

**МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ**  
**Національний авіаційний університет**

**PROFESSIONAL ENGLISH**  
**APPLIED MATHEMATICS**

Навчальний посібник

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Автори: *О. М. Акмалдінова*, канд. філол. наук, проф.;  
*О. О. Гурська* – канд. пед. наук, доц.;  
*Л. Г. Теремінко* – канд. пед. наук, доц.;  
*Н. Г. Денисенко* – ст. викл.;  
*Г. В. Сорокун* – ст. викл.

Рецензенти: *О. С. Снитко* – докторфілол. наук, проф. (Київський національний університет імені Тараса Шевченка);  
*В. В. Орлова* – канд. філол. наук, доц. (Київський національний університет імені Тараса Шевченка);  
*Я. В. Хижун* – канд. філол. наук, доц. (Український державний університет імені М. П. Драгоманова)

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Посібник з дисципліни «Фахова іноземна мова» містить автентичні тексти професійного спрямування та лексико-граматичні вправи для формування навичок іншомовної комунікації.

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*Навчальне видання*

Автори:

АКМАЛДІНОВА Олександра Миколаївна

ГУРСЬКА Олена Олександрівна

ТЕРЕМІНКО Лариса Григорівна

ДЕНИСЕНКО Наталія Григорівна

СОРОКУН Ганна Василівна

# **PROFESSIONAL ENGLISH APPLIED MATHEMATICS**

Навчальний посібник

*В авторській редакції*

## INTRODUCTION

The manual on the discipline "Professional Foreign Language" for higher education applicants of the specialty 113 "Applied Mathematics", the educational degree "Bachelor" is intended for auditorium, self-study, and individual work of students under the guidance of a lecturer.

The purpose of the manual is to teach the future information technology specialists the basics of professional communication in English, to develop stable skills of reading, translating, annotating, abstracting special technical literature to obtain and use information necessary for their future practical activities.

The manual consists of four units devoted to studying professionally oriented issues and contains various types of communicative vocabulary and grammar exercises arranged in a logical sequence with increasing complexity to ensure effective learning. The grammar section of each unit contains theoretical and practical tasks aimed at mastering the studied content.

The manual is based on authentic original non-adapted texts from modern periodicals in the sphere of information technology.

## Unit I. MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

Exercise 1. *Memorize the basic vocabulary to text 1.*

Applied mathematics – прикладна математика

provide smb. with smth. – забезпечувати когось чимось

computational tool – обчислювальний засіб

problem – задача

mathematician – математик

physicist – фізик

reduce cost – зменшувати витрати

distinguish – відрізнити

on the one hand... on the other hand – з одного боку...з іншого боку

accurate justification – точне обґрунтування

proof – доказ

challenge – 1) виклик; 2) проблема

determine – визначати

application – 1) застосування, використання; 2) прикладна програма, додаток

interdisciplinary field – міждисциплінарна сфера

overlapping concept – 1) поняття, що збігаються; 2) поняття, що перетинаються

vital role – важлива роль

encryption – шифрування

random number generation – генерація випадкових чисел

either...or – або...або

applied probability – прикладна ймовірність

trigger – 1) викликати; 2) провокувати

allow – дозволяти

unsolvable problem – нерозв'язна задача

differential equation – диференціальне рівняння

calculus of variations – варіаційні обчислення

computational algebra – обчислювальна алгебра

applied probability theory – прикладна теорія ймовірностей

statistics – статистика

numerical analysis – (*pl. analyses*) чисельний аналіз

scientific computing – наукове обчислення

evaluation – оцінка

specific – конкретний

prediction – передбачення

Exercise 2. Choose nouns among the following words. Put their first letters into the cells below in the same order. Read and translate the obtained word.

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Computational, security, develop, historically, practical, empirical, other, concept, accurate, between, reduce, introduction, applied, distinguish, accurate, appreciate, encryption, attracted, overlapping, notably, noun, identify, involve, calculus, cooperate, equation.

Exercise 3. Give the initial form of the words below. Translate the pairs.

Application, mathematician, programmer, productivity, formulation, justification, interested, mathematical, attracted, determining, overlapping, organization, coding, encryption, generation, mathematicians, principally, revolutionary, development, traditional, powerful, researcher, previously, unsolvable, dynamical, partial, computational, scientific, computing.

Exercise 4. Give synonyms (a) and antonyms (b) of the following words.

a) field, develop, goal, cooperate, find, improve, difference, enjoy, appreciate, precise, justification, involve, determine, consider, consist of, trigger (v), deal with, prediction;

b) logical, accurate, abstract, difference, useless, security, coding, encryption, development, reduce, powerful, allow, unsolvable, traditional, include, cooperate, improve.

Exercise 5. Explain the meaning of the following words and word combinations.

Mathematician, programmer, engineering, medicine, proof, graphics, differential equation, probability theory, numerical analysis, scientific computing.

Exercise 6. Give Ukrainian equivalents of the following words and word combinations.

The focus of the applied mathematics; application of mathematics to problems in science and engineering; to provide people with the ability to use mathematical tools; to solve complex problems; to develop sound

practical solutions; to cooperate with engineers, physicists and programmers; the common goal; to improve quality; to reduce cost; to increase productivity; empirical sciences; to distinguish the fields from one another; on the one hand... on the other hand; difference between applied math and pure math; for its own sake; to appreciate the logical foundations; precise formulation of the concept; accurate justification of the results (proofs); abstract mathematical concepts and theories; challenge; to determine what mathematical tools are appropriate for a particular application; interdisciplinary field of study and research; to have many overlapping concepts; applied analysis; differential equation; applied probability; to change dramatically over the past 30 years; revolutionary developments in traditional areas; scientific computing; to deal with; formulation of scientific concepts and problems in mathematical terms.

*Exercise 7. Read, translate and give the gist of text 1.*

### **Text 1. APPLIED MATHEMATICS**

These days mathematics is applied almost everywhere. The focus of the applied mathematics is the application of mathematics to problems in science, engineering, medicine, etc. It provides people with the ability to use a variety of mathematical and computational tools to solve complex problems in various fields and develop sound practical solutions. The applied mathematicians closely cooperate with engineers, programmers, physicists, and other specialists. The common goal is to find ways to improve quality, increase productivity, and reduce cost.

Generally speaking, applied mathematics is a disciplined activity which lies between the empirical sciences and pure mathematics. What is the difference between applied math and pure math? There are several differences that distinguish these fields from one another.

On the one hand, some people enjoy mathematics for its own sake. They appreciate the logical foundations, the precise formulation of the concepts and the accurate justification of the results (proofs). They are interested in the abstract structure of mathematics. Such people enjoy pure mathematics. Pure mathematics involves the study of abstract mathematical concepts and theories.

On the other hand, some people enjoy seeing how math can be used to solve problems of the real world. They are attracted by the challenge of determining what mathematical tools are appropriate for a particular

application. Such people enjoy applied mathematics. Applied mathematics is an interdisciplinary field of study and research, linking mathematics with a wide range of areas of application.

In fact, pure and applied math have many overlapping concepts. For example, the branch of pure mathematics known as “number theory” was once considered as the most “useless” one, but now it plays a vital role in computer organization and security, coding and encryption, random number generation, and graphics. Many great mathematicians of the past would be hard pressed to identify themselves as either pure or applied ones.

Historically, applied mathematics consisted principally of applied analysis (mainly differential equations), and applied probability. Research in applied mathematics has changed dramatically over the past 30 years, with revolutionary developments in traditional areas. These changes have been triggered by the development of more powerful computers allowing researchers to address previously unsolvable problems and developments in other fields, which have led to new mathematical problems. Today, the field of applied mathematics includes mathematicians working in dynamical systems theory, differential equations (PDEs), calculus of variations, computational algebra, statistics, applied probability theory, numerical analysis, scientific computing, etc.

Applied mathematicians deal with: (a) the formulation of scientific concepts and problems in mathematical terms, (b) the solution of the mathematical problems, and (c) the discussion, interpretation and the evaluation of the analysis results, including the making of specific predictions.

Exercise 8. *Find in text 1 the English for:*

ціль прикладної математики; застосування математики для задач науки, інженерії та медицини; надавати людям можливість; використовувати математичні та обчислювальні засоби (інструменти); вирішувати складні задачі; розробляти розумні, практичні рішення; математик; співпрацювати з інженерами, фізиками, програмістами та іншими спеціалістами; спільна мета; покращувати якість; зменшувати витрати; збільшувати продуктивність; з однієї сторони ... з іншої сторони; емпірична наука; відрізнити сфери одну від одної; цінувати логічні основи; чітке формулювання понять; точні підтвердження результатів



(докази); абстрактні математичні поняття і теорії; вирішувати проблеми реального світу; приваблювати; виклик/проблема; визначати; міждисциплінарна галузь навчання та дослідження; поняття, що перетинаються; теорія чисел; відігравати важливу роль у безпеці, кодуванні і шифруванні; генерація випадкових чисел; графіка; прикладний аналіз; диференційні рівняння; прикладна ймовірність; кардинально змінитися протягом останніх років; бути викликаним/спровокованим розробкою більш потужних комп'ютерів; дозволяти дослідникам звертатися до невирішених задач і розробок; диференційне рівняння; варіаційні обчислення; обчислювальна алгебра; прикладна теорія ймовірностей; статистика; чисельний аналіз; наукове обчислення; формулювання наукових понять і проблем в математичних термінах; оцінка результатів аналізу; робити конкретні прогнози.

Exercise 9. *Translate into English paying special attention to the italicized words.*

1. Насправді, *чиста і прикладна математика* мають багато *понять, що збігаються*. 2. Прикладна математика допомагає *розв'язувати складні задачі, покращувати якість, зменшувати витрати та збільшувати продуктивність*. 3. *З однієї сторони*, люди *цінують логічні основи, чітке формулювання понять та точні підтвердження результатів (докази)*, а з *іншої сторони*, вони насолоджуються тим, як математика може *вирішувати проблеми реального світу*. 4. *Математичні інструменти* відіграють важливу роль в *безпеці, кодуванні, шифруванні, генерації випадкових чисел і графіці*. 5. *Прикладна математика* займається *формулюванням наукових понять та задач, обговоренням, інтерпретацією і оцінкою результатів аналізу*, а також *робить конкретні прогнози*. 6. Математика застосовується всюди, *вирішуючи проблеми науки, інженерії, медицини, тощо*. 7. *Галузь прикладної математики включає в себе математиків, які працюють з диференційними рівняннями, варіаційними обчисленнями, обчислювальною алгеброю, прикладною теорією ймовірностей, статистикою, чисельним аналізом і науковими обчисленнями*.

Exercise 10. *Match the terms (1 – 15) with their definitions (a – o).*

1) applied mathematics	a) a branch of mathematics concerned with the analysis of random phenomena
2) mathematician	b) an individual that writes/creates computer software or applications by giving the computer specific programming instructions
3) encryption	c) a fact, an argument, or a piece of evidence which shows that something is definitely true
4) probability theory	d) someone who studies, teaches, or is an expert in mathematics
5) programmer	e) the collection of tools, techniques, and theories required to solve on a computer mathematical models of scientific problems
6) pure mathematics	f) the art of drawing, especially as used in mathematics, engineering, etc.
7) proof	g) the application of mathematical methods by different fields such as physics, engineering, medicine, biology, finance, business, etc.
8) differential equation	h) the study of mathematics that is abstract and without any application to real-world problems
9) scientific computing	i) an equation (a mathematical statement) that expresses a relationship between a function and one or more of its derivatives
10) graphics	j) the method by which information is converted into secret code that hides the information's true meaning

Exercise 11. *Fill in the gaps with proper prepositions: of, with, over, from, between, for, by, on, in. Translate the sentences.*

1. Applied mathematicians deal ... (a) the formulation ... scientific concepts and problems ... mathematical terms. 2. These changes have been triggered ... the development ... more powerful computers allowing researchers to address previously unsolvable problems and developments ... other fields. 3. It provides people ... the ability to use a variety ... mathematical and computational tools to solve complex problems ... various fields. 4. ... fact, pure and applied math have many overlapping concepts. 5. The focus ... the applied mathematics is the application ... mathematics to problems ... science, engineering, medicine, etc. 6. ... the one hand, some people enjoy mathematics ... its own sake. 7. Generally speaking, applied mathematics is a disciplined activity which lies ... the empirical sciences and pure mathematics. 8. There are several differences that distinguish these fields ... one another. 9. Research ... applied mathematics has changed dramatically ... the past 30 years, ... revolutionary developments ... traditional areas.

