МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
МИКОЛАЇВСЬКИЙ НАЦІОНАЛЬНИЙ АГРАРНИЙ УНІВЕРСИТЕТ

Факультет культури й виховання
Кафедра іноземних мов

Англійська мова

методичні рекомендації та навчальний матеріал для аудиторної та самостійної роботи здобувачів першого (бакалаврського) рівня вищої освіти ОПП «Комп'ютерні науки» спеціальності F3 (122) «Комп'ютерні науки» денної форми здобуття вищої освіти

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CONTENT

ПЕРЕДМОВА

Методичні рекомендації та навчальний матеріал з англійської мови призначені для аудиторної та самостійної роботи здобувачів першого (бакалаврського) рівня вищої освіти — здобувачів ступеня «Бакалавр» спеціальності «Комп'ютерні науки». Методичні рекомендації розроблені відповідно до освітньо-професійної програми підготовки бакалаврів та навчального плану підготовки фахівців спеціальності F3 (122) «Комп'ютерні науки», у рамках дисципліни «Іноземна мова за професійним спрямуванням» (ESP – English for Specific Purposes) на засадах компетентнісного, комунікативного та системного підходів.

Метою методичних рекомендацій є формування іншомовної комунікативної компетентності у сфері комп'ютерних наук: розвиток навичок читання та розуміння англомовних фахових текстів, засвоєння галузевої термінології, повторення та закріплення граматичних конструкцій у професійному контексті. Автентичні тексти слугують основним джерелом фахової лексики і відображають сучасний стан розвитку інформаційних технологій, включаючи теми штучного інтелекту, кібербезпеки та хмарних обчислень. Лексичні вправи забезпечують поетапне формування термінологічної компетенції, необхідної для читання технічної документації, участі в міжнародній науковій комунікації та подальшого навчання англійською мовою.

Методичні рекомендації складаються з 4 уроків, кожен з яких містить автентичні фахові тексти, лексичні та граматичні вправи, завдання на розуміння прочитаного і комунікативні завдання.

Посібник також містить англо-український словник комп'ютерних термінів.

LESSON 1
COMPUTING BASICS

1. Read and translate the text.

The first computers were used primarily for numerical calculations. However, as any information can be numerically encoded, people soon realized that computers are capable of general-purpose information processing. Their capacity to handle large amounts of data has extended the range and accuracy of weather forecasting. Their speed has allowed them to make decisions about routing telephone connections through a network and to control mechanical systems such as automobiles, nuclear reactors, and robotic surgical tools. They are also cheap enough to be embedded in everyday appliances and to make clothes dryers and rice cookers "smart." Computers have allowed us to pose and answer questions that could not be pursued before. These questions might be about DNA sequences in genes, patterns of activity in a consumer market, or all the uses of a word in texts that have been stored in a database. Increasingly, computers can also learn and adapt as they operate.

Computers also have limitations, some of which are theoretical. For example, there are undecidable propositions whose truth cannot be determined within a given set of rules, such as the logical structure of a computer. Because no universal algorithmic method can exist to identify such propositions, a computer asked to obtain the truth of such a proposition will (unless forcibly interrupted) continues indefinitely – a condition known as the "halting problem." Other limitations reflect current technology. Human minds are skilled at recognizing spatial patterns – easily distinguishing among human faces, for instance – but this is a difficult task for computers, which must process information sequentially, rather than grasping details overall at a glance. Another problematic area for computers involves natural language interactions. Because so much common knowledge and contextual information is assumed in ordinary human communication,

researchers have yet to solve the problem of providing relevant information to general-purpose natural language programs (from https://www.britannica.com/technology/computer).

2. Fill in the gaps in the sentences with the suitable words (the first letter of the word is given as a clue).

1. A C _____can store much data.
2. The module provides 16Mb of m _____ .
3. A computer v_____ can cause system failure, wasting computer resources, corrupting data, etc.
4. We c _____ large files to reduce downloading time.
5. People use a search engine such as Google to locate data via the w_____ .
6. I sat down at the computer, moved the m_____and opened a browser.
7. It is easy to c ___ and p _____ the text if necessary.
8. This allows the user to move the c _____ to the edge of the screen and as a result, the camera will move in the same direction.
9. A m _____and a computer k_____ are fine for word processing but not for recording and mixing.

3. Use the correct form of the verb "to be" in the following sentences:

1) An application *is/are* a program designed to fulfil a particular purpose.

2) A program *are/is* a series of coded software instructions to control the operation of a computer or other machine.

3) A cursor *am/is* a movable indicator on a computer screen.

4) A keyboard *is/are* a panel of keys that operate a computer or typewriter.

5) A mouse pad *are/is* a piece of rigid material on which a computer mouse is moved.

6) Files *are/is* collections of data, programs, etc., stored in a computer's memory or on a storage device under a single identifying name.

4. Read and translate the text.

What is a computer?

The word computer comes from a Latin word which means to count. Nearly one hundred and fifty years ago there were no such things as computers. Knotted ropes, marks in clay, the abacus are all methods of keeping track of numbers.

What is a computer? Computer, device for processing, storing, and displaying information. *Computer* once meant a person who did computations, but now the term almost universally refers to automated electronic machinery.

Most computers rely on a binary system that uses two variables, 0 and 1, to complete tasks such as storing data, calculating algorithms, and displaying information. Computers come in many different shapes and sizes, from handheld smartphones to supercomputers weighing more than 300 tons.

Who invented the computer? Many people throughout history are credited with developing early prototypes that led to the modern computer. During World War II, physicist John Mauchly, engineer J. Presper Eckert, Jr., and their colleagues at the University of Pennsylvania designed the first programmable digital computer, the Electronic Numerical Integrator and Computer (ENIAC).

*What is the most powerful computer in the world?*As of 2025, the most powerful computer in the world is the American supercomputer El Capitan, deployed at Lawrence Livermore National Laboratory (California, USA). It achieves 1.8 exaFLOPS and has been used for nuclear stockpile simulations and advanced AI workloads. Fugaku (Japan, developed by RIKEN and Fujitsu. It has been used to model COVID-19Fujitsu) formerly held the top spot and was used to model COVID-19 simulations.

