МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
Національний авіаційний університет

PROFESSIONAL ENGLISH

Практикум

для студентів напряму

6.050202 «Автоматизація та комп'ютерно-

інтегровані технології»

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А 40

Містить базову термінологію, автентичні тексти, комплекс комунікативних лексико-граматичних вправ та додаткові тексти для самостійного опрацювання.

Для студентів спеціальності 6.050202 "Автоматизація та комп'ютерно-інтегровані технології ".

ПЕРЕДМОВА

Практикум призначений для аудиторної та самостійної роботи з англійської мови за професійним спрямуванням для студентів спеціальності "Автоматизація та комп'ютерно-інтегровані технології", а також для фахівців

, які бажають поглибити свої знання англійської термінології з фаху.

Метою практикуму є комплексне навчання студентів, робота з фаховою літературою та формування навичок професійного спілкування. Навчальні тексти слугують не лише для розвитку навичок читання та перекладу фахової літератури, а й несуть у собі нову важливу інформацію, яку можна використовувати як основу для подальшого обговорення і створення тематичних ситуацій, максимально наближених до професійних.

Практикум складається з двох модулів, що містять автентичні тексти з тем: "Computers. Types of Computers. Computer Networks", "Computer Programming. Programming Languages". Термінологічні словники- мінімуми до кожного тексту допомагають краще оволодіти лексичним матеріалом та дають змогу розширити словниковий запас.

Вправи лексично-граматичного і комунікативного характеру, спрямовані на розвиток усіх видів мовленнєвої діяльності, розподіляються за рівнем складності, дозволяючи працювати окремо з лексичними одиницями, зі словосполученнями, реченнями та з текстом. Лексичні вправи передбачають пошук українсько-англійських та англо-українських термінологічних еквівалентів, добір синонімів, антонімів. Граматичні вправи охоплюють основні граматичні явища, характерні для англійської науково-технічної літератури. Комунікативні вправи сприяють розвитку навичок висловлювання власної думки, аргументації; участі в дискусіях, студентських конференціях тощо.

Практикум містить додаткові оригінальні інформаційно насичені тексти для самостійного опрацювання, які

супроводжуються творчими завданнями та поясненням важкозрозумілих термінологічних словосполучень.

UNIT I. Computers. Types of Computers.
Computer Networks.

Exercise 1. *Read, practice and learn the following words and word combinations.*

Programmable – програмований
calculate – обчислювати
calculator – обчислювальний пристрій
process – обробляти
retrieve – вилучати, одержувати
data (*sing.*– datum) – дані
instruction – команда
enable – давати можливість (змогу)
software – програмне забезпечення, програмні засоби
hardware – апаратні засоби
digital computer – цифровий комп'ютер
analog computer – аналоговий комп'ютер
compute – обчислювати, розраховувати
computation – обрахування, обчислення
variable – змінна величина
discrete – дискретний
quantity – 1) кількість 2) величина
value – значення
binary – двійковий
general purpose – спільного призначення
arithmetic logic unit (ALU) – арифметико-логічний пристрій
control unit – блок керування
storage device – запам'ятовувальний пристрій
memory – пам'ять (*комп'ютера*), запам'ятовувальний пристрій
input – 1) введення (*даних*) 2) вхідні дані
output – 1) виведення (*даних*) 2) вихідні дані
input /output devices (I/O) – пристрої введення/виведення
bus – шина
bit (binary digit) – 1) біт, 2) один розряд (*суматор*); лінія (*шини*)
digit – цифра
gate – вентиль, логічний вентиль, простий електронний перемикач

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processor – процесор
central processing unit (CPU) – центральний процесор
register – 1) регістр 2) реєструвати, зазначати
peripheral device – зовнішній пристрій, периферійний пристрій
array – 1) масив, 2) сукупність, набір однакових елементів

Exercise 2. *Read, translate and give the gist of text 1.*

Text 1. Computer Hardware

A **computer** is a programmable machine designed to carry out a sequence of arithmetic or logic operations automatically. The distinguishing feature of a computer as compared with a calculating machine, such as an electronic calculator, is its ability to process, store, and retrieve data without human intervention. This ability makes it possible for a computer to perform many operations without the need for a person to enter new instructions each time. Modern computers are made of high-speed electronic components that enable the computer to perform thousands of operations each second. The definition of the operations is called the program. Computers perform tasks or calculations according to a set of instructions or programs. The various programs by which a computer controls its operations, such as those for translating data from one form to another, are known as software. There are two basic types of computers analog and digital. An analog computer performs computations by manipulating continuous physical variables, such as voltage and time. A digital computer operates on discrete quantities, most represented as 'on-off', indicating whether the value of a binary variable is 0 or 1. Numbers and information are then represented by the binary system. Most digital computers are general purpose computers. A general purpose computer has four main components: the arithmetic logic unit (ALU), the control unit, the memory, and the input and output devices (I/O). The control unit, A LU, registers, and basic I/O (and often other hardware closely linked with these) are collectively known as CPU. These parts are interconnected by busses, often made of groups of wires. Inside each of these parts are thousands to trillions of small electrical circuits which can be turned off or on by means of an electronic switch. Each circuit represents a bit (binary digit) of information so that when the circuit is on it represents a "1", and when off it represents a "0" (in positive logic representation). The control unit directs and controls the signals and commands inside

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the processor, and the arithmetic-logic unit does the five arithmetic operations and the three decision-making operations.

All the other devices in the computer system, which can be connected to the CPU, are known as peripherals or peripheral devices. These include input devices, output devices and storage devices.

Early CPUs were composed of many separate components but since the mid-1970 s CPUs have typically been constructed on a single integrated circuit called a microprocessor. The CPU contains a special set of memory cells called registers that can be read and written much more rapidly than the main memory area. Registers are the fastest and most costly storage units in a computer. Normally contained within the processing unit, registers hold data that are involved with the computation currently being performed.

There are typically between two and one hundred registers depending on the type of CPU. Registers are used for the most frequently needed data items to avoid having to access main memory every time data is needed. As data is constantly being worked on, the need to access main memory (which is often slow compared to the ALU and control units) is reducing and the computer speed is greatly increasing (fig.1).
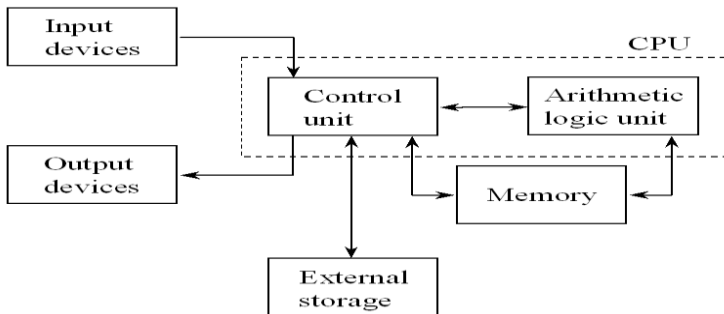

Figure. 1. Central processing unit

Exercise 3. *Translate the following universal words without a dictionary. Mind the difference in their pronunciation and spelling in English and Ukrainian.*

Computer, machine, electronic, component, program, physical, system, control, information, group, typically, positive, logic, micropro-

cessor, type, register, operation, manipulate, installation, instruction, automatically.

Exercise 4. *Find in text 1 words that can be used both as a noun and a verb. Translate the pairs.*

> **Model:** work – to work
> праця – працювати

Exercise 5. *Give the initial form of the following words.*

Programmable, computer, processing, automatically, calculator, operation, distinguishing, instruction, electronic, definition, various, translating, equipment, computation, contrasted, continuous, has, physical, variable, voltage, representation, rapidly, installation, integrated, constantly, reduction, greatly, increasing, interconnected, more, called, typically, turned, made, frequently, needed, worked, comparison, known, indicating, arrangement.

Exercise 6. Choose the appropriate form of the words to complete the sentences. Check the differences of meaning in your dictionary.

program, programming, programmable, programmer

1. A computer is a … machine designed to carry out a sequence of arithmetic or logic operations automatically.

2. A … decides what the computer is to do.

3. Without the …the computer cannot process the necessary information.

4. Computer … is the preparation and writing of detailed instructions for a computer.

calculate, calculator, calculation, calculating

5. The arithmetic/logic unit gives the chip its … ability.

6. The distinguishing feature of a computer from an electronic … is its ability to process, store, and retrieve data without human intervention.

7. Computers perform tasks or … according to a set of instructions or programs.

8. A computer can … numbers much faster than a manual … .

computer, computation, computerized, compute

9. An analog computer performs … by manipulating continuous physical variables, such as voltage and time.

10. … speeds are measured in megahertz.

11. Navigation between airports relies on electronic and …

equipment within the airplane.

12. Onboard equipment can … the position of the airplane.

processing, process, processed, processor

13. The basic difference between analog and digital computers is the type of data they … .

14. Due to the fact that analog computers work with real numbers many industries use them as data … systems.

15. Large, extremely fast, multi-use computers often contain complex arrays of …

16. An output device enables information to be brought out of the computer, usually to display the … data.

store, storage, stored, storing

17. A digital computer can … the results of its calculations for later use.

18. Results or other data are … for periods of time ranging from a small fraction of a second to days or weeks before being retrieved for further processing.

19. All auxiliary … devices are used as input/output devices.

20. Memory of a computer system is used for … programs and data.

Exercise 7. *Translate and comment upon the following verb forms.*

To carry out; to process, store, and retrieve; to perform; to enter; are made of; to perform; to enable; is called; performs; controls; operates; are inter-connected; are made of; can be turned off or on; represents; are arranged; may control; are known; were composed of; have been constructed; contains; called; can be read and written; depending on; are used; needed; is needed; to avoid having to access ; is being worked on; is reducing; is increasing.

Exercise 8. *Use the verbs in brackets in the proper tense and voice form. Translate the sentences.*

1. The distinguishing feature of a computer as compared with a calculating machine, such as an electronic calculator, is its ability (process, store, and retrieve) data without human intervention. 2. Modern computers (make) of high-speed electronic components that (enable) the computer (perform) thousands of operations each second. 3. The definition of the operations (call) the program. 4. The various programs by which a computer (control) its operations (know) as software. 4. An

analog computer (perform) computations by manipulating continuous physical variables. 5. A general purpose computer (have) four main components. 6. The parts of a general purpose computer (interconnect) by busses, often (make) of groups of wires. 7. Small electrical circuits can (turn) off or on by means of an electronic switch. 8. Each circuit (represent) a bit. 9. The CPU (contain) a special set of memory cells. 10. A special set of memory cells (call) registers. 11. Registers (use) for the most frequently needed data items (avoid) (have) (access) main memory every time data (need). 12. As data constantly (work) on, the need (access) main memory (reduce) and the computer speed greatly (increase).

Exercise 9. *Translate the following word combinations into Ukrainian.*

Designed to carry out a sequence of arithmetic or logic operations automatically; to process, store, and retrieve data; to perform many operations; to enter new instructions; to be made of high-speed electronic components; to be called the program; a set of instructions or programs; to be known as software; to perform computations; to manipulate continuous physical variables; to operate on discrete quantities; to be represented by the binary system; to be inter-connected by busses; to be made of groups of wires; to be turned off or on by means of an electronic switch; a bit (binary digit) of information; positive logic representation; to be arranged in logic gates; to be composed of many separate components; to be constructed on a single integrated circuit; called a microprocessor; can be read and written much more rapidly; to depend on the type of CPU; to be used for the most frequently needed data items; to access main memory; to avoid having to access main memory.

Exercise 10. *Make all possible word combinations using the words given in columns A and B. There may be more than one word combination.*

	A		**B**
1)	electronic	a)	machine
2)	digital	b)	calculator
3)	output	c)	quantity
4)	discrete	d)	device
5)	calculating	e)	operation
6)	input	f)	computer
7)	analog	g)	variable

Exercise 11. *Match the English-Ukrainian equivalents.*

1)	data	a)	запам'ятовувальний пристрій
2)	input device	b)	центральний процесор
3)	output device	c)	апаратні засоби
4)	software	d)	обчислювальний пристрій
5)	hardware	e)	пристрій введення
6)	central processing unit	f)	команда
7)	storage device	g)	програмне забезпечення
8)	arithmetic logic unit	h)	пристрій виведення
9)	bus	i)	магістраль, шина
10)	instruction	j)	арифметико-логічний пристрій
11)	calculator	k)	дані

Exercise 12. *Match the terms with their functions.*

1)	storage device	a)	It does all the processing and controls the peripherals
2)	input device	b)	It allows data to be entered
3)	output device	c)	It displays the processed data
4)	main memory	d)	It provides permanent storage for programs and data
5)	processor	e)	It holds the programs and data being used by the processor

Exercise 13. *Complete the sentences using English equivalents of the words in brackets.*

1. The distinguishing feature of a computer as compared with a calculating machine, such as an electronic (обчислювальний пристрій), is its ability (обробляти, зберігати і вилучати дані) without

human intervention. 2. Computers perform tasks or calculations according to a (набір команд або програм). 3. The various programs by which a computer controls its operations, such as those for translating data from one form to another, are known as (програмне забезпечення). 4. (Апаратні засоби) is the physical equipment comprising the installation. 5. An analog computer performs computations by manipulating (безперервно змінні фізичні величини), such as voltage and time. 6. A (цифровий комп'ютер) operates on (дискретні величини), most represented as 'on-off', indicating whether the value of a (двійкове число) is 0 or 1. 7. Most digital computers are (універсальні ЕОМ). 8. The main components of a (універсальна ЕОМ) are interconnected by (шини), often made of groups of wires. 9. The (центральний процесор) contains a special set of memory cells called (регістри) that can be read and written much more rapidly than the (запам'ятовувальний пристрій). 10. (Основна пам'ять) is often slow compared to the (арифметико-логічний пристрій і блоки керування).

Exercise 14. *Match the beginnings (column A) and the ends (column B) of the sentences.*

A	B
1. A computer is a programmable machine …	a) that one or more of the circuits may control the state of one or more of the other circuits.
2. This ability makes it possible for a computer…	b) by manipulating continuous physical variables.
3. Modern computers are made of high-speed electronic components …	c) depending on the type of CPU.
4. The definition of the operations …	d) designed to carry out a sequence of arithmetic or logic operations automatically.
5. An analog computer performs computations …	e) is called registers.
6. The circuits are arranged in logic gates so …	f) is called the program.
7. The CPU contains a special	g) to enter new instructions each

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set of memory cells …

8. There are typically between two and one hundred registers …

time.

h) that enable the computer to perform thousands of operations each second.

Exercise 15. *Translate the following sentences into English.*

1. Комп'ютер – це програмована машина, призначена для автоматичного виконання послідовних арифметичних або логічних операцій. 2. Відміною особливістю комп'ютера порівняно з обчислювальною машиною, такою як, наприклад, електронний калькулятор, є його здатність обробляти, зберігати і вилучати дані без втручання людини. 3. Певні дії комп'ютера називаються програмою. 4. Комп'ютер виконує завдання і розрахунки відповідно до набору команд або програм. 5. Різні програми, за допомогою яких комп'ютер контролює свої дії, називаються програмним забезпеченням. 6. Комп'ютер та його складові називають апаратними засобами. 7. Існують два основних типи комп'ютерів: аналогові та цифрові. 8. Аналоговий комп'ютер виконує обчислення, використовуючи неперервно змінювані фізичні величини, такі як напруга і час. 9. Цифровий комп'ютер виконує операції з дискретними числами, відображаючи два стани електричного кола, такі як «включено /виключено", вказуючи на значення двійкової змінної 0 або 1. 10. Більшість цифрових комп'ютерів – це універсальні комп'ютери. 11. Універсальний комп'ютер складається з чотирьох основних компонентів: арифметико-логічного пристрою, блоку керування, пам'яті та пристроїв введення / виведення. 12. Ці частини з'єднані між собою шинами, часто зробленими з набору дротів. 13. Блок керування, арифметико-логічний пристрій, регістри та основні пристрої введення/виведення (а часто й інше устаткування тісно пов'язане з ними) – всі разом утворюють центральний процесор. 14. Регістри застосовуються для опрацювання найчастіше використовуваних даних, щоб уникнути потреби звертатися до основної пам'яті комп'ютера кожного разу, коли необхідно. 15. Оскільки дані постійно опрацьовуються, необхідність доступу до оперативної пам'яті, яка часто є повільнішою порівняно з арифметико-логічним пристроєм і блоками керування, знижується, а швидкість комп'ютера значно зростає.

Exercise 16. *Answer the questions on text 1.*

1. What is a computer? 2. What is a distinguishing feature of a computer as compared to a calculating machine? 3. What does the operation of a computer depend on? 4. What is software? 5. What is the purpose of computer hardware? 6. How do analog and digital computers operate? 7. What are the main components of a general purpose computer? 8. What components are collectively known as a central processing unit (CPU)? 9. What is a microprocessor? 10. What are registers? How are they used in a computer?

Exercise 17. *Label the diagram of a computer system using these terms:*

main memory; input device; output device; processor; storage device

CPU
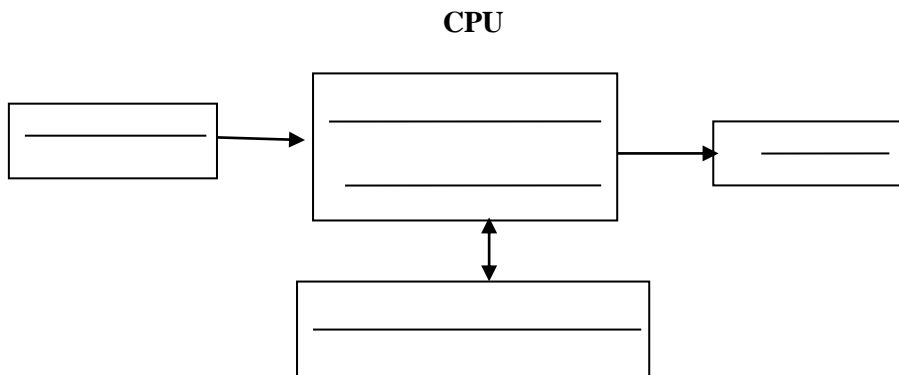
Exercise 18. *Discuss the following questions in groups.*

1. Why were computers substituted for calculating machines?

2. What is the core of computer operation?

3. What fundamental principles of operation do analog and digital computers depend on?

4. What is the function of CPU?

Exercise 19. *Read, practice and learn the following words and word combinations to text 2.*

Communication – зв'язок; канал зв'язку

communicate – взаємодіяти, мати зв'язок

case – корпус (*прилада*)

keyboard – клавіатура

mouse – миша

auxiliary – зовнішня (периферійна) пам'ять,

medium – носій інформації

punched card – перфорована карта, перфокарта

typewriter – друкарська машинка

pointing device – вказівний пристрій

track-ball – кульовий маніпулятор (*для керування рухом курсора*)

touchpad – сенсорний планшет, сенсорна панель, тачпад

cathode-ray tube – електронно-променева трубка, катодно-променева трубка

liquid-crystal display – рідкокристалічний дисплей

interface – 1) інтерфейс 2) програмні і / чи апаратні засоби

operating system (OS) – операційна система (ОС)

word processor program – текстовий редактор

spreadsheet – програма оброблення динамічних таблиць великого формату

database program – база даних

capable – ефективний; здатний, спроможний

fraction – 1) частка, доля 2) дріб

execute – виконувати

conditional – умовний

environment – середовище

personal computer (PC) – персональний комп'ютер

fit – 1) підходити; вміщатися 2) пристосовуватися; підганяти

embedded computer – вбудований комп'ютер

Exercise 20 . *Read, translate and give the gist of text 2.*

Text 2. Computer System Structure

A computer system consists of four major components: storage, processor, peripherals and input/output communication. (fig. 2) The storage system is used to keep data and programs. The processor is the unit that controls the operation of the system and carries out various computations. The peripheral devices are used to communicate with the outside world, and the input/output system allows the previous components to communicate with one another. Storage is made up of registers,

main memory and secondary storage. Broken lines indicate input/output.