Exercise 12. *Answer the questions on text 1.*

1. What is the focus of the applied mathematics? 2. What do the applied mathematicians closely cooperate with? 3. What is the difference between applied math and pure math? 4. In what field does the branch of pure mathematics known as “number theory” play a vital role? 5. What did applied mathematics historically consist of? 6. What was the trigger for changes in applied mathematics? 7. What does the field of applied mathematics include today? 8. What do applied mathematicians deal with?

Exercise 13. *Memorize the basic vocabulary to text 2.*

Computer science – 1) комп’ютерна наука; 2) інформатика

software – програмне забезпечення

computer scientist – фахівець у галузі інформатики

binary numbers – двійкові числа

linear algebra – лінійна алгебра

calculus – 1) числення, розрахунок 2) обчислення 3) математичний аналіз

discrete mathematics – дискретна математика

require – 1) вимагати; 2) потребувати

programming language – мова програмування

mobile apps (applications) – мобільні додатки  
explore – 1) вивчати; 2) досліджувати  
advanced – 1) сучасний; 2) удосконалений; 3) прогресивний  
computer security – комп'ютерна безпека  
operating system – операційна система  
decimal number system – десяткова система числення  
digital electronics – цифрова електроніка  
binary number system – двійкова система числення  
discrete mathematics – дискретна математика  
number theory – теорія чисел  
graph theory – теорія графів  
set theory – теорія множин  
computer architecture – комп'ютерна архітектура  
database – база даних  
distributed system – розподільна система  
machine learning – машинне навчання  
network – мережа  
data (*sing.* datum) – дані  
data mining – 1) інтелектуальний аналіз даних; 2) добування даних  
future modelling – моделювання майбутнього  
image analysis – аналіз зображення  
vision analysis – аналіз візуалізації  
speech recognition – розпізнавання мови  
artificial intelligence – штучний інтелект  
simulation – 1) моделювання; 2) імітація  
performance – 1) робота, виконання; 2) продуктивність  
linear equation – лінійне рівняння  
quadratic equation – квадратне рівняння  
matrix – (*pl.* matrices) матриця  
ratio – коефіцієнт  
rectangular coordinates – прямокутні координати  
vector space – векторний простір  
bug – помилка  
comprehend – 1) розуміти, осмислити; 2) охоплювати

Exercise 14. *Give synonyms of the following words.*

Fundamental, require, develop, advanced, understand, efficient, important, use (*n, v*).

Exercise 15. *Explain the meaning of the following words and word combinations.*

Software, application, programmer, binary number system, decimal number system, statistics, discrete mathematics, computer security, operating system, database, algorithm, artificial intelligence, data mining, linear equation.

Exercise 16. *Give Ukrainian equivalents of the following words and word combinations.*

Fundamental tool of computer science; application or software; programmer; linear algebra; calculus; discrete mathematics; computer scientist; to have some basic knowledge of mathematics; computer science career; to develop basic mobile apps; to explore advanced fields; computer security or operating system; advanced-level math concept; binary number system; decimal number system; discrete mathematics; to test out multiple algorithms; to approach programming tasks more methodically; number theory; graph theory; algebra; functional programming; computer architecture; database; algorithm; distributed system; computer system; machine learning; network; operating system; computer security; personalized app performance; machine learning; data mining; future modelling; vision and image analysis; speech recognition; artificial intelligence; simulation; coding in application; the design and analysis of algorithms; linear equation; determinant; exponent; rational expression; quadratic equation; ratio; radical; rectangular coordinates; proportion; vector space.

Exercise 17. *Read, translate and give the gist of text 2.*

## **Text 2. MATHEMATICS AS A FUNDAMENTAL TOOL OF COMPUTER SCIENCE**

Mathematics is a fundamental tool of computer science. Therefore, programmers use mathematics (binary numbers, statistics, linear algebra, calculus, discrete mathematics, etc.) in each application or software.

Mathematics is a fundamental part of computer application, every computer scientist or programmer needs to have some basic knowledge of mathematics. Some computer science careers require only basic knowledge of mathematics. For example, if you know simple arithmetic and basic programming languages, you can develop basic mobile apps

(applications). However, if you want to explore advanced fields such as computer security or operating systems, then you have to understand some advanced-level math concepts. Some mathematics concepts used in computer applications are as follows:

1. *Binary Number System*. Computers use the binary number system instead of the decimal number system. According to digital electronics and mathematics, this system uses only two digits, 1 and 0, to express all mathematics concepts.

2. *Discrete Mathematics*. Discrete mathematics is the foundation of computer science. It analyses the relationship between distinct and separate things. Moreover, it is used to test out multiple algorithms and find which is the most efficient. Discrete mathematics helps to approach programming tasks more methodically. The concept of discrete math includes probability, combinations, logic, number theory, graph theory, set theory, algebra, etc. Discrete math is applied in various areas such as functional programming, databases, computer architecture, computer systems, algorithms, distributed systems, machine learning, operating systems, networks, and computer security.

3. *Statistics*. In the past few years, data has become an increasingly important aspect from personalized app performance to machine learning and artificial intelligence. In the statistics field, we study methodologies to review, obtain, evaluate and form conclusions from experimental data. Statistics plays a key role in computer applications as it is used for machine learning, data mining, future modelling, vision and image analysis, speech recognition, artificial intelligence, and simulations.

4. *Calculus*. It is concerned with the calculation of continuous change and the rates of change that occur. *Calculus* considers the finding and properties of derivatives and integrals of functions. It is used in the following computer science areas: creating graphs or visuals, problem-solving applications, simulations, coding in applications, the design and analysis of algorithms. There are two different types of calculus in mathematics: integral calculus and differential calculus.

5. *Linear Algebra*. Linear algebra is concerned with mathematical structures. It is the study of linear combinations and their transformation properties. It includes various topics such as linear equations, matrices, determinants, exponents, rational expressions, quadratic equations, ratios, radicals, rectangular coordinates, proportions, and vector spaces.

6. *Mathematics as an Analytical Tool*. In computer applications, analytical skills are necessary for data analysis and problem-solving. In

programming, computer scientists or programmers sometimes make mistakes. Mathematics, in turn, provides us with analytical skills to find and fix bugs.

7. *Mathematics and Abstract Language.* Computer science has its own language which is abstract. Mathematical tools that students learn in math class are very similar to abstract programming languages. From simple mathematical equations to complex mathematical concepts, mathematics teaches students the art of comprehending, formulating thoughts, reading, and communicating with abstract language.

8. *Mathematics in Modelling.* Facts and figures are essential for computer applications. As computer applications interact more with our real world, the importance of accurate modelling to that world grows through mathematics.

Exercise 18. *Find in text 2 the English for:*

основний інструмент інформатики; додаток або програмне забезпечення; програміст; двійкові числа; статистика; лінійна алгебра; обчислення (математичний аналіз); дискретна математика; мати базові знання з математики; кар'єра в галузі інформатики; вимагати лише базові знання з інформатики; проста арифметика та базові мови програмування; розробляти основні мобільні додатки; комп'ютерна безпека; операційні системи; розуміти математичні поняття складного рівня; двійкова система числення; десяткова система числення; цифри; дискретна математика; ймовірність; комбінації; логіка; теорія чисел; теорія графів; теорія множин; алгебра; функціональне програмування; комп'ютерна архітектура; бази даних; алгоритми; розподілені системи; комп'ютерні системи; машинне навчання; мережі; операційні системи; комп'ютерна безпека; переглядати, отримувати, оцінювати та робити висновки з експериментальних даних; машинне навчання; інтелектуальний аналіз даних; моделювання майбутнього; аналіз візуалізації та зображення; розпізнавання мови; штучний інтелект; моделювання; алгоритми; інтегральне та диференціальне числення; лінійні рівняння; матриці; детермінанти; експоненти; раціональні вирази; квадратні рівняння; відношення, радикали; прямокутні координати; пропорції та векторні простори; факти та цифри; взаємодіяти з реальним світом.

Exercise 19. *Put different types of questions (general, alternative, subject, special and disjunctive) on the following sentences.*

1. Mathematics is a fundamental tool of computer science.  
2. Research in applied mathematics has changed dramatically over the past 30 years.  
3. Programmers use mathematics in each application.  
4. Statistics plays a key role in computer applications.  
5. Analytical skills are necessary for data analysis and problem-solving.  
6. Programmers sometimes can make mistakes.

Exercise 20. *Answer the questions on text 2.*

1. What is a fundamental tool of computer science? 2. In what areas do programmers use mathematics (binary numbers, statistics, linear algebra, calculus, discrete mathematics, etc.)? 3. What does every computer scientist or programmer need to have? 4. Why do different computer science careers require either basic or advanced knowledge of mathematics? 5. What mathematics concepts are used in computer applications? 6. What is the function of discrete mathematics in computer science? 7. What does the concept of discrete math include? 8. In what areas is discrete math used? 9. What do we study in the statistics field? 10. Why does statistics play a key role in computer applications? 11. What computer science areas is calculus used in? 12. What topics does linear algebra include? 13. Why are analytical skills necessary in computer applications? 14. Why are mathematical tools important for programming languages?

Exercise 21. *Memorize the basic vocabulary to text 3.*

Electrical engineering – електротехніка

management information system – інформаційна система управління

represent – представляти

sequence – послідовність

provide – забезпечувати

circuit design – 1) проектування схем; 2) схемотехніка

electrical impulse – електричний імпульс

arbitrary output – довільний вихід

medium – (*pl. media*) носій (*даних*)

transmission – передача

storage – зберігання



result from – 1) бути результатом чогось; 2) витікати з чогось  
result in – 1) призводити до чогось; 2) викликати щось  
advance (*n.*) – успіх, прогрес, досягнення  
stored-program computer – комп'ютер із збереженою програмою  
breakthrough – 1) прорив; 2) досягнення  
credit – 1) кредитувати; 2) приписувати  
realize – усвідомлювати  
machine language – машинна мова  
assembly language – мова асемблера  
instruction – команда  
emergence – 1) поява; 2) виникнення  
scientific modeling – наукове моделювання  
hardware – 1) апаратне забезпечення; 2) обладнання; 3) «залізо»  
bitmap graphics – растрова графіка  
affordable – 1) доступний; 2) доступний за ціною, недорогий  
visual computing – графічні обчислення  
computational task – обчислювальне завдання  
magnetic disk storage – накопичувач на магнітному диску  
information retrieval system – інформаційно-пошукова система  
contribute (to) – 1) робити внесок; 2) сприяти  
computer hacking – комп'ютерне хакерство  
issue – 1) проблема; 2) питання  
personal privacy – 1) особиста конфіденційність; 2) особиста приватність  
reliability – надійність

Exercise 22. *Give derivatives of the following words.*

Science, relate, invent, produce, use, compute, person, innovate, create, apply.

Exercise 23. *Give Ukrainian equivalents of the following words and word combinations.*

Computer science; independent discipline; electronic digital computer; decade; electrical engineering; key concept; to be represented as sequences of the binary digits; circuit design; invention of the transistor; transmission and storage of information; invention of electronic, optical, and magnetic media; great breakthrough; machine language; to be neither practical nor reliable; discovery; to lead to the

development of assembly language; to allow programmers to use symbols for instructions; increasing use of computers; to provide the impulse for the development of the first operating system; emergence of powerful computer graphics device; became more affordable; to evolve into the field of computer science known as graphics; to interact directly with users; to carry out various computational tasks; to have strong mathematical and engineering roots.

Exercise 24. *Read, translate and give the gist of text 3.*

### **Text 3. THE HISTORY OF COMPUTER SCIENCE**

Computer science became an independent discipline in the early 1960s, although the electronic digital computer, that is the object of its study, was invented some two decades earlier. The roots of computer science lie primarily in the related fields of mathematics, physics, electrical engineering and management information systems.

Mathematics is the source of key concept in the development of the computers - the idea that all information can be represented as sequences of the binary digits zeroes and ones.

Electrical engineering provides the basics of circuit design – in particular<sup>1</sup>, the idea that electrical impulses input to a circuit can be combined using Boolean algebra to produce arbitrary outputs.

The invention of the transistor and the miniaturization of circuits, as well as the invention of electronic, optical, and magnetic media for the transmission and storage of information, resulted from advances in electrical engineering and physics.

A great breakthrough was the specification of the Turing machine in 1936, which was invented by the British mathematician Alan Turing. Another progress was the concept of the stored-program computer, credited to Hungarian American mathematician John von Neumann.

Next important step was made when most computer users realized that writing programs in the machine language of zeroes and ones was neither practical nor reliable. This discovery led to the development of assembly language in the early 1950s, which allows programmers to use symbols for instructions.