How do programming languages work? Popular modern

programming languages, such as JavaScript and Python, work through multiple forms of programming paradigms. Functional programming, which uses mathematical functions to give outputs based on data input, is one of the more common ways code is used to provide instructions for a computer.

What can computers do? The most powerful computers can perform extremely complex tasks, such as simulating nuclear weapon experiments and predicting the development of climate change. The development of quantum computers, machines that can handle a large number of calculations through quantum parallelism (derived from superposition), would be able to do even more complex tasks.

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5. Match words a-d to words 1-4. Use a dictionary if necessary.

1)	to evolve	a) to help
2)	to aid	b) to calculate
3)	to compute	c) to make possible
4)	to enable	d) to develop

6. Read the text and fill in the blanks with the appropriate phrase a-d.

a) which enables them to perform a vast number of calculations or computations in less than no time.

b) which were invented in the last century, and have evolved into modern computers we use today.

c) where input, output and processing are simply the act of moving the beads into new positions, seeing the changed positions,

and counting.

d) which aids humans in performing various kinds of computations or calculations.

7. Fill in the gaps with suitable words:

In its most basic form a computer is any device 1) _____ . The earliest computer was the abacus, used to perform basic arithmetic operations. Every computer supports some form of input, processing, and output. This is less obvious on a primitive device such as the abacus 2) _____ . Nevertheless, this is what computing is all about. We input information; the computer processes it according to its basic logic or the program currently running, and outputs the results. Modern computers do this electronically 3) _____ the fact that we currently use computers to process images, sound, text and other non-numerical forms of data, all of it depends on nothing more than basic numerical calculations. Graphics, sound, etc. are abstractions of the numbers. Every image, every sound, and every word have a corresponding binary code. While abacus may have technically been the first computer most people today associate the word "computer" with electronic computers 4) _____ .

8. Define sentences as True (T) and False (F).

a) The abacus was the first type of the computer.

b) The use of the computer depends on basic numerical calculations.

c) Binary codes belong to images, sounds, and words.

9. Give the English equivalents to the following word-combinations:

Рахівниця, пристрій, тим не менш, в цьому суть процесу комп'ютерних обчислень, дозволяти / давати можливість,

вводити дані, видавати результат, обробляти.

10. Answer the questions.

- Does the computer aid humans in performing various kinds of computations or calculations?
- What does every computer support?
- What depends on basic numerical calculations?
- What do most people today associate the word "computer" with?

LESSON 2
FROM THE HISTORY OF COMPUTERS

1. Read and translate the text.

The very first calculating device used was the ten fingers of a man's hands. This, in fact, is why today we count in tens and multiply of tens. Then the abacus was invented, a bead frame in which the beads are moved from left to right. People went on using some form of abacus well into the 16th century; it is being used in some parts of the world because it can be understood without knowing how to read.

During the 17th and 18th centuries many people tried to find easy ways of calculating. J.Napier, a Scotsman, devised a mechanical way of multiplying and dividing, which is how the modern slide rule works. Henry Briggs used Napier's ideas to produce logarithm which all mathematicians used today.

Calculus, another branch of mathematics, was independently invented by Sir Isaac Newton, an Englishman, and Leibnitz, a German mathematician. The first real calculating machine appeared in 1820 as the result of several people's experiments. This type of machine, which saves a great deal of time and reduces the possibility of making mistakes, depends on ten-toothed gear wheels.

In 1830 Charles Babbage, an Englishman, designed a machine that was called 'The Analytical Engine'. This machine, which Babbage showed at the Paris Exhibition in 1855, was an attempt to cut out the human being altogether, expert for providing the machine with the necessary facts the problem to be sowed. He never finished this work, but many of his ideas were the basis for building today's computers.

In 1930, the first analog computer was built by American named Vannevar Bush. The device was used in World War II to help aim guns. Mark I, the name given to the first digital computer, was completed in 1944. The men responsible for this invention were Professor Howard Aiken and some people from IBM. This was the first machine that could figure out long of mathematical problems all at a very fast speed.

In 1946 two engineers at the University of Pennsylvania, J. Eckert and J. Mauchly, built the first digital computer using parts called vacuum tubes. They named their new invention UNIVAC. The first generation of computers, which used vacuum tubes, came out in 1950. UNIVAC I was an example of these computers which could perform thousands of calculations per second.

In 1960, the second generation of computers was developed and could perform work ten times faster than their predecessors. The reason for this extra speed was the use of transistors instead of vacuum tubes. Second-generation computers were smaller, faster and more dependable than firstgeneration computers.

The third-generation computers appeared on the market in 1965. These computers could do a million calculations a second, which is 1000 times faster than the first generation computers. Unlike second-generation computers, these are controlled by tiny integrated circuits and are consequently smaller and more dependable.

Fourth-generation computers have now arrived, and the integrated circuits that are being developed have been greatly reduced in size. This is due to microminiturization, which means that the circuits are much smaller than before; as many as 1000 tiny

circuits now fit onto a single chip. A chip is a square or rectangular piece of silicon, usually from 1/10 to 1/4 inch, upon which several layers of an integrated circuit are attached or imprinted, after which the circuit is encapsulated in plastic metal. Fourth-generation computers are 50 times faster than third-generation computers and can complete approximately 1.000.000 instructions per second.

2. Give the Ukrainian equivalents to the following word-combinations:

to calculate, ten-toothed gear wheels, to aim guns, responsible, to devise, a chip, rectangular, to encapsulate, dependable, a slide rule, an abacus, a bead frame, to reduce, to figure out, a generation, a predecessor, a layer, attached

3. Fill in the gaps with the suitable words from the list:

Machine, chip, speed, figure out, calculating, vacuum tubes, dependable, reduces, analog, abacus, tiny, logarithm, devised, microminiturization

1. The very first ..... device used was 10 fingers of a man's hand.
2. Then, the ..... was invented.
3. J.Napier ..... a mechanical way of multiplying and dividing.
4. Henry Briggs used J.Napier's ideas to produce ..... .
5. The first real calculating ..... appeared in 1820.
6. This type of machine ..... the possibility of making mistakes.
7. In 1930 the first ..... computer was built.
8. This was the first machine that could .... mathematical problems at a very fast speed.
9. In 1946 was built the first digital computer using parts called .... .
10. The reason for this extra ..... was the use of transistors instead of vacuum tubes.