Computers work through an interaction of hardware and software. Hardware refers to the parts of a computer that you can see and touch, including the case and everything inside it. The most important piece of hardware is a tiny rectangular chip inside your computer. It's the "brain" of your computer—the part that translates instructions and performs calculations. Hardware items such as your monitor, keyboard, mouse, printer and other items are often called hardware de-vices or peripheral devices.
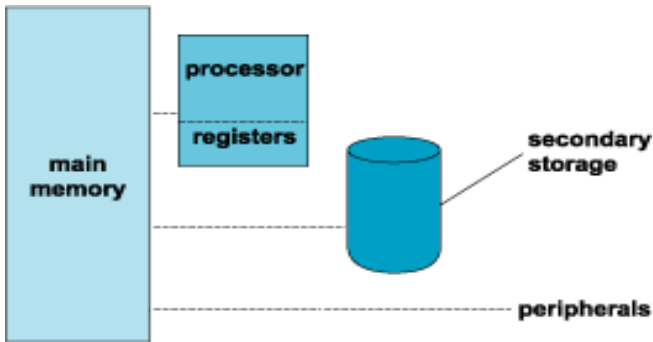

Figure 2. A computer system

Peripheral devices allow information to be entered from an external source and allow the results of operations to be sent out. Data are entered into the computer and the processed data made available via input/output devices. All auxiliary or secondary storage devices are used as input/output devices. For many years the most popular input/output medium was the punched card. Although this is still used, but nowadays the most popular input device is the computer terminal and the most popular output device is the high-speed printer. Human beings can directly communicate with the computer through computer terminals, entering instructions and data by means of keyboards much like typewriters, by using a pointing device such as a mouse, track-ball or touchpad, or by speaking into a microphone that is connected to computer running voice-recognition soft-ware. Responses may be displayed on a cathode-ray tube, liquid-crystal display or printer. The CPU, main storage, auxiliary storage and input/output devices collectively make up a system. The interface between the computer and the human operator is known as

the user interface.

Software refers to the instructions or programs, that tell the hardware what to do. A word processing program that you can use to write letters on your computer is a type of software. The operating system (OS) is software that manages your computer and the devices connected to it. Two well-known operating systems are Windows and Macintosh. Your computer uses the

Windows operating system.

Computers are general purpose machines. Conventionally a computer consists of some form of memory that carries out arithmetic and logic operations and sequencing and a control unit that can change the order of operations based on the information that is stored. The storage or memory of a computer system holds the data that the computer will process and the instructions that indicate what processing is to be done. Main memory holds the data to be processed and the instructions that specify what processing is to be done. Normally, a processor is directed by a program, which consists of a series of instructions that are kept in main memory. The particular sequence of operations can be changed readily, allowing the computer to solve more than one kind of problem. By changing the program instructions, computers can be used to process information in very different ways. For example, a word processor program allows the computer to process text, a spreadsheet enables the computer to perform calculations, a data-base program is used for searching and sorting records, and a browser program is used for looking at pages on the Internet. An important class of computer operations on some computing platforms is the accepting of input from human operators and the output of results formatted for human consumption.

Exercise 21. *Answer the questions on text 2.*
1. What major components does a computer system consist of ? 2. What is the function of each component in a computer system? 3. What piece of hard-ware is called a "brain" of a computer? 4. How are peripheral devices used? 5. What makes up a computer system? 5. Why is software considered basic in computer operation? 6. What forms of memory does a computer consist of? 6. What is the function of a storage device? 7. How can program instructions be used to solve different tasks?

Exercise 22. *Comment upon the structure of the following nouns. Give your own examples of word formation.*

Storage, processor, communication, hardware, software, computer, computation, operation, register, interaction, instruction, calculation, monitor, keyboard, printer, information, typewriter, track-ball, touch-pad, voice-recognition, cathode-ray, liquid-crystal, interface, operator, user, memory, spreadsheet, browser, database, consumption.

Exercise 23. *Give derivatives of the following words, translate the pairs or chains.*

> *Model:* compute – computer – computation
> обчислювати – комп'ютер – обрахування

Store, process, instruct, inform, calculate, print, interact, operate, communicate, use, recognize, connect, manage, indicate, perform, program, consume, accept, connect, instruct, vary, periphery, system, act, collect, consume.

Exercise 24. *Translate 'noun + noun' word combinations.*

Storage system; hardware item; hardware device; peripheral device; input de-vice; output device; storage device; input medium; output medium; computer terminal; high-speed printer; computer voice-recognition software; cathode-ray tube; liquid-crystal display; computer interface; user interface; control unit; computer system; computer processor; program instruction; word processor program; database program; browser program; computer operation; human operator; human consumption .

Exercise 25. *Translate the following words and word combinations into Ukrainian. Use them in sentences of your own.*

a) More important piece; tiny rectangular chip; peripheral device; external source; processed data; auxiliary device; secondary device; most popular input / output medium; punched card; pointing device; running voice-recognition soft-ware; auxiliary storage; word processing program; operating system; well-known operating system; general purpose machine; arithmetic and logic operations; processing unit; arithmetic and logic unit; main memory; computing platform.

b) To work through an interaction of hardware and software; to be used to keep data and programs; to allow information to be entered; to allow the results to be sent out; to enter the computer; to make available; to use as input / out-put devices; to communicate with the computer; to enter instructions and data; to use a pointing device; to speak into a microphone; to connect to computer running voice-recognition software; to display on a cathode-ray tube, liquid-crystal display or printer; to make up a system; to be known as the user interface; to refer to the instruction or program; to tell the hardware what to do; to manage a computer and the devices; to use operating system; to consist of some form of memory and control unit; to carry out arithmetic and logic operations; to change the order of operations; to be based on the information; to hold data; to be involved with the computation; to indicate processing; to be done; to consist of a control unit; to direct the operation of a system; to perform computational operation; to be directed by a program; to consist of a series of instructions; to be kept in main memory; to be changed readily; to solve a problem; to change the program instruction; to be used to process information; to allow the computer to process text; to enable the computer to perform calculation; to be used for searching and sorting records; to be used for looking at pages on the Internet; to format for human consumption.

Exercise 26. *Translate and comment upon the following verb forms.*

Consists of; is used to keep; refers to; controls; carries out; to communicate; allows; is made up; work; refers; can; translates, performs, are called, to be entered, to be sent out, are entered into, made, is used, can communicate, is connected, may be displayed, make up, is known, refers, tell, to write, connected, manages, connected to, uses, based on, is stored, holds, will process, indicate, is to be done, contained, being performed, holds, to be processed, specify, consists of; are kept; can be changed; can be used to process; enables to perform; is used for searching and sorting; is used for looking; formatted for.

Exercise 27. *Put the verbs in brackets into the correct voice and tense form.*

1. A computer system (consist) of four major components. 2. The storage system (use) (keep) data and programs. 3. The processor is the

unit that (control) the operation of the system and (carry) out various computations. 4. The peripheral devices (use) (communicate) with the outside world. 5. The input/output system (allow) the previous components (communicate) with one another. 6. Storage (make) up of registers, main memory and secondary storage. 7. Hardware items such as your monitor, keyboard, mouse, printer and other items often (call) hardware devices or peripheral devices. 8. All auxiliary or secondary storage devices (use) as input/output devices. 9. A microphone (connect) to computer. 10. The CPU, main storage, auxiliary storage and input/output devices collectively (to make) up a system. 11. The interface between the computer and the human operator (know) as the user interface. 12. Software (refer) to the instructions or programs, that (tell) the hardware what (do).13. The operating system (manage) your computer and the devices connected to it. 14. Conventionally a computer (consist) of some form of memory and a control unit. 15. Memory (carry) out arithmetic and logic operations and sequencing. 16. The control unit can (change) the order of operations based on the information that (store). 17. Main memory (hold) the data (process) and the instructions that (specify) what processing is (do). 18. A control unit (direct) the operation of the system. 19. An arithmetic and logic unit (perform) computational operations. 20. A word processor program (allow) the computer (process) text, a spreadsheet (enable) the computer (perform) calculations, a data-base program (use) for searching and sorting records, and a browser program (use) for looking at pages on the Internet.

Exercise 28. *Rewrite the following sentences in the Passive Voice.*

1. A computer can perform mathematical operations very quickly. 2. Programs translate the data from different input and output devices. 3. A mathematical model can always replace any real physical process. 4. Modern simulation languages have replaced electronic analog computers. 5. An arithmetic and logic unit performs computational operations. 6. A control unit directs the operation of the system. 7. Peripheral devices such as printers, keyboards and displays, translate electronic signals into mechanical motion or light (or vice versa).8. A computer controls the flow of data across buses or channels by means of special instructions and mechanisms. 9. Auxiliary memory keeps programs and data when not in immediate use. 10. The electric circuits can easily perform a

wide variety of simulations.

Exercise 29. *Match the terms and definitions.*

Terms	Definitions
1. Computer	a) the storage of data that the computer will process and the instructions that in-dicate what processing is to be done.
2. Processor	b) software that manages your computer and the devices connected to it.
3. Peripheral devices	c) a programmable machine designed to carry out a sequence of arithmetic or logic operations automatically.
4. Operating system	d) the instructions or programs, that tell the hardware what to do.
5. User interface	e) the fastest and most costly storage units in a computer to hold data that are in-volved with the computation currently being performed..
is **are**	
6. Hardware	f) the unit that controls the operation of the system and carries out various com-putations.
7. Memory	g) hardware items such as your monitor, keyboard, mouse, printer and other items.
8. Registers	h) the interface between the computer and the human opera-tor.
9. Software	i) the physical equipment comprising the installation.

Exercise 30. *Match the synonyms or synonymous word combinations.*

1.	computation	a)	secondary
2.	hardware	b)	command
3.	instruction	c)	processor
4.	computer	d)	binary digit
5.	auxiliary	e)	program
6.	memory	f)	calculation
7.	bit	g)	manage
8.	a set of instructions	h)	storage

9. control
10. processing unit

i) programmable machine
j) physical equipment

Exercise 31. *Translate the following sentences into English.*

1. Комп'ютерна система складається з чотирьох основних компонентів: запам'ятовувального пристрою, процесора, периферійних пристроїв та комунікаційних засобів введення і виведення інформації. 2. Система запам'ятовувальних пристроїв використовується для зберігання даних і програм. 3. Оперативна пам'ять містить дані, які необхідно обробити, та інструкції щодо способу здійснення операції. 4. Процесор – це пристрій, який керує роботою системи та виконує різні розрахунки. 5. Периферійні пристрої використовуються для зв'язку із зовнішнім світом. 6. Система введення / виведення дозволяє вищезгаданим компонентам взаємодіяти один з одним. 7. Елементи устаткування - монітор, клавіатура, миша, принтер та інші предмети - часто називають апаратними пристроями або периферійними пристроями. 8. Периферійні пристрої дозволяють вводити інформацію із зовнішнього джерела і розсилати операційні дані. 9. Люди можуть безпосередньо обмінюватися даними з комп'ютером через комп'ютерні термінали шляхом введення команд і даних за допомогою клавіатури, подібної до клавіатури друкарської машинки, вказівного пристрою, такого як миша, кульового маніпулятора або мікрофона, підключеного до комп'ютера. 10. Програмне забезпечення – це команди або програми, які керують роботою апаратних засобів. 11. Можливість легко змінювати послідовність операцій дозволяє комп'ютеру вирішувати більшу кількість завдань.

Exercise 32. *Comment upon the statements using the phrases: of course, surely, to my mind, most probably or perhaps.*

1. A computer differs from a calculating machine. 2. Computers are general purpose machines. 3. A general purpose computer has four main components. 4. There are two fundamentally different types of computers. 5. Computers work through an interaction of hardware and software. 6. The most important item of hardware is the CPU. 7. A computer can do very little until it is given some information.

Exercise 33. *Ask:*
a) if a computer system consists of four major components;
if a computer consists of some form of memory;
if a computer processor consists of a control unit;
if it' s the "brain" of a computer;
if computers can be used to process information in very different ways;

b) how the storage system is used;
what component controls the operation of the system and carries out various computations ;
how all auxiliary or secondary storage devices are used ;
why computers are general purpose machines;
how human beings can directly communicate with the computer;
why computers can be used to process information in very different ways.

Exercise 34. *Speak on:*
1. Computer Structure and components.
2. Computer Classification.
3. Computer System.

Exercise 35. *Read, practice and learn the following words and word combinations.*
Transaction – транзакція (групова операція)
accuracy – точність, безпомилковість, ретельність
precision – точність, чіткість
appliance – обладнання, прилади
personal computer – персональний комп'ютер
mainframe computer – головний комп'ютер обчислювального
        центру, мейнфрейм

minicomputer – мінікомп'ютер

workstation – робоча станція (*клас ЕОМ*)

microcomputer – мікрокомп'ютер

desktop computer – настільний комп'ютер

laptop computer – дорожній комп'ютер

handheld computer – кишеньковий ПК (персональний комп'ютер), мікрокалькулятор, портативний комп'ютер

tablet computer – планшетний комп'ютер

capable (of) – здатний (до)

scale – 1) шкала 2) масштаб 3) розмах, охоплення

nucleus (pl. nuclei) – атомне ядро

nuclear – ядерний

nuclear fusion – злиття ядер

prohibitive – надмірний, непомірно високий

network – мережа

server – сервер

portable – портативний, переносний

lack – 1) брак, нестача 2) не вистачати, бракувати

stylus – сенсорне перо *(пристрій для введення даних планшетного комп'ютера)*, стилус

versatile – універсальний

handle – обробляти

numeric – числовий

manufacture – 1) виробництво; виготовлення 2) виробляти, виготовляти

simulator – тренажер

Exercise 36. Discuss the following questions using the information of text 3.

1. Why is a computer considered one of the most brilliant inventions of mankind?

2. How have computers changed over time?

3. Computers are now widespread, aren't they?

4. What are the purposes for buying home computer?

Text 3

A computer is one of the most brilliant inventions of mankind.

Thanks to computer technology, we were able to achieve storage and processing of large amounts of data, employing computer memory capacities for storage of information. Owing to computers, we have been able to speed up daily work, carry out critical transactions and achieve accuracy and precision at work. The first fully electronic computers, introduced in the 1940s, were large machines of the size of a large room that required great amounts of electric power to consume and teams of people to operate. However, with the advancing technology, today's computers are not only thousands of times faster, they can fit on your desk, in your lap or even in your pocket. Modern computers based on integrated circuits are millions to billions of times more capable than the early machines and occupy a fraction of the space. At one end of the scale are super-computers, very large computers with thousands of linked microprocessors that perform extremely complex calculations. At the other end are tiny computers embedded in cars, TVs, stereo systems, calculators and appliances. These computers are built to perform a limited number of tasks and can be powered by small batteries as those in mobile computers. Personal computers in their various forms are icons of the Information Age and are what most people think of as "computers". However, the embedded computers found in many devices from mp 3 players to fighter aircraft and from toys to industrial robots are the most numerous.

Exercise 37. *Divide text 3 into logical parts, entitle them and write a topical sentence for each part.*

Exercise 38. Translate the following universal words related to computers. Mind the difference in their pronunciation and spelling.

Transaction; supercomputer; minicomputer; microcomputer; personal computer; microprocessor; calculator; transistor; monitor; computer animation; peripheral; notebook; Internet; stereo system; simulation; bit; signal; analog; process; hybrid computer; control; automobile speedometer; automated; physical simulation; stylus; program.

Exercise 39. Read, translate and give the gist of text 4.

Text 4. Computers Classification
Computers may be classified in different ways: according to their

size, technology and purpose. Computers vary greatly in size. They may be supercomputers, mainframe computers, minicomputers, workstations and microcomputers or personal computers.

Supercomputers are the most powerful, extremely fast computers that can perform hundreds of millions of instructions per second. Because of their size and expense, supercomputers are relatively rare. The highly calculation-intensive tasks can be effectively performed by means of supercomputers. Their ability of parallel processing and their well-designed memory give the supercomputers large transaction processing powers. They are used for problems requiring complex calculations such as problems including quantum physics, weather forecasting, climate research, oil and gas exploration, molecular modeling, computing the structures and properties of chemical compounds, biological macromolecules, polymers and crystals and physical simulations such as simulation of airplanes in wind tunnels, simulation of the detonation of nuclear weapons and research into nuclear fusion. Another giant among computers after the supercomputer is мainframe, which can also process millions of instructions per second and capable of accessing billions of data.

Mainframe computers are usually slower, less powerful and less expensive than supercomputers. Mainframe computers can support hundreds or thousands of users simultaneously, handling massive amounts of input, output, and storage. Mainframe computers are used in large organizations where many users need access to shared data and programs.

Minicomputers are smaller than mainframe, general purpose computers. Minicomputers are multiuser computers capable of supporting up to hundreds of users simultaneously. In terms of size and processing capacity, minicomputers lie in between mainframes and microcomputers. They are generally easier to use. They give computing power without adding the prohibitive expenses associated with larger systems. Minicomputers usually have multiple terminals. Minicomputers may be used as network servers and Internet servers. Minicomputers are also called mid-range systems or workstations. They took up the space that would be needed for a refrigerator or two and used transistor and core memory technologies. The 12-bit minicomputer of the Digital Equipment Corporation was the first successful minicomputer.

Workstations are powerful single-user computers. A workstation

is like a personal computer, but it has a more powerful microprocessor and, in general, a higher-quality monitor. Workstations are used for tasks that require a great deal of power, such as product design and computer animation. Workstations are of-ten used as network and Internet servers.

Microcomputers or **Personal Computers** are the smallest, least expensive of all the computers. Microcomputers have the smallest memory, less power and permit fewer peripherals to be attached. Microcomputers are more commonly known as personal computers or PC. This term refers to any independent (stand-alone) computer, fully equipped and useful for any individual to accomplish tasks successfully. There are various kinds of personal computers: desktops, lap-tops, handheld computers and tablet PCs. Desktop computers are the most common type of PC. Notebook or laptop computers are used by people who need the power of a desktop system, but also portability. Handheld PCs lack the power of a desktop or notebook PC, but offer features for users who need limited functions and small size. Tablets are mobile computers that are very handy to use. They use the touch screen technology. Tablets come with an on-screen keyboard or use a stylus or a digital pen. Apple's iPad redefined the class of tablet computers.

According to technology there are three basic types of computers: analog, digital and hybrid computers.

Analog computers are different from a digital computer due to their capability to perform several mathematical operations simultaneously. An analog computer uses continuous variables for mathematical operations and utilizes mechanical or electrical energy. It recognizes data as a continuous measurement of a physical property (voltage, pressure, speed and temperature),for example, automobile speedometer.

Digital computers are high speed programmable electronic devices that per-form mathematical calculations, compare values and store results. They recognize data by counting discrete signal representing either a high or low voltage state of electricity. Digital computers use digital circuits and are designed to operate on two states, namely bits 0 and 1. They are analogous to states ON and OFF. Data on these computers are represented as a series of 0s and 1s. Digital computers are suitable for complex computation and have higher processing speeds. Digital computers are either general purpose computers or special purpose ones.

Hybrid computers process both analog and digital data. A hybrid computer combines the desirable features of analog and digital computers. It is mostly used for automatic operations of complicated physical processes and machines. In this type of computers, the digital segments perform conversion of analog signals to digital ones. Nowadays analog-to-digital and digital-to-analog converters are used for transforming the data into suitable form for either type of computation. Hybrid computers are mainly used for specialized tasks.

Computers differ according to their purpose as general purpose computers and special purpose computers.

General purpose computers are designed to solve a large variety of problems. That is they can be given different programs to solve different types of problems. General-purpose computers can process business commercial data, store large amount of data and the programs necessary to process them. Because of general-purpose computers versatility, most businesses today use them. Virtually all computers from micro to mainframe are general purpose. Even computers in toys, games and single-function devices follow instructions in their built-in program.

Special purpose computers are designed to operate on a restricted class of problems. The computer program for solving the problem is built right into the computer. Special purpose computers have many features of general-purpose computers but are designed to handle specific problems and are not applied to other computerized activities. For example, special purpose computers may be designed to process only numeric data or to completely control automated manufacturing processes. Most analog computers are special purpose computers. Special purpose computers are often used as training simulators. A simulator is a computer-controlled device for training people under simulated or artificially created conditions.

Exercise 40. Translate the objective and attributive word combinations below. Remember the ways of their formation.

1. *V-ing + n*

processing data, employing capacities, advancing technology, amazing computers, processing powers, requiring calculations, computing properties, accessing data, processing capacity, adding expenses, counting signal, representing signal, processing speeds, transforming data, solving problem, training simulators, training people.

2. ***V-ed + n***

introduced computers, limited number, required power, integrated circuits, linked microprocessors, embedded computers, limited number, powered computers, classified computers, used computers, shared data, shared programs, associated expenses, used mini-computers, used servers, used term, needed space, used workstations, attached peripherals, designed computer, limited functions, redefined class, complicated processes, used converters, specialized tasks, given programmes, restricted problems, applied computers, computerized activities, con-trolled device, simulated conditions.

3. ***adv V-ed + n***

effectively performed tasks, well-designed memory, commonly introduced computers, effectively performed conversion, simultaneously performed operations, mostly used computers, mainly used computers, completely automated processes, artificially created conditions, independently used computer, fully equipped computer.

4. ***n + n (+n)***

computer technology, computer memory capacities, stereo systems, Information Age, fighter aircraft, mainframe computers, calculation tasks, transaction power, climate research, oil exploration, gas exploration, wind tunnel, multiuser computers, network servers, Internet servers, core memory technologies, single-user computers, computer animation, desktop computers, laptop computers, touch screen technology, onscreen keyboard, tablet computers, automobile speedometer, hybrid computers, business data, computers versatility.