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<sup>1</sup>*in particular* – зокрема

Increasing use of computers in the early 1960s provided the impulse for the development of the first operating systems. The 1970s and 1980s saw the emergence of powerful computer graphics devices, both for scientific modeling and other visual activities.

Expensive hardware and the limited availability of software kept computer field from growing until the early 1980s, when the computer memory required for bitmap graphics (in which an image is made up of small rectangular pixels) became more affordable. Support for all these activities evolved into the field of computer science known as graphics and visual computing.

The design and analysis of systems are closely related to the field of graphics and visual computing; they interact directly with users who are carrying out various computational tasks. These systems came into wide use during the 1980s and 1990s with the development of graphical user interfaces (GUIs). GUI design was introduced by Xerox and later was picked up by Apple (Macintosh) and finally by Microsoft (Windows).

In the 1960s the invention of magnetic disk storage provided rapid access to data located at an arbitrary place on the disk. This invention led not only to more cleverly designed file systems but also to the development of database and information retrieval systems, which later became essential for storing, retrieving, and transmitting large amounts and wide varieties of data across the Internet.

Three developments in computing in the early part of the 21st century (client-server computing, mobile computing, and computer hacking) contributed to the development of new fields in computer science.

With the emergence of the Internet in the 1980s, for example, software developers needed to address important issues related to information security, personal privacy, and system reliability.

Computer science continues to break boundaries today. It continues to have strong mathematical and engineering roots and its history provides important context for today's innovations.

*Exercise 25. Find in text 3 the English for:*

стаття незалежною дисципліною; електронний цифровий комп'ютер; об'єкт дослідження; електротехніка; інформаційні системи управління; джерело; ключове поняття у розвитку комп'ютерів; бути представленим як послідовність двійкових чисел; електротехніка; основи схемотехніки; зокрема; винахід транзисторів; винахід електронних, оптичних і магнітних носіїв;

передача та зберігання інформації; великий прорив; користувач комп'ютера; усвідомлювати; написання програм машинною мовою одиниць та нулів; відкриття; призвести до розвитку мови асемблера; дозволяти програмістам використовувати символи для інструкцій /команд; збільшення використання комп'ютерів; дати поштовх для розробки перших операційних систем; поява потужних пристроїв комп'ютерної графіки; дороге апаратне забезпечення; обмежена доступність програмного забезпечення; вимагати; доступний/недорогий; проектування та аналіз систем; безпосередньо взаємодіяти; виконувати різні обчислювальні завдання; увійти в широкий вжиток; розробка графічних інтерфейсів користувача; винахід накопичувача на магнітних дисках; забезпечувати швидкий доступ до даних; розумно розроблені файлові системи; розробка баз даних та інформаційно-пошукових систем; зберігання, отримання та передача даних через Інтернет; хакерство; звертатися до важливих питань; інформаційна безпека; особиста конфіденційність і надійність систем; руйнувати кордони.

Exercise 26. Answer the questions on text 3.

1. When did computer science become an independent discipline?
2. What are the roots of computer science primarily in?
3. What is the role of mathematics in the development of the computers?
4. What does electrical engineering provide?
5. What did advances in electrical engineering and physics result in?
6. What was great breakthrough in 1936?
7. What encouraged the development of assembly language in the early 1950s?
8. What did increasing use of computers in the early 1960s provide?
9. What were powerful computer graphics devices used for in the 1970s and 1980s?
10. What kept computer field from growing until the early 1980s?
11. What systems came into wide use during the 1980s and 1990s with the development of graphical user interfaces (GUIs)?
12. What provided rapid access to data located at an arbitrary place on the disk in the 1960s?
13. What developments in computing in the early part of the 21st century contributed to the development of new fields in computer science?
14. What issues did software developers need to address with the emergence of the Internet in the 1980s?
15. What roots does computer science continue to have?

Exercise 27. *Translate into English paying special attention to the italicized words.*

1. Математика є **ключовим поняттям** у розвитку комп'ютерних наук. 2. **Винахід транзисторів, електронних, оптичних і магнітних носіїв** - це великий **прорив** у розвитку комп'ютерних наук. 3. Дороге **апаратне забезпечення** та обмежена доступність **програмного забезпечення** стояли на заваді розвитку галузі. 4. Збільшення використання комп'ютерів дало поштовх для розробки перших **операційних систем**. 5. Розробка **баз даних** та **інформаційно-пошукових систем** були важливими етапами технологічного розвитку. 6. **Розробники програмного** забезпечення приділяли значну увагу питанням **інформаційної безпеки, особистої конфіденційності та надійності систем**. 7. Винахід **жорсткого диску** дозволив **зберігати, отримувати та передавати** великі обсяги інформації через інтернет. 8. Коли комп'ютери стали більш доступними, почали розвиватися **графіка та графічне обчислення**.

Exercise 28. *Memorize the basic vocabulary to text 4.*

Scientific research – наукове дослідження  
space exploration – дослідження космосу  
consumer product – споживчий продукт  
home appliance – 1) побутова техніка; 2) побутові прилади  
manufacturing industry – виробнича промисловість / галузь  
processing industry – переробна промисловість / галузь  
power distribution system – система розподілу електроенергії  
airline – авіакомпанія  
supervision – 1) нагляд; 2) спостереження  
call forwarding – переадресація викликів  
built-in – вбудований  
facilitate – сприяти

Exercise 29. *Give Ukrainian equivalents of the following words and word combinations.*

Modern computer; to control complex operations; to range from ... to;  
scientific research; space exploration; to produce consumer products;  
medical equipment; home appliance, to use extensively in manufacturing  
and processing industries; power distribution system; airline; railway  
reservation system; continual human supervision and control; security  
system; to result in; to improve energy efficiency; call forwarding; to

store vital information; health record; driver's license; to meet individual needs; built-in monitoring system; to turn light on and off; multimedia system; entertainment; to enhance the interaction between user and computer; to prescribe appropriate drugs; to stay in touch with the office while you are working at home; employee; employer; hospital staff; disabled; to facilitate effective communication; distance learning and videoconferencing; to interact through a video connection; to give the opportunity; to set up virtual classroom; to collaborate on project; to interact in a team atmosphere.

Exercise 30. *Give synonyms of the following words.*

Control (v), incompatible, employee, require, improve, built-in, vital, manufacture, enable, enhance, collaborate, expert, smart, perform, monitor, appliance, interaction, extensively.

Exercise 31. *Read, translate and give the gist of text 4.*

#### **TEXT 4. MODERN COMPUTERS**

The ability of modern computers to control complex operations has transformed the way many tasks are performed, ranging from scientific research and space exploration to producing consumer products. Computers are used everywhere, in particular, in medical equipment, home appliances, cars and toys. They are now being used extensively in manufacturing and processing industries, power distribution system, airline, and railway reservation systems.

Computing equipment is getting smaller and more sophisticated. Computers are part of many machines and devices that once required constant human supervision and control. Today, computers in security systems result in safer environments, computers in cars improve energy efficiency, and computers in phones provide features such as call forwarding, call monitoring, video calls and call answering.

Modern computers and technologies are designed to take over some basic tasks previously performed by people; by so doing, they make life a little easier and a little more pleasant. Smart cards store vital information such as health records, driver's license, bank balances, and so on. Smart phones, cars, and appliances with built-in computers can be programmed to better meet individual needs. A smart house has a built-in monitoring system that can turn lights on and off, open and close windows, operate the oven, and more.

Multimedia systems are known for their educational and entertainment value. Multimedia combines text with sound, video, animation, and graphics, which greatly enhances the interaction between user and computer and can make information more interesting and appealing to people. Expert systems software enables computers to “think” like experts. Medical diagnosis experts systems, for example, can help doctors pinpoint a patient’s illness, suggest further tests, and prescribe appropriate drugs.

Connectivity enables computers and software that might otherwise be incompatible to communicate and to share resources. Many people today use their computers to stay in touch with the office while they are working at home; employees work for employers from other countries without even seeing them. Multimedia systems are known for their educational and entertainment value. Similarly, the disabled can communicate more effectively with others using computers.

Modern computer-based technologies facilitate effective communication. Distance learning and videoconferencing involve people in different places interacting through a video connection. Further, video conferencing gives students the opportunity to set up virtual classrooms, where they “meet” online, collaborate on projects and interact in a team atmosphere.

Taking the above into consideration, ethical behavior among computer professionals and other users is a key factor. Both computer users and professionals should ensure that hardware, software, and networks are effectively integrated in a socially responsible way.

Exercise 32. *Fill in the gaps with proper prepositions: with, by, to, on, into, for, from, without, among, at, in, of. Translate the sentences.*

1. Computers are used everywhere, ... particular, ... medical equipment, home appliances, cars and toys. 2. Multimedia systems are known ... their educational and entertainment value. 3. Many people today use their computers to stay ... touch ... the office while they are working ... home; employees work ... employers ... other countries without even seeing them. 4. Taking the above ... consideration, ethical behavior ... computer professionals and other users is a key factor. 5. Further, video conferencing gives students the opportunity to set up virtual classrooms, where they “meet” online, collaborate ... projects and interact ... a team atmosphere. 6. The ability ... modern computers to control complex operations has transformed the way many tasks are

performed, ranging ... scientific research and space exploration ... producing consumer products. 7. Modern computers and technologies are designed to take over some basic tasks previously performed ... people; ... so doing, they make life a little easier and a little more pleasant.

Exercise 33. *Work in groups to discuss the following items.*

1. Importance of computers in modern life.
2. The advantages and disadvantages of computers.
2. Agree or disagree with the fact that computer professionals will be in demand in Ukraine in the foreseeable future.

Exercise 34. *Research a topic “The Role of Computers in Modern Life”. Prepare an essay or make a presentation in class revealing the main issues of the topic.*

## GRAMMAR REVIEW

### ACTIVE VOICE

Exercise 35. *Study the examples below. Pay attention to the forms of the Active Voice in English.*

	<b>Simple</b>	<b>Continuous</b>	<b>Perfect</b>	<b>Perfect Continuous</b>
<b>Present</b>	I <b><u>speak</u></b> to Mike every day.	I <b><u>am speaking</u></b> to Mike now.	I <b><u>have</u></b> already <b><u>spoken</u></b> to Mike.	I <b><u>have been speaking</u></b> to Mike for two hours / since 5 o'clock.
<b>Past</b>	I <b><u>spoke</u></b> to Mike yesterday.	I <b><u>was speaking</u></b> to Mike yesterday at 5 o'clock / when you called me.	I <b><u>had spoken</u></b> to Mike by 5 o'clock / by the time you came.	I <b><u>had been speaking</u></b> to Mike for two hours by the time you came / by 6 o'clock.



<b>Future</b>	<b><u>I will speak</u></b> to Mike tomorrow.	<b><u>I will be speaking</u></b> to Mike tomorrow at 5 o'clock / when you call me.	<b><u>I will have spoken</u></b> to Mike by 5 o'clock / by the time you come.	<b><u>I will have been speaking</u></b> to Mike for two hours by the time you come / by 6 o'clock.
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Exercise 36. *Open the brackets and put the verbs into the Present Simple, the Present Continuous, the Present Perfect or the Present Perfect Continuous.*

1. They already (modernize) databases. 2. A computer (be) an electronic device that manipulates information, or data. 3. Companies (start) to use virtual reality on their websites. 4. I (not/ upgrade) my computer since July. 5. A computer (have) the ability to store, retrieve, and process data. 6. They (produce) computers with onboard graphics system for ten years. 7. Hardware (be) any part of your computer that (have) a physical structure, such as the keyboard or mouse. 8. How long you (make) educational software? 9. We now (live) in what some people call “digital age”. 10. A hard drive (spin) at over 7,200 revolutions per minute (rpm) and (store) data on stack of metal rotating disk called platters. 11. At the moment we (set up) a website for a large insurance company. 12. How long you (have) website for investors? 13. This software (be/not) fully compatible with older operating system. 14. For the last three years, I (work) as a software engineer for Intelligent Software. 15. Since 2021, I (be) a computer operator for COSMO. 16. Applied mathematics (involve) the application of mathematics to problems which arise in various areas. 17. I never (work) with databases. 18. Many TVs now (include) applications – or apps – that let you access various types of online content. 19. I (use /not) Microsoft Access for years. 20. Wearable technology (be) a general term for a group of devices – including fitness trackers and smartwatches – that are designed to be worn throughout the day. 21. Manufacturing (benefit) from AI for years.

Exercise 37. *Open the bracket using “be going to + verb” to make future predictions and describe future intentions. Translate the sentences.*

Model: She (*write*) a book about methods of computing. – She *is going to write* a book about methods of computing. (Вона *збирається написати* книгу про методи обчислення.)