11. The second generation computers were smaller, faster and more ..... than first-generation computers.

12. The third-generation computers are controlled by ..... integrated circuits.

13. This is due to ....., which means that the circuits are much smaller than before.

14. A ..... is a square or rectangular piece of silicon, usually from 1/10 to 1/4 inch.

4. Give the English equivalents for the following words and word combinations:

Винаходити рахівницю; вдосконалення комп'ютерів; математичні задачі; важливе досягнення; застарілий, цифрові комп'ютери; запам'ятовуючий пристрій; значний внесок; двійковий код; висока напруга; низька напруга; електричні імпульси; тисячна частка секунди; відбуватися; завершувати; продовжувати використовувати; механічний спосіб множення і ділення; зменшувати ймовірність помилок; обчислювати довгі списки математичних задач; попередник; більш надійний; прямокутний шматочок кремнію; технічні електронні трубки; вдосконалення; відповідальний за винахід; обчислювати; зберігати команди всередині комп'ютера; запам'ятовувати інформацію; запам'ятовувати команди; сприяти; використовувати одиницю і нуль; спрощувати дизайн; посилювати сигнали; виконувати обчислення.

5. Arrange the items of the plan in a logical order according to the text:

1. J.Napier devised a mechanical way of multiplying and dividing.

2. The very first calculating device was the ten fingers of a man’s hands.

3. Babbage showed his analytical engine at Paris Exhibition.

4. The first real calculating machine appeared in 1820.

5. The first analog computer was used in World War II.

6. Look through the text and decide if the sentences are true (T) or false (F). Change the false sentences to make them true:

1. The slide rule was invented hundreds of years ago.
2. During the early 1880s, many people worked on inventing a mechanical calculating machine.
3. Charles Babbage, an Englishman, can well be called the father of computers.
4. The first computer was invented and built in the USA.
5. Instructions used by computers have always been kept inside the computer's memory.
6. Using transistors instead of vacuum tubes did nothing to increase the speed at which calculations were done.
7. As computers evolved, their size decreased and their dependability increased.
8. Today's computers have more circuits than previous computers.
9. Computer technology has developed to a point from which new developments in the field will take a long time to come.

7. Answer the questions.

1. When was the first analog computer built?
2. Where and how was that computer used?
3. When did the first digital computers appear?
4. Who was the inventor of the first digital computer?
5. What could that device do?
6. What is ENIAC? Decode the word.
7. What was J. Neumann's contribution into the development of computers?
8. What were the advantages of EDVAC in comparison with ENIAC?
9. What does binary code mean?
10. Due to what invention could the first digital computers be built?

8. Give the Ukrainian equivalents to the following word-combinations:

Process, create, data network, learning tool, electronic digital computers, hardware, software, price has dropped, exceed, computers were running.

9. Mark the sentences in the text that answer the questions.

- What is the computer's main function?
- What do computers do to process information?
- What kind of information can computers process?
- How has the computer changed the world?
- How has hardware advanced since 1946?
- How has the technology of software changed?
- Why has the price of computer dropped sharply?

LESSON 3
THE COMPUTER-BASED INFORMATION SYSTEM

1. Read and translate the text.

A computer-based information system involves collecting data (input), processing it into information, and storing the information for future reference and output. The system, as you remember, has five basic components – hardware, software, people, procedures, and data/information – and four major phases of activity – input, processing, output, and storage. People are most directly involved during the input and output phases. Each organization has different processing requirements, depending on the nature of its business and activities and how quickly the data needs to be processed. To accommodate these differing needs, the computer-based information system can be designed to use one or both of two basic types of processing approaches: batch and on-line. These approaches differ in terms of the methods for collecting

the data for input, the amount of time that passes between data input and actual processing, and the speed with which the output is produced. In the batch approach, data recorded manually on source documents is gathered together in batches and input all at one time. In the on-line approach, data is input immediately, on a case-by-case basis, and is processed immediately. On-line processing used for immediate decision making is often called real-time processing. In many organizations, we can see a direct relationship between computer-related functions and management's organizational philosophy. As a result, organizations set up their computer facilities differently, using either a centralized, decentralized, or distributed computer facility. A centralized computer facility has all its equipment in one location. This equipment serves all the company's departments. A decentralized facility has separate computer equipment for each department in the company. A distributed facility combines aspects of both the centralized and the decentralized facilities: users have microcomputers with communication programs so that they may switch to the main computer from time to time. They have the choice of working independently or with the central computer. (from https://en.wikipedia.org/wiki/Information_system).

2. Match words with their definitions:

financial, Internet, electronic, print, design, microchips

1) tiny pieces of silicon containing complex electronic circuits;

2) to make or draw plans for something;

3) relating to money or how money is managed;

4) involving the use of electric current in devices such as TV sets;

5) the large system of connected computers around the world;

6) to produce text and pictures using a printer.

3. Choose the most suitable answer:

1. . … is the product of data processing.

a. data

b. information

c. software

d. a computer

e. none of the above

2. The most common input device used today is the … .

a. motherboard

b. central processing unit

c. keyboard

d. system unit

e. semiconductor

3. Software instructions intended to satisfy a user's specific processing needs are

called … .

a. systems software

b. a microcomputer

c. documentation

d. applications software

e. all of the above

4. Read and translate the text.

Parts of a computer

A computer is an electronic machine that accepts, processes, stores and outputs information. A typical computer consists of two parts: hardware and software.

Hardware: is any electronic or mechanical part of the computer system that you can see or touch.