Exercise 41. Determine the parts of speech of the following words and translate them. Define the suffixes, if any and give the initial form.

Faster, most, more, slower, less, smaller, easier, larger, higher, smallest, better, least, fewer.

Exercise 42. Give the comparative and superlative forms of the following adjectives and adverbs.

Brilliant, fast, powerful, capable, numerous, complex, rare, intensive, many, effective, large, slow, expensive, prohibitive, popular, small, successful, common, well, high, low, suitable, easy, few, little, far,

much, good, little.

Exercise 43. Complete the sentences with the correct form of the adjectives and adverbs basing on text 4.

a) 1. Today's computers are not only thousands of times _____, they can fit on your desk, in your lap, or even in your pocket. 2**.** Mainframe computers are usually _____ than supercomputers. 3. Minicomputers are _____ than mainframe, general purpose computers. 4. Minicomputers are generally _____ to use. 5. Mini-computers give computing power without adding the prohibitive expenses associated with _____ systems. 6. The term 'workstations ' began to be popularly used in the 1960s to refer to relatively _____ third generation computers. 7. A workstation is like a personal computer, but it has a _____ -quality monitor. 8. Microcomputers or Personal Computers are the _____ of all the computers. 9. Microcomputers have the _____ memory and permit _____ peripherals to be attached. 10. Digital computers are suitable for complex computation and have _____ processing speeds.

b) 1. Modern computers based on integrated circuits are millions to billions of times _____ capable than the early machines, and occupy a fraction of the space. 2. The embedded computers found in many devices from mp 3 players to fighter aircraft and from toys to industrial robots are the _____ numerous. 3. Supercomputers are the _____ powerful, extremely fast computers that can perform hundreds of millions of instructions per second. 4. Mainframe computers are ___ powerful and _____ expensive than supercomputers. 5. A workstation is like a personal computer, but it has a _____ powerful microprocessor. 6. Microcomputers are _____ commonly known as personal computers. 7. Microcomputers or Personal Computers are _____ expensive of all the computers. 8. Desktop computers are the _____ common type of PC. 9. Desktops are becoming _____ powerful and are often used for running multimedia programs containing some combination of text, sound, high quality graphics, animation and video. 10. Digital computers are generally _____ effective than analog computers.

Exercise 44. Compose sentences using the degrees of comparison:

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a) … are faster than …
… are cheaper than …
… are slower than …
… are larger than …
… are smaller than …
… is easier than …

b) … are the fastest …
… is the largest …
… is the simplest …
… are the smallest …
… is the easiest …
… are the best …

c) … are less powerful …
… is less expensive …
… are more powerful …
… is more prohibitive …

d) … are the least expensive …
… are the most effective …
… is the least intensive …
… is the most rare …

Exercise 45. Make up sentences with "as … as'' or "not so / as … as'' to express comparison. Translate the sentences.

Supercomputers			rare	general purpose computers
Mainframe			fast	special purpose computers
Minicomputers	are	as	power-ful	mainframe compu-ters
Workstations			large	minicomputers
Personal computers			versatile as	workstations
Analog computers	are		effective	supercomputers
Digital computers	not	so/as	suitable	personal computers
Hybrid computers			expensive	digital computers
General purpose computers			slow	analog computers
Special purpose computers			popular	hybrid computers

Exercise 46. Insert articles where necessary.

1. A computer is one of … most brilliant inventions of mankind. 2. The embedded computers are … most numerous. 3. Personal computers in their various forms are icons of the Information Age and are what … most people think of as "computers". 4. Supercomputers are … most powerful, extremely fast computers. 5. Mainframe computers are usually … slower, … less powerful and … less ex-pensive than super-computers. 6. A workstation is like a personal computer, but it has …

more powerful microprocessor and, in general, … higher-quality monitor. 7. Minicomputers are … smaller than mainframe, general purpose computers. 8. The term 'minicomputer' began to be popularly used in the 1960s to refer to … relatively smaller third generation computers. 9. Because of general-purpose computers versatility, … most businesses today use them. 10. Digital computers are suitable for complex computation and have … higher processing speeds.

Exercise 47. Translate and comment upon the following grammar forms.

Were able to, have been able to, to achieve, achieving, are capable, carry out, occupy, owing to, to speed up, are built to perform, can be powered, may be classified, to vary, can perform, can be performed, are used, can process, is capable of, can support, to use, give, may be used, refers, are called, would be needed, to perform, uses, recognizes, perform, compare, stored, are designed to operate, is represented, have, combines, converters, differ, follow, is built, may be designed to process, to control, can be given, to solve.

Exercise 48. Put the verbs in brackets into the correct tense and voice form. Translate the sentences.

1. Thanks to computer technology, we (be) able (achieve) storage of huge amounts of data. 2. We have (be) able (speed) up daily work, (carry) out critical transactions and (achieve) accuracy and precision at work. 3. The first fully electronic computers (be) huge machines of the size of a large room that (require) huge amounts of electric power (consume) and teams of people (operate). 4. Today's computers (be) not only thousands of times faster, they (can fit) on your desk, in your lap or even in your pocket. 4. Computers (use) for problems that (require) complex calculations. 5. Mainframe can also (process) millions of instructions per second. 6. Mainframe computers (use) in large organizations where many users (need) access to shared data and programs. 7. Minicomputers may (use) as network servers and Internet servers. 8. In the 1960s minicomputers (take) up the space that (need) for a refrigerator or two and (use) transistor and core memory technologies. 9. Workstations (use) for tasks that require a great deal of power, (use) often as network and Internet servers. 10. Handheld PCs (lack) the power of a desktop or notebook PC, but (to offer) features for users who (need)

limited functions and small size. 11. Tablets (be) mobile computers that (be) very handy (use). 12. They (use) the touch screen technology. 13. Tablets (to come) with an on-screen keyboard or (use) a stylus or a digital pen. 14. Apple's iPad (redefine) the class of tablet computers. 15. An analog computer (use) continuous variables for mathematical operations and (utilize) mechanical or electrical energy. 16. A hybrid computer (to combine) the desirable features of analog and digital computers. 17. The digital segments (perform) conversion of analog signals to digital ones.

Exercise 49. Analyse the **ing-**forms. State which of them are Non-finite forms of the verb (gerunds, participles) or other parts of speech. Translate the sentences.

1. Thanks to computer technology, we were able to achieve storage and processing of huge amounts of data, employing computer memory capacities for storage of information. 2. Owing to computers, we have achieved speeding up daily work, carrying out critical transactions and accuracy and precision at work. 3. With the advancing technology, today's computers are amazing. 4. Their ability of parallel processing and their well-designed memory give the supercomputers large transaction processing powers. 5. Supercomputers are used for problems requiring complex calculations such as problems including quantum physics, weather forecasting, molecular modeling, computing the structures and properties of chemical compounds. 6. Mainframe can also process millions of instructions per second and capable of accessing billions of data. 7. Mainframe computers can support hundreds or thousands of users simultaneously, handling massive amounts of input, output, and storage. 8. Minicomputers are multi-user computers capable of supporting up to hundreds of users simultaneously. 9. In terms of size and processing capacity, minicomputers lie in between mainframes and microcomputers. 10. Minicomputers give computing power without adding the prohibitive expenses. 11. Digital computers recognize data by counting discrete signal representing either a high or low voltage state of electricity. 12. Digital computers are suitable for complex computation and have higher processing speeds. 13. Nowadays analog-to-digital and digital-to-analog converters are used for transforming the

data into suitable form for either type of computation. 14. A simulator is a computer-controlled device for training people under simulated or artificially created conditions.

Exercise 50. Define the functions of the Participle II in the following sentences (it may be used as an attribute, adverbial modifier, part of a compound verbal predicate). Translate the sentences.

1. The first fully electronic computers, introduced in the 1940s, were huge machines of the size of a large room. 2. Modern computers based on integrated circuits are millions to billions of times more capable than the early machines. 3. At one end of the scale are supercomputers, very large computers with thou-sands of linked microprocessors that perform extremely complex calculations. 4. At the other end are tiny computers embedded in cars, TVs, stereo systems, calculators and appliances. 5. These computers are built to perform a limited number of tasks and can be powered by small batteries as those in mobile computers. 6. However, the embedded computers found in many devices from mp 3 players to fighter aircraft and from toys to industrial robots are the most numerous. 7. Computers may be classified in different ways: according to their size, technology and purpose. 8. The highly calculation-intensive tasks can be effectively performed by means of supercomputers. 9. The term began to be popularly used in the 1960s to refer to relatively smaller third generation computers.10. Minicomputers are also called mid-range systems or workstations. 11. Microcomputers permit fewer peripherals to be attached. 12. Microcomputers are more commonly known as personal computers. 13. The term "personal computer'' or PC refers to any independent (stand-alone) fully equipped computer. 14. Digital computers use digital circuits and are designed to operate on two states, namely bits 0 and 1. 15. Data on these computers are represented as a series of 0s and 1s. 16. A hybrid computer is mostly used for automatic operations of complicated physical processes and machines. 17. General purpose computers are designed to solve a large variety of problems. 18. General purpose computers can be given different programs to solve different types of problems. 19. **S**pecial purpose computers are designed to operate on a restricted class of problems and are not applied to other computerized activities. 20. A simulator is a computer-controlled device for training people under simulated or artificially created conditions.

Exercise 51. Give synonyms of the following words.

Capacity, excessive, outlay, be short of, process, explosion, portion, execute, strong, variable, manage, useful, command, microcomputer, mid-range system, laptop computer, computation, screen, fit, task, demand, function, accuracy, transportable.

Exercise 52. Give English equivalents of the following terminological word combinations.

Комп'ютерні технології; потенціал пам'яті комп'ютера; зберігання та оброблення величезних обсягів даних; акуратність і точність у роботі; передові технології; в тисячі разів швидше; надзвичайно складні розрахунки; обмежена кількість завдань; розрахунок ресурсоємних завдань; потужність оброблення транзакцій; доступ до великої кількості інформації; доступ до загальних даних і програм; надмірні витрати; обчислювальна потужність; обчислювальна система середнього класу; безперервні змінні; комп'ютер для індивідуального використання; більш якісний монітор; більш потужний мікропроцесор; технологія сенсорного екрану; більш високі швидкості оброблення даних; складні фізичні процеси; аналого-цифрові та цифро-аналогові перетворювачі; універсальність комп'ютерів; пристрій для виконання однієї функції; вбудована програма; обмежений клас задач; автоматизовані виробничі процеси.

Exercise 53. Define whether the following statements are true or false. Correct the false ones using one of the following phrases: ***I don't think so, I'm afraid I can't agree with you here, it's not quite so, on the contrary, nothing of the kind.***

1. Mainframe computers are the most powerful, extremely fast computers that can perform hundreds of millions of instructions per second. 2. Another giant among computers after the supercomputer is mainframe, which can also process millions of instructions per second and capable of accessing billions of data.

3. Minicomputers are used in large organizations where many users need access to shared data and programs. 4. A workstation is like a personal computer, but it has a more powerful microprocessor and, in general, a higher-quality monitor.

5. Digital computers use continuous variables for mathematical operations and utilizes mechanical or electrical energy. 6. In analog computers, the digital segments perform conversion of analog signals to digital ones. 7. All computers from micro to mainframe are general purpose. 8. General purpose computers are often used as training simulators.

Exercise 54. Complete the table.

	Mainframe	Minicomputer	Microcomputer
Size			
Power			
Use			

Exercise 55. Translate the following questions into English and answer them.

1. За якими ознаками здійснюється класифікація комп'ютерів? 2. Як комп'ютери класифікують за розміром? 3. Чому суперкомп'ютери використовують у разі необхідності застосування складних обчислень? 4. У яких галузях застосовують суперкомп'ютери? 5. Як використовують універсальні комп'ютери? 6. Які властивості мінікомп'ютерів дозволяють використовувати їх в якості мережевих серверів та інтернет-серверів? 7. Чим відрізняєть-ся робоча станція від персонального комп'ютера? 8. Який тип комп'ютерів належить до розряду таких, що використовуються індивідуально? 9. За яким принципом комп'ютери поділяються на аналогові, цифрові та гібридні? 10. Чим відрізняється аналоговий комп'ютер від цифрового? 11. У чому полягає принцип роботи гібридного комп'ютера? 12. Як комп'ютери поділяють за їхнім призначенням?

Exercise 56. Discuss the following questions in groups.

1. Why are computers widespread nowadays? 2. How does computers variety influence different spheres of modern life? 3. What are the reasons for buying home computers? 4. Does good knowledge of English help to operate the computer better? 5. Portables are not very popular, are they?

Exercise 57. Speak on "The types of Computers".

Exercise 58. Read, practice and learn the following words and word combinations.

Original – початковий

intervening – посередницький, проміжний

utilities – приладдя

high-end – високоякісний, високого класу

local area network – локальна обчислювальна мережа

computer-aided design (CAD) – система автоматизованого проектування (САП)

draft – 1) проект 2) проектувати, складати проект

image processing – обробка зображень

tower case – корпус типу "вежа", який встановлено на підлозі

single unit – моноблок

touch screen – сенсорний екран

optional – додатковий; факультативний; необов'язковий

fold (down) – складатися; згортатися

adapter – перехідний пристрій, адаптер

approach – 1) підхід 2) принцип роботи

pocket computer – кишеньковий комп'ютер

personal digital assistant (PDA) – персональний цифровий помічник, електронний секретар *(тип портативного комп'ютера)*, кишеньковий персональний комп'ютер (КПК)

palmtop – комп'ютер, що вміщується на долоні, кишеньковий комп'ютер

cell – комірка, елемент

cell(ular) phone – сотовий телефон, мобільний телефон

fax sender – пристрій електронної передачі документа, факсимільний апарат

type – друкувати

schedule – 1) розклад, графік (*роботи*) 2) планувати

appointment – ділова зустріч

memory card – карта пам'яті

web browser – веб-браузер, засіб огляду інформації в інтернеті

pen – перо

incorporate – містити (у собі), включати (в структуру)

iPad – інтернет-планшет, планшетний комп'ютер

cockpit – кабіна екіпажу

cut (down) – скорочувати

manual – керівництво, збірник інструкцій

weigh – важити, мати вагу

flight manual – керівництво з льотної експлуатації

wearable computer – переносний мініатюрний комп'ютер, який можна носити на одязі

e-mail – електронна пошта

multimedia – мультимедійне середовище, мультимедіа; аудіовізуальне представлення інформації; система комплексного представлення інформації декількох видів (аудіо, відео, текст)

routine – 1) підпрограма 2) розпорядок, режим роботи

consistency – постійність, узгодженість

intervention – втручання

prosthetic – протез

Exercise 59. Read, translate and give the gist of text 5.

Text 5. Personal computers

A **personal computer** (**PC**) is any general-purpose computer whose size, capabilities and original sales price make it useful for individuals and which is intended to be operated directly by an end-user. They are also called PCs in short for personal computers. They are fully equipped with its own central processing unit, memory, software, storage and other utilities which make it useful to accomplish any tasks. All personal computers are divided into two types: stationary, as workstations and desktops, and mobile computers such as laptops, tablets and pocket or handheld computers.

A **workstation** is a high-end personal computer designed for technical or scientific applications. Intended primarily to be used by one person at a time, they are commonly connected to a local area network and run multiuser opera-ting systems. Workstations are used for tasks such as computer-aided design (CAD), drafting and modeling, computation-intensive scientific and engineering calculations, image processing, architectural modeling and computer graphics for animation and motion picture visual effects.

A **desktop computer** is a personal computer (PC) in a form in-

tended for regular use at a single location. In modern usage the word "desktop" usually refers to tower cases that are in fact more often located on the floor under the desk than on a desk. Other components, such as the monitor, mouse, and keyboard, connect to the system unit. Desktops are widely popular for daily use in the workplace and households.

Laptop computers are often called notebook computers because of their small size. Laptops can operate on batteries, so you can take them anywhere. Unlike desktops laptops combine the CPU, screen, and keyboard in a single case. The screen folds down on the keyboard when not in use. Laptops run on a single battery or an external adapter that charges the computer batteries. They are enabled with an inbuilt keyboard, touch pad acting as a mouse and a liquid crystal display. Thei portability and capacity to operate on battery power have proven to be of great help to mobile users.

Notebooks fall in the category of laptops, but are inexpensive and relatively smaller in size. It can store the same amount of data and have a memory of the same size as that of a personal computer. One can say that it is the replacement of a personal desktop computer.

A pocket PC is a hardware specification for a handheld computer or personal digital assistant (PDA)**.** It has many of the capabilities of modern desktop PCs. Personal digital assistants are popularly known as palmtops. A handheld device combines computing, telephone, fax, and networking features. A typical PDA can function as a cellular phone, fax sender, and personal organizer. Handhelds are useful for scheduling appointments, storing addresses and phone numbers and playing games. They also have a touch screen instead of keyboards and a memory card for storage of data. PDAs can also be used as portable audio players, web browsers and smartphones. Unlike portable computers, most PDAs are pen-based, using a stylus rather than a keyboard for input. This means that they also incorporate handwriting recognition features. Some PDAs can also react to voice input by using voice recognition technologies. Some have more advanced capabilities, such as making telephone calls or accessing the Internet by means of Bluetooth or Wi-Fi communication.

Tablet computers or tablets are mobile computers that combine features of laptops and handhelds. Like laptops, they're powerful and have a built-in screen. Like handhelds, they allow you to write notes or draw pictures on the screen, usually with a tablet pen instead of a stylus

(a pen-shaped pointing tool) or a digital pen. They can also convert your handwriting into typed text. Apple's[1] iPad redefined the class of tablet computers. This is a new category of device. But it also will replace laptops for many people. Since March 2011, the US Federal[2] Aviation Administration has approved the iPad for in-cockpit use to cut down on the paper consumption in several airlines. Alaska Airlines became the first airline to replace pilots' paper manuals with iPads, weighing 0.68 kg compared to 11 kg for the printed flight manuals.

Wearable computers are the latest trend in computing. Wearable computers or 'wearables' for short, are miniature electronic devices that are worn on the body, with or on top of clothing. This class of wearable technology has been developed for general or special purpose information technologies and media development. Essentially, common computer applications such as e-mail, database, multimedia, calendar or scheduler are integrated into watches, cell phones and even clothing. These computers are often used in the study of behavior modeling and human health. Military and health professionals have incorporated wearable computers into their daily routine, as a part of such studies. There is a constant interaction between the computer and user, i.e. there is no need to turn the device on or off and remain in operation without user intervention. Another feature is the ability to multitask. It is not necessary to stop what you are doing to use the device. These devices can be incorporated by the user to act like a prosthetic. Wearable computers provide computational support even when the user hands, eyes, voice and attention is actively engaged - with physical environment.

Notes:

[1]Apple Computer – фірма-розробник, виробник і продавець комп'ютерів

[2]Federal Aviation Administration – федеральне управління цивільної авіації

Exercise 60. Answer the questions on text 5.

1. What does PC abbreviation stand for? 2. Why is the personal computer mostly preferred by home users? 3. What are the types of personal computers? 4. Why are workstations referred to personal computers? 5. What is the application of workstations? 6. Why are desktops widely popular for daily use in the workplace and households? 7. How can you explain the portables popularity among the users? 8. What is the

difference between desktop and laptop computers? 9. Why are notebooks regarded as the replacement of a personal desktop computer? 10. What type of PCs is less powerful? 9. What handheld computers do you know? 11. What functions can they perform to help the users? 12. What distinctive characteristics enable handheld computers to execute different operations? 13. What features do tablet computers combine? 14. Why are tablet computers of great help for the users? 15. What type of PCs is the least size personal computer? 16. Why are they called wearable computers? 17. What are wearable computers applications? 18. What enables wearable computers to be incorporated into daily routine of many professionals?

Exercise 61. Translate the following universal terms without a dictionary. Mind the difference in their pronunciation and spelling in English and Ukrainian.

Operator; graphics; animation; notebook; battery; adapter; display; monitor; telephone; fax; organizer; address; audio; browser; smartphone; technology; media; Computer; Internet; Bluetooth or Wi-Fi communication; stylus; Federal Aviation Administration; iPad; pilot; e-mail; multimedia; calendar; sensory; touch pad; Linux; electronic; architectural; modeling.

Exercise 62. *Explain the meaning of the following word combinations in English . Translate them*.

General-purpose computer, end-user, high-end computer, computer-aided design, computation-intensive calculation, all-in-one PC, lightweight PC, battery-powered computers, pen-based PDA, pen-shaped tool, handheld computer, in-cockpit use, built-in screen.