1. Nanotechnology (have) huge impact on business and our daily lives. 2. Big factories (benefit) from new technologies. 3. Scientists (use) machine learning to analyze images and videos. 4. Organizations (achieve) sustainable production levels by optimizing processes with the use of AI-powered software. 5. Operators in factories (eliminate and reduce) human error. 6. I (accept) the job. 7. New IT company (go bankrupt). 8. He (install) high-quality video conferencing software.

Exercise 38. *Open the brackets and put the verbs into the Past Simple or the Present Perfect.*

1. I (lose) my Personal Digital Assistant (PDA). 2. You ever (live or work) in other country? 3. The first usable computer (begin) with the vacuum tube and later (evolve) with the invention of the transistor. 4. After graduation I (work) for Nike. 5. I never (organize) a videoconference like this. 6. I (send) my CV last Thursday. 7. I (not / have) holiday for three years. 8. NTL just (announce) that it is cutting price for Internet access by 20%. 9. He (join) IBM in 2020. 10. The engineers (have problem) with chips, so they made some modifications to it. 11. When she (set up) a company? 12. The Macintosh (be) the first widely sold personal computer with a graphical user interface.

Exercise 39. *Open the brackets and put the verb into the Past Simple, the Past Continuous, the Past Perfect or the Past Perfect Continuous.*

1. I was nervous because I never (test) this system. 2. I (work) there for six months. 3. Scientists (play) an important support role, developing control software for technologies like mobile phones, microprocessors, and robotic surgery. 4. She (become) IT consultant in 2021. 5. When I left the office, the building was empty because everyone (go) home. 6. When he bought the company, it (produce) equipment for three years. 7. I (do) my homework by 8 o'clock. 9. In 1981, Computer Innovations Inc. (be) a leader in electronic claims processing. 10. She (not/ accept) the job because the salary was too low. 11. Microsoft (launch) Windows 7 on July 22. 12. When he came I (wait) for a half an hour. 13. They (work) at this project since 2012 until they finished it.

Exercise 40. *Open the brackets and put the verb into the Future Continuous or the Future Perfect.*

1. Scientists (inject) nanobots into the body bloodstream to treat diseases. 2. Engineers (build) different types of android by next year. 3. In September, we (develop) built-in monitoring system to control complex operations. 4. Thanks to new computer-based technologies, by the year 2030 we (find) drugs for the major diseases of our time. 5. In twenty years' time, some people (live) in space, perhaps, inside a computerized colony. 6. By this time next month, I (buy) upgraded app that I've been wanting to buy for a month. 7. Scientists predict that in fifteen years' time almost everyone (live) in smart houses. 8. By this time next week, I (work) for IBM. 9. I am afraid I can't see you on the 2<sup>nd</sup> because I (attend) training IT course. 10. I (repay) money for new software by the end of July. 11. In August tech giants like Google, Apple, Microsoft and Amazon (spend) billions to create new products and services. 12. By the end of the year manufacturing industry (increase) productivity due to robotic innovations. 13. We (have) a break at 11 a.m. 14. We (finish) repairing the computer by 6 p.m.

## Unit II. COMPUTER SOFTWARE

Exercise 1. *Study the words to text 1.*

Software – програмне забезпечення

application software – прикладне програмне забезпечення

application – прикладна програма, додаток, застосунок

system software – системне програмне забезпечення

general-purpose software – універсальне програмне забезпечення

customized software – спеціальне програмне забезпечення  
(розроблене відповідно до конкретних вимог окремого клієнта)

utility software – службове програмне забезпечення, утиліта

hardware – апаратне, технічне забезпечення або оснащення

instruction – команда

execute – виконувати

smoothly – гладко; рівно; плавно

storage device – запам'ятовувальний пристрій, накопичувач

whereas – тоді як, в той час як

vice versa – навпаки

distinguish – відрізнити, розрізнити

operating system – операційна система  
 processor – процесор  
 language processor – мовний процесор  
 word processing – обробка текстів  
 central processing unit (CPU) – центральний процесор (ЦП / ЦПП)  
 device driver – драйвер пристрою  
 load – завантажувати  
 interact – взаємодіяти  
 programming language – мова програмування  
 high-level language – мова високого рівня  
 source code – вихідний код / програма  
 operation – операція, робота  
 design – 1) розробляти; 2) призначати  
 spreadsheet – (великоформатна) електронна таблиця  
 database management – система керування / управління базами даних  
 inventory – інвентаризація, облік ресурсів  
 payroll program / system – програма / система нарахування заробітної плати  
 feature – характерна риса, особливість, властивість  
 railway reservation system – система бронювання залізничних квитків  
 invoice management system – система управління рахунками  
 maintain – підтримувати; обслуговувати  
 take care of – дбати про когось / щось  
 disk defragmenter – дефрагментатор диску  
 disk repair – відновлення / ремонт диску  
 registry cleaner – очистка / очищувач реєстру

Exercise 2. Find verbs among the words in the list below. Insert their first letters into the cells in the order the verbs appear in the exercise to obtain a resulting word. Translate the word.

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Hardware, computer, apply, whereas, defragmenter, predict, basically, spreadsheet, perform, database, launch, inventory, interact,

storage, carry, device, add, smoothly, purpose, tell, software, reservation, instruct, processor, operate, payroll, machine, utility, negate.

Exercise 3. *Give the initial form of the words below. Translate the pairs.*

Management, operation, application, processing, execution, maintenance, programming, reservation, functionality, readable defragmenter, distinguished, instruction, communication, useful, readable, conversion, organization, infrastructure.

Exercise 4. *Find synonyms (a) and antonyms (b) of the words.*

a) execute, design (*n*, *v*), store, storage, apply, application, instruction, interact, provide, control, maintain, for example, because, operation, various, basically, whereas, use, generally;

b) hardware, special-purpose, system software, high-level language, internal, directly, difficult, connect, smoothly.

Exercise 5. *Explain the meaning of the following words and word combinations.*

Computer, instruction, hardware, software, operating system, application software, system software, machine language, high-level language, CPU, database, spreadsheet, hard disk.

Exercise 6. *Translate the following terminological expressions into Ukrainian.*

A set of instructions; system software; application software; to directly operate computer hardware; to run smoothly; to convert the human language into machine language and vice versa; the following characteristic features of system software can be distinguished; to be subdivided into operating systems, language processors and device drivers; to manage resources; CPU, hard disk, and printer; high-level programming languages such as Java, C, C++, Python; source code; a device driver; to include spreadsheets, word processors, inventory, database management, and payroll programs; to accomplish tasks; storage space; general-purpose software; customized software and utility software; railway reservation system; antivirus, disk defragmenter, memory tester, disk repair, registry cleaner, disk cleaner, disk space analyzer.

Exercise 7. Read text 1 and use the diagram of exercise 8 to speak about computer software.

### **Text 1. COMPUTER SOFTWARE**

Software is a set of instructions to operate a computer system. It is a computer program providing a set of commands to tell the computer what to do. For example, MS-Word, MS-Excel, PowerPoint, etc.

In general, there are two main types of computer software: **system software and application software**.

**System software** directly controls computer hardware and provides basic functionality for users and other software to keep operations running smoothly. System software mainly controls internal operations of the computer and manages hardware devices such as monitors, storage devices, printers, etc. It acts like an interface between user applications and the hardware and user applications. It helps them communicate with each other since hardware understands only machine language (0s or 1s) while the user applications run in human languages like English, German, French etc. Thus, system software converts human languages into machine languages and vice versa.

The following characteristic features of system software can be distinguished:

- it is closer to the computer system;
- generally, it is written in a low-level language;
- system software is difficult to develop and understand;
- it is fast (working speed);
- system software is less interactive for users as compared to application software.

System software is further subdivided into *operating systems, device drivers, and language processors*.

*An operating system* is the main program of a computer system. When a computer system is turned on, it is the first software that is loaded into computer's memory. It manages such resources as CPU, a hard disk, memory, a printer, etc. and acts as an interface that helps the user interact with the computer system. It also provides various services for other computer software. Linux, Microsoft Windows, Apple macOS are the examples of operating systems.

*A device driver* is a program or software that controls a device and helps it perform its functions. Every device like printer, mouse, modem, etc. needs a driver to interact with a computer system. When you connect

a new device to your computer system, first you need to install the device driver so that your operating system know how to monitor or control the device.

System software converts human languages into machine languages and vice versa. The conversion is performed by *the language processor*. It converts programs written in high-level programming languages such as Java, Python, C, C++, etc. (known as source code) into machine-readable sets of instructions (known as object code or machine code).

Software that performs special functions or provides more functions than the basic operation of the computer is known as **application software**. It is designed to accomplish specific tasks for end users. It is a product, or a program intended to meet their needs.

The main features of application software are as follows:

- it performs more specialized tasks like word processing, spreadsheets, email, payroll programs, database management, inventory, etc.;
- the software is so large, that it requires more storage space;
- it is more interactive, so it is easy to use, understand, and design;
- in general, application software is written in a high-level language.

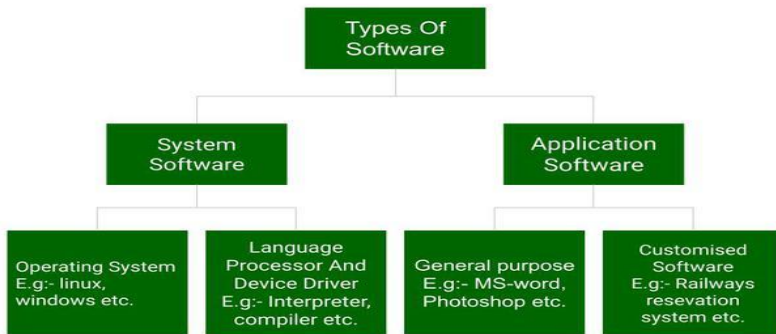
Application software is grouped into *general-purpose software*, *customized software*, *utility software*.

*General-purpose software* is intended to perform various tasks, and not limited to performing a specific task. For example, MS-Word, MS-Excel, PowerPoint, etc.

*Customized software* is intended to accomplish a particular task or a function or designed for specific organizations. For example, railway reservation system, invoice management system, etc.

*Utility software* is dedicated to support computer infrastructure. It is used to analyze, optimize, configure, and maintain the system. For example, antivirus, disk defragmenter, memory tester, disk repair, disk cleaner, registry cleaner, disk space analyzer.

Exercise 8. Use the diagram below to give the gist of text 1.



Exercise 9. *Use text 1 to translate the word combinations:*

набір команд; безпосередньо керувати апаратним забезпеченням комп'ютера; працювати безперебійно; запам'ятовувальний пристрій; зрозуміла для людини мова; прикладне програмне забезпечення; системне програмне забезпечення; драйвер пристрою; центральний процесор (ЦП); вихідний код; задовольняти вимоги користувача; мовний процесор та електронна таблиця; керування базами даних; облік ресурсів; програма нарахування заробітної плати; місце (простір) для зберігання; утиліта; спеціальне програмне забезпечення; система бронювання залізничних квитків; система управління рахунками; антивірусна програма; дефрагментатор диску; відновлення диску; очищувач реєстру.

Exercise 10. *Translate the sentences and pay attention to the words in bold type.*

1. Операційна система – це набір програм, що контролює роботу **апаратного забезпечення** комп'ютера. 2. **Прикладне програмне забезпечення** призначене для безпосередньої взаємодії з користувачем. 3. **Програма нарахування заробітної плати** повинна надавати дані, які показують, де ваші гроші, і як ви можете отримати вигоду з найцінніших активів. 4. **Операційна система** та **утиліти** залежать один від одного, щоб функціонувати належним чином. 5. 20-ядерний процесор є найшвидшим **процесором (ЦП)** для споживачів. 6. Резервне копіювання на основі хмарних обчислень – це **простір для зберігання** в Інтернеті й синхронізація, доступна



через Інтернет. 7. Системи **керування базами даних** забезпечують створення, обслуговування та спільне використання баз даних. 8. Не можна встановити **драйвер пристрою** вручну, щоб пристрій почав працювати. 9. Використовуючи **систему бронювання залізничних квитків**, покупець має право змінити або анулювати замовлення.

Exercise 11. Match the terms (1 – 10) with their definitions (a – k).