The physical elements of a computer, its hardware, are generally divided into the central processing unit (CPU), main memory (or random-access memory, RAM), and peripherals. The last class encompasses all sorts of input and output (I/O) devices: keyboard, display monitor, printer, disk drives, network connections, scanners, and more.

The CPU and RAM are integrated circuits (ICs) – small silicon wafers, or chips, that contain thousands or millions of transistors that function as electrical switches. In 1965 Gordon Moore, one of the founders of Intel, stated what has become known as Moore's law: the number of transistors on a chip doubles about every 18 months. Moore suggested that financial constraints would soon cause his law to break down, but it has been remarkably accurate for far longer than he first envisioned. It now appears that technical constraints may finally invalidate Moore's law, since sometime between 2010 and 2020 transistors would have to consist of only a few atoms each, at which point the laws of quantum physics imply that they would cease to function reliably.

Software is a set of instructions called a program, which tells a computer what to do.*Software* denotes programs that run on computers. John Tukey, a statistician at Princeton University and Bell Laboratories, is generally credited with introducing the term in 1958 (as well as coining the word *bit* for binary digit). Initially software referred primarily to what is now called system software – an operating system and the utility programs that come with it, such as those to compile (translate) programs into machine code and load them for execution. This software came with a computer when it was bought or leased. In 1969 IBM decided to "unbundle" its software and sell it separately, and software soon became a major income source for manufacturers as well as for dedicated software firms.

5. Match the terms with their definitions:

1 CD/DVD drive	A any socket into which a peripheral device may be connected
2 speaker	B device used to produce voice output and play back music
3 modem	C mechanism that reads and/or writes to optical discs
4 port	D device that converts data so that it can travel over the Internet

5 CPU (Central Processing Unit)	E a set of keys on a computer which you press to produce letters, numbers, etc.
6 keyboard	F the part of a computer that controls what it does
7 mouse	G the box of a computer that contains the hardware
8 case	H a small object connected to a computer, that you move with your hand and press to make the computer do things

6. Memorize the words:

to imply - мати на увазі
a mixture of integrated parts - суміш пов'язаних деталей
equipment - обладнання
to direct the processing of data - направляти обробку даних
to interact - взаємодіяти
application software - прикладне програмне забезпечення
internal resources - внутрішні ресурси
to run (execute programs) - запускати (виконувати) програми
to store data and programs - зберігати дані і програми
word processing - текстова обробка
payroll checks - перевірка платіжних відомостей
explore - досліджувати, вивчати
a pointing device - вказівний пристрій
to roll on the desktop - кататися (ковзати) на поверхні столу
to direct the insertion point (cursor) - направляти покажчик (курсор)
to glide the mouse - ковзати мишкою
to move in the direction of your movement - рухатися в напрямку вашого руху
to press and release the button one time - натиснути і відпустити кнопку один раз
the system unit - системний блок
to double-click the mouse - робити подвійне клацання мишею
to hold the processed information - містити оброблену інформацію
temporary storage - тимчасове сховище
if the electrical power is disrupted or cut off - якщо електрику переривається або відключається
the electrical power is on - електрику включено
to store permanently - зберігати постійно

the turning off the electrical power - вимикання електрики
to have much greater capacity - мати набагато більшу ємність
to access information - отримати доступ до інформації
to resemble - нагадувати
to display text characters - показувати текстові символи
image - зображення
to be made up of tiny dots - складатися з крихітних точок
resolution - роздільна здатність
to send and receive data - відправляти і отримувати дані
to convert the electronic signals - перетворювати електронні сигнали
external unit - зовнішній елемент

7. Give the Ukrainian equivalents for the following word combinations:

1) custom programs might compute payroll checks; 2) to be contained on a single integrated circuit; 3) programs prewritten by professional programmers; 4) to imply a mixture of integrated parts working together; 5) to enable the application software to interact with the computer hardware; 6) more advanced applications; 7) to fall into five categories; 8) to look like a typewriter keyboard; 9) to direct the insertion point; 10) a browser to navigate, explore, and find information in the Internet; 11) to depend on the number and size of the pixels; 12) internal or external unit; 13) to distribute full-length motion pictures; 14) a protective sturdy plastic cover; 15) to be located on the tiny memory chips.

8. Read and translate the text.

Central processing unit

The CPU provides the circuits that implement the computer's instruction set—its machine language. It is composed of an arithmetic-logic unit (ALU) and control circuits. The ALU carries out basic arithmetic and logic operations, and the control section determines the sequence of operations, including branch instructions that transfer control from one part of a program to another. Although the main memory was once considered part of the CPU, today it is regarded as separate. The boundaries shift,

however, and CPU chips now also contain some high-speed cache memory where data and instructions are temporarily stored for fast access.

The ALU has circuits that add, subtract, multiply, and divide two arithmetic values, as well as circuits for logic operations such as AND and OR (where a 1 is interpreted as true and a 0 as false, so that, for instance, 1 AND 0 = 0; *see* Boolean algebra). The ALU has several to more than a hundred registers that temporarily hold results of its computations for further arithmetic operations or for transfer to main memory.

The circuits in the CPU control section provide branch instructions, which make elementary decisions about what instruction to execute next. For example, a branch instruction might be "If the result of the last ALU operation is negative, jump to location A in the program; otherwise, continue with the following instruction." Such instructions allow "if-then-else" decisions in a program and execution of a sequence of instructions, such as a "while-loop" that repeatedly does some set of instructions while some condition is met. A related instruction is the subroutine call, which transfers execution to a subprogram and then, after the subprogram finishes, returns to the main program where it left off.

In a stored-program computer, programs and data in memory are indistinguishable. Both are bit patterns – strings of 0s and 1s – that may be interpreted either as data or as program instructions, and both are fetched from memory by the CPU. The CPU has a program counter that holds the memory address (location) of the next instruction to be executed.

At the end of these steps the cycle is ready to repeat, and it continues until a special halt instruction stops execution.

Steps of this cycle and all internal CPU operations are regulated by a clock that oscillates at a high frequency (now typically measured in gigahertz, or billions of cycles per second). Another factor that affects performance is the "word" size – the number of bits that are fetched at once from memory and on which

CPU instructions operate. Digital words now consist of 32 or 64 bits, though sizes from 8 to 128 bits are seen.