Exercise 63. *Match* the English-Ukrainian equivalents.
1) desktop computer   a) сенсорне перо
2) laptop computer   b) планшетний комп'ютер
3) touchpad   c) робоча станція
4) palmtop computer   d) мініатюрний комп'ютер
5) tablet computer   e) комірка
6) workstation   f) дорожній комп'ютер
7) screen   g) настільний комп'ютер
8) stylus   h) кишеньковий комп'ютер

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9) cell   i) сенсорна панель
10) wearable computer   j) екран

Exercise 64. *Translate into Ukrainian.*

Original sales price; to be operated directly by an end-user; common type of computers; mostly preferred by home users; to be equipped with central processing unit, memory, software, storage and other utilities; drafting and mode-ling; scientific and engineering calculations; image processing; could fit on a desk; a horizontally oriented computer case; inner components of the PC; to refer to tower cases; to be often located directly behind the monitor; lightweight mo-bile PCs; to operate on batteries; similar in operation to desktops; to run on a single battery or an external adapter; to be enabled with an inbuilt keyboard; to operate on battery power; to be of great help to mobile users; in comparison with laptops; can store the same amount of data; to run an alternative operating system; to be popularly known as palmtop; networking features; can function as a cellular phone; to be useful for scheduling appointments, storing addresses and phone numbers and playing games; to have a touch screen instead of keyboard; to use a stylus rather than a keyboard for input; to incorporate hand-writing recognition features; to use voice recognition technologies; to access the Internet; to be pioneered by Apple Computer; to write notes or draw pictures on the screen; a digital pen; to convert hand-writing into typed text; to replace pilots' paper manuals with iPads; to be worn on the body; to be developed for general or special purpose information technologies and media development; a constant interaction between the computer and user; to remain in operation without user intervention; can be incorporated by the user; to act like a prosthetic; to be actively engaged with physical environment.

Exercise 65. *Use the correct form of the adjective given in brackets.*

1. Personal computers are (low/lower) in cost and also (small/smaller) in size than other types of computers. 2. Nowadays personal computers are the (much/ most) common type of computers. 3. Desktop computers are typically (large/ larger) and (powerful/more powerful) than other types of personal computers. 4. Desktops power consumption is (less/least) critical than in laptops. 5. Notebooks fall in the category of laptops, but are (little/less) inexpensive and relatively

(smallest/smaller) in size. 6. Notebooks had a (small/smaller) feature set and (less/least) capacities in comparison with regular laptops. 7. Some PDAs have (many/more) advanced capabilities than other types of computers. 8. The printed flight manuals weigh (more/most) compared to iPads. 9. Wearable computers are especially useful for applications that require (much/more) complex computations. 10. Wearable computers are the (late/latest) trend in computing.

Exercise 66. *Put the verbs in brackets into the correct Active or Passive forms.*
1. Personal computers (to come) in different forms such as desktops, laptops, handheld computers and personal digital assistants (PDA). 2. Desktop computers (to design) for use at a desk or a table. 3. They (to equip) fully with its own central processing unit, memory, software, storage and other utilities which make it useful to accomplish any tasks. 4. Desktop computers (to make up) of separate components. 5. Unlike desktops laptop (to combine) the CPU, screen, and key-board in a single case. 6. The screen of a desktop computer (to fold) down on the keyboard when not in use. 7. Laptops (to run) on a single battery or an external adapter that (to charge) the computer batteries. 8. Laptops (to enable) with an in-built keyboard, touch pad and a liquid crystal display. 9. The portability and capacity to operate on battery power (to prove) to be of great help to mobile users. 10. Notebooks (to store) the same amount of data and (to have) a memory of the same size as that of a personal computer. 11. Personal Digital Assistants (PDAs) (to be) handheld computers and (to know) popularly as palmtops. 12. A handheld device (combine) computing, telephone/fax, and networking features. 13. Most PDAs (use) a stylus rather than a keyboard for input. 14. The field of PDA (to pioneer) by Apple Computer, which (to introduce) the Newton Message Pad. 15. Like laptop, tablet computer (to be) powerful and (to have) a built-in screen. 16. Like handhelds, tablet computers (to allow) you to write notes or to draw pictures on the screen, usually with a tablet pen instead of a stylus or a digital pen. 17. The US Federal Aviation Administration (to approve) the iPad for in-cockpit use. 18. Wearable computers often (to use) in the study of behaviour modeling and human health.

Exercise 67. Match the synonymous words or word combinations.

1) mobile	a) personal digital assistant
2) high-end	b) microcomputer
3) laptop computer	c) digital pen
4) display	d) stationary computer
5) palmtops	e) portable
6) fold down	f) high quality
7) desktop computer	g) pen-enabled interface
8) stylus	h) screen
9) personal computer	i) collapse
10) touchscreen	j) notebook

Exercise 68. *Write the following sentences in the Past / Future In-definite, Present / Past / Future Continuous, Present / Past / Future / Perfect tenses. Add appropriate adverbial modifiers.*

1. Engineers use computers for planning manufacturing processes. 2. Computers invade people's privacy. 3. Scientific and technological breakthroughs bring great benefits.

Exercise 69. Match the definitions in the left column with the terms in the right column.

1. Any general-purpose computer whose size, capabilities and original sales price make it useful for individuals –	a) laptop computers
2. A computer which remains in one position –	b) handheld computer
3. A computing device described as small, lightweight, portable and containing wireless Internet –	c) tablet computers
4. A high-end personal computer designed for technical or scientific applications –	d) personal computer
5. A personal computer intended for regular use at a single location –	d) mobile computer
6. Computers with the CPU, screen, and keyboard in a single case –	e) wearable computers
7. A device with a touch screen instead of	f) stationary computer

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keyboards and a memory card for storage
of data –

8. Computers that combine features of lap-   g) workstation
tops and handhelds –

9. Miniature electronic devices that are   h) desktop computer
worn on the body, with or on top of cloth-
ing –

Exercise 70. Give the terms to the following definitions.

Personal computer, stationary computer, mobile computer, work-station, desktop computer, laptop computer, handheld computer, tablet computer, wearable computer.

Exercise 71. Translate into English.

1. Персональний комп'ютер – це комп'ютер загального призначення, повністю обладнаний власним центральним процесором, пам'яттю, програмним забезпеченням, пристроєм для збереження інформації та іншими складовими, що робить його корисним для виконання будь-яких завдань. 2. Робочі станції використовують для систем автоматизованого проектування (САП), розроблення і моделювання, інтенсивних обчислень наукових та інженерних розрахунків, оброблення зображень, архітектурного моделювання та комп'ютерної графіки для анімації та візуальних ефектів. 3. Настільний комп'ютер – це стаціонарний персональний комп'ютер (ПК), призначений для регулярного використання, на відміну від мобільного ноутбука або портативного комп'ютера. 4. На відміну від настільних комп'ютерів у ноутбуках процесор, екран і клавіатура розміщені в одному корпусі. 5. Вони оснащені вбудованою клавіатурою, сенсорною панеллю, яка виступає в якості миші, та рідкокристалічним дисплеєм. 6. Стверджують, що ноутбук може стати заміною персональному настільному комп'ютеру, тому що він здатен зберігати таку ж кількість даних, і має пам'ять такого ж обсягу, що і персональний комп'ютер. 7. Портативний комп'ютер – це персональний цифровий помічник, який має багато з можливостей сучасних настільних ПК. 8. Портативний пристрій поєднує в собі телефон, факс, обчислювальну та мережеві можливості. 9. Як і ноутбуки, планшетні комп'ютери є досить потужними та мають

вбудований екран. 10. Подібно до кишенькових комп'ютерів планшетні комп'ютери дають можливість робити записи та малювати на екрані. 11. Насправді, функції переносного мініатюрного комп'ютера, такі як: електронна пошта, база даних, мультимедіа, календар або планувальник, інтегровано в годиники, мобільні телефони та навіть одяг.

Exercise 72. Speak on the following topics.
1. Stationary personal computers.
2. Laptop personal computers.
3. Handheld personal computers.
4. Tablet computers.
5. Wearable computers.

Exercise 73. Read, practice and learn the following words and word combinations.

Mention – згадувати
come across – натрапляти, випадково зустріти
obsolete – застарілий; що вийшов з ладу
logarithm – логарифм
summation – підсумовування
exponentiation – зведення в ступінь
calculus – обчислення
multiplication – множення
product – 1) продукт, продукція 2) результат, наслідок 3) добуток
division – ділення
inversion – інверсія
density – 1) щільність, компактність 2) питома вага
pipe – труба
valve – клапан
lever – важіль
gear – зубчасте колесо
generator – генератор
amplifier – підсилювач
potentiometer – потенціометр
integrator – інтегратор
hydraulic – гідравлічний
solely – лише, тільки, винятково

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real-time computer – ЕОМ, що працює у реальному масштабі часу
real number – дійсне число
accelerate – прискорювати
rate – швидкість; темп
aircraft – літак
nuclear power plant – атомна електростанція (АЕС)
watt-hour meter – лічильник ват-годин
drive shaft – вал механічного привода, приводний вал; транс -
                місія
rotate – обертати(ся)
continuously variable vector – безперервно змінний вектор
slide rule – логарифмічна лінійка
monitor – контролювати

Exercise 74. Read, translate and give the gist of text 6.

Text 6. Analog computers

We have heard a lot about digital computers, but, analog computers are rarely mentioned. Not because they don't exist, but because people think computers are digital only. We come across so many analog computers, but we hardly notice them as a computer. An analog computer has become obsolete type of computer these days. An analog computer is one which can perform multiple mathematical operations simultaneously, unlike the digital computers that could not operate the more complex operations. The basic difference between analog and digital computers is the type of data they process. Analog computers process analog, i.e. continuously varying data. Digital computer process data which is bi-nary, i.e. in the form of 0 and 1. Analog computers involve some basic mathematical principles for data processing : logarithm, summation, exponentiation, calculus, multiplication and division, inversion.

The analog computer which is a complex machine is an integration of various mechanical parts which has pipes, valves, levers, gears and several key parts which can be named as follows: fixed function generators, operational amplifiers, potentiometers, integrators. The key component of the analog computer is the operational amplifier (op-amp). The computer's capacity is determined by the number of amplifiers, often containing over 100.

Analog computers operate on mathematical variables in the form

of physical quantities that are continuously varying. The basis of the analog computers operation is *modeling*. The analog computers carry out arithmetic and logical operations by manipulating and processing data in a way analogous to the correspond-ding quantities in the problem to be solved. Analog computers operate by translating such physical phenomena as the weight, temperature, voltage, power, density, speed etc. into corresponding mechanical or electrical quantities.

Control engineers often convert a mechanical or hydraulic system to its electrical analogy to make a mathematical model for computation. This analogy or conversion of a physical process is the basis of analog computing. After the modeling has been done the computation becomes very easy and convenient.

An analog computer is classified either in accordance with its use (general- or specific-purpose) or based on its construction (hydraulic, mechanical or electronic). General-purpose implies programmability and adaptability to different applications or the ability to solve many kinds of problems. Most electronic analog computers were general-purpose systems, either real-time analog computers in which the results were obtained without any significant time-scale changes, or high-speed repetitive operation computers. If the analog computer is built solely for one purpose, it is termed a special-purpose electronic analog computer.

Analog computers also specialize in solving differential calculus and other mathematical problems. Many computer theorists around the world refer to these unique analog computers as real computers, due to the fact that they work with real numbers. Because of all these qualities, today many industries use these analog computers as data processing systems. Analog computers are especially well suited to simulating dynamic systems. Such simulations may be conducted in real time or at greatly accelerated rates. Analog computers have been widely used in simulating the operation of aircraft, nuclear power plants and industrial chemical processes.

An analog computer can work both mechanically and electronically. Mechanical analog computers have existed for thousands of years. The oldest known example is a Greek machine, thought to have been made around 100 BC[1], designed for calculating astronomical positions. One of the most widely used present day mechanical analog computers are speedometers and watt-hour meters. A speedometer translates the measurement of the drive shaft rotation per minute into display of miles

per hour. A watt-hour meter computes the sum over time of the product of two continuously variable vectors – current and voltage. A more recent and common mechanical analog computer is the slide rule. The electronic analog computer works on the same principles, but uses electrical components, such as capacitors, inductors and resistors to replace the physical parts. The development of transistors made electronic analog computers practical. They continued to be commonly used in science and industry. These electric circuits can al-so easily perform a wide variety of simulations. For example, voltage can simulate water pressure and electric current can simulate rate of flow in terms of cubic metres per second. Given flow rate and accumulated volume of liquid, a simple integrator provides the latter; both variables are voltages. In practice, current was rarely used in electronic analog computers, because voltage is much easier to work with. Electronic analog computers in chemical plants monitor temperatures, pressures and flow rates and send corresponding voltages to various control devices.

Note:

[1]BC – before (the birth of Christ)- до нашої ери до Різдва Христова

Exercise 75. Find equivalents in text 6. It will help you to translate it.

Кілька математичних операцій; на відміну від цифрових комп'ютерів; безперервно змінні дані; підсумовування; зведення в ступінь; генератор фіксованої функції; операційний підсилювач; математична величина; здійснювати арифметичні і логічні операції; шляхом маніпулювання і оброблення даних; перетворювати фізичне явище у відповідну механічну або електричну величину; створювати математичну модель обрахування; передбачати програмування і адаптування; здатність вирішувати різного роду завдання; аналоговий комп'ютер, що працює в режимі реального часу; високошвидкісний комп'ютер з повторюваністю операцій; спеціальний електронний аналоговий комп'ютер; система оброблення даних; значно прискореними темпами; атомна електростанція; промисловий хімічний процес; лічильник ват-годин; добуток двох безперервно перемінних векторів; логарифмічна лінійка; широкий спектр моделювання; враховуючи швидкість потоку; контролювати температуру,

клерувальний пристрій.

Exercise 76. Translate the following word combinations into Ukrainian.

Can perform multiple mathematical operations simultaneously; can not operate the more complex operations; to process continuously varying data; to be determined by the number of amplifiers; to operate on mathematical variables; to carry out arithmetic and logical operations; to manipulate and process data; the problem to be solved; to translate physical phenomena into mechanical or electrical quantities; to convert a mechanical or hydraulic system to its electrical analogy; to solve many kinds of problems; to be built solely for one purpose; to be especially well suited to simulating dynamic systems; can work both mechanically and electronically; translates the measurement into display; drive shaft rotations per minute; to compute the sum of the product of two continuously variable vectors; to replace the physical parts; to be commonly used in science and industry; can easily perform a wide variety of simulations; can simulate water pressure; can simulate rate of flow; accumulated volume of liquid; to monitor temperatures, pressures and flow rates; to send corresponding voltages to various control devices.

Exercise 77. *Match* the English-Ukrainian equivalents.

1)	generator	a)	вал механічного привода
2)	valve	b)	підсилювач
3)	lever	c)	логарифмічна лінійка
4)	real number	d)	генератор
5)	equation	e)	точність
6)	amplifier	f)	важіль
7)	calculus	g)	котушка індуктивності
8)	meter	h)	клапан
9)	slide rule	i)	конденсатор
10)	capacitor	j)	рівняння
11)	inductor	k)	обчислення
12)	gear	l)	дійсне число
13)	drive shaft	m)	лічильник
14)	accuracy	n)	зубчасте колесо

Exercise 78. Complete the sentences with English equivalents of the words in brackets.

1. An analog computer is one which can perform (кілька математичних операцій) simultaneously. 2. Analog computers process analog, i.e. (безперервно змінні дані). 3. Digital computer (обробляти дані) which is binary. 4. The key component of the analog computer is the (операційний підсилювач). 5. Analog computers operate by translating such physical phenomena as the weight, temperature, voltage, power, density, speed etc. into corresponding (механічна або електрична величини). 6. Most electronic analog computers were general-purpose systems, either (аналоговий комп'ютер, що працює в режимі реального часу) or (високошвидкісний комп'ютер з повторюваністю операцій). 7. Analog computers also specialize in solving (диференціальне обрахування) and other mathematical problems. 8. Today many industries use analog computers as (система оброблення даних). 9. Such simulations may be con-ducted in real time or (значно прискореними темпами). 10. One of the most widely used present day mechanical analog computers are speedometers and (лічильник ват-годин). 11. A (лічильник ват-годин) computes the sum over time of the (добуток двох безперервно перемінних векторів) – current and voltage. 12. The electric circuits can also easily perform a (широкий спектр моделювання). 13. Electronic analog computers in chemical plants (контролювати температуру, тиск і швидкість потоку) and send corresponding voltages to various (клерувальні пристрої).

Exercise 79. Work in pairs. Translate the following questions and answer them.

1. Який тип комп'ютера, аналоговий чи цифровий, здатен виконувати більш складні операції? 2. Які принципи оброблення інформації використовуються в аналогових і цифрових комп'ютерах? 3. Чому аналоговий комп'ютер вважають складною машиною за конструкцією? 4. Який елемент є основним компонентом аналогового комп'ютера? 5. Як аналогові комп'ютери здійснюють арифметичні і логічні операції? 6. Яким чином аналогові комп'ютери використовують такі фізичні явища як вага, температура, напруга, сила, щільність, швидкість? 7. Що є основою аналогового обчислення? 8. Як класифікуються аналогові

комп'ютери щодо їхньої структури та призначення? 9. Як використовують аналогові комп'ютери загального призначення? 10. Чим відрізняються механічні та електронні аналогові комп'ютери? 11. Чому в науковій діяльності та промисловості зазвичай використовують електронні аналогові комп'ютери?

Exercise 80. Read, practice and learn the following words and word combinations to text 7.

Circuitry – схема
consecutive – послідовний
redundant – надлишковий
detection – виявлення
reservation – бронювання
investigation – дослідження

interior – внутрішній; внутрішній бік, внутрішня частина
auxiliary – допоміжний
secondary – додатковий, допоміжний
selection – набір
path – канал (зв'язку)
implement – здійснювати, виконувати
internally – 1) усередині, з внутрішнього боку; зсередини
    2) внутрішньо
externally – зовні
indicate – вказувати
media – носій (даних)
trackball – "трекбол" (кулька-маніпулятор)
response – відповідь, реакція (*на щось*)
cathode-ray tube – електронно-променева трубка
communications network – мережа зв'язку

Exercise 81. Read, translate and give the gist of text 7.

Text 7. Digital Computers Operation

A **digital computer** is a programmable device that processes information by manipulating symbols according to logical rules. Today most computers are digital and work by reducing all data to binary numbers before processing. Digital computers process data in numerical

form. Their circuits perform directly the mathematical operations of addition, subtraction, multiplication and division. The numbers operated on by a digital computer are expressed in the binary sys-tem. Binary digits, or bits, are 0 and 1, so that 0, 1, 10, 11, 100, 101, etc., correspond to 0, 1, 2, 3, 4, 5, etc. Binary digits are easily expressed in the computer circuitry by the presence (1) or absence (0) of a current or voltage. A series of eight consecutive bits is called a "byte". The eight-bit byte permits 256 different "on-off" combinations. A digital computer can store the results of its calculations for later use, can compare results with other data and change the series of operations it performs. Digital computers are used for reservations systems, scientific investigation, data-processing and word-processing applications, desktop publishing, electronic games and many other purposes. The operations of a digital computer are carried out by logic circuits or digital circuits. The various circuits processing data in the computer's interior must operate in a highly synchronized manner. Operating at these speeds, digital computer circuits are capable of performing thousands to trillions of arithmetic or logic operations per second. In addition to the arithmetic and logic circuitry and a small number of registers the heart of the computer is called the central processing unit or CPU. The CPU, main storage, auxiliary storage, and input/output devices collectively make up a system.

A computer's **processor (processing unit)** consists of a control unit, which directs the operation of the system and an arithmetic and logic unit, which per-forms computational operations. The design of a processing unit involves selection of a register set, communication paths between these registers and a means of directing and controlling how these operate. Normally, a processor is directed by a program, which consists of a series of instructions that are kept in main memory. A microprocessor is a processor implemented through a single, highly integrated circuit.

Computer systems can store data internally (in memory) and externally (on storage devices). The **storage or memory** of a computer system holds the data that the computer will process and the instructions that indicate what processing is to be done. A computer will generally have several different kinds of storage devices, each organized to hold one or more words of data. These types include registers, main memory, and secondary or auxiliary storage. **Registers** are the fastest and most costly storage units in a computer. Normally contained within the pro-

cessing unit, registers hold data that are involved with the computation currently being performed.

Main memory holds the data to be processed and the instructions that specify what processing is to be done. The electronic memory inside a computer is of limited capacity. It can hold data only when the computer is switched on. There are a variety of storage devices and storage media used to store data that is not being processed and to save data when the computer is switched off. They are auxiliary storage devices. **Auxiliary memory** sometimes called secondary storage is the slowest, lowest-cost and highest-capacity computer storage area. All auxiliary storage devices are used as input/output devices. Input devices include keyboards, mouse, track-balls or touchpad, or by speaking into a micro-phone that is connected to computer running voice-recognition software. Responses may be displayed on a cathode-ray tube, liquid-crystal display or printer. Input/output devices and storage devices are known as peripherals. Communications network, connecting peripherals and secondary storage devices to the rest of the computer, is called a "bus". The bus is essentially a wire or group of wires between a peripheral device and a memory device. The bus is more economical than a large number of channels for a system with many peripherals.