1) customized software	a) the action or process of writing computer programs
2) utility software	b) software intended to manage the operation of most computer systems
3) language processor	c) software developed to meet specific needs of an individual user
4) operating system	d) the process of producing, storing, and manipulating texts by a computer or word processor
5) CPU	e) the original form of a computer program as it is written by a programmer
6) programming language	f) software intended to facilitate analyzing, configuring, optimizing, or maintaining a computer
7) programming	g) the main component of a computer that is responsible for performing arithmetic and logical operations specified by the program, controlling computing processes and coordinating the operation of all computer units
8) system software	h) a special set of programs through which all computer systems interact both with each other and with the user
9) storage device	i) a device handling programs in a programming language; denotes compilers, translators, and interpreters
10) source code	j) an artificial language intended for writing computer programs
11) word processing	k) a piece of computer equipment on which information can be stored

Exercise 12. *Fill in the correct prepositions: by, in, to, into, between, with, for, of, on.*

1. System software directly operates computer hardware and provides the basic functionality ... the users as well as ... the other software to operate smoothly. 2 ... other words, system software basically controls a computer's internal functioning. 3. It is like an interface ... hardware and user applications, it helps them to communicate ... each other because hardware understands machine language (i.e., 1s or 0s) whereas user applications work ... human-readable languages like English, French, German, etc., so system software converts the human language ... machine language. 4. It is less interactive ... the users ... comparison ... application software. 5. System software is further subdivided ... operating systems, language processors and device drivers. 6. An operating system is the main program ... a computer system. 7. When the computer system is..., it is the first software that is loaded ... the computer's memory. 8. It also provides various services ... other computer software. 9. The conversion is done ... the language processor. 10. It converts programs written ... high-level programming languages like Java, C, C++, Python, etc. 11. Application software is created to perform a specific task ... end users. 12. Generally, application software is written ... a high-level language. 13. General-purpose software is used ... a variety of tasks, and it is not limited ... performing only a specific task.

Exercise 13. *Answer the questions on computer software.*

1. What is software in a computer system? 2. What are the main types of computer software? 3. What is system software? 4. Why does system software convert the human-readable language into machine language and vice versa? 5. What features of system software can be distinguished? 6. How is system software classified? 7. What is an operating program? 8. What operating systems are there? 9. What is the purpose of language processor? 10. What is the device driver? 11. What is application software? 12. What is it designed for? 13. What are the main characteristics of application software? 14. What types does application software fall into? 15. What is general-purpose software used for? 16. What is customized software intended for? 17. What is utility software designed for?

Exercise 14. *Make questions (general, alternative, subject, special and disjunctive) on the sentences.*

1. The main categories of computer software are system software and application software. 2. System software coordinates computer hardware providing basic user functions. 3. Internal computer functions are controlled by the operating system. 4. System software handles the operation of monitors, storage devices, and printers. 5. Human language is converted into machine language by system software. 6. System software is further subdivided into operating systems, language processors and device drivers. 7. An operating system manages the operation of the whole computer system. 8. Device driver is a software that helps a device perform its specific functions. 9. Application software is intended to accomplish specific tasks. 10. Utility software supports computer infrastructure. 11. Customized software can be written for target organizations. 12. Antivirus can protect your computer from malicious software.

Exercise 15. *Translate the sentences using text 1.*

1. У комп'ютерній системі програмне забезпечення – це, в основному, набір команд, які вказують комп'ютеру, що робити. 2. Загалом, існує два основних типи програмного забезпечення: системне програмне забезпечення та прикладне програмне забезпечення. 3. Системне програмне забезпечення – це програмне забезпечення, яке безпосередньо керує апаратним забезпеченням комп'ютера й забезпечує базову функціональність для користувачів, а також іншого програмного забезпечення, для безперебійної роботи. 4. Іншими словами, системне програмне забезпечення в основному контролює внутрішнє функціонування комп'ютера та керує апаратними пристроями, такими як монітори, принтери, пристрої зберігання даних тощо. 5. Воно є інтерфейсом між апаратним забезпеченням і додатками користувача, що допомагає їм спілкуватися один з одним, оскільки апаратне забезпечення розуміє лише машинну мову (тобто 0 та 1). 6. Програми користувача працюють на зрозумілих для людини мовах, таких як англійська, хінді, німецька тощо, тому системне програмне забезпечення перетворює зрозумілу людині мову в машинну мову й навпаки. 7. Системне програмне забезпечення поділяють на операційні

системи, мовні процесори та драйвери пристроїв. 8. Операційна система – основна програма комп'ютерної системи. 9. Коли комп'ютерна система ввімкнена, це програмне забезпечення першим завантажується в пам'ять комп'ютера. 10. По суті, операційна система керує всіма ресурсами, такими як пам'ять, ЦП, принтер, жорсткий диск тощо, і забезпечує інтерфейс, який допомагає користувачеві взаємодіяти з комп'ютерною системою. 11. Прикладами операційних систем є Linux, Apple macOS, Microsoft Windows. 12. Мовний процесор перетворює програми, написані мовами програмування високого рівня, такими як Java, C, C++, Python тощо (відомі як вихідний код), у набори команд, які легко зчитуються машинами (відомі як об'єктний або машинний код). 13. Драйвер пристрою – це програма або програмне забезпечення, яке керує пристроєм і допомагає цьому пристрою виконувати свої функції. 14. Прикладне програмне забезпечення призначене для виконання конкретного завдання кінцевих користувачів. 15. Воно включає текстові процесори, електронні таблиці, керування базами даних, інвентаризацію, програми нарахування заробітної плати тощо. 16. Існують різні типи прикладного програмного забезпечення, наприклад програмне забезпечення загального призначення, спеціальне та службове програмне забезпечення.

Exercise 16. *Study the words to text 2.*

Code editor – редактор вихідного коду

Integrated Development Environment (IDE) – інтегроване середовище розробки (програм)

consider – 1) розглядати, обговорювати; обмірковувати; 2) брати до уваги, враховувати

appropriate – відповідний; доречний

primarily – 1) у першу чергу; головним чином 2) спочатку, спершу

web development – розробка та впровадження веб-додатків (сайтів)

assembly language – мова асемблера

procedural language – процедурна (імперативна) мова

scripting language – мова (підготовки) сценаріїв, скриптова мова

functional language – функціональна мова, мова функціонального програмування

object-oriented language – об'єктно-орієнтована мова

exploit – використовувати

Exercise 17. *Find synonyms of the words.*

Program (*n, v*), perform, developer, consider, include, appropriate, popular, primary, variety, area, general-purpose, collection, exploit.

Exercise 18. *Define the terms below.*

Instruction, program, source code, programming, programmer, software engineer, programming language, compiling, code editor, word processor, database system, functional programming, object-oriented programming.

Exercise 19. *Use the following word combinations in sentences of your own.*

To be composed of; code executed on a computer; to perform particular tasks; software engineers; a set of instructions; a code editor or IDE; to consider the needs of the application; to decide which languages to choose; to be mostly used in one area of development; fields such as data analysis, machine learning, and web development; do not need to be compiled but rather to be interpreted; to exploit the idea of building programs around collections of objects.

Exercise 20. *Read text 2 and find out more information about programming.*

## **Text 2. COMPUTER PROGRAMMING**

A computer program is composed of code executed on a computer for performing various tasks. The code is created by programmers / developers / software engineers.

*Programming* is the process of giving machines a set of instructions describing execution of a program. Throughout their careers, programmers will learn various programming languages and tools to efficiently create computer programs.

Programmers can start by using a code editor or IDE to write a source code. It is a set of instructions written in *a programming language* that can be read by other programmers. The source code is converted into machine language so that computers can understand the instructions and run the program. Conversion of source code into machine language is known as compilation. C and C++ are the examples of compiled programming languages.

Some languages use interpreters instead of compilers to read and execute the code, for example, PHP and JavaScript.

After the code is executed, the computer program can run. Various types of computer programs involve word processors, video games, database systems, and websites. These computer programs allow us to interact with software devices and services, such as phones, websites and the computers themselves.

Hundreds of programming languages are already known. Developers will first consider the needs of the application so they can decide which languages to choose. Popular programming languages are Python, C/C++, JavaScript, C#, Java, Ruby, PHP, etc. Some of these languages are mostly used in one area of development, while others are more general-purpose.

JavaScript is primarily used in web development and is usually the first programming language learnt by beginning web developers. JavaScript is also used for mobile and game development. Python can be used in various fields such as data analysis, machine learning, and web development.

Programming languages are divided into the following *categories*.

*Machine language* is a low-level language composed of binary 0s and 1s. High-level languages are compiled into machine code so that the code can be run on a computer.

*Assembly language* is a low-level language compiled by assembler. Assemblers convert human code into machine code.

*Procedural languages* use a series of procedures before executing a program, for example, Go and Julia.

*Scripting languages* usually do not need to be compiled, but rather to be interpreted. Interpreted means that the interpreter will read and execute the code instead of compiling it to machine code. For example, JavaScript and PHP.

*Functional languages* create complex programs using a set of smaller functions. For example, Haskell and Scala.

*An object-oriented language* exploits the idea of building programs around collections of objects, for example, Java and Python.

Exercise 21. *Write out of text 2 and translate the sentences with the predicates in the Passive Voice. Identify their tense forms.*

Exercise 22. *Use text 2 to translate the following terminological word combinations:*

для виконання певного завдання; процес надання машині набору команд, які описують, як програма має виконуватися; редактор коду або IDE для написання того, що називається вихідним кодом; текстовий процесор, система баз даних, відеоігра й веб-сайт; взаємодіяти з різними програмними пристроями та службами, такими як телефони, веб-сайти й самі комп'ютери; розглянути, що потрібно програмі; вирішити, які мови будуть доречними для використання; мова програмування загального призначення; веб-розробник-початківець; аналіз даних, машинне навчання та веб-розробка; компілюватися в машинний код; мова асемблера; процедурна мова; мова сценаріїв; функціональна мова; об'єктно-орієнтована мова.

Exercise 23. *Work with a partner to discuss these questions.*

1. What does a computer program consist of? 2. Who is the code written by? 3. What is programming? What other software development lifecycle processes do you know? Dwell on them in detail. 4. Will your future career be related to programming / software development? 5. What is a code editor or IDE and what is it used for? 6. Why does source code need to be converted into machine language? 7. What is compiling? 8. What is the difference between compiled and interpreted programming languages? Give their examples. 9. What are common computer programs? What do they allow us to do? 10. How do programmers choose appropriate programming languages? 11. What are popular programming languages? What areas are they used in? 12. What categories of programming languages are there? Characterize each of them.

Exercise 24. *Study the words to text 3.*

Object-oriented programming (OOP) – об'єктно-орієнтоване програмування (ООП)

unique – унікальний, однозначний, оригінальний, специфічний  
attribute – атрибут

well-suited – такий, що добре підходить

beneficial – корисний; вигідний

collaborative development – колективна розробка

reusability – придатність для повторного використання  
scalability – розширюваність, масштабованість  
efficiency – ефективність  
entity – 1) об'єкт; 2) сутність  
property – властивість, атрибут, якість  
widget – графічний фрагмент, кліп, піктограма; інтерфейсний елемент вікна, *проф.* віджет  
label – класифікувати, відносити до якоїсь категорії  
distinct – окремий, визначений  
blueprint – (детальний) план, програма, проєкт; зразок, шаблон  
instance – екземпляр класу (об'єкту)  
subroutine – підпрограма  
encapsulated – інкапсульований, розміщений в капсулі  
template – шаблон, трафарет, зразок  
state – стан, режим  
fault tolerant system – відмовостійкий, що зберігає працездатність при відмові окремих елементів  
functional programming – функціональне програмування  
structured or modular programming – структуроване або модульне програмування  
imperative programming – імперативне програмування  
declarative programming – декларативне програмування  
logical programming – логічне програмування  
statement – 1) оператор; речення; 2) твердження; висловлювання; формулювання  
outcome – результат  
problem domain – проблемна область / сфера  
query – запит

Exercise 25. *Find derivatives of the following words.*

Object, program, organize, computer, manipulate, logic, function, behavior, active, maintain, manufacture, apply, develop, use, scale, add, alter, structure, benefit, differ, routine.

Exercise 26. *Translate the word combinations.*

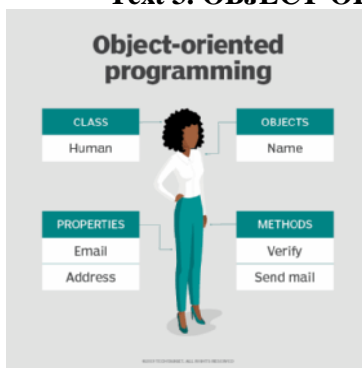
Unique attributes and behavior; used for manufacturing system simulation software; beneficial to collaborative development; additional



benefits of OOP include code reusability, scalability, and efficiency; to range from physical entities, such as a human being to small computer programs, such as widgets; to be labeled with a class of objects; any logic sequences that can manipulate data; distinct logic sequence; well-defined interfaces called messages; correspond to real-world objects or an abstract entity; to start with a reference to an instance object; instance methods; programmers use methods for reusability or keeping functionality encapsulated inside one object at a time; class template and attributes; functional programming; structured or modular programming; this alternative to OOP focuses on function rather than models and includes C++ and Java; declarative programming; logical programming; a problem domain; to benefit from rule-based logical queries.