Processing instructions one at a time, or serially, often creates a bottleneck because many program instructions may be ready and waiting for execution. Since the early 1980s, CPU design has followed a style originally called reduced-instruction-set computing (RISC). This design minimizes the transfer of data between memory and CPU (all ALU operations are done only on data in CPU registers) and calls for simple instructions that can execute very quickly. As the number of transistors on a chip has grown, the RISC design requires a relatively small portion of the CPU chip to be devoted to the basic instruction set. The remainder of the chip can then be used to speed CPU operations by providing circuits that let several instructions execute simultaneously, or in parallel.

There are two major kinds of instruction-level parallelism (ILP) in the CPU, both first used in early supercomputers. One is the pipeline, which allows the fetch-decode-execute cycle to have several instructions under way at once. While one instruction is being executed, another can obtain its operands, a third can be decoded, and a fourth can be fetched from memory. If each of these operations requires the same time, a new instruction can enter the pipeline at each phase and (for example) five instructions can be completed in the time that it would take to complete one without a pipeline. The other sort of ILP is to have multiple execution units in the CPU – duplicate arithmetic circuits, in particular, as well as specialized circuits for graphics instructions or for floating-point calculations (arithmetic operations involving noninteger numbers, such as 3.27). With this “superscalar” design, several instructions can execute at once.

Both forms of ILP face complications. A branch instruction might render preloaded instructions in the pipeline useless if they entered it before the branch jumped to a new part of the program. Also, superscalar execution must determine whether an arithmetic operation depends on the result of another operation, since they

cannot be executed simultaneously. CPUs now have additional circuits to predict whether a branch will be taken and to analyze instructional dependencies. These have become highly sophisticated and can frequently rearrange instructions to execute more of them in parallel.

(from https://www.britannica.com/technology/computer/).

9. Match the terms with their definitions:

1 Expansion cards	A handles all processor control signals. It directs all input and output flow, fetches code for in-structions from microprograms and directs other units and models by providing control and tim-ing signals.
2 motherboard	B determines how much data can be transmitted.
3 control unit (CU)	C extra circuit boards that are used to increase the functions of a computer.
4 arithmetic logic unit	D is a firm slotted board onto which computer circuitry is attached.
5 bus width	E is a major component of the central processing unit of a computer system. It does all processes related to arithmetic and logic operations that need to be done on instruction words.

10. Answer the questions:

1. What is the main function of a computers processor?
2. What unit of frequency is used to measure processor speed?
3. What are the main parts of the CPU?
4. What does ALU stand for? What does it do?
5. What is the function of the system clock?
6. What is a bus, backside bus, front-side bus?
7. What do you know about multiple processors?

11. Read and translate the text.

Main memory

The earliest forms of computer main memory were mercury delay lines, which were tubes of mercury that stored data as ultrasonic waves, and cathode-ray tubes, which stored data as charges on the tubes' screens. The magnetic drum, invented about

1948, used an iron oxide coating on a rotating drum to store data and programs as magnetic patterns.

In a binary computer any bistable device (something that can be placed in either of two states) can represent the two possible bit values of 0 and 1 and can thus serve as computer memory. Magnetic-core memory, the first relatively cheap RAM device, appeared in 1952. It was composed of tiny, doughnut-shaped ferrite magnets threaded on the intersection points of a two-dimensional wire grid. These wires carried currents to change the direction of each core's magnetization, while a third wire threaded through the doughnut detected its magnetic orientation.

The first integrated circuit (IC) memory chip appeared in 1971. IC memory stores a bit in a transistor-capacitor combination. The capacitor holds a charge to represent a 1 and no charge for a 0; the transistor switches it between these two states. Because a capacitor charge gradually decays, IC memory is dynamic RAM (DRAM), which must have its stored values refreshed periodically (every 20 milliseconds or so). There is also static RAM (SRAM), which does not have to be refreshed. Although faster than DRAM, SRAM uses more transistors and is thus more costly; it is used primarily for CPU internal registers and cache memory.

In addition to main memory, computers generally have special video memory (VRAM) to hold graphical images, called bitmaps, for the computer display. This memory is often dual-ported—a new image can be stored in it at the same time that its current data is being read and displayed.

It takes time to specify an address in a memory chip, and, since memory is slower than a CPU, there is an advantage to memory that can transfer a series of words rapidly once the first address is specified. One such design is known as synchronous DRAM (SDRAM), which became widely used by 2001.

Nonetheless, data transfer through the "bus" – the set of wires that connect the CPU to memory and peripheral devices – is a bottleneck. For that reason, CPU chips now contain cache memory – a small amount of fast SRAM. The cache holds copies

of data from blocks of main memory. A well-designed cache allows up to 85–90 percent of memory references to be done from it in typical programs, giving a several-fold speedup in data access.

The time between two memory reads or writes (cycle time) was about 17 microseconds (millionths of a second) for early core memory and about 1 microsecond for core in the early 1970s. The first DRAM had a cycle time of about half a microsecond, or 500 nanoseconds (billionths of a second), and today it is 20 nanoseconds or less. An equally important measure is the cost per bit of memory. The first DRAM stored 128 bytes (1 byte = 8 bits) and cost about $10, or $80,000 per megabyte (millions of bytes). In 2001 DRAM could be purchased for less than $0.25 per megabyte. This vast decline in cost made possible graphical user interfaces (GUIs), the display fonts that word processors use, and the manipulation and visualization of large masses of data by scientific computers (from https://www.britannica.com/technology/computer/).

12. Answer the questions:

1. What are three main memory circuit boards types? Which type is used more than others?
2. What type of memory is permanent and includes instructions needed by the CPU?
3. What is the difference between two main types of RAM?
4. How can RAM be increased?
5. What do you know about the BIOS?
6. What is a firmware?
7. What is a MaskROM?