Exercise 82. Answer the questions on text 9.

1. What is a digital computer? 2. How do digital computers process data? 3. What mathematical operations do digital computers perform? 4. How does a digital computer operate with binary digits? 5. What is called a "byte"? 6. What are the purposes of digital computers? 7. How are the operations of a digital computer carried out? 8. What does the number of arithmetic or logic operations depend on? 9. What is called the heart of the computer? 10. What devices make up a system? 11. How is the central processing unit used? 12. What operations do a control unit and an arithmetic and logic unit perform? 13. What does the design of a computer processing unit involve? 14. What are the kinds of storage devices? 15. How do registers and main memory hold data? 16. What is called auxiliary memory? 17. How are the auxiliary storage devices used? 18. How are peripherals and secondary storage devices connected to the rest of the computer? 19. What connection is more economical for a system?

Exercise 83. Translate the following words and word combinations into Ukrainian. Use them in sentences of your own.

a) Programmable device; binary digits; computer circuitry; consecutive bits; "on-off" combinations; reservation system; scientific investigation; data-processing and word-processing applications; desktop publishing; logic circuit; computer interior; highly synchronized manner; arithmetic and logic circuitry; main storage; auxiliary storage; input/output devices; processing unit; series of instructions; single, highly integrated circuit; the fastest and most costly storage unit; register; limited capacity; storage media; the slowest, lowest-cost, and highest-capacity computer storage area; keyboard; mouse; track-ball or touch-pad; voice-recognition software; cathode-ray tube; liquid-crystal display or printer; bus; group of wires; peripheral device.

b) To process information; to manipulate symbols; to reduce data to binary numbers; to process data in numerical form; to perform the mathematical operations; to correspond to; to be expressed in the computer circuitry; to store the results of calculations; to compare results with other data; to change the series of operations; to be used for reservation systems, scientific investigation, data-processing and word-processing applications; to be carried out by logic circuits or digital circuits; to process data in the computer interior; to operate in a highly synchronized manner; to be capable of performing arithmetic or logic operations; to be called the central processing unit; to perform computational operations; to involve selection of a register set; to be directed by a program; to consist of a series of instructions; to be kept in main memory; to be implemented through a single, highly integrated circuit; to store data internally and externally; to hold data and instructions; to be the fastest and most costly storage units; to be contained within the processing unit; to be involved with the computation; to be of limited capacity; to save data; to be displayed on a cathode-ray tube, liquid-crystal display or printer.

Exercise 84. Match the terms and their definition.

Terms   **Definitions**

1. Byte   a) a part of the computer where programs and data being used by the processor can be stored.

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2. Central pro-cessing unit	b) a long-term storage medium which keeps programs and data when they are not in immediate use.
3. Registers	c) communications network that links all the elements of the system and connects the system to the external world.
4. Main memory	d) a series of eight consecutive bits.
5. Auxiliary memory	e) the heart of the computer, which performs arithmetic and logic operations and directs the operation of the system.
6. Bus	f) temporary storage units within the processing unit which hold data involved with the computation currently being performed..

Exercise 85. Match the synonyms or synonymous word combinations.

1) binary digit	a) main storage
2) bus	b) peripherals
3) computation	c) bit
4) auxiliary storage	d) carry out
5) register	e) calculation
6) keep	f) secondary storage
7) main memory	g) storage unit
8) input/output devices	h) hold
9) perform	i) communications network

Exercise 86. Complete the sentences translating the words given in brackets into English.

1. Digital computers (обробляти дані) in numerical form. 2. Normally, a processor is directed by a program which consists of a (ряд інструкцій) that are kept in (основна пам'ять). 3. A microprocessor is a processor implemented through a single, highly (інтегровані схеми). 4. Computer systems can store data internally (в пам'яті) and externally (на периферійних пристроях). 5. (Регістри) are the fastest and most costly storage units in a computer. 6. (Основна пам'ять) inside a com-

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puter is of limited capacity. 7. (Допоміжна пам'ять) sometimes called (вторинна пам'ять) is the slowest, lowest-cost and highest-capacity computer storage area. 8. (Пристрої введення / виведення) and (пристрої зберігання) are known as (периферійні пристрої). 9. (Мережа зв'язку) connecting (периферійні пристрої) and (вторинні пристрої зберігання) to the rest of the computer is called a ("шина ").

Exercise 87. Use the verbs in brackets in the correct tense and voice forms.

1. Digital computers (process) data in numerical form. 2. Their circuits (per-form) directly the mathematical operations of addition, subtraction, multiplication and division. 3. The numbers operated on by a digital computer (express) in the binary system. 4. The operations of a digital computer (carry) out by logic circuits or digital circuits. 5. Operating at these speeds, digital computer circuits (to be) capable of performing thousands to trillions of arithmetic or logic operations per second. 6. A computer processing unit (consist) of a control unit and an arithmetic and logic unit. 7. A control unit (direct) the operation of the system. 8. An arithmetic and logic unit (perform) computational operations. 9. A processor (direct) by a program which (consist) of a series of instructions that (keep) in main memory. 10. The storage or memory of a computer system (hold) the data that the computer (process) and the instructions that (indicate) what processing is (do). 11. Registers (hold) data that (involve) with the computation currently being performed. 12. Main memory (hold) the data to process and the instructions that (specify) what processing is (do). 13. All auxiliary storage devices (use) as input/output devices. 14. Responses may (display) on a cathode-ray tube, liquid-crystal display or printer. 15. Input/output devices and storage devices (know) as peripherals.

Exercise 88. Put the verbs in brackets into the Past Indefinite, Present Perfect or Present Perfect Continuous Tense.

1. Computer technology (open) a variety of opportunities for people, who are creative risk-takers. 2. Personal computers first (appear) in the late 1970s. 3. In 1975, Bill Gates and Paul Allen (develop) a program that (allow) people to write their own programs in BASIC program language. 4. The aircraft autopilot (develop) since 1912. 5. The impact of the digital computer on society (arise) since personal comput-

ers were launched. 6. A young English mathematician Charles Babbage (convince) that a machine (can) do mathematical calculations faster and more accurately than humans and in 1822 (produce) a small working model of what he (call) his "difference engine." 7. We (hear) a lot about digital computers, but, analog computers are rarely mentioned. 8. The operation of air-craft, nuclear power plants and industrial chemical processes (use) widely analog computers since the 1970s. 9. Modern simulation languages (replace) already electronic analog computers. 10. The analog computer (become) obsolete type of computer these days. 11. The second generation computers, introduced in 1960, (use) transistors and (be) the first successful commercial computers.

Exercise 89. Translate into English.

1. Комп'ютер – це програмований пристрій, який обробляє інформацію, маніпулюючи символами у процесі логічних операцій. 2. Цифрові комп'ютери обробляють дані у цифровій формі. 3. Їхні схеми виконують безпосередньо математичні операції додавання, віднімання, множення і ділення. 4. Цифровий комп'ютер може запам'ятовувати результати обчислень для подальшого використання, порівнювати результати з іншими даними та змінювати порядок виконуваних дій. 5. Цифрові комп'ютери використовуються для систем бронювання, наукових досліджень, обробки даних і текстів, як настільний персональний комп'ютер для електронних розваг та з іншою метою. 6. Робота цифрового комп'ютера здійснюється завдяки логічним або цифровим схемам. 7. Процесор, оперативна пам'ять, допоміжна пам'ять та пристрої введення / виведення разом складають систему. 8. Процесор комп'ютера складається з блоку управління, який керує роботою системи та арифметикологічного пристрою, що виконує обчислювальні операції. 9. Комп'ютерні системи можуть зберігати дані всередині (в пам'яті) і ззовні (на пристроях зберігання). 10. Комп'ютери, як правило, мають кілька різних видів пристроїв зберігання даних: регістри, оперативну пам'ять і вторинну або допоміжну пам'ять. 11. Регістри зберігають дані, обчислення яких здійснюється в певний час. 12. Основна пам'ять зберігає дані під час безпосереднього опрацювання. 13. Вторинна пам'ять називається також периферійною. 14. У ній зазвичай зберігається інформація, яка не використовується в даний час, у тому числі і за

вимкненого живлення. 15. Шини – це набір кабелів для передачі даних та сигналів управління.

Exercise 90. Ask

a) if digital computers manipulate binary numbers;

if digital computer circuits are capable of performing thousands to trillions of arithmetic or logic operations per second;

if the heart of the computer is called the central processing unit or CPU ;

if a control unit directs the operation of the system;

if computer systems can store data internally and externally;

b) what mathematical operations digital computer circuits perform;

what circuits the operations of a digital computer are carried out through;

why the electronic memory inside a computer is of limited capacity;

how computer systems save data when the computer is switched off;

how peripherals and secondary storage devices are connected to the rest of the computer.

Exercise 91. Memorize the following words and word combinations to text 8.

Converter – перетворювач

controller – контролер

solver – пристрій для розв'язання задач

differential equation – диференціальне рівняння

breakthrough – прорив

substantially – 1) значною мірою, істотно 2) по суті, в основному

precise – точне

phased-array radar – радіолокаційна станція (РЛС) з фазованою антенною решіткою (ФАР)

weather system – метеосистема

Exercise 92. Read text 8. Select the key words and expressions for a five-minute conversation with your partners on topic "Hybrid computer advantages".

Text 8. Analog-digital hybrid computers

There is an intermediate device, a "hybrid" computer, that exhibits features of analog and digital computers. This integration is obtained by digital to analog and analog to digital converter. Hybrid computer is a digital computer that accepts analog signals, converts them to digital and processes them in digital form. The digital component normally serves as the controller and provides logical operations, while the analog component normally serves as a solver of differential equations. Because of their ease of use and technological break-throughs in digital computers in the early 70s, the analog-digital hybrids were replacing the analog-only systems. The hybrid computer is usually substantially faster than a digital computer, but can supply a far more precise computation than an analog computer. A hybrid computer capable of real-time solution has been less expensive than any equivalent digital computer. An example of a hybrid computer is the computer used in hospitals to measure the heartbeat of the patient. Hybrid machines are generally used in scientific applications or in controlling industrial processes (e.g. a high frequency phased-array radar or a weather system computation).

Exercise 93. Give English equivalents of the following word combinations.

Аналогово-цифровий перетворювач, цифрово-аналоговий перетворювач, проміжний пристрій, приймати аналоговий сигнал, обробляти в цифровому вигляді, набагато точніші обчислення, знаходити рішення в режимі реального часу, для вимірювання серцебиття пацієнта, високочастотна радіолокаційна станція з фазованою антенною решіткою, обчислення метеосистеми.

Exercise 94. Fill in the gaps with the words or word combinations below and translate the sentences.

Controller, solver, converter, hybrid computer, analog computer, digital computer, intermediate device.

1. Hybrid computer is an … that exhibits features of analog and digital computers. 2. The integration of analog and digital computers is obtained by digital to analog and analog to digital … . 3. The digital component normally serves as the … and provides logical operations. 4. The analog component normally serves as a … of differential equa-

tions. 5. The hybrid computer is usually substantially faster than a … .
6. The hybrid computer can supply a far more precise computation than
an … . 7. A … is capable of real-time solution.

Exercise 95. Say whether the following statements are true or
false. Correct the false ones using the following expressions.
I don't agree with this statement.
I am afraid I can't agree with you here.
I disagree with this.
I am afraid (I think) you are mistaken.
I see your point, but … .
On the contrary...
Nothing of the kind, I am afraid.
I am sure, that ...
1. A "hybrid" computer is an integration of analog and digital
computers. 2. A hybrid computer combines the desirable features of
analog and digital computers. 3. In this type of computers the digital
segments perform conversion of analog signals to digital ones. 4. The
analog component normally serves as the controller and provides logical
operations. 5. The digital component serves as a solver of differential
equations. 6. The hybrid computer is usually substantially faster than a
digital computer. 7. A hybrid computer capable of real-time solution has
been more expensive than any equivalent digital computer.

Exercise 96. Discuss the following topics in groups.
1. Features of analog and digital computers in a hybrid computer.
2. The principles of hybrid computer operation.
3. Hybrid machines applications.

Exercise 97. Memorize the following words and word combina-
tions to text 9.
Autopilot – автопілот
guide – направляти, вести
vehicle – транспортний засіб
steer – управляти
gear – шасі
missile – ракета
fatigue – втома

heading indicator – індикатор курсу (*курс літака*)

attitude – положення в повітрі (відносно трьох осей)

attitude indicator – авіагоризонт, індикатор положення (*літака*) у повітрі

elevator – руль висоти

rudder – руль повороту

range – дальність польоту

gyroscope – гіроскоп, гірокомпас

takeoff – зліт

landing – приземлення

axis (*pl.* axes) – вісь

control – орган керування

pitch – тангаж, обертання навколо поперечної осі; кут нахилу

roll – крен, обертання навколо продольної осі

yaw – рискання, обертання навколо вертикальної осі

taxiing – руління

ascent – набирання висоти, підйом

descent – зниження

cruise – 1) крейсерський (*горизонтальний*) політ 2) літати на крейсерському режимі

approach – заходження (на посадку), підхід, наближення

runway (RW) – злітно-посадкова смуга (ЗПС)

subject (to) – 1) залежний, підвладний 2) схильний 3) за умови

adverse – несприятливий

flight management system – система індикації пілотажних даних

flight control system – система управління польотом

accumulate – накопичувати

error – помилка, похибка

incorporate – включати

reduction – скорочення

null – 1) нуль 2) анулювати

drift – відхилення від курсу (*польоту*)

corrupt – спотворювати

resolve – вирішувати

Kalman filter – фільтр Кальмана

performance factor – показник ККД

altitude – висота (*польоту*)

latitude – широта

longitude – довгота
route – маршрут, курс
update – 1) поновлення 2) поновлювати

Exercise 98. Read and translate text 9. Make the plan of key ideas.

Text 9. Autopilot

An **autopilot** is a mechanical, electrical or hydraulic system used to guide a vehicle without assistance from a human being. An autopilot can refer specifically to aircraft, self-steering gear for boats or autoguidance of space craft and missiles. The autopilot of an aircraft is sometimes referred to as "George", after one of the key contributors to its development

In the early days of aviation aircraft required the continuous attention of a pilot in order to fly safely. As aircraft range increased allowing flights of many hours, the constant attention led to serious fatigue. An autopilot is designed to perform some of the tasks of the pilot.

The first aircraft autopilot was developed in 1912. The autopilot connected a gyroscopic heading indicator and attitude indicator to hydraulically operated elevators and rudder. It permitted the aircraft to fly straight and level on a compass course without a pilot's attention, greatly reducing the pilot's workload. In 1930 the Royal Aircraft Establishment in England developed an autopilot called a pi-lots' assister that used a gyroscope and compressed air to move the flight controls. Additional instrumentation such as the radionavigation aids made it possible to fly during night and in bad weather. In 1947 a US Air Force C-54 made a transatlantic flight including takeoff and landing completely under the control of an autopilot.

Not all of the passenger aircraft flying today have an autopilot system. Older and smaller general aviation aircraft especially are still hand-flown and even small airliners with fewer than twenty seats may also be without an autopilot as they are used on short-duration flights with two pilots. There are three levels of control in autopilots for smaller aircraft. A single-axis autopilot controls an air-craft in the roll axis only. A two-axis autopilot controls an aircraft in the pitch axis as well as roll axis. A three-axis autopilot adds control in the yaw axis and is not required in many small aircraft.

Autopilots in modern complex aircraft are three-axis and general-

ly divide a flight into taxiing, takeoff, ascent, cruise (level flight), descent, approach and landing phases. Autopilots exist that automate all of these flight phases except the taxiing. An autopilot-controlled landing on a runway is known as Autoland, available on many major airports runways today, especially at airports subject to ad-verse weather phenomena such as fog. An autopilot is often an integral component of a flight management system.

Modern autopilots use computer software to control the aircraft. The software reads the aircraft current position and then controls a flight control system to guide the aircraft. The autopilot in a modern large aircraft typically reads its position and the aircraft attitude from an inertial guidance system. Inertial guidance systems accumulate errors over time. They will incorporate error reduction and nulling systems. Error in gyroscopes is known as drift. This is due to physical properties within the system, be it mechanical or laser guided, that corrupt positional data.

The disagreements between the two are resolved with digital signal processing, most often a six-dimensional Kalman filter. The six dimensions are usually roll, pitch, yaw, altitude, latitude, and longitude. Aircraft may fly routes that have a required performance factor, therefore the amount of error or actual performance factor must be monitored in order to fly those particular routes. The longer the flight, the more error accumulates within the system. Radio aids such as DME[1], DME updates, and GPS[2] may be used to correct the aircraft position.

1. DME –Distance Measuring Equipment – апаратура для вимірювання відстані, далекомірне обладнання

2. GPS – Global Positioning System – глобальна навігаційна система, глобальна система позиціонування

Exercise 99. Find equivalents in text 9. It will help you to translate it.

Автоматизований механізм керування; гіроскопічний покажчик курсу; авіагоризонт; гідравлічні рулі висоти, руль повороту; допоміжний засіб; керування польотом; вимірювальні прилади; радіонавігаційний засіб; під керуванням автопілота; пілотований вручну; короткочасний політ; одно-(дво-,три-)осний автопілот; поперечна вісь; вісь крену; вертикальна вісь повороту; руління, зліт, набір висоти, крейсерський політ; зниження; заходження на посадку; приземлення під контролем автопілота;

автоматичне приземлення; злітно-посадкова смуга аеропорту; несприятливі погодні явища; невід'ємний компонент; система індикації пілотажних даних; положення літака в повітрі відносно трьох осей; інерційна система наведення; накопичувати помилки; система скорочення і анулювання помилок; відхилення від курсу польоту; фізичні властивості в межах системи; спотворювати дані щодо місцезнаходження літака; відхилення від курсу; цифрове оброблення сигналу; розбіжності; шестимірний фільтр Калмана; висота; широта; довгота; показник ККД; далекомірне обладнання; глобальна навігаційна система.

Exercise 100. Fill in the gaps with the words given in brackets below and translate the sentences.

(an autopilot-controlled landing, drift, the roll axis, to guide, the pitch axis, an autopilot system, the yaw axis, positional data, digital signal processing, inertial guidance system).

1. An autopilot is used … a vehicle without assistance from a human being. 2. Not all of the passenger aircraft flying today have … … . 3. A single-axis autopilot controls an aircraft in the roll axis only. 4. A two-axis autopilot controls an aircraft in … … as well as roll axis. 5. A three-axis autopilot adds control in … … and is not required in many small aircraft. 6. … … … is available especially at airports subject to adverse weather phenomena such as fog. 7. The auto-pilot in a modern large aircraft typically reads its position and the aircraft attitude from an … … … . 8. Error in gyroscopes is known as … . 9. The disagreements between mechanical or laser guided systems are resolved with … … …. 10. Errors in gyroscopes corrupt … … .

Exercise 101. Change the sentences to the past and future tenses using equivalents of the modal verbs where necessary: **can – could – will be able; may – might – will be allowed; must – had to – will have to**. Add appropriate adverbial modifiers and translate the sentences.

1. An autopilot can guide a vehicle without assistance from a human being. 2. The pilot may relieve during routine cruising due to autopilots. 3. Automatic pilots can include additional instrumentation such as the radionavigation aids that make it possible to fly during night and in bad weather. 4. Aircraft navigation system can determine attitude at

any time. 5. The crew must take measures to prevent any failure using electronic instrument system in the cockpit. 6. Working together, industry and government safety officials can virtually eliminate some of the most common accidents still occurring. 7. The aircraft can operate with maxi-mum safety and efficiency. 8. Safety experts must study accidents to identify the chains of events for preventing the same kinds of accidents in the future. 9. Even small airliners with fewer than twenty seats may also be without an autopilot as they are used on short-duration flights with two pilots. 10. Not all of the passenger aircraft flying today may have an autopilot system. 11. Aircraft may fly routes that have a required performance factor. 12. The amount of error or actual performance factor must be monitored in order to fly those particular routes. 13. Radio aids such as DME, DME updates, and GPS may be used to correct the aircraft position.

Exercise 102. Choose the appropriate form of the words to complete the sentences. Check the differences of meaning in your dictionary.

assistance, assists, assister

1. An autopilot-controlled landing on a runway … the crew during aircraft landing especially in adverse weather conditions such as fog.

2. Automatic pilot is used to control an aircraft or other vehicle without constant human … .

3. An autopilot called a pilots' … was developed in England in 1930.

guided, guides, guidance

4. Air traffic control begins with the ground controller in the airport tower, who … airliners to the runway for departure.