Exercise 27. Read text 3 and find out more about object-oriented programming and its structure.

### Text 3. OBJECT-ORIENTED PROGRAMMING



**Object-oriented programming (OOP)** is a computer programming method that organizes software design around data or objects rather than functions and logic. An object is defined as a data field that has unique attributes and behavior.

OOP focuses on the objects that developers want to manipulate rather than the logic needed to manipulate them. The approach is well-suited for programs that are large, complex, and actively updated or maintained. This includes applications for manufacturing and design, as well as mobile applications; for instance, OOP can be used to develop system modeling software.

The organization of an object-oriented program also makes the method productive for collaborative development when projects are divided into teams. Additional benefits of OOP include code reuse, efficiency, and scalability.

The first step in OOP is to collect all the objects that the programmer wants to manipulate and determine how they are related to each other, an exercise known as data modeling.

Examples of objects can range from physical entities such as a person described by properties such as name and address to small computer programs such as widgets.

When an object is known, it is labeled by an object class that defines the type of data it contains and any logical sequences that can manipulate it. Each individual logical sequence is known as a method. Objects can communicate using well-defined interfaces called messages.

Object-oriented programming includes the following building blocks or the framework:

- **Classes** are user-defined data types acting as a blueprint for particular objects, methods, and attributes.

- **Objects** are instances of a class created with specifically defined data. They can correspond to real-world objects or an abstract entity. When a class is initially defined, the description is only the defined object.

- **Methods** are functions defined inside a class describing the behavior of an object. Every method contained in a class definition begins with a reference to an instance object. Routines contained in an object are called instance methods. Programmers use methods for reusing or keeping functionality encapsulated in one object at a time.

- **Attributes** are defined in the class template and represent the state of the object. Object data is stored in the attribute field. Class attributes belong to the class itself.

Alternative methods to OOP include:

- **Functional programming** including such languages as Erlang and Scala, used for telecommunications and fault-tolerant systems.

- **Structured or modular programming** including languages like PHP and C#.

- **Imperative programming.** This alternative to OOP focuses on functions rather than models and includes C++ and Java.

- **Declarative programming** is a programming method involving statement of a task or desired result, but not how to achieve it. Languages include Prolog and Lisp.

- **Logic programming** is based mostly on formal logic and using languages such as Prolog; it contains a set of sentences that express facts

or rules about a problem domain. It focuses on tasks that can benefit from rule-based logical queries.

Advanced programming languages allow developers to combine models because they can be used for different programming methods. For example, JavaScript is suitable for OOP and functional programming.

Exercise 28. *Work in pairs to discuss the items.*

1. What is object-oriented programming? 2. What is an object? 3. What does OOP focus on? 4. What is this approach to programming well-suited for? 5. What are the benefits of OOP? 6. What is the first step in OOP? 7. Give the examples of an object. 8. What is done after the object is known? 9. What are methods and messages? 10. What are classes / objects / methods / attributes? 11. What do alternative to OOP methods include? 12. What do most advanced programming languages enable developers to do?

Exercise 29. *Match the following terms (1 – 10) to their definitions (a – j).*

1) class	a) a methodology, in which strict sequence of actions is observed
2) structured (modular) programming	b) a programming paradigm describing a problem by a set of logical statements
3) imperative programming	c) a programming paradigm that specifies the solution of a problem by description of the expected result, not the way it is obtained
4) object	d) a feature characterizing an object symbolizing its state and relationship with other objects
5) logical programming	e) types of data defined by users that correspond to real world objects in business or subject domain
6) declarative programming	f) a methodology of designing programs, in which problems are divided into smaller parts to simplify their understanding
7) object-oriented programming	g) an activity performed by an object; a named built-in procedure or function

	associated with an object that changes its state or causes it to send a message, i.e. realizes the behavior of an object of a particular class
8) method	h) a programming paradigm, in which all language structures are implemented as functions and expressions
9) functional programming	i) a class instance possessing inheritance, encapsulation, and polymorphism
10) attribute	j) the major programming paradigm with the main idea representing data as objects having certain properties and containing both data structures and procedures to operate (methods)

Exercise 30. *Explain the meaning of the terms.*

Low-level language, machine language, translator, high-level language, compiler, assembly language, assembler, binary form, interpreter, hexadecimal form, reusability, scalability, problem domain.

Exercise 31. *Find synonyms of the following words.*

Advantage, specific, programmer, mainly, fast, machine-dependent programming language, designed, require, memory, distinct, contain, manipulate, efficiency, entity, initially, be divided into.

Exercise 32. *Read text 4 and speak on low-level programming languages.*

#### **Text 4. LOW-LEVEL PROGRAMMING LANGUAGES**

Programming languages are computer languages used by programmers to communicate with computers. They are sets of instructions written in specific languages (C, C++, Java, Python) to accomplish specific tasks. Programming languages are designed to develop desktop and mobile applications, websites, etc. They are classified as low-level languages, high-level, and middle-level languages.

**Low-level languages** are machine-dependent programming languages. They operate 0s and 1s. The processors do not need to perform low-level programs directly, they require compilers and interpreters to

execute a program, so programs can be run very fast. Low-level languages fall into *machine languages* and *assembly languages*.

A *machine language* is also known as a machine code or an object code. It is easier to read for it is normally displayed in binary or hexadecimal form (base 16) form. A machine language does not need a translator to convert the programs since a computer directly understands machine language programs.

The advantage of machine languages is that they help programmers run programs faster than high-level languages.

An *assembly language* is another type of low-level programming languages designed for particular processors. Sets of instructions are represented in symbolic and human-understandable form. Assemblers are usually used to convert assembly languages into machine code.

The advantage of assembly languages is that they require less memory and less time to execute a program.

#### Exercise 33. *Translate the word combinations:*

використовуватися програмістами (розробниками) для взаємодії з комп'ютерами; виконувати конкретне завдання; додатки для настільних комп'ютерів, веб-сайтів і мобільних додатків; мови низького, високого та середнього рівня; безпосередньо запускати програми; поділятися на машинні мови та мови асемблера; машинний код або об'єктний код; відображатися у двійковій або шістнадцятковій формі; розроблений для конкретних процесорів; набір команд у символічній і зрозумілій людині формі; потребувати менше пам'яті та менше часу для виконання програми.

#### Exercise 34. *Discuss the following with your partners.*

1. What are programming languages?
2. What are programming languages designed for?
3. What are low-level languages?
4. What do processors require to perform programs?
5. What categories do low-level languages fall into?
6. What is a machine language also known as?
7. What numbers does it operate with?
8. Why does a machine language not need a translator?
9. What is the advantage of machine languages?
10. What is an assembly language?
11. In what form are sets of instructions represented in assembly languages?
12. What are assemblers used for?
13. What is the advantage of assembly languages?

Exercise 35. Ask questions on the italicized parts of the sentences.

1. **Programming** languages are designed *to develop software*.  
2. **Instructions** are given in a *low-level* language. 3. Users requirements are studied by *software engineers*. 4. **Fortran** was widely known as the first compiled language. 5. The first *functional* language was developed in *1958*. 6. **Assemblers** were created *to transform commands into machine language*. 7. **Several** programming languages are commonly used by professional programmers. 8. The error must be eliminated *as soon as possible*. 9. The skills *of solving a problem and analyzing a situation* are required in *programming*. 10. The task must be coordinated and discussed with *other team members*.

Exercise 36. Study the words to text 5.

User-friendly – зручний для користувача; дружелюбний

derive – виникати, походити (від)

routine – (стандартна) програма

procedure call – виклик процедури

accomplish – виконувати

inheritance – наслідування

polymorphism – поліморфізм

abstraction – абстракція

reusable – що допускає багаторазове використання; придатний для повторного використання

debug – налагоджувати (*програму*)

natural language – природна мова (*на відміну від машинної*)

automatic summarization – автоматичне реферування, анутовання, резюмування

utilize – використовувати

Named Entity Recognition (NER) – розпізнавання іменованих об'єктів

relationship – взаємозв'язок

extraction – вилучення; виділення

segmentation – сегментація, розподіл на сегменти

respond – відповідати, реагувати

middle-level programming language – мова програмування середнього рівня

intermediate – проміжний

Exercise 37. *Translate the word combinations.*

A high-level programming language; to be designed to develop user-friendly applications; to execute a program; easy to maintain; to fall into two broad categories; procedural programming languages, object-oriented programming languages; natural languages; procedure call concept; small routines named subroutines or functions; to easily trace the program flow; the code can be reused; to implement real-world objects such as inheritance, polymorphism, abstraction; allow to run, maintain, and debug a program faster and easier; languages are utilized by programmers; automatic summarization; Named Entity Recognition (NER), relationship extraction, and topic segmentation; respond directly in seconds; intermediate programming language and pseudo-language.

Exercise 38. *Give derivatives of the following words.*

Design, develop, apply, translate, program, execute, easy, category, procedure, routine, edit, advantage, code, use, divide, implement, efficient, bug, utilize, maintain, manipulate, interpret, perform, translate, automate, summary, recognize, relate, extract, segment, nature, direct, mediate, friend.

Exercise 39. *Read the text and compare high-level languages with low-level languages.*

### **Text 5. HIGH-LEVEL PROGRAMMING LANGUAGES**

A high-level programming language is designed to develop user-friendly applications and websites. It needs a compiler or an interpreter to translate the program into machine language (execute the program). The main advantage of high-level languages is that they are easy to read, write, and maintain.

The examples of high-level programming languages include Python, Java, JavaScript, PHP, C#, C++, Objective C, Cobol, Perl, Pascal, LISP, FORTRAN, and Swift.

High-level languages fall into three broad categories: *procedural programming languages, object-oriented programming languages, and natural languages.*

A *procedural programming language* is derived from structured programming and based on a procedure call concept. The program is divided into small routines named subroutines or functions.

Procedural languages are used to develop programs that can be executed using a programming editor such as an IDE, Adobe Dreamweaver, or Microsoft Visual Studio.

The advantage of procedural languages is that they help programmers easily trace the program flow, and the code can be reused in different parts of the program. Examples are C, FORTRAN, Basic, Pascal, etc.

An object-oriented programming language (OOP) is based on objects. Programs are divided into small parts called objects. Object-oriented languages are used to implement real-world objects such as inheritance, polymorphism, abstraction, etc. in a program and make it reusable, efficient, and easy to use.

The main advantage of object-oriented languages is that they allow you to run, maintain, change, and debug a program faster and easier. Examples include C++, Java, Python, C#, etc.

A *natural language* is part of human languages such as English, Ukrainian, German, and French. It is used by machines to understand, manipulate, and interpret human languages. Natural languages are utilized by programmers to perform tasks such as translation, automatic summarization, Named Entity Recognition (NER), relationship extraction, and topic segmentation.

The main advantage of natural languages is that they help users ask questions on any topic and respond directly in seconds.

**A middle-level programming language** finds itself between a low-level language and a high-level language. It is also known as an intermediate programming language and pseudo-language.

The advantage of middle-level programming languages is that they support high-level programming features, are user-friendly and closely related to machine and human languages. Examples are C and C++.

Exercise 40. *Answer the questions on high-level languages.*

1. What is a high-level programming language designed for? 2. What is the function of compilers and interpreters? 3. What are the advantages of high-level languages? Give their examples. 4. What kind of programs are they intended for? 5. What categories do high-level languages fall into? 6. What is a procedural language derived from and what is it based on? 7. What is the program divided into? 8. What are procedural



languages used for? 9. What is the advantage of procedural languages? 10. What are the examples of procedural languages? 11. What is OOP language based on? 12. What are object-oriented languages used for? 13. What is the main advantage of object-oriented languages? Give their examples. 15. What are natural languages used for? What is their advantage? 16. What is a middle-level programming language? 17. What is the advantage of middle-level programming languages? Give their examples.