13. Give the definitions to the following meanings:

1. Read-only memory
2. Random access memory (RAM)
3. Volatile/non-volatile
4. Dynamic random access memory (DRAM)
5. Narrow printed circuit board
6. Static RAM (SRAM)
7. Rewrite the data

8. Dual in-line package
9. SIMMs (single in-line memory modules)
10. DIMMs (dual in-line memory modules)
11. RIMMs (Rambus in-line memory modules)
12. BIOS (basic input/output system)
13. Essential for boot-up
14. Dual in-line memory modules (DlMMs)
15. To hold programs or software instructions
16. Embedded into a hardware device
17. Firmware
18. MaskROM (MROM)
19. Erasable programmable ROM (EPROM)

14. Read and translate the text.

Peripherals

Computer peripherals are devices used to input information and instructions into a computer for storage or processing and to output the processed data. In addition, devices that enable the transmission and reception of data between computers are often classified as peripherals.

Input devices

A plethora of devices falls into the category of input peripheral. Typical examples include keyboards, mice, trackballs, pointing sticks, joysticks, digital tablets, touch pads, and scanners.

Keyboards contain mechanical or electromechanical switches that change the flow of current through the keyboard when depressed. A microprocessor embedded in the keyboard interprets these changes and sends a signal to the computer. In addition to letter and number keys, most keyboards also include “function” and “control” keys that modify input or send special commands to the computer.

Mechanical mice and trackballs operate alike, using a rubber or rubber-coated ball that turns two shafts connected to a pair of encoders that measure the horizontal and vertical components of a user’s movement, which are then translated into cursor movement on a computer monitor. Optical mice employ a

light beam and camera lens to translate motion of the mouse into cursor movement.

Pointing sticks, which are popular on many laptop systems, employ a technique that uses a pressure-sensitive resistor. As a user applies pressure to the stick, the resistor increases the flow of electricity, thereby signaling that movement has taken place. Most joysticks operate in a similar manner.

Digital tablets and touch pads are similar in purpose and functionality. In both cases, input is taken from a flat pad that contains electrical sensors that detect the presence of either a special tablet pen or a user's finger, respectively.

A scanner is somewhat akin to a photocopier. A light source illuminates the object to be scanned, and the varying amounts of reflected light are captured and measured by an analog-to-digital converter attached to light-sensitive diodes. The diodes generate a pattern of binary digits that are stored in the computer as a graphical image (from https://www.britannica.com/technology/computer/).

15. Agree or disagree with the statements using phrases of agreement and disagreement. If you disagree, give the correct variant.

1. System software is one of the kinds of application software.
2. The operating system interacts between the application software and the computer.
3. System software may be packaged or custom-made.
4. Packaged software is programs written for a specific purpose and for a specific organization.
5. One of the general-purpose programs is a browser to navigate, explore, and find information in the Internet.
6. Microcomputer hardware consists of input devices, the system unit, secondary storage, output devices and communications devices.
7. The processor is often referred to as CPU.
8. The keyboard and the mouse are output devices.

9. Memory is a permanent storage.

10. Hard disk is a secondary storage device.

11. The capacity of floppy disks is far greater than CD's.

12. The monitor is an input device with the help of which you enter information into the computer.

13. A modem converts the electronic signals that can travel over a telephone line.

16. Match the words from right side with the statements with the words from left side.

hardware	the physical, electronic devices
software	a pointing device that rolls on the desktop
memory	"background software"
secondary storage	"end-user software"
system software	the programs
application software	temporary storage
a mouse	permanent storage
custom-made software	programs written for a specific purpose

LESSON 3
FUNCTIONS OF A COMPUTER

1. Read and translate the text.

The four functions of a computer actually explain the core reasons why it was built. They include:

– Data input.
– Data processing.
– Information output.
– Data and information storage.

Data Input

Every computer is designed with data input as a first function, an activity which is accomplished via input devices.

Data entry is done manually, automatically or both. Manual input is done via add-on peripherals like the keyboard, mouse and stylus. Input can also be accomplished via vocal dictation applica-tions and body gestures peripherals like Kinect and biometric de-vices.

Data may be entered into a database, spreadsheet or other forms of a computerized work area.

Data Processing

Data processing is the core function of a computer. Processing involves manipulation of raw data into before converting it into meaningful information. Usually, data is in raw form, and will thus undergo processing before dissemination for user consumption.

The ”brain” of the computer where data is processed is re-ferred to as the microprocessor. It is also commonly known as the central processing unit (CPU) or accelerated processing unit (APU).

Information Output

When raw data has been manipulated by the microprocessor, the outcome is meant to be disseminated for

useful purposes. The output is thus referred to as information and is beneficial to the computer user.

Processed data or information can be:

– viewed as alphanumeric, images and video via a display hardware;

– listened to as audio files by use of a speaker;

– printed as hard copy output onto paper;

– printed as 3D models.

Data and Information Storage

The fourth and equally very important function of a computer is data and information storage. After sleepless nights of video and animation creation and editing, the user wants to have the finished product stored for future dissemination and additional editing.

A computer can store information internally and externally. The hard disk drive (HDD) and/or solid-state disk drive (SSD) are internal storage devices and serve to protect and house all data and information on a computer. In bigger systems, the RAID system is used. Multiple disk drives operate simultaneously to ensure data and information integrity.

External storage is achieved through accessories that attach externally to the computer. They include external drives and optical disks (from https://en.wikipedia.org/wiki/Computer).

2. Remember the four functions of a computer and com-plete the following sentences:

1. Computer … is the visible or audible result of data processing – information that can be read, printed or heard by the us-er.

2. The CPU will process data as instructed by the programmes you're running. … includes functions like calculating, sorting, ed-iting, drawing and searching.

3. DVDs were expected to replace CDs as … devices twenty years ago.

4. As a scanner the Sigma-100 can be used to … photographs as well as documents into the computer.

3. Answer the questions:

1. What are the four functions of a computer?
2. Describe the first function of a computer.
3. What is a core function of a computer?
4. What are the ways of information output?
5. How can information be stored?