5. The autopilot in a modern large aircraft typically reads its position and the aircraft attitude from an inertial … system.

6. Automatically … supersonic aircraft are capable of vertical takeoff and landing.

safely, save, safety

7. One of the requirements for any flight is flight … .

8. Onboard computers … all information during the flight.

9. In the early days of aviation aircraft required the continuous at-

tention of a pilot in order to fly … .

<p align="center">***perform, performance, performed***</p>

10. Aircraft may fly routes that have a required … factor.

11. An autopilot is designed to … some of the tasks of the pilot.

12. Complex manoeuvres of modern aircraft are … due to automatic pilots.

<p align="center">***control, controller, controlled***</p>

13. An autopilot-… landing on a runway is known as Autoland.

14. Modern autopilots use computer software to … the aircraft.

15. Air traffic … issues instructions, advice and information to pilots by radio to keep aircraft flying safely, efficiently and quickly.

Exercise 103. Rewrite the following sentences in the Past Simple and Present Perfect. Add appropriate adverbial modifiers.

> **Model**: The system includes …
> The system included …
> The system has included …

1. Aircraft requires the continuous attention of a pilot in order to fly safely.

2. Aircraft range increases allowing flights of many hours.

3. Automatic pilots execute complex manoeuvres and flight plans.

4. Approach controllers guide pilots as they approach airports.

5. As pilots approach airports, they contact the aerodrome controllers.

6. Automatic pilots for manned aircraft are designed as fail-safe.

7. The first aircraft autopilot maintains an aircraft in straight and level flight.

8. Inertial guidance systems accumulate errors over time.

9. The computer software reads the aircraft current position and attitude. 10. Onboard computers apply the technique called Kalman filtering.

Exercise 104. Put the verb in brackets into the correct form of

Present Perfect or Past Simple.

1. In the late 1950s, the transistor (become) available to replace the vacuum tube. 2. All recent developments (result) in a microprocessor revolution. 3. Computer technology (open) a variety of opportunities for people who are creative risk-takers. 4. Steven Jobs and Stephen Wozniak (work) together to invent the personal computer. 5. Jobs and Wozniak (become) (know) as two of the most brilliant innovators. 6. Computer-related crime not (diminish) yet. 7. The earliest automatic pilots (can) do no more than maintain an aircraft in straight and level flight. 8. Some home entertainments such as television, video recorders and vi-deo games (affect) people's life. 9. In the early days of aviation aircraft (require) the continuous attention of a pilot that (lead) to his serious fatigue. 10. In 1930 the Royal Aircraft Establishment in England (develop) an autopilot called a pilots' assister.

Exercise 105. Translate into English.

1. Автопілот – це механічна, електрична, або гідравлічна система, що використовується для керування транспортним засобом без допомоги людини. 2. Автопілот призначений для виконання деяких завдань пілота. 3. Збільшення дальності та тривалості польоту літака потребували постійної уваги, що викликало серйозну втому пілота. 4. Найперші автопілоти дозволяли літакам літати прямо і рівно за компасом, не потребуючи уваги пілота, що значно знизило навантаження на пілота. 5. Додаткові прилади, такі як радіонавігаційне обладнання, дали можливість літати в нічний час і за несприятливих погодних умов. 6. Старші й менші за розміром літаки загального призначення і навіть невеликі літаки з менш ніж двадцятьма місцями також можуть бути без автопілота, оскільки вони використовуються для короткочасних польотів з двома пілотами. 7. Автопілоти невеликих літаків здійснюють три рівні контролю. 8. Одноосний автопілот здійснює лише крен літака. 9. Двоосний автопілот керує обертанням літака навколо продольної та поперечної осей. 10. Триосний автопілот додатково здійснює керування навколо вертикальної осі. 11. Автопілоти сучасних складних літаків є триосними і керують рулінням, зльотом, набором висоти, горизонтальним польотом, зниженням, заходженням на посадку та

приземленням. 12. У сучасних автопілотах використовуються комп'ютерні програми керування літаком. 13. Автопілоти сучасних великих літаків зазвичай одержують інформацію про місцезнаходження та положення літака в повітрі від інерційної системи наведення. 14. Шестивимірний фільтр Калмана застосовують для цифрового оброблення сигналу вимірювань, таких як крен, тангаж, рискання, висота, широта і довгота.

Exercise 106. Answer the questions on text 9.

1. What is an autopilot? 2. What is the autopilot used for? 3. What is the autopilot sometimes called? 4. What are the first aircraft autopilot characteristics? 5. What additional instrumentation made it possible to fly during night and in bad weather? 6. What are the levels of control in autopilots for smaller aircraft? 7. What manoeuvres do autopilots of modern complex aircraft execute? 8. What is the function of computer software in a modern large aircraft? 9. How do inertial guidance systems operate in aircraft? 10. What is known as drift? 11. What dimensions does a six-dimensional Kalman filter process during flight? 12. What radio aids may be used to correct aircraft position?

Exercise 107. Speak on:

1. The advantages of digital computers.
2. Digital computers applications.
3. Digital computer components.

UNIT II. Computer Programming. Programming Languages

Exercise 1. *Read, practice and learn the following words and word combinations.*
Computer programming – комп'ютерне програмування
ordered instruction – задана команда
comprehensive – всебічний, всеохоплюючий
computing problem – проблема обчислення
executable program –виконувана програма

designing – проектування *(програми)*
testing – тестування *(програми)*
debugging – налагоджування програми
bug – помилка, збій роботи програми
maintaining – підтримання
source code – вихідний код; вихідний текст (програми)
programming language – мова програмування
individual – окремий
suitability – придатність
approximate – приблизний
spectrum – спектр, діапазон
low-level language – мова низького рівня
machine-oriented – машинно-орієнтований
high-level language – мова високого рівня
applications programmer – розробник прикладних програм
fourth-generation language – мова програмування четвертого
    покоління
resemble – бути схожим, нагадувати
translate – перекладати; транслювати, компілювати
machine language – машинна мова
operating code – операційний код
memory address – адрес (комірка) пам'яті
compiler – компілятор
assembler – асемблер
executable image – зображення, що здійснюється програмою
interpreter – інтерпретатор
smart program – розумна програма
program logic – програмна логіка або послідовність операцій,
                що виконуються програмою
scope – обсяг
code the program – кодувати програму
programming cycle – цикл програмування
programming paradigm – принцип програмування; парадигма
    програмування
imperative programming – імперативне програмування
declarative programming – декларативне програмування
functional programming – функціональне програмування
object-oriented   programming   –   об'єктно-орієнтоване

программування
prescribe – приписувати; встановлювати
stateless – без зберігання інформації щодо стану
function evaluation – визначення вихідних реакцій функціональних елементів
interacting objects – об'єкти, що взаємодіють
software engineering – розроблення програмного забезпечення
advocate – підтримувати; рекомендувати
expertise – експертиза, експертна оцінка
application domain – галузь застосування
algorithm – алгоритм
formal logic –формальна логіка
iterative – ітеративний; повторюваний
jointly developed program –спільно розроблена програма

Exercise 2. *Read, translate and give the gist of text 1.*

Text 1. Programming Process

Computer programming is a process of writing a sequence of instructions to automate performing a specific task or solve a given problem. A set of ordered instructions that enable a computer to carry out a specified task is called a computer program. So, programming is the comprehensive process that leads from an original formulation of a computing problem to executable programs. It involves activities such as designing, writing, testing, debugging, and maintaining the source code of computer programs.

The source code of a computer program, which is a collection of computer instructions, is written by computer programmers in one or more programming languages. They consist of words, individual letters, numerals, and other symbols, as well as rules for combining these elements. The choice of a programming language depends on many considerations, such as company policy, suitability to task, or individual preference.

Programming languages form an approximate spectrum from "low-level" to 'high-level'. Low-level languages are typically more ma-

chine-oriented and faster to execute, whereas high-level languages are more abstract and easier to use but executed less quickly. Most applications programmers use one of the high-level languages or fourth-generation languages that more closely resemble human communication.

As computer cannot work directly with a program written in a programming language, the instructions must be translated into a machine language composed of binary digits. These digits represent operating codes, memory addresses, and various symbols, such as plus and minus signs. Special programs called compilers and assemblers translate programming languages into machine or low-level languages. The source code of the program may be converted into an executable image by a compiler and later executed by a central processing unit or executed immediately with the aid of an interpreter.

Compilers, assemblers, and operating systems may be viewed as "smart programs" because they enable a computer to carry out complicated instructions. The user communicates with the smart program, and the smart program communicates with the computer.

Generally, programming is performed using the following step-by-step process:

1. Developing the program logic to solve the particular problem, that includes defining the purpose, scope and design of the program; planning the sequence of computer operations.

2. Writing the program logic in a specific programming language or coding the program.

3. Assembling or compiling the program to turn it into machine language.

4. Testing and debugging the program, which means detecting, locating, and correcting bugs (mistakes), usually by running the program.

5. Preparing the necessary documentation which describes the programming cycle and specific facts about the program.

Different programming languages support different styles of programming, also called programming paradigms. There are four main paradigms: imperative, declarative, functional and object-oriented. Declarative programming expresses *what* the program should accomplish without prescribing *how* to do it in terms of sequences of actions to be taken, which is provided in imperative programming. In functional programming a program can be thought of as a sequence of stateless func-

tion evaluations, while in object-oriented programming, programmers can think of a program as a collection of interacting objects. Methodologies with different programming languages in software engineering advocate different programming paradigms.

The process of programming thus often requires expertise in many different subjects, including knowledge of the application domain, specialized algorithms and formal logic. It is the iterative process, which sometimes involves coordinating with other programmers on a jointly developed program.

Exercise 3. *Translate terminological word combinations related to programming.*

a) programming algorithm, programming assignment, programming background, programming check, programming coefficient, programming cycle, programming department, programming environment, programming language, programming manual, programming methodology, programming software, programming solution, programming style, programming supervisor, programming support, programming techniques, programming tools, programming unit;

b) programmable action, programmable automation, programmable automation system, programmable component, programmable control system, programmable data input, programmable design, programmable device, programmable instrument, programmable logic, programmable machine, programmable parameter, programmable switch;

c) programmed automaton, programmed channel, programmed check, programmed computer, programmed control, programmed cycle, programmed data processor, programmed decision, programmed disk, programmed learning, programmed requirements, programmed search, programmed sequence, programmed test.

Exercise 4 . *Match the English –Ukrainian equivalents.*

1) application domain	a) налагоджування програми
2) computing problem	b) мова високого рівня
3) ordered instruction	c) об'єктно-орієнтоване програмування
4) debugging	d) галузь застосування

5) executable program	e) проблема обчислення
6) memory address	f) задана команда
7) programming paradigm	g) вихідний код
8) high-level language	h) машинно-орієнтований
9) object-oriented programming	i) програма, що виконується
10) source code	j) розроблення програмного забезпечення
11) operating code	k) визначення вихідних реакцій функціональних елементів
12) machine-oriented	l) парадигма програмування
13) interacting objects	m) адрес (комірка) пам'яті
14) software engineering	n) спільно розроблена програма
15) executable image	o) операційний код
16) jointly developed program	p) повторюваний
17) function evaluation	q) об'єкти, що взаємодіють
18) iterative	r) зображення, що здійснюється програмою

Exercise 5. *Match the terms with their definitions.*

1) computer programming	a) the original form of a computer program before it is converted into a machine-readable code
2) algorithm	b) a fundamental style of computer programming
3) source code	c) a type of computer program that converts a program written in assembly language into machine code
4) computer program	d) the iterative process of writing or editing source code
5) interpreter	e) a computer program by which a high-level programming language is converted into machine language
6) assembler	f) a logical, arithmetical or computational procedure that if correctly applied ensures the solution of a problem
7) compiler	g) the process of locating and removing defects in a device or a system
8) declarative programming	h) a programming paradigm that defines a sequence of actions to be taken to solve the prob-

	lem
9) functional programming	i) a programming paradigm that considers a program as a collection of interacting objects
10) object-oriented programming	j) a programming paradigm that defines the problem to be solved and the logic of a computation without describing how to solve it
11) imperative programming	k) a programming paradigm that describes a program as a sequence of stateless function evaluations
12) programming paradigm	l) a program that immediately executes stored precompiled source code- made by a compiler
13) debugging	m) a set of ordered instructions that enable a computer to carry out a specified task

Exercise 6. *Complete the following sentences.*
1. Programming is the comprehensive process that leads from ….. 2. Programming involves …… 3. The source code of a computer program is written by …. . 4. Programming languages consist of ….. . 5. The choice of a programming language depends on …. . 6. Programming languages form …. . 7. Most applications programmers use …. . 7. …. must be translated into a machine language composed of binary digits as computer cannot work directly with a program written in a programming language. 8. …. translate programming languages into machine or low-level languages. 9. Compilers, assemblers, and operating systems may be viewed as "smart programs" because …. . 10. Programming is performed using step-by-step process which involves …. . 11. Different programming languages support different styles of programming, also called …. . 12. Declarative programming expresses …. .13. The process of programming often requires expertise in …. . 14. Programming is the iterative process, which sometimes involves coordinating with other programmers on …. .

Exercise 7. *Ask questions on the information missed in the sentences in exercise 6.*

Exercise 8. *Translate the following word-combinations from text 1 and make up sentences with them.*

To automate performing a specific task; to solve a given problem; to enable a computer to carry out a specified task; to lead from an original formulation; to depend on many considerations; to form an approximate spectrum; to be typically more machine-oriented; to be more abstract and easier to use; to closely resemble human communication; to be translated into a machine language; to translate programming languages into machine or low-level languages; to be converted into an executable image; to be executed immediately with the aid of; to be viewed as "smart programs"; to be performed using step-by-step process; to detect, locate, and correct bugs; to support different styles of programming; to prescribe a sequence of actions to be taken; to be thought of as a sequence of stateless function evaluations; to advocate different programming paradigms; to require expertise in many different subjects.

Exercise 9. *Explain the difference between the following terms.*
Computer programming and computer program; low-level and high-level languages, compiler, assembler and interpreter; program logic and programming cycle; imperative and declarative programming paradigms; functional and object-oriented programming paradigms; designing, writing, testing, debugging, and maintaining the source code.

Exercise 10. *Answer the questions on text 1.*
1. What process is called computer programming? 2. Why can it be defined as a comprehensive process? 3. What activities does computer programming involve? 3. What is the source code a computer program is written in? 4. What do programming languages consist of? 5. What does the choice of a programming language depend on? 6. What is the difference in the use of low-level and high-level languages? 7. Which language is used by most applications programmers? 8. Why must the instructions be translated into a machine language? 9. What do the binary digits of a machine language represent? 10. Why may compilers, assemblers, and operating systems be viewed as "smart programs"? 11. What steps does the process of programming include? 12. What supports different styles of programming? 13. Why do methodologies in software engineering advocate different programming paradigms? 14. What expertise does the process of programming require? 15. Whose coordination does programming process often involve?

Exercise 11. *Translate the following sentences and define the tense and voice form of the predicate. Change the sentences into interrogative forms.*

1. Computer programming has evolved from programs that run on big mainframe computers. 2. Programming has been versed in a variety of different PC applications, such as Access and SPSS. 3. In creating a program, decisions are based on the information required to be stored and accessed and the skill level of the staff that will utilize it. 4. A programmer prepares the instructions of a computer program and runs these instructions in test programs to see if they work properly. 5. The program is being updated and maintained to provide optimum performance. 6. Programmers are charged with the responsibility of determining which programs available on the open market are the best suited to the individual needs. 7. In 1954 FORTRAN was invented as the first high-level programming language which opposed a design on paper. 8. The new forms of programming have made programming career decisions in developed countries more complicated. 9. Text editors were developed to allow changes and corrections to be made much more easily. 10. The increase in speed of modern computers made the use of programming languages much more practical than in the past. 11. The high labour cost of programmers in developed countries will lead to import of software and services from other countries. 12. The program will be modified for the purpose of helping a user to fill a need of more effective performance.

Exercise 12. *Change the following sentences from the Active Voice into the Passive Voice after the model.*

Model:

The programmer **checks** the program. - The program **is checked** by the programmer.

The programmer **is checking** the program. - The program **is being checked** by the programmer.

The programmer **has checked** the program. - The program **has been checked** by the programmer.

The programmer **must check** the program. - The program

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must be checked by the programmer.

1. A programmer converts problem solutions into instructions for the computer to perform. 2. A translator is checking the syntax of the program to make sure it works correctly. 3. They have used a text editor to create a file that contains the necessary program. 4. The programmer must code the program to express his solution in a programming language. 5. A programming language provides a way of instructing the computer what operations to perform. 6. Program experts are writing a complicated program to fill special needs of customers. 7. The manager has coordinated the meetings with systems analysts to discuss the program errors. 8. They may discover several errors in testing the program. 9. They need documentation to supplement human memory and to help organize program planning. 10. The team is writing a detailed description of the programming cycle and specific facts about the program. 11. We must consider the advantages of the computer field in order to succeed in it.

Exercise 13. *Translate the following sentences into English.*

1. Програмування – це процес написання інструкцій на конкретній мові програмування. 2. Набір заданих інструкцій, що дає можливість комп'ютеру виконувати спеціальне завдання, називається програмою. 3. Команди вказують комп'ютеру, які дані використовувати та яку виконувати послідовність операцій з цими даними. 4. Вихідний код комп'ютерної програми складається з сукупності комп'ютерних команд, написаних програмістами однією або кількома мовами програмування. 5. Вибір мови програмування залежить від багатьох міркувань, таких як політика компанії, придатність до вирішення завдання або надання особистої переваги. 6. Компілятор перетворює вихідний текст програми у машинний код, що безпосередньо виконується електронними компонентами комп'ютера. 7. Інтерпретатор створює віртуальну машину для виконання програми, що повністю або частково здійснює функції виконання програм. 8. Програмування здійснюється як наступний послідовний процес, що включає аналіз, проектування, кодування та компіляцію, тестування та налагоджування, документальне супроводження програми. 9. Першим етапом програмування є визначення мети, обсягу та структури програми. 10. Далі планується послідовність

операцій комп'ютера та пишуться програмні команди, закодовані за допомогою конкретної мови програмування. 11. Тестування та налагодження програми передбачає виявлення, знаходження та виправлення помилок. 12. Останній етап програмування – це документальний супровід, що описує програмний цикл та надає особливу інформацію щодо програми. 13. Програмування часто потребує глибоких знань у різних галузях та вміння співпрацювати з іншими програмістами над спільно розроблюваними програмами.

Exercise 14. *Speak on:*
1. Computer programming as a comprehensive process.
2. Programming process and its steps in developing a program.
3. Styles of computer programming.
4. Knowledge required to succeed in programming.

Exercise 15. *Read, practice and learn the vocabulary to text 2.*
Electronic brains – електронний мозок
artificial intelligence – штучний інтелект
convey – передавати
primary memory – первинна пам'ять
memory location – комірка пам'яті
declaration – заявлення процедури або функції
expression – вираз; запис мовою програмування деяких дій над даними
statement – формулювання; оператор (програми); пропозиція
control flow – потік команд; логіка управління програмою
mathematical relations – математичні відношення
declared object – заявлений; описаний об'єкт
visual language program – програма візуального спілкування
manipulate – управляти
system software – системне програмне забезпечення
application software – прикладне програмне забезпечення
couple – з'єднувати
utility program – сервісна програма, утиліта
tune – налагоджувати

word processing – оброблення тексту
database function – функціонування бази даних
accessing the Internet – під'єднання до Інтернету
middleware – проміжне програмне забезпечення
application problem – прикладна проблема
sorting – сортування
multitasking – багатозадачність
process scheduling – планування процесів
multiprocessor computer – багатопроцесорна обчислювальна машина
multicore – багатоядерний
multiple – чисельний
robustness – стійкість; здатність системи відновлюватися після помилок
anticipate – передбачувати
usability – зручність в експлуатації
intended – намічений; запланований
portability – транспортабельність, мобільність
maintainability – ремонтоздатність; зручність в експлуатації
performance – продуктивність, швидкість дії
system resource – системний ресурс
consume – споживати
engineering practice – проектування

Exercise 16. *Read, translate and give the gist of text 2.*

Text 2. Computer Program

In spite of much written about computers being electronic brains or having artificial intelligence, it is still necessary for humans to convey a sequence of instructions to the computer before the computer can perform the task. The set of instructions and the order in which they have to be performed is known as an algorithm. The result of expressing the algorithm in a programming language is called a program. A computer requires programs to function, typically executing the program's instructions in a central processor.

In order to execute the instructions indicated by a program, the program needs to be stored in the primary memory of the computer. Each instruction of the program may occupy one or more memory locations. Instructions are stored as a sequence of binary numbers (sequenc-

es of zeros and ones), where each number may indicate the instruction to be executed or the pieces of data on which the instruction is carried out. Instructions that the computer can understand directly are said to be written in machine language. Programmers who design computer algorithms have difficulty in expressing the individual instructions of the algorithm as a sequence of binary numbers. To solve this problem they may choose a programming language.