*Exercise 41. Use text 5 to translate the word combinations:*

бути призначеним для розробки зручних програм і веб-сайтів; поділятися на три великі категорії; базуватися на концепції виклику процедури; розподілятися на невеликі підпрограми; легко відстежувати потік програми; код можна повторно використовувати; об'єкти реального світу, такі як успадкування, поліморфізм та абстракція; виконувати, підтримувати, змінювати та налагоджувати програму швидше та легше; автоматичне реферування; розпізнавання іменованих об'єктів, вилучення зв'язків і сегментація тем; відповідати за лічені секунди; мова програмування середнього рівня; проміжна мова та псевдомова.

*Exercise 42. Work in groups to research and discuss the following items.*

1. Is software development industry an important branch of Ukrainian economy? Substantiate your answer. Exchange your ideas and opinions.

2. What areas of software development are there? Which of them are the most prevalent nowadays?

3. What are the most popular programming languages? What kind of software are they used to develop?

4. Discuss the advantages and disadvantages of popular programming languages.

5. Have you learnt any programming languages? What category do they belong to? Would you like to learn some? Discuss your experience and intentions with your friends.

6. What positions in software development are there? What are the most popular / well paid?

7. Would you like your future career to be related with software development? What kind of work would you like to do in future?

## GRAMMAR REVIEW

### PASSIVE VOICE

Exercise 43. *Study the following examples and review passive verb forms.*

<b>Present Simple</b>	1. Sharp <b>is used</b> to write applications. 2. Instructions <b>are understood</b> by computers.
<b>Past Simple</b>	1. C++ <b>was used</b> to write applications. 2. Instructions <b>were understood</b> by computers.
<b>Future Simple</b>	1. Instructions <b>will be understood</b> by computers. 2. C++ and Sharp <b>will be used</b> to write applications.
<b>Present Continuous</b>	1. The code <b>is being written</b> now. 2. C++ and Sharp <b>are being used</b> to write the applications.
<b>Past Continuous</b>	1. The code <b>was being written</b> the whole night yesterday. 2. C++ and Sharp <b>were being used</b> to write the applications.
<b>Present Perfect</b>	1. The code <b>has</b> already <b>been written</b> . 2. C++ and Sharp <b>have been used</b> to write the applications.
<b>Past Perfect</b>	1. The code <b>had been written</b> before I came. 2. He said that C++ and Sharp <b>had been used</b> to write the applications.
<b>Future Perfect</b>	1. The application <b>will have been written</b> by September. 2. The code <b>will have been debugged</b> by tomorrow.
<b>Passive Infinitives</b>	1. The algorithm is going <b>to be used</b> . 2. The application can <b>be written</b> . 3. The code may <b>have been debugged</b> .

Exercise 44. *Use Passive Voice to transform the sentences.*

1. Students majoring in Applied Mathematics study such subjects as Dynamic Systems, Algorithms Complexity Theory, Nonlinear Processes and Models, etc. 2. Students of this specialty will obtain analytical and problem-solving skills. 3. Studying the discipline can give future graduates a decisive advantage in their professional activity. 4. He is analyzing data. 5. Problem statement involves choosing the way and the methods of research. 6. Data analysts were processing complex data

7. They have found correct solution. 8. You will need the disciplines related to statistics, linear algebra, probability theory. 9. Students will have studied such programming languages as Python and R. 10. Teachers pay attention to developing students' research activity. 11. Business analyst has already stated a problem. 12. The HR manager had already interviewed the applicants when I came. 13. Online resources and video courses provide basic information in accessible manner. 14. They reached a conclusion. 15. The data scientist has gathered, structured, extracted, and synthesized data from various sources.

Exercise 45. *Open the brackets using the Passive Voice.*

1. Mathematical models (use) to develop software. 2. The knowledge of Applied Mathematics (enhance) currently. 3. Fluent English (require) to communicate with team members and customers. 4. The pros and cons of PHP (discuss) when I came in. 5. The basics of Discrete Mathematics (learn) by the end of the term. 6. Developers can (group) into several categories. 7. The language (design) to develop web sites. 8. The algorithm (use) to solve typical problems. 9. The example of simple algorithm (be) shown now. 10. The software product (develop) by the end of the month. 11. Standard problems (solve) by junior developers. 12. The graduates (employ) by the company. 13. Data Analysis and Methods of Machine Learning (study) next term. 14. Mathematics (apply) in IT, natural sciences, business, and finance. 15. The graduates of the department (prepare) for successful career in academic circles, public service, Ukrainian and international business companies. 16. Physics, Mathematics, and Computer Science (base) on critical thinking.

Exercise 46. *Translate the sentences using the Passive Voice.*

1. Компанія займається розробкою програмного забезпечення для західних клієнтів. 2. Він сподівався, що йому допоможе досвідчений колега. 3. Для успіху потрібно розвивати не лише професійні, а й соціальні навички. 4. Фірма розробляє мобільні застосунки для іноземних замовників вже 3 роки. 5. Маючи математичну спеціальність, можна опанувати професію програміста. 6. Завдання було виконане до встановленого терміну. 7. Як можна знайти першу роботу? 8. Помилки у коді будуть до завтра виправлені. 9. Зарубіжні споживачі зацікавлені в українських ІТ-фахівцях. 10. Потрібні навички роботи ще не сформовано.

11. Можна досягти відмінного результату, працюючи віддалено.
12. Прикладну математику застосовують в різних галузях науки, техніки та промисловості.
13. Українські науково-технічні інновації знаходять все більше визнання в академічному середовищі.
14. Кафедра прикладної математики була створена в 1992 році.

### Unit III. COMPUTER HARDWARE

#### Exercise 1. *Vocabulary activity to text 1.*

Accept – приймати

certain – певний, визначений, конкретний

process – обробляти (інформацію)

define – визначати

external – зовнішній

internal – внутрішній

CPU (central processing unit) – центральний процесор

Blu-ray – блюрей (оптичний диск для зберігання відео високої чіткості)

fan (heat sink) – кулер, пристрій охолодження

order – наказувати

operate – працювати

peripherals – периферійні пристрої, пристрої введення-виведення

brain, «smarts» – мозок, розум

silicon – кремній

interpret – перетворювати

execute – виконувати

keep track – відслідковувати, контролювати

performance – продуктивність, експлуатаційні якості

clock speed – тактова частота

hertz – герц

cycles per second – герци, періоди за секунду

RAM (random access memory) – пам'ять з довільним доступом, оперативний запам'ятовувальний пристрій

ROM (read only memory) – пам'ять тільки для читання, постійний запам'ятовувальний пристрій

DIMM (dual in-line memory module) – модуль пам'яті з характерним розміщенням виводів у два ряди (*використовується головним чином в настільних ПК, серверах та ноутбуках*)  
 volatile – енергозалежний (*дані зникають при вимкненні джерела енергопостачання*)  
 routine – підпрограма  
 capacity – ємність  
 expand – розширювати  
 insert – вставляти  
 feed – подавати, постачати  
 touch screen – сенсорний екран  
 drive – привід  
 light pen – світлове або світне перо; пристрій, який при переміщенні по монітору впізнає світлові сигнали  
 barcode reader – сканер штрих-коду

Exercise 2. *Search for the nouns among the words below. Place their first letters into the cells in the same order. Translate the word you obtained.*

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Modern, pen, reader, concentrate, physical, internal, divided, order, electronic, three, accept, centre, feed, insert, amazing, electron, main, complicated, within, single, itself, scanner, called, integrated, each, execute, section, examine, create, specified, operation, random, register.

Exercise 3. *Give the initial form of the words. Translate the pairs.*

Computer, electronic, processing, information, central, variety, constantly, mechanical, activity, examine, instruction, calculation, multiplication, division, addition, subtraction, performance, application, further.

Exercise 4. *Search in the vocabulary for the synonyms (a) and the antonyms (b) of these words.*

a) accept, data, certain, specific, to define, power, components, to increase, constantly, important, fundamental, section, brain, to execute, to take place, within, small, complex, to examine, to interpret, different;

b) internal, modern, input, to cause, addition, multiplication, high speed, light, hard, to give, to feed, to divide, heat.

Exercise 5. *Try to define the following words and word combinations as terms.*

Computer, data, hardware, software, internal, external, components, sections, instructions, physical part, power supply, program, peripherals, drives, circuit.

Exercise 6. *Read, translate and be ready to retell text 1.*

### **Text 1. COMPUTER HARDWARE**

A computer is an electronic machine which can accept the data in a certain form, process the data, and give the results of the processing in a specific format as information. Abbreviated as **HW, hardware** is defined as any physical part of the computer system, also divided here into external hardware (e.g. flat-panel monitor and LCD, keyboard, mouse, microphone, printer, scanner etc.) and internal hardware (e.g. CPU (central processing unit), drives (Blu-ray, CD-ROM, DVD, hard drive, fan (heat sink), modem, motherboard, network card, power supply, RAM). So, you see it exists a great variety of hardware components and their number is being increased constantly, anyway now we will concentrate on the most important ones.

A computer system consists of two parts: hardware and software. **Hardware** is an electronic or mechanical part you can see or touch (physical part). **Software** is a set of instructions, called a program, which orders the computer how to operate. There are three fundamental hardware sections: **central processing unit (CPU), main memory and peripherals.**

The centre of a PC (the brain or the «smarts» of the personal computer) is the **processor**, also called the **CPU**, or **central processing unit**. It is built into a single **chip** which executes program instructions and coordinates the activities that take place within the computer system. The chip itself is a small piece of silicon with a complex electrical circuit called an **integrated circuit**.

The processor consists of three main parts:

- The **control unit** examines the instructions in the user's program, interprets each instruction and causes the circuits and the rest of the

components - monitor, disk drives, etc. - to execute the functions specified.

- The **arithmetic logic unit (ALU)** performs mathematical calculations (multiplication, division, addition, subtraction) and logic operations (AND, OR, NOT).

- The **registers** are high-speed units of memory used to store and control data. One of the registers (the program counter, or PC) keeps track of the next instruction to be performed in the main memory. The other (the instruction register, or IR) holds the instruction that is being executed.

The power and the performance of a computer are partly defined by the speed of its processor. A **system clock** sends out signals at fixed intervals to measure and synchronize the flow of data. **Clock speed** is measured in **gigahertz (GHz)**. For example, a CPU running at 4GHz (four thousand million hertz, or cycles, per second) will enable your PC to handle the most demanding applications.

The next fundamental part of hardware is **main memory**. The programs and data which pass through the processor must be loaded into the main memory for further processing. When you run a program, the CPU searches for it on the hard disk and sends a copy into the **RAM** chips. RAM (**random access memory**) is volatile - that is, its content is lost when the computer is switched off. However, **ROM (read only memory)** is non-volatile, having instructions and routines for the main operations of the CPU. The **BIOS (basic input/output system)** uses ROM to control connection with peripherals. RAM capacity can be expanded by inserting extra chips, usually located in small circuit boards called dual in-line memory modules (**DIMMs**).

The third fundamental hardware part of your personal computer is **peripherals**, or they are sometimes called **input/output units (I/O units)**. A great number of these devices can be connected to a computer to let the user to feed various data into your machine and they also allow you to display the information you need and control the computer in different ways. At present the quality and quantity of these devices on the market is amazing, and the examples of these devices include such standard input device as keyboard; cursor control input devices as mice, track ball, joystick, touch screen; optical input devices as light pen, graphics tablet, barcode reader and a voice input device such as microphone.

Exercise 7. *Translate the word combinations used in the text*  
**COMPUTER HARDWARE.**

Machine which can accept the data, abbreviated as, is defined as, flat-panel monitor, Blu-ray, heat sink, a great variety of hardware components, is being increased constantly, you can see or touch (physical part), orders the computer how to operate, three fundamental hardware sections, peripherals, the brain or the «smarts», executes program instructions, single chip, coordinates the activities that take place within, a small piece of silicon with a complex electrical circuit, examines the instructions in the user's program, to execute the functions specified, high-speed units of memory, keeps track of the next instruction to be performed, the instruction that is being executed, is partly defined by the speed of its processor, to measure and synchronize the flow of data, to handle the most demanding applications, for further processing, its content is lost when the computer is switched off, capacity can be expanded by inserting, to feed various data into your machine.

Exercise 8. *The word combinations below are taken from text 1. Search for their English equivalents in text 1:*

одиночний чип, велика кількість цих пристроїв, потужність та продуктивність комп'ютера, високошвидкісні ділянки пам'яті, по різному, сенсорний екран, світлове перо, тактова частота, математичні обрахунки та логічні дії, перевіряти команди, фіксовані проміжки, виконувати задані функції, решта компонентів, плаский монітор, система охолодження (кулер), мережева карта, контролювати діяльність, складна електрична схема, команди, які виконуються, визначається швидкістю, потік даних, арифметико-логічний пристрій, енергонезалежний, ємність оперативного запам'ятовувального пристрою, розміщений на невеликій схемній платі, найвимогливіші прикладні програми, шарова миша, сканер штрих-коду, всередині комп'ютерної системи, вимірювати та синхронізувати, випускати (посилати) сигнали.