4. Complete the gaps with appropriate words:

A computer like any other machine is used because 1) _____ . It can receive more information and process it faster than any human. The speed at which a computer works means it can replace weeks or even months of pencil-and-paper work. Therefore computers are used when the time saved offsets their cost which is one of the many reasons 2) _____ .

Modern accounting firms use spreadsheet software to do complicated calculations. They can provide their clients with an up-to-date report 3)_____. This software has many functions and can be integrated with other software. The spreadsheet's basic component is a cell. This may contain a formula 4)_____ . It could also contain a label or data. The former describes the information on the worksheet. The latter is the information itself.

The worksheet is the basic work area of a spreadsheet program. It is made up of cells arranged in rows and columns. The number of these varies depending on the software you are using.

You can change the width and formatof cells. Such parameters are usually quite easy 5) _____ .

5. Put in right order.

- the computer, is, why, used, widely?
- speed, what, the computer, does, mean?
- do, what modern, use, account firms?
- the worksheet, what, is?

6. Translate the sentences.

1) Комп'ютери обробляють дані швидше і ефективніше, ніж людина.

2) Комп'ютери використовують в промисловості, якщо виграш за часом перевищує грошові витрати на їх обслуговування.

3) Швидкість роботи комп'ютера дозволяє виконати за годину тижневий обсяг паперової роботи.

4) Основним елементом великоформатної електронної таблиці є комірка.

LESSON 4
CLASSES AND TYPES OF COMPUTERS

1. Read the text and answer the question:

Types of computers

Supercomputer

Supercomputer is the fastest type of computer. Supercomputers are very expensive and are employed for specialized applications that require immense amounts of mathematical calculations. Weather forecasting, animated graphics, fluid dynamic calculations, nuclear energy research, and petroleum exploration require a supercomputer.

Mainframe

Mainframe is a very large and expensive computer capable of supporting hundreds, or even thousands, of connected users simultaneously. In some ways, mainframes are more powerful than supercomputers because they support more simultaneous programs. But supercomputers can execute a single program faster than a mainframe.

Minicomputer

Minicomputer is a midsized computer. In size and power, minicomputers lie between workstations and

mainframes. But in general, a minicomputer is a multiprocessing system capable of supporting from 4 to about 200 users simultaneously.

Microcomputer

The term microcomputer is generally synonymous with personal computer (PC), or a computer that depends on a microprocessor. Microcomputers are designed to be used by individuals, whether in the form of PCs, workstations or notebook computers. A microcomputer contains a central processing unit (CPU) on a microchip (the microprocessor), a memory system (typically read-only memory (ROM) and random access memory (RAM)), a bus system and I/O ports, typically housed in a motherboard.

Workstation

Workstation is a computer intended for individual use that is faster and more capable than a personal computer. It's intended for business or professional use (rather than home or recreational use). Workstations and applications designed for them are used by small engineering companies, architects, graphic designers, and any organization, department, or individual that requires a faster microprocessor, a large amount of random access memory, and special features such as high-speed graphics adapters.

PDA

PDA is short for personal digital assistant, is a handheld device that combines computing, telephone/fax, Internet and networking features. A typical PDA can function as a cellular phone, fax sender, Web browser and personal organizer. PDAs may also be referred to as a palmtop, hand-held computer or pocket computer.

Unlike portable computers, most PDAs began as pen-based, using a stylus rather than a keyboard for input. This means that they also incorporated handwriting recognition features. Some PDAs can also react to voice input by using voice recognition technologies. PDAs are available in either a

stylus or keyboard version.

Apple Computer, which introduced the Newton MessagePad in 1993, was one of the first companies to offer PDAs. As technology changed the world of mobile devices, the PDA has become obsolete as devices like touch-screen smartphones and tablets grow in popularity.

2. Find the answers to the questions in the text: Which of the devices ...

1) is capable of supporting 300-3000 users simultaneously?
2) is intended for business or professional use?
3) can function as a cellular phone?
4) is used for animated graphics?
5) incorporates handwriting recognition features?
6) is used by small engineering companies?
7) is capable of supporting 15-150 users simultaneously?
8) is employed for specialized applications that require immense amounts of mathematical calculations?
9) has come out of use because of new technologies?
10) reacts to voice input by using voice recognition technologies?
11) is referred to as hand-held computer?
12) is used by graphic designers?
13) is used for nuclear energy research?
14) is used by architects?
15) is the fastest type of computers?

3. Match words with similar meaning and their translation:

1. need	a.capable
2. erform	b. direct
3. huge	c. require
4. concurrent	d. obsolete

5. channel
6. able
7. outmoded

e. vague
f. immense
g. simultaneous

2) lifespan — b) мінливість, швидкоплинність
3) antique — c) сліди
4) traces — d) дивний, незрозумілий
5) iterations — e) середній
6) ephemerality — f) антикваріат
7) weird — g) версії, варіанти

B. 1) to last (for) — a) визнавати
2) to fluctuate — b) перевищувати
3) to exceed — c) тривати, існувати
4) to venture — d) відповідати
5) to field — e) різко змінюватися
6) to leap — f) коливатися, змінюватися
7) to acknowledge — g) наважитися

C. 1) flicker in and out of existence — a) важко зрозуміти
2) at a rapid clip — b) з'являтися і зникати
3) hard to grasp — c) швидко

СЛОВНИК КОМП'ЮТЕРНИХ ТЕРМІНІВ

Англійський термін	Українські відповідники	Тлумачення

A

API (Application Programming Interface)	інтерфейс прикладного програмування	Набір правил і протоколів, що дозволяють різним програмним застосункам взаємодіяти між собою.
Attachment	вкладення	Файл, прикріплений до електронного листа або повідомлення для передачі отримувачу.
Assembler	асемблер	Мова програмування низького рівня, що безпосередньо відповідає командам процесора; також — програма-транслятор для такої мови.