Computer programs can be categorized by the programming language paradigm used to produce them. Two of the main paradigms are imperative and declarative. Programs written using an imperative language specify an algorithm using declarations, expressions, and statements, while programs written using a declarative language specify the properties that have to be met by the output. They do not specify details expressed in terms of the control flow of the executing machine but of the mathematical relations between the declared objects and their properties.

The form in which a program is created may be textual or visual. In a visual language program, elements are graphically manipulated rather than textually specified.

Computer programs may be classified along functional lines into applications and system programs. The main functional categories are system software and application software. System software includes the operating system which couples computer hardware with application software. The purpose of the operating system is to provide an environment in which application software executes in a convenient and efficient manner. It is a large program that controls the operations of the computer, the transfer of files, and the processing of other programs. In addition to the operating system, system software includes utility programs that help manage and tune the computer. If a computer program is not system software then it is application software. Applications perform tasks such as word processing, database functions, or accessing the Internet. Application software includes middleware, which couples the system software with the user interface. It also includes utility programs that help users solve application problems, like the need for sorting.

Many operating systems support multitasking, which enables many computer programs to appear to run simultaneously on one computer. Operating systems may run multiple programs through process scheduling — a software mechanism to switch the CPU among process-

es so users can interact with each program while it runs. Within hardware, modern day multiprocessor computers or computers with multi-core processors may run multiple programs.

Any computer program must satisfy some fundamental requirements, such as reliability: how often the results of a program are correct; robustness: how well a program anticipates problems not due to programmer error; usability: the ergonomics of a program that is the ease with which a person can use the program for its intended purpose; portability: the range of computer hardware and operating system platforms on which the source code of a program can be compiled/interpreted and run; maintainability: the ease with which a program can be modified by its present or future developers in order to make improvements or adapt it to new environments; efficiency or performance: the amount of system resources a program consumes.

Nowadays the academic field and the engineering practice of computer programming are both largely concerned with discovering and implementing the most efficient programs for different classes of problem.

Exercise 17. *Write the verbs related to the following nouns.*
Automation, performance, execution, specification, relation, reference, correspondence, integration, development, categorization, involvement, analysis, introduction, application, expression, declaration, statement, solution, interaction, usability, reliability, modification, improvement, maintainability.

Exercise 18. *Write the nouns derived from the following verbs. Define the suffixes used to form the nouns. Translate them.*
Compile, translate, represent, store, reflect, exist, operate, modify, instruct, distinct, define, interpret, indicate, inspect, assemble, require, identify, recover, expect, create, improve, generate, compute, produce, manage, use, complete.

Exercise 19 *Match words in group I with their synonyms in group II.*
I. Application, instruction, procedure, property, bug, computation, specification, different, effective, difficult, device;
II. Detailed description, efficient, complicated, diverse, command, machine, quality, technique, error, use, calculation.

Exercise 20. *Translate terminological word combinations related to computer programs.*

a) program analyst, program assembly, program bus, program capacity, program certification, program check-out, program compatibility, program competition, program control system, program data error, program directory, program editing, program evaluation, program failure, program flexibility, program flowchart, program input, program layout, program load, program modification, program optimization, program package, program portability, program schedule, program sequence, program testing, program verification;

b) accessory program, application program, archive program, assembler program, background program, benchmark program, cataloged program, check program, communication program, compiled program, consulting program, copyrighted program, debugging program, embedded program, fault-location program, general-purpose program, hardware-maintenance program, interpreter program, license program, mail program, multitasking program, robust program, routine program, self-adapting program, self-monitoring program.

Exercise 21. *Find in text 2 the equivalents of the following words and word combinations.*

Електронний мозок, штучний інтелект, первинна пам'ять, комірка пам'яті, парадигма програмування в конкретній мові програмування, заявлення процедури або функції, потік команд, математичні відношення, описаний об'єкт, програма візуального спілкування, прикладні програми, системне програмне забезпечення, утиліта, прикладне програмне забезпечення, функціонування бази даних, прикладна проблема, проміжне програмне забезпечення, планування процесів, багатопроцесорна обчислювальна машина, багатоядерний процесор, зручність в експлуатації, транспортабельність, ремонтоздатність, системний ресурс, проектування.

Exercise 22. *Translate the following word-combinations from text 2 and make up sentences with them.*

To have artificial intelligence, to convey a sequence of instructions, to execute the program instructions, to execute the instructions indicated by a program, to be stored in the primary memory of the computer, to occupy one or more memory locations, to be stored as a se-

quence of binary numbers, to understand directly, to have difficulty in expressing individual instructions of the algorithm, to be categorized by the programming language, to specify properties of the program, to be graphically manipulated, to be textually specified, to be classified along functional lines, to couple computer hardware with application software, to control the operations of the computer, to manage and tune the computer, to couple the system software with the user interface, to support multitasking, to run simultaneously on one computer, interact with each program, to satisfy some fundamental requirements, to implement the most efficient programs.

Exercise 23. *Fill in the gaps with the words given in brackets and translate the sentences.*

(multiple programs, imperative language, machine language, declarative language, utility programs, process scheduling, mathematical relations, primary memory)

1. The program needs to be stored in the …… of the computer. 2. Instructions that the computer can understand directly are said to be written in ……. 3. Programs written using …… specify an algorithm using declarations, expressions, and statements. 4. Programs written using …… specify the properties that have to be met by the output. 5. Programmers specify details expressed in terms of …… between the declared objects and their properties. 6. System software includes …… that help manage and tune the computer. 7. Operating systems may run multiple programs through ……. 8. Modern multiprocessor computers or computers with multicore processors may run …….

Exercise 24. *Match the terms and their definitions related to program requirements.*

1) reliability	a) the range of computer hardware and operating system platforms on which the source code can be compiled / interpreted and run;
2) robustness	b) the ease with which a person can use the program for its intended purpose;
3) usability	c) how often the results of a program are correct;
4) portability	d) how well a program anticipates problems not due to programmer error;

5) maintainability	e) the ease with which a human reader can comprehend the purpose, control flow and operation of source code;
6) efficiency	f) the ease with which a program can be modified by its present or future developers;
7) readability	g) the amount of system resources a program consumes.

Exercise 25. *Comment if the sentences are true or false.*

1. Having artificial intelligence, computers can convey a sequence of instructions to perform the task without a human being. 2. Each instruction of the program may occupy only one memory location. 3. Programmers choose a programming language as they have difficulty in expressing the individual instructions of the algorithm as a sequence of binary numbers. 4. In a visual language program, elements are more often graphically manipulated than textually specified. 5. System software includes the operating system which couples the system software with the user interface. 6. Many computer programs can run simultaneously on one computer due to multitasking. 7. Process scheduling enables the users to interact with each program while it runs. 8. The ergonomics of a program is the ease with which a program can be modified in order to make improvements or adapt it to new environments. 9. Nowadays the engineering practice of computer programming is more focused on developing and implementing the most efficient programs.

Exercise 26. *Read the statements and define the program requirements they refer to (reliability, robustness, usability, portability, efficiency, maintainability). Comment upon the statements using the phrases: in my opinion, I would say, to my mind, most probably, perhaps, I believe, as I remember, as far as I know.*

1. This depends on differences in the programming facilities provided by the different platforms, including hardware and operating system resources. 2. This involves a wide range of textual, graphical and sometimes hardware elements that improve the clarity, intuitiveness, cohesiveness and completeness of a program. 3. This includes situations such as incorrect, inappropriate or corrupt data, unavailability of needed resources. 4. This depends on conceptual correctness of algorithms, and minimization of programming mistakes. 5. This also includes correct

disposal of some resources, such as cleaning up temporary files and lack of memory leaks. 6. This provides opportunities to make improvements or customizations, fix bugs and security holes, or adapt it to new environments.

Exercise 27. *Give definitions to the following terms.*

An algorithm, a computer program, primary memory, machine language, imperative language, declarative language, system software, application software, operating system, utility programs, multitasking, process scheduling.

Exercise 28. *Ask and answer the questions working in groups.*

a) if a program is the result of expressing the algorithm in a programming language;

if a computer requires programs to function, typically executing the program's instructions in a central processor;

if each instruction of the program may occupy one or more memory locations;

if the form in which a program is created may be textual or visual;

if computer programs can be categorized by the programming language paradigm;

if elements in a visual language program graphically manipulated or textually specified;

b) why programmers, who design computer algorithms use a programming language;

what functional lines computer programs may be classified into.

what system software includes;

what the purpose of the operating system is;

what application software consists of;

how operating systems may run multiple programs;

what requirements any computer program must satisfy;

what the academic field and the engineering practice of computer programming are largely concerned with.

Exercise 29. *Translate the following sentences into English.*

1. Комп'ютерна програма – це послідовність інструкцій, призначених для виконання пристроєм керування обчислюваної

машини. 2. Програма є одним із компонентів програмного забезпечення. 3. Запис вихідних текстів програм за допомогою мов програмування полегшує розуміння та редагування програм. 4. Для виконання на комп'ютері текст програм перетворюється у машинний код. 5. Вихідні тексти комп'ютерних програм на більшості мов програмування складаються зі списку інструкцій, що точно описують заданий алгоритм. 6. Більшість користувачів використовують програми, призначені для виконання конкретних прикладних завдань, таких як оброблення тексту, керування базою даних, під'єднання до Інтернету. 7. Системне програмне забезпечення здійснює керування компонентами обчислюваної системи та забезпечує середовище для функціонування прикладних програм. 8. Операційна система може запускати багато програм за допомогою планування процесів. 9. Операційні системи підтримують режим багатозадачності, що дає змогу програмам одночасно функціонувати на комп'ютері. 10. Сервісні програми допомагають користувачам вирішувати прикладні проблеми, як, наприклад, сортування даних.

Exercise 30. *Before reading text 3, discuss the following questions.*

1.What does computer programming deal with? 2. What is the programmer's job? 3. Is the programming team or solo activities? 4.What are the pros and cons of the programmer's job? 5. What is necessary to succeed in this field?

Exercise 31. *Write a composition on one of the questions from exercise 30.*

Exercise 32. *Speak on:*
1. Computer program and language paradigms of its writing.
2. Classification of computer programs along their functional lines.
3. Modern requirements to computer programs.
4. The academic field and the engineering practice of computer programming.
5. The programmer's job.

Exercise 33. *Read, translate and entitle text 3. Specify which*

questions from exercise 30 the text answers. Give the gist of the text.

Text 3

Computer programming is a field that has to do with the analytical creation of the source code that can be used to configure computer systems. Computer programmers may choose to function in a broad range of programming functions, or specialize in some aspect of development, support, or maintenance of computers for the home or workplace. Programmers provide the basis for the creation and ongoing function of the systems that many people rely upon for all sorts of information exchange, both business related and for entertainment purposes.

In general, the programmer's job is to convert problem solutions into instructions for the computer. That is, the programmer prepares the instructions of a computer program and runs those instructions on the computer, tests the program to see if it is working properly, and makes corrections to the program. The programmer also writes a report on the program. These activities are all done for the purpose of helping a user fill a need, such as paying employees, billing customers, or admitting students to college.

The programming activities just described could be done, perhaps, as solo activities, but a programmer typically interacts with a variety of people. For example, if a program is part of a system of several programs, the programmer coordinates with other programmers to make sure that the programs fit together well. If you were a programmer, you might also have coordination meetings with users, managers, systems analysts, and with peers who evaluate your work – just as you evaluate theirs.

Exercise 34. *Read, practice and learn the vocabulary to text 4.*

Machine-readable – зчитуваний машиною
value – значення
render – візуалізувати; переводити
machine code – машинний код
computer platform – комп'ютерна платформа, стандартизоване комп'ютерне обладнання
embedded software – вбудоване програмне забезпечення
device driver – драйвер пристрою

server – сервер
window system – система вікон
enterprise software – програмне забезпечення підприємства
accounting software – бухгалтерське програмне забезпечення
office suite – офісний пакет
graphics software – програмне забезпечення машинної графіки
bundle – поставляти у комплекті, комплектувати
constraint – обмеження
appliance – прилад, пристрій
pacemaker – регулятор швидкості
bit – біт (найменший елемент комп'ютерної пам'яті)
sophisticated – складний
process control system – автоматизована система управління технологічними процесами
debugger – програма відлагодження
linker – компоновщик, редактор зв'язків
hand tool – ручний інструмент
integrated development environment – інтегроване середовище розробки
lengthy – тривалий
software development – розроблення програмного забезпечення
range – 1) коло, сфера; 2) діапазон
word processing program – програма підготовки текстів
Internet dialing software – програмне забезпечення підключення до мережі Інтернет через кодонабирач
insertion – введення
customized platform – спеціалізована платформа
intranet – корпоративна мережа, внутрішня локальна мережа.

Exercise 35. *Read, translate and give the gist of text 4.*

Text 4. Computer Software

Computer software, or just software, is any set of machine-readable instructions, most often in the form of a computer program, which directs a computer's processor to perform specific operations. The term is used to contrast with computer hardware, the physical objects that carry out the instructions. Hardware and software require each other, neither has any value without the other.

Software is a general term. It can refer to all computer instructions in general or to any specific set of computer instructions. It includes both machine instructions (the binary code that the processor understands) and source code (more human-understandable instructions that must be rendered into machine code by compilers or interpreters before being executed.

On most computer platforms, software can be grouped into a few broad categories such as system software, application software and embedded software.

System software is the basic software designed to operate the computer hardware, to provide basic functionality, and to provide a platform for running application software. System software includes device drivers, operating systems, servers, utilities, and window systems.

Application software is all the computer software that causes a computer to perform useful tasks beyond the running of the computer itself. It is also called a software application, application or app. Examples include enterprise software, accounting software, office suites, graphics software and media players. Many application programs deal principally with documents. Applications may be bundled with the computer and its system software or published separately, and can be coded as university projects.

Embedded software is written to control machines or devices that are not typically thought of as computers. It is typically specialized for the particular hardware that it runs on and has time and memory constraints. Manufactures build in embedded software in the electronics in cars, telephones, modems, robots, appliances, toys, security systems, pacemakers, televisions and digital watches, for example. This software can be very simple, such as lighting controls running on an 8-bit microprocessor and a few kilobytes of memory, or can become very sophisticated in applications such as airplanes, missiles, and process control systems.

Software refers to one or more computer programs and data held in the storage of the computer. In other words, software is a set of programs, procedures, algorithms and its documentation concerned with the operation of a data processing system. Program software performs the function of the program it implements, either by directly providing instructions to the digital electronics or by serving as input to another piece of software. It refers to relatively simple programs such as com-

pilers, debuggers, interpreters, linkers, and text editors, that can be combined together to accomplish a task, much as one might use multiple hand tools to fix a physical object. Programming tools are intended to assist a programmer in writing computer programs, and they may be combined in an integrated development environment to more easily manage all of these functions.

Sometimes lengthy process of computer programming is usually referred to as software development. The computer programmer focuses on the development of software that allows people to perform a broad range of functions. All online functions that are utilized in the home and office owe their origins to a programmer or group of programmers. Computer operating systems, office suites, word processing programs, and even Internet dialing software all exist because of the work of programmers.

Computer programming goes beyond software development. The profession also extends to the adaptation of software for internal use, and the insertion of code that allows a program to be modified for a function that is unique to a given environment. When this is the case, the computer programmer may be employed with a company that wishes to use existing software as the foundation for a customized platform that will be utilized as part of the company intranet.

Exercise 36. *Write the adjectives related to the following nouns and verbs. Make up word combinations using them.*

Value, program, characterize, object, base, principle, control, compare, application, procedure, function, diagnosis, environment, access, direction, concept, art, algorithm, execution, digit, sequence, symbol, action, information, declaration, operation, expression, type, addition, relation, communication, tradition, use, physics, digit, length, vary, origin, progress, office, system, allow, part, suit.

Exercise 37. *Write the adverbs related to the following adjectives. Make up word combinations using them.*

Principal, variable, typical, equal, safe, free, formal, internal, exclusive, exceptional, automatic, specific, necessary, immediate, sensitive, separate, independent, structural, autonomous, statistic, intentional, dangerous, adequate, explicit, external, brief, beneficial, particular, attentive, simultaneous, relative, easy.

Exercise 38. *Translate the following word combinations. Define the - ing form (Present Participle or Gerund).*

Working machine, testing program, preceding state, translating program, representing technique, compiling program, restricting method, improving technology, developing strategy, increasing number, processing device, debugging system, programming system, interpreting application, supporting structure, cooperating programmers, self-checking program, operating mode, editing tool.

Exercise 39. *Translate the following word combinations with the Participle in the attributive function.*

Customized platform, utilized program, employed staff, embedded software, combined components, interpreted code, processed data, performed task, developed software, implemented technology, sophisticated device, coded language, executed instruction, grouped terms, modified system, fixed tool.

Exercise 40. *Translate terminological word combinations related to computer software.*

Application software, autoinstall software, business software, common software, communication software, compatible software, computer manufacturer's software, copyrighted software, custom-made software, database software, desktop software, diagnostic software, educational software, engineering software, floppy-disk software, graphics software, industry-standard software, maintenance software, menu-driven software, multitasking software, operational software, portable software, problem-oriented software, prototype software, self-checking software, simulation software, startup software, supporting software, system management software, system software, user software, word-processing software.

Exercise 41. *Find in text 4 the equivalents of the following words and word combinations.*

Програмне забезпечення підприємства, зчитуваний машиною, машинний код, комп'ютерна платформа, офісний пакет, регулятор

швидкості, вбудоване програмне забезпечення, драйвер пристрою, автоматизована система управління технологічними процесами, програмне забезпечення машинної графіки, редактор зв'язків, інтегроване середовище розробки, спеціалізована платформа, тривалий процес, програма налагодження, ручний інструмент, текстовий редактор, система оброблення даних, система вікон, розроблення програмного забезпечення, бухгалтерське програмне забезпечення, біт, програмне забезпечення підключення до мережі Інтернет через кодонабирач, введення коду, цифрова електроніка, обмеження часу та пам'яті, корпоративна мережа, сервісна програма.

Exercise 42. *Distribute the following terminological word combinations in 3 columns below.*

System software	Application software	Embedded software

To be typically specialized for the particular hardware that has time and memory constraints; to include enterprise software, accounting software, office suites, graphics software and media players; to be concerned with the operation of a data processing system; to cause a computer to perform useful tasks beyond its running; to deal principally with documents; to refer to data held in the storage of the computer; to perform the function of the program by directly providing instructions to the digital electronics; to be built in the electronics in cars; to be bundled with the computer and its system software or published separately; to be very simple, such as lighting controls running; to refer to relatively simple programs such as compilers, debuggers, interpreters, linkers, and text editors; to become very sophisticated in applications such as process control systems; be combined in an integrated development environment; to more easily manage all of the programming functions.

Exercise 43. *Complete the sentences using the English equivalents of the words in brackets.*

1. Computer software is (будь-яка сукупність зчитуваних машиною інструкцій) most often in the form of a computer program, which (спрямовує процесор комп'ютера на виконання спеціальних

операцій) 2. Software includes both machine instructions (двійковий код, який процесор розуміє) and source code (більш доступні для людського розуміння інструкції, що мають переводитися у машинний код компіляторами та інтерпретаторами перед здійсненням). 3. On most computer platforms, software can be grouped into a few broad categories such as (системне, прикладне та вбудоване програмне забезпечення). 4. System software is the basic software designed (керувати апаратними засобами комп'ютера, забезпечувати виконання основних функцій та платформу для запуску прикладного програмного забезпечення). 5. A lengthy process of computer programming is usually referred to as (розробка програмного забезпечення). 6. (Операційні системи, офісні пакети, програми підготовки текстів, програмне забезпечення підключення до мережі Інтернет через кодонабирач) all exist because of the work of programmers.

Exercise 44. *Match the word groups with the following terms.*
*(**Programming languages, programming paradigms, programming process, program requirements, types of software, simple programs, software components, elements of programming languages**)*

a) defining the problem, planning the solution, coding the program, testing the program, documenting the program;

b) imperative, declarative, functional, object-oriented;

c) machine, low-level, assembly, high-level, natural;

d) reliability, robustness, usability, portability, maintainability, efficiency, performance;

e) system, application, embedded;

f) words, individual letters, numerals, symbols, rules for combining elements;

g) compilers, debuggers, interpreters, linkers, text editors;

h) programs, procedures, algorithms.