Exercise 9. *The italicized words and word combinations are used in text 1, translate the sentences below.*

1. Цей пристрій *може приймати* дані тільки в оцифрованому форматі на даному етапі. 2. *Мережева плата*, також відома як



мережева карта, мережевий адаптер, це – **периферійний пристрій**, що дозволяє комп'ютеру взаємодіяти з іншими пристроями мережі.

3. Термін програмне забезпечення **часто визначається** як набір команд чи інструкцій, які **вказують** машині, як виконувати ці дії.

4. Зараз на ринку існує **величезна різноманітність** продуктів як програмного, так і апаратного забезпечення, їх асортимент **постійно зростає**.

5. **Світлове перо** – це пристрій, який при переміщенні по **монітору**, впізнає світлові сигнали, побудова і модифікація графічного елемента виконується дотиком пера певних позицій екрану при натиснутій кнопці на світловому пері, яка знаходиться біля його наконечника.

6. **Фізичну частину** будь-якого пристрою ми можемо або побачити, або її торкнутися.

7. При створенні **інтегральних схем** зі **складними електронними схемами** використовують **кремній** – хімічний елемент з атомним номером 14, напівпровідник, електричні властивості якого залежать від домішок.

8. **Пристрій управління (керування)** – це компонент апаратного забезпечення центрального процесора комп'ютера, що **керує роботою** та взаємодією функціональних вузлів ПК і являє собою кінцевий дискретний автомат, що в архітектурі фон Неймана є невід'ємною частиною **центрального процесора**.

9. **Оперативна пам'ять** характеризується високою швидкістю та малим часом доступу, призначена для зберігання даних у **процесі виконання** комп'ютерних програм, типовими прикладами **довготривалої пам'яті** є **жорсткі диски** а також пристрої флеш-пам'яті.

10. Принцип роботи **сканера штрих-коду** полягає в дії лазера, який виконує рух мікроконтролера при проходженні темних і світлих смуг штрих-коду.

Exercise 10. Match the appropriate definitions with the terms below in the table.

1) hardware	a) a machine that creates a stream of air, takes heat away and dissipates it, for example into the air around it.
2) keyboard	b) a device that is used at both ends of a connection between two computers to let data to be sent over phone lines

3) scanner	c) technology that uses a blue laser (a very strong line of light) to record and play large amounts of high-quality data on a type of DVD
4) Blu-ray	d) a computer's central communications backbone connectivity point, through which all components and external peripherals connect.
5) fan	e) an electronic device that connects a computer to a computer network, usually a LAN
6) modem	f) a section of the computer that transforms alternating current (AC) to direct current (DC) (other parts of the computer need this DC power so that they can work properly)
7) motherboard	g) a device for examining something or recording something using light, sound, or X-rays
8) network card	h) it is sometimes called RAM. "Random" means that the memory cells can be accessed in any order. However, "RAM" means the type of silicon chip used to implement main memory.
9) power supply	i) a single piece of specially prepared silicon into which an electronic circuit is embedded using photolithography, electrical contact with the chip is done using wires that connect the chip to larger metal pins that stick out of the package
10) main memory	j) digital circuit that performs arithmetic and logical operations, it is a basic building block of the central processing unit (CPU)
11) integrated circuit	k) likely to change suddenly; easily becoming dangerous
12) ALU	l) the set of keys for operating a computer or typewriter, or the set of letters that you can touch to write on a smart phone or tablet

13) register	m) an electronic part that is used to give your computer more memory amount
14) volatile	n) a placeholder for information about some hardware condition
15) DIMM	o) the machines and electronic parts in a computer or other electronic system

Exercise 11. *Insert the proper preposition in the gaps: of, with, for, to, by, on, in, into, out, at, through, within.*

1. A computer is an electronic machine which can accept the data ... a certain form, process the data, and give the results ... the processing ... a specific format as information. 2. You see there is a great variety ... hardware components and their number is being increased constantly, we will concentrate ... the most important ones. 3. A computer system consists ... two parts: hardware and software. 4. Software is a set ... instructions which order the computer how to operate. 5. A central processing unit is built ... a single chip which executes program instructions and coordinates the activities that take place ... the computer system. 6. The power and performance ... a computer is partly defined ... the speed ... its processor. 7. A system clock sends ... signals ... fixed intervals to measure and synchronize the flow ... data. 8. Clock speed is measured ... gigahertz (GHz). 9. ... example, a CPU running ... 4GHz will enable your PC to handle the most demanding applications. 10. The programs and data which pass ... the processor must be loaded ... the main memory ... further processing. 11. The BIOS uses ROM to control connection ... peripherals. 12. RAM capacity can be expanded ... inserting extra chips, usually located ... small circuit boards called dual in-line memory modules.

Exercise 12. *Answer the questions on text 1.*

1. What is a computer? 2. What is hardware? Give examples of internal and external hardware. 3. What is software? 4. How many fundamental sections of hardware are there? Name them. 5. What is central processing unit? 6. What are the basic functions of the control unit? 7. What functions does the arithmetic-logic unit perform? 8. What are the registers? What are their functions? 9. What defines the power and performance of your computer? 10. What does the system clock do? 11.

How is clock speed measured? 12. Where must programs and data be loaded into for further processing? 13. What does the word volatile mean? 14. What does BIOS use to control connection with the peripherals? 15. How can RAM capacity be expanded? 16. What is the other name for peripherals? 17. What is the function of the input/output units? 18. What are the examples of the input devices?

Exercise 13. *Make up different types of questions (general, alternative, subject, special and disjunctive) on the sentences below.*

1. A computer is an electronic machine which can accept the data in a certain form, process the data, and give the results of the processing in a specific format as information. 2. Hardware is defined as any physical part of the computer system. 3. There exists a great variety of hardware components. 4. Their number is being increased constantly. 5. We will concentrate on the most important ones. 6. A computer system consists of two parts: hardware and software. 7. There are three fundamental hardware sections: central processing unit (CPU), main memory and peripherals. 8. The arithmetic logic unit (ALU) performs mathematical calculations. 9. The power and performance of a computer are partly defined by the speed of its processor. 10. The programs and data must be loaded into the main memory for further processing. 11. RAM capacity can be expanded by inserting extra chips. 12. Peripherals are sometimes called input/output units.

Exercise 14. *Translate into English.*

1. Цей пристрій може приймати дані, обробляти їх та надавати результати обробки у вигляді інформації. 2. Апаратне забезпечення комп'ютера – це будь-яка фізична частина комп'ютера, існує два типи апаратного забезпечення – зовнішнє та внутрішнє. 3. Існують різноманітні компоненти апаратного забезпечення та їх кількість постійно зростає на ринку. 4. Зараз ми зосередимося на найважливіших складових. 5. Світлове перо – пристрій, який при переміщенні по монітору, впізнає світлові сигнали, побудова і модифікація графічного елемента виконується дотиком пера певних позицій екрану при натиснутій кнопці на світловому пері, яка знаходиться біля його наконечника. 6. «Мозком» комп'ютерної системи є процесор, який вбудований на одиничний чип, що виконує програмні команди та керує діяльністю всередині комп'ютера.

7. Інтегральна мікросхема – це пристрій з високою щільністю упаковки електрично зв'язаних елементів або елементів та компонентів. 8. Пристрій керування перевіряє команди користувачької програми, інтерпретує кожен команду та забезпечує виконання визначених функцій електронними схемами. 9. Арифметико-логічний пристрій – це блок процесора, що виконує арифметичні та логічні перетворення над даними, які називаються операндами, він є фундаментальною частиною будь-якого обчислювального пристрою, навіть найпростіші контролери мають його у складі свого ядра. 10. **Процесор** містить дванадцять 16-розрядних реєстрів, їх об'єднують в три групи: реєстри даних, реєстри-показники та сегментні реєстри. 11. Швидкість процесора частково характеризує потужність та продуктивність персонального комп'ютера. 12. Тактова частота – це одиниця вимірювання частоти тактів у синхронних колах, що визначає кількість елементарних операцій (тактів), які виконує система за 1 секунду, найчастіше цей термін використовують для компонентів комп'ютерних систем. 13. Енергозалежні пристрої потребують резервного джерела живлення, такого як пауербанк. 14. Об'єм оперативної пам'яті можна збільшити шляхом устаткування додаткових чипів – модулів пам'яті з характерним розміщенням виводів у два ряди, ця технологія використовується головним чином в настільних ПК, серверах та ноутбуках. 15. Інша назва периферійних пристроїв – це пристрої введення-виведення, що дозволяють вводити дані в комп'ютер для їх подальшої обробки та виводити готові результати обчислень. 16. Джойстик – (англ. *joystick*, дослівно «паличка радості») – пристрій введення інформації в персональний комп'ютер, має вигляд вертикальної ручки, що качається у двох площинах та дозволяє керувати віртуальним об'єктом у дво- або тримірному просторі. 17. Першою кишеньковою ігровою консоллю з сенсорним екраном була Nintendo DS, а першим масовим пристроєм із підтримкою мультитач – iPhone. 18. Дигітайзер або графічний планшет – пристрій із сенсорним екраном для роботи з графікою, створений для введення малюнків, виконаних від руки, в ПК або ноутбук, синхронізується з комп'ютером через USB або блютуз, такий інструмент – відмінна підмога дизайнерам, фотографам і художникам. 19. Сканер штрих-коду – пристрій, який зчитує штрих-код, нанесений на упаковку товару і передає інформацію в комп'ютер, касовий апарат чи POS-термінал. 20. Він

несе в собі інформацію для ідентифікації товару, наноситься (або друкується за допомогою спеціалізованого принтера етикеток) на упаковку продукту виробником. 21. Його широко використовують в сфері торгівлі та послуг для швидкої ідентифікації товару, при відпуску, складуванні, у бібліотечній справі, при видачі книг тощо.

Exercise 15. *Vocabulary activity to text 2.*

Backbone – хребет, основа, база, фундамент

evolve – розвиватися, еволюціонувати

reliability – надійність

critical – важливий

due to – завдяки

virtually – фактично

particularly – а саме, головним чином

manufacturer – виробник

significant – вагомий, значний

recent – недавній

data transfer rate – швидкість передачі даних

capacity – ємність

streaming – потоковий

wavelength – довжина хвилі

backup – резервне копіювання

remain – залишатися

advancement – досягнення, успіх

undoubtedly – беззаперечно, без сумніву

be responsible for – відповідати за

convert – перетворювати

rectify – випрямляти (*тут* – електричний струм)

power cord receptacle – розетка шнура живлення

sleep mode – сплячий режим

be susceptible to failure – мати велику вірогідність виходу з ладу

rebooting – перезавантаження

connectivity – зв'язок

Exercise 16. *Search for the synonyms of the following words in a dictionary.*

Significant, critical, to remain, to evolve, virtually, instrument, different, rate, capability, essential, to allow, to reduce, to generate, to be housed in, to require, to affect, solution.

Exercise 17. *Try to define the following words and word combinations as terms.*

Gaming motherboard, server motherboard, central processing unit, M.2, M.2 drives, wireless connectivity, online activities, built-in Ethernet ports, blue-violet laser, cloud storage, computer power supply, cooling fan, SATA, transformer, standard, specification, mission-critical server, sleep mode.

Exercise 18. *Read, translate and be ready to retell text 2.*

## **Text 2. INTERNAL COMPUTER HARDWARE COMPONENTS**

**Motherboard.** Your PC is an important instrument in today's world, and the motherboard is the backbone of the computer system. Over the years, motherboards have evolved significantly, and they are now more powerful, efficient, and compact than ever before. They come in different sizes, form factors, and designs, depending on the type of computer system they are intended for. For example, gaming motherboards are designed to handle high-end graphics cards and intensive computing tasks, while server motherboards are built to provide reliability and stability for critical business applications. Due to the motherboard all the components and peripherals are connected, including the chipsets, CPU, memory, Wi-Fi, Ethernet, and graphics cards. The motherboard is present in virtually all computers, particularly desktop and laptop PCs, and it is produced by leading manufacturers such as Acer, AS Rock, Asus, Gigabyte Technology, Intel, and Micro-Star International.

One of the most significant successes in recent years has been the rise of the M.2 form factor. M.2 is a small, compact form factor that lets faster data transfer rates and more efficient use of space in a computer system. M.2 drives are typically used for permanent storage and are now widely available in various capacities. One of the latest trends in motherboards is the integration of Wi-Fi 6