B

Backup	резервна копія / резервне копіювання	Копія даних, що зберігається окремо від оригіналу з метою відновлення у разі втрати або пошкодження.
Bandwidth	пропускна здатність	Максимальна кількість даних, що може передаватися мережею або каналом зв'язку за одиницю часу.
Binary	двійковий / бінарний	Система числення з основою 2, що використовує лише цифри 0 і 1; основа роботи комп'ютерів.
BIOS (Basic Input/Output System)	базова система введення-	Вбудована мікропрограма, що ініціалізує апаратне забезпечення під час запуску комп'ютера.

	виведення	
Boot	завантаження / завантажувати	Процес запуску та ініціалізації операційної системи комп'ютера.
Bug	помилка / баг	Дефект або помилка у програмному коді, що спричиняє неочікувану або неправильну поведінку програми.

C

Cloud Computing	хмарні обчислення	Надання обчислювальних ресурсів (серверів, сховищ, програм) через Інтернет за моделлю «за потребою».
Compiler	компілятор	Програма, що перекладає вихідний код, написаний мовою програмування, у машинний код або інший формат.
Crash	збій / «крах»	Раптова відмова програми або системи, що призводить до її зупинки. Може бути програмним або апаратним.

D

Debug	налагодження / виявлення помилок	Процес пошуку та усунення помилок (багів) у програмному коді.
Default	типове значення / за замовчуванням	Попередньо встановлене значення параметра або налаштування, що застосовується без вказівки користувача.

Device Driver	драйвер пристрою	Програмне забезпечення, що дозволяє операційній системі взаємодіяти з апаратним пристроєм.
Digital	цифровий	Спосіб представлення інформації у вигляді дискретних числових значень (зазвичай 0 і 1).
Domain	домен	Частина адреси в Інтернеті, що ідентифікує мережевий ресурс або організацію (наприклад, google.com).

E

Encryption	шифрування	Процес перетворення даних у нечитабельний формат за допомогою алгоритму для захисту від несанкціонованого доступу.

F

Firewall	міжмережевий екран / брандмауер	Система безпеки, що контролює вхідний і вихідний мережевий трафік відповідно до заданих правил.
Firmware	мікропрограма / прошивка	Постійне програмне забезпечення, вбудоване в апаратний пристрій для управління його основними функціями.
FTP (File Transfer Protocol)	протокол передачі файлів	Стандартний мережевий протокол для передачі файлів між клієнтом і сервером у

		комп'ютерних мережах.

G

GPU (Graphics Processing Unit)	графічний процесор	Спеціалізований мікропроцесор для обробки графіки та паралельних обчислень; використовується у відеокартах.
GUI (Graphical User Interface)	графічний інтерфейс користувача	Тип інтерфейсу, що використовує графічні елементи (вікна, іконки, кнопки) для взаємодії з програмою.

H

Host	хост / вузол мережі	Комп'ютер або інший пристрій, підключений до мережі та здатний надавати або отримувати дані.
HTML (HyperText Markup Language)	мова розмітки гіпертексту	Стандартна мова розмітки для створення веб-сторінок та визначення їх структури і вмісту.
HTTP / HTTPS	протокол передачі гіпертексту / захищений протокол	Протоколи для передачі даних між веб-браузером і сервером; HTTPS додає шифрування для безпеки.

K

Kernel	ядро (операційної системи)	Центральна частина операційної системи, що управляє апаратними ресурсами та забезпечує взаємодію між апаратним і

		програмним забезпеченням.

M

Malware	шкідливе програмне забезпечення	Будь-яке програмне забезпечення, призначене для завдання шкоди комп'ютеру або мережі (вірус, троян, шпигунська програма).

P

Peripheral	периферійний пристрій	Зовнішній пристрій, підключений до комп'ютера для розширення його функціональності (принтер, сканер, веб-камера).
Phishing	фішинг	Шахрайська техніка, що полягає у виманюванні конфіденційних даних користувача (паролів, номерів карток) шляхом підробки довірених ресурсів.
Plugin	плагін / розширення	Програмний компонент, що додає певну функцію до існуючої програми або браузера.
Protocol	протокол	Набір правил і стандартів для обміну даними між комп'ютерними системами або мережевими пристроями.

R

RAM (Random Access Memory)	оперативна пам'ять (ОЗП)	Тип комп'ютерної пам'яті, що забезпечує тимчасове зберігання даних і програм під час їх виконання.

Resolution	роздільна здатність	Кількість пікселів на одиницю площі або загальна кількість пікселів зображення чи екрана; визначає чіткість зображення.

S

Script	скрипт	Програма або послідовність команд, написана мовою сценаріїв для автоматизації виконання завдань.
Search Engine	пошукова система / пошуковик	Програмна система для пошуку інформації в Інтернеті або базі даних за ключовими словами (Google, Bing тощо).
SQL (Structured Query Language)	мова структурованих запитів	Стандартна мова для управління реляційними базами даних та виконання запитів до них.
Storage	сховище / зберігання даних	Носії або системи для тривалого зберігання даних (жорсткий диск, SSD, флеш-пам'ять, хмарне сховище).
Streaming	стрімінг / потокове передавання	Безперервна передача аудіо- або відеоданих через Інтернет для перегляду/прослуховування без попереднього завантаження.
Spreadsheet	електронна таблиця	Програма для опрацювання числових даних у сітці рядків і стовпців; найпоширеніший приклад — Microsoft Excel.

T

Tablet	планшет	Портативний комп'ютер із сенсорним екраном, без фізичної клавіатури, більший за смартфон.
Terminal	термінал	Пристрій або програма для введення команд і отримання результатів від комп'ютерної системи у текстовому режимі.
Touchscreen	сенсорний екран / тачскрін	Дисплей, що реагує на дотик пальця або стилусу та дозволяє керувати пристроєм безпосередньо через екран.

U

URL (Uniform Resource Locator)	уніфікований локатор ресурсів / адреса веб-сторінки	Унікальна адреса ресурсу в Інтернеті, що вказує на його місцезнаходження (наприклад, https://example.com).

X

XML (Extensible Markup Language)	розширювана мова розмітки	Мова розмітки для кодування документів у форматі, зрозумілому як людям, так і машинам; широко використовується для зберігання та передачі даних.

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