Exercise 45. *Work in pairs. Translate the following questions and answer them.*

1. Чи є програмне забезпечення сукупністю зчитуваних обчислювальною машиною команд, що спрямовують процесор до виконання певних операцій? 2. До яких інструкцій належить термін "програмне забезпечення"? 3. З чого складається програмне

забезпечення? 4. На які широкі категорії поділяється програмне забезпечення для більшості стандартизованого комп'ютерного обладнання? 5. Для чого призначене системне програмне забезпечення? 6. Чим відрізняється прикладне програмне забезпечення від системного? 7. Для чого використовується вбудоване програмне забезпечення? 8. В яких електронних приладах виробники використовують вбудоване програмне забезпечення? 9. Чи є цей тип програмного забезпечення простим або складним у застосуванні? 10. Яким чином програмне забезпечення виконує функцію програми? 11. На чому має зосереджуватися програміст у процесі розроблення програмного забезпечення? 12. Чи виходить комп'ютерне програмування за межі розроблення програмного забезпечення?

Exercise 46. *Complete the sentences using the verbs in brackets in the correct tense and voice form.*
1.The first theory about software (propose) by Alan Turing in his 1935 essay. 2. When a customer (buy) a minicomputer, at that time the smallest computer on the market, the computer (not to come) with installed software, but needed to be installed by engineers employed by the company. 3. Most hardware companies today (have) more software programmers since software tools (automate) many tasks. 4. Today software products (sell) by many successful companies. 5. New opportunities (arise) recently for software tools that (become) standardized. 6. Software (encompass) a wide array of products and (develop) using different techniques. 7. Application software usually (run) on an underlying software operating systems and (use) also in video games. 8. System software (design) to operate the computer hardware and to provide basic functionality. 9. Programming tools (intend) to assist a programmer in writing computer programs and they (combine) in an integrated development environment. 10. Software (patent) in some but not all countries, though software patents (be) controversial with many people. 11. Specific algorithms or techniques that the software contains (consider) as intellectual property and copyright infringement.

Exercise 47. *Put questions to the italicized words.*

1. *Computer programs and data* are held *in the storage of the computer.* 2. Program software performs *the function of the program* by *directly providing instructions to the digital electronics*. 3. *The computer programmers* focus on *the development of software*. 4. *Development of software* can allow people *to perform a broad range of functions.* 5. *All online functions* are utilized *in the home and office.* 6. *The computer programmer* may be employed with a company that wishes *to use existing software for particular needs.* 7. *System software* is the basic software designed *to operate the computer hardware.* 8. *Many application programs* deal principally with *documents.*

Exercise 48. *Translate the following sentences into English.*
1. Програмне забезпечення передбачає взаємодію між користувачем, прикладним програмним забезпеченням, операційною системою та апаратним забезпеченням. 2. Програмне забезпечення охоплює всі або частину програм, процедур, правил та відповідної документації системи оброблення документації. 3. Академічними галузями, що вивчають програмне забезпечення є інформатика, програмування та програмна інженерія. 4. Програми можна поділити за засобом виконання на інтерпретовані та компільовані. 5. У порівнянні з прикладним програмним забезпеченням, системне забезпечення не розв'язує конкретні практичні завдання, а лише забезпечує роботу інших програм. 6. До системного програмного забезпечення відносять операційні системи, утиліти, системи програмування, системи керування базами даних. 7. Вбудовані програми – це програми, "зашиті" в цифрові електронні пристрої. 8. Прикладне програмне забезпечення призначене для виконання певних завдань користувачів і розраховане на безпосередню взаємодію з користувачем. 9. Програмне забезпечення використовується у проектуванні, розробленні та супроводженні програм на відміну від прикладного та системного програмного забезпечення.

Exercise 49. *Discuss the following questions before reading text 5.*
1. Is writing of programs an art form, a craft, or an engineering discipline? 2. Does the programming language used in writing computer programs affect the form of the final program? 3. Is it possible to repre-

sent the world perfectly with a programming language?

Exercise 50 . *Read, translate, entitle and give the gist of text5.*

Text 5

There is an ongoing debate on the extent to which the writing of programs is an art form, 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 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. However, representing oneself as a "Professional Software Engineer" without a licence 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 and cognitive science, which postulates that a particular spoken language 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.

Exercise 51. *Find the English equivalents in text 5.*

Технічна дисципліна, еволюційне програмне рішення, зважене використання, бути ліцензованим, пройти стандартизоване сертифікаційне випробування, постійні суперечки, охоплювати багато галузей, включати важливі застосування, бути дискусійним, потребувати ліцензію, саморегульований, визначати певне середовище, неправомірний, впливати на кінцеву форму програми, бути аналогічним, впливати на повсякденне мислення мовця,

ставити під сумнів можливість ідеального відображення світу мовою, зумовлювати мислення мовної спільноти.

Exercise 52. *Answer the questions on text 5.*

1. What issues are discussed in the text? 2. What is considered to be good programming? 3. How does the discipline of programming differ from many other technical professions? 4. Why is it still debatable whether licensing is required for the profession as a whole? 5. What is programming discipline self-governed by? 6. Is representing oneself as a "Professional Software Engineer" without a licence legal? 7. What is the subject of the second debate? 8. What is the subject of this debate analogous to? 9. Why does the idea that different language patterns yield different patterns of thought challenge the possibility of representing the world perfectly with language?

Exercise 53 . *Make up a summary of text 5.*

Exercise 54. *Speak on:*

1. Computer software and its categories.
2. Software development and its perspectives.
3. Licensing in computer programming and problems of intellectual property.

Exercise 55. *Read, practice and learn the words and word combinations to text 6.*

Convention – умовне позначення
procedural language – процедурна мова
invoke – здійснювати
assembly language – мова асемблера
natural language – природна мова
state – стан, режим роботи
rudimentary – елементарний,
correspondence – відповідність; співвідношення
computer architecture – архітектура комп'ютера, організаційна
        структура комп'ютера
repetitive – повторюваний
tedious – нудний

error prone – схильний до помилок
devise – розробляти, винаходити
industrial robot – промисловий робот
flexible – гнучкий
generation number – номер покоління
evolve – розвиватися, еволюціонувати
shorthand – умовне позначення
perception – розуміння, сприйняття
outweigh – перевішувати
result-oriented – орієнтований на результат
shield – захищати, екранувати
awareness – усвідомлення, інформованість
infancy – початкова стадія розвитку
knowledge-based language – інтелектна мова
knowledge-based system – інтелектна система, система,
    заснована на знаннях

Exercise 56. *Read, translate and give the gist of text 6.*
Text 6. Programming Languages

In computer technology a programming language is considered as a set of conventions in which instructions are written for the machine. There are many languages that allow humans to communicate with computers. Some languages are known as procedural languages because they use a sequence of commands to specify how the machine is to solve a problem. Others are functional, where programming is done by invoking procedures executed within a program.

Programming languages can also be classified as high-level or low-level, depending on how close they are to the language the computer itself uses or to the language people use. Let's consider five levels or generations of a programming language. They are

    1. Machine language
    2. Assembly languages
    3. High-level languages
    4. Very high-level languages
    5. Natural languages

The lowest level is a machine language which represents data and program instructions as 1s- and 0s-binary digits corresponding to the on and off electrical states in the computer. In the early days of

computing, programmers had rudimentary systems for combining numbers to represent instructions and the programs were not convenient for people to read and use. The computer industry quickly moved to develop assembly languages.

An assembly language is a low-level language for a computer, in which there is a very strong correspondence between the language and the machine code instructions. Each assembly language is specific to particular computer architecture, in contrast to most high-level languages, which are generally portable across multiple systems. The programmer who uses an assembly language requires a translator to convert the assembly language program into machine language. A translator is needed because machine language is the only language the computer can actually execute. The translator is an assembler program, also referred to as an assembler. It takes the programs written in assembly language and turns them into machine language.

Although assembly languages represent a step forward, they still have many disadvantages. A key disadvantage is that assembly language is detailed in the extreme, making assembly programming repetitive, tedious, and error prone.

High-level languages deal in concepts that humans devise and can understand, but they must be translated by means of a compiler in to a language the computer understands. These third-generation languages enable a programmer to accomplish more with less effort, and make programs execute much more complex tasks. Some of such languages are created to serve a specific purpose, such as controlling industrial robots or creating graphics. Many languages, however, are extraordinarily flexible and are considered to be general-purpose.

Very high-level languages are often known by their generation number and are called fourth-generation languages or, more simply, 4GLs. They are still evolving, and that's why cannot be fully defined or standardized. There is no consensus about what constitutes a fourth-generation language. The 4GLs are essentially nonprocedural shorthand programming languages which specify what is to be accomplished without describing how.

A common perception of 4GLs is that they do not make efficient use of machine resources. However, the benefits of getting a program finished more quickly can far outweigh the extra costs of running it. These languages are beneficial as they are result-oriented, improve

productivity, can be used with a minimum of training by both programmers and nonprogrammers and shield users from needing an awareness of hardware and program structure.

Fifth-generation languages which are still in their infancy, are an outgrowth of artificial intelligence research. They are most often called natural languages because of their resemblance to the "natural" spoken English language. Natural languages are sometimes referred to as knowledge-based languages, because they are used to interact with a base of knowledge on some subject. The use of a natural language to access a knowledge base is called a knowledge-based system. The most common application for natural languages is interacting with databases.

Exercise 57. *Translate the following words paying attention to the meaning of prefixes.*

en- : enable, encode, enlarge, enlist, endanger, enroll, entitle, enumerate;

de-: decode, decompile, decompose, decompress, decontrol, deconstruct, debug, deform;

re-: react, recheck, replace, replay, reconstruct, refill, replenish, represent, reread, rewrite, reset;

out-: outboard, outdate, outdo, outgrow, outsource, outweigh, outwork.

Exercise 58. *Add the proper prefixes to form the opposites of the italicized words and translate the corrected sentences.*

1. Writing software without a license is considered *legal*. 2. Many users *agree* with advantages of the new program software. 3. It is *possible* to perform computations without an appropriate algorithm. 4. The programmer is *decisive* about which programming language to use for a given problem. 5. The device must be *connected* in case of short circuiting. 6. The program might be *relevant* to the specific needs of the customer. 7. To eliminate the current error all the program should be *coded*. 8. The device was *composed* in order to be fixed. 9. The source code of the program must be *compiled* in high-level language from its executable code. 10. A computer program that translates machine code into assembly language is called *assembler*.

Exercise 59. *Translate terminological word combinations related*

to programming languages.

Assembly language, current programming language, declarative language, formal language, functional language, high-level language, interpretive language, language definition, language extension, 4GL, language implementation, machine language, natural language, problem-oriented language, program language, simulation language, typed language.

Exercise 60. *Translate the following word-combinations from text 6.*

a) a set of conventions; a sequence of commands; the lowest level; rudimentary system; machine code instructions; an assembler program; a detailed language; a repetitive, tedious and error prone programming; an industrial robot; an extraordinarily flexible language; a general-purpose language; evolving languages; machine resources; result-oriented language; awareness of hardware and program structure; artificial intelligence research; a knowledge-based system; common application;

b) to invoke procedure, to correspond to the on and off electrical states, to be specific to particular computer architecture, to be generally portable across multiple systems, to convert the assembly language program into machine language, to be referred to as an assembler, to represent a step forward, to be translated by means of a compiler, to accomplish more with less effort, to make programs execute much more complex tasks, to serve a specific purpose, to be known by generation number, to be fully defined or standardized, to constitute a language, to outweigh the extra costs, to improve productivity, to be used with a minimum of training, to shield users, to interact with databases.

Exercise 61. *Match the English –Ukrainian equivalents.*

1) convention
a) організаційна структура комп'ютера

2) error prone program
b) елементарний

3) repetitive process
c) мова загального призначення

4) computer architecture
d) схильна до помилок програма

5) result-oriented
e) номер покоління

6) artificial intelligence
f) орієнтований на результат

7) general-purpose language	g) умовне позначення
8) generation number	h) процедурна мова
9) knowledge-based system	i) команда машинною мовою
10) procedural language	j) штучний інтелект
11) rudimentary	k) інтелектна мова
12) machine code instruction	l) система, заснована на знаннях
13) machine resource	m) повторюваний процес
14) knowledge-based language	n) машинний ресурс

Exercise 62. *Read the statements about advantages and disadvantages of some programming languages. Fill in the gaps with the words given in brackets and translate the sentences.*

(assembly language, machine language, fourth-generation language, fifth-generation languages, high-level languages, very high-level languages)

1. Programming in …… was difficult and fraught with errors due to the rudimentary systems for combining numbers to represent instructions. 2. ……. are beneficial as they are result-oriented, improve productivity, can be used with a minimum of training by both programmers and nonprogrammers and shield users from needing an awareness of hardware and program structure. 3. …… enable a programmer to accomplish more with less effort, and make programs execute much more complex tasks. 4. …… is detailed in the extreme, making assembly programming repetitive, tedious, and error prone. 5. …… are an outgrowth of artificial intelligence research. 6. …… do not make efficient use of machine resources.

Exercise 63. *Match the terms with their definitions to complete the sentences.*

1.Machine language	a) are called so because of their resemblance to the spoken English language
2.Assembly language	b)are nonprocedural shorthand programming languages which specify what is to be accomplished without describing how
3. High-level languages	c) has very strong correspondence between the language and the machine code

	instructions
4. Very high-level languages	d) represents data and program instructions corresponding to the on and off electrical states in the computer
5.Natural languages	e) must be translated by means of a compiler in to a language the computer understands

Exercise 64. *In exercise 64 ask a) subject questions on the information missed in the sentences; b) special, alternative and disjunctive questions.*

Exercise 65. *Answer the questions on text 6.*

1. What is considered as a programming language? 2. What is the difference between procedural and functional languages? 3. How can programming languages be classified? 4. What does this classification depend on? 5. What data and program instructions does the low-level or machine language represent? 6. Why did the computer industry quickly move to develop assembly languages? 7. Is each assembly language specific to particular computer architecture? 8. Why does the programmer who uses an assembly language require a translator? 9. What is referred to as an assembler? 10. What is considered to be a key disadvantage of assembly language? 11. How do high-level languages enable a programmer to accomplish his task? 12. Which languages are often known by their generation number and called fourth-generation languages? 13. What are the advantages and disadvantages of fourth-generation languages? 14. Why are fifth-generation languages often called natural languages? 15. What are natural languages sometimes referred to? 16. What is the most common application for natural languages? 17. Many high-level languages are considered to be general-purpose, aren't they? 18. Are 4Gls or fifth-generation languages called natural languages? Why?

Exercise 66. *Explain the difference between the following terms.*

Procedural and functional language; machine language and assembly language, high-level languages and very high-level languages, artificial intelligence and knowledge-based system.

Exercise 67. *Find in text 6 examples of non-finite forms of the verbs and arrange them in the chart below.*

The Infinitive	The Gerund	The Participle	
		Present Participle	Past Participle

Exercise 68. *Use the verbs in brackets in the appropriate voice form.*

1. Programming languages can also (classify) as high-level or low-level. 2. High-level languages must (translate) by means of a compiler into language computer understands. 3. The program (need) to be stored in the primary memory of the computer. 4. Each number in the sequence of zeros and ones may (indicate) the instruction to be executed. 5. Instructions that the computer can (understand) directly are said to be written in machine language. 6. Explicit locations must (write) in an appropriate language to find the best solution to a given problem. 7. Some of the difficulties of machine programming can (eliminate). 8. A relatively simple program called an assembler can (convert) symbolic notation into an equivalent machine language. 9. There may (be) various binary operations involving the internal format of the data. 10. While the data operations provide manipulation, there must (be) a mechanism for deciding which expressions to execute in order to generate the desired answer. 11. An algorithm must (trace) a path through a series of expressions in order to arrive at an answer.

Exercise 69. *Translate the following sentences into English.*

1. Мова програмування призначена для написання комп'ютерних програм, які використовуються для надання комп'ютеру інструкцій до виконання обчислювального процесу та організації керування окремими пристроями. 2. У мовах програмування можуть використовуватися спеціальні команди для визначення та маніпулювання даними. 3. Процедурні мови використовують послідовність команд для визначення, як саме машина повинна розв'язувати проблему. 4. Функціональні мови

відповідають типу програмування, що здійснює виконання операцій в межах програми. 5. Можливість швидкого виконання програми переважує недолік, пов'язаний з додатковими витратами на її експлуатацію. 6. Мови четвертого покоління є більш досконалими, оскільки є орієнтованими на результат, підвищують продуктивність, можуть використовуватися з мінімальною підготовкою як програміста, так і користувача та не потребують обов'язкового розуміння апаратного забезпечення і структури програми. 7. Мови п'ятого покоління, які все ще знаходяться на початковій стадії розвитку, походять з досліджень штучного інтелекту. 8. Деякими мовами може користуватися лише невелика кількість їх розробників, інші стають відомі мільйонам людей. 9. Кожний рік кількість мов програмування збільшується. 10. Для багатьох поширених мов програмування існують міжнародні стандарти.

Exercise 70. *Read, translate and entitle text 7. Write key questions to the text.*

Text 7

The third-generation languages in common use today are FORTRAN (a scientific language), COBOL (a business language), BASIC (simple language used for education and business), Pascal (education) and C (general purposed).

FORTRAN is noted for its brevity, and this characteristic is part of the reason why it remains popular. This language is very good at serving its primary purpose, which is execution of complex formulas such as those used in economic analysis and engineering.

COBOL is very good for processing large files and performing relatively simple business calculations, such as payroll or interest. A noteworthy feature of COBOL is that it is English-like far more so than FORTRAN or BASIC. Today some companies, devoted to fast, nimble program development, are converting to the more trendy language C. But COBOL, with more than 30 years of staying in power, is still famous for its clear code, which is easy to read and debug.

BASIC is easy to learn, even for a person who has never programmed before. Thus, the language is used often to train students in the classroom. BASIC is also used by non-programming people, such as engineers, who find it useful in problem solving.

Pascal was developed as a teaching language and first became available in 1971. Since that time it has become quite popular, particularly in universities and colleges offering computer science programs.

C produces code that approaches assembly language in efficiency while still offering high-level language features. C was originally designed to write systems software but is now considered a general-purpose language. C contains some of the best features from other languages, including Pascal. C compilers are simple and compact.

Although C is simple and elegant, it is not simple to learn. It was developed for gifted programmers, and the learning curve may be steep. Straightforward tasks may be solved easily in C, but complex problems requ ire mastery of the language.

Today C has been replaced by its enhanced cousin, C++. C++ in turn is being challenged by web-aware languages like Java and Javascript, that look and act a lot like C++, but add features to support working with networked computers, among other things.

Exercise 71. *Discuss advantages and disadvantages of programming languages given in text 7.*

Exercise 72. *Read text 8 and put the questions to all the statements related to choosing a programming language. Arrange the questions with answers to compose a dialogue. Work in groups.*

Text 8. Choosing a Language

How do you choose the language with which to write your program?

There are several possibilities:

• In a work environment, your manager may decree that everyone on your project will use a certain language.

• You may use a certain language, particularly in a business environment, based on the need to interface with other programs; if two programs are to work together, it is easiest if they are written in the same language.

• You may choose a language based on its suitability for the task. For example, a business program that handles large files may be best written in the business language COBOL.

• If a program is to be run on different computers, it must be written in a language that is portable-suitable on each type of computer-

so that the program need be written only once.

• You may be limited by the availability of the language. Not all languages are available in all installations or on all computers.

• The language may be limited by the expertise of the programmer; that is, the program may have to be written in a language that available programmer knows.

• Perhaps the simplest reason, one that applies to many amateur programmers, is that they know the language called BASIC because it came with or was inexpensively purchased with their personal computers.

Exercise 73. *Speak on:*

1. Types of programming languages and their application.

2. Advantages and disadvantages of different programming languages.

3. How to choose a programming language.

CONTENTS

LITERATURE

1. *Англійська* мова: Навчальний посібник / О. М. Акмалдінова, С. Й. Аніщенкова, В. А. Каширський, С. П. Фатєєва. – К. : НАУ,

2003. – 120 с.

2. *Automation* in aviation: навчальний посібник: О. М. Акмалдінова, С. Й. Аніщенкова, В. А. Каширський. – К. : НАУ, 2006. – 156 с.

3. *A Dictionary* of Computing. John Daintith, Valerie Illingworth, Ian C. Pyle. – Oxford University Press, 2004. – 608 p.

4. *Oxford* English for Information Technology. Eric H. Glendinning, John McEwan. – Oxford University Press, 2002. – 222 p.

5. *Longman* Dictionary of English Language and Culture. – Edinburgh : Pearson Education, 2003. – 1568 p.

6. *English*-Ukrainian Dictionary. Vol. I, II. – К. : Освіта, 1996. – Vol. I. – 752 с.

7. Англо-український тлумачний словник з обчислювальної техніки, Інтернету і програмування / Е. М. Пройдаков, Л. А. Теплицький. – Вид1-К.: Видавничий дім “Софт Прес”, 2005. – 552с.

7. *Новий* англо-українсько-російський словник. – Х. : Єдиноріг, 1999. – 512 с.

8. http://www.wikipedia.org

9. http://www.answers.com