitive) – неличная форма глагола, которая только называет действие и отвечает на вопросы «Что делать?», «Что сделать?». Инфинитив называет действие, но не указывает лицо. Формальным признаком инфинитива в английском языке является части-

ца "to", но в некоторых случаях инфинитив употребляется без данной частицы. Частица "not" перед инфинитивом указывает на отрицательную форму. Инфинитив является основной глагольной формой, от которой образуются все личные формы глагола во всех группах времён в действительном и страдательном залогах.

Категория времени инфинитива, как и других неличных форм глагола, носит относительный характер и не имеет самостоятельного временного значения. Инфинитив может выражать характер действия (длительность, законченность) и имеет залог.

В английском языке имеются следующие формы инфинитива:

Tense/Voice	Active	Passive
Simple	**to V**	**To be V$_{3(ed)}$**
Progressive	**To be Ving**	---------
Perfect	**To have V$_{3(ed)}$**	**To have been V$_{3(ed)}$**
Perfect Progressive	**To have been Ving**	-----------

Функции инфинитива

В английском языке инфинитив может выполнять следующие функции:

1. Подлежащего.
2. Части составного сказуемого.
3. Дополнения.
4. Обстоятельства.
5. Определения.

Exercise I. *Переведите следующие предложения и определите функции и формы инфинитивов.*

1. The first step to be taken is to start negotiations. 2. The inflation rate was not high enough to start paying compensations to workers. 3. To ensure a steady economic growth, all the macroeconomic parameters must be involved. 4. Suffice it to say, the unemployment rate has substantially de-

clined in the free economic zones. 5. The tendency to increase the amount of benefits paid to the population is becoming more obvious. 6. The crops harvested were so big as to be able to store   them and even export part of them. 7. To unify the exchange rates would be one of the main objectives of the country's foreign exchange policy. 8. Poland was the first post-communist country to implement what later on was called a 'shock thera-py' in the economic policy. 9. The type of policy to be followed will be broadly discussed in the mass media. 10. To go back again to the first-turn measures, all the circumstances are to be taken into account.

Exercise II. *Переведите следующие предложения, содержащие инфинитивные обороты, и определите их вид.*

1. The economic laws are known to be universal. 2. The employees expected the management of the company to reconsider the terms of the contract. 3. For the economic growth to continue a whole set of macroeconomic measures needs to be taken. 4. The financial crisis appeared to have affected different regions of the world. 5. The new method is believed to have given good results. 6. A new social protection policy is expected to be put into practice already this year. 7. At the end of the year the statistical data will be found in the line with the projections.   8. The arrival of the technical experts is not likely to change the general picture of the reforms under way. 9. They established what is believed to be a solid system of relationships with trade partners. 10. Their attitude to the process of reforms has never been thought to change so radically.

Exercise III. *Определите инфинитивные обороты.*

1. Previous experiments had shown the electron. 2. Rutherford's experiments showed the atoms of radium to be given off atoms of helium. 3. We supposed our instruments to have perfect precision. 4. This line must contain the ideal point since we wish it to have a point in common with every ordinary line. 5. The author defines the sequence to be monotonic, if the vectors all lie in a closed half-space determined by a hyperplane through the origin. 6. Brown showed the anti-*Brucella* phage to have a potent effect on *Brucella* dissociation. 7. We have repeated these condensations and found the properties and infrared absorption of the product to be in agreement with the formula assigned to it by Muller. 8. While Mr. Brooke wants us to wait and to watch, the fascist poison creed is being spread around by

its perverted apostles. 9. We want to see the security of Britain to be fully safeguarded and its people to be saved from the horrors of a nuclear war. 10. Several fluorides are known to crystallize in the *NaCl*.

Unit II. Participle

Причастие (The Participle) – неличная форма глагола, которая соответствует в русском языке причастию и деепричастию. В английском языке нет отдельной формы, которая соответствовала бы русскому деепричастию. Причастие имеет признаки как прилагательного, так и глагола.

В английском языке существуют два типа причастия:

1. Причастие настоящего времени (Present participle или Participle I) с окончанием –ing: reading.
2. Причастие прошедшего времени (Past Participle или Participle II) с окончанием –ed (played) для правильных глаголов, неправильные глаголы имеют разные формы.

В научно-технической литературе причастие и причастные обороты употребляются очень часто.

Существуют простые и сложные формы причастий.

	Active	**Passive**
Participle I	using	being used
Participle II	----	used
Perfect Participle	having used	having been used

Перевод причастий зависит от функций, которые они выполняют в предложении.

Причастия выполняют функцию определения или обстоятельства.

Упражнение 1. Переведите слова в скобках, используя правильную форму причастия.

1.We came up to the man (стоявшему на углу) and asked him the way. 2.Go to the shop and ask the man (стоящего там) to show you the way. 3.(Рассказав всё, что он знал) the man left the room. 4.(Постучав дважды и не получив ответа) he came in. 5.The conference (проходящая

сейчас) in our city is devoted to the problems of environment protection. 6.Suddenly I heard a sound of a key (поворачиваемого) in the lock.

Упражнение 2. Сгруппируйте предложения в зависимости от того, какую позицию в предложении занимает причастие.

1. We were demonstrated an opening engine. 2. Designing new systems we can use electronic computers. 3. Having finished the experiment the engineers started a series of new tests. 4. A barometer is an instrument meausuring atmospheric pressure. 5. Metals being used in industry in the form of alloys have better properties than pure metals. 6. Having made many experiments scientisis proved that electricity had an atomic character. 7. Being the cheapest of the metals cast iron is widely used everywhere. 8. A neutron is a particle having the same mass as a proton but carrying no electric charge.

Упражнение 3. Переведите предложения на русский язык, обращая внимание на причастия прошедшего времени.

1. An automobile begins its life in the fully mechanized assembly department. 2. The area of the car works built on thr Kama river is almost 1000 hectares. 3. The cars are going through special tests called "the Belgian road" and the washboard road. 4. The results obtained were carefully studied. 5. When frozen? Water is a colourless solid known as ice. 6. The steering system used has been tested by the research engineers of the safety device laboratory. 7. When assembled the car undergoes various tests.

Unit III. Gerund

Герундий (The Gerund) – это неличная форма глагола. Он обладает свойствами как глагола, так и существительного. Образуется путем прибавления суффикса –ing к основе глагола. Герундий имеет следующие формы:

	Simple	**Perfect**
Active	V-ing	having V3
Passive	being V3	having been V3

Глагольные свойства герундия:
  1) может выражать категории залога и времени;
  2) может иметь при себе прямое дополнение;
  3) определяется наречием.

Свойства существительного:

1) перед герундием может стоять существительное в общем или притяжательном падеже, или притяжательное местоимение;
2) герундию может предшествовать предлог;
3) герундий в предложении выполняет те же синтаксические функции, что и существительное, и может быть подлежащим, именной частью сказуемого, дополнением, определением и обстоятельством.

Упражнение 1. Переведите предложения на русский язык и определите формы и функции герундия.

1. A theory of solids must therefore enable the crystal form and elastic properties of any solid substance being deduced from the properties of the atoms of which it is built. 2. On being heated to a sufficient high temperature any body becomes a source of light. 3. The property of a body to remain in its natural state and to resist being accelerated is known as inertia. 4. In studying the physical principles, it may be assumed that the core magnetisation curve can be brought to its ideal form. 5. The insertion of resistance in the control winding has the effect of increasing the power amplification factor. 6. We object to their being denied the aspiration to test such new methods as may be suggested by fresh knowledge.

Упражнение 2. Переведите следующие предложения, обращая внимание на функцию выделенных слов.

1. Casting is a process *of forming* metal objects. 2. The open-herath process is one of the most important methods *of making* steel. 3. Numerous methods have deen developed *for producing* metal castings. 4. The test needed *increasing* the termperature of the molten metal. 5. There are some ways *of obtaining* high quality alloys. 6. *After pouring*, the molten metal is allowed to solidify in a mold. 7. *In building* new metallurgical works, engineers have to solve many different problems. 8. Liquids and gases expand *on heating*. 9. Mankind is interested in atomic ebergy *being used* only for peacefulgreat process. 10. Greatattention is paid to the metal *being heated* to the proper temperature.

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[*]Приводится в авторской редакции.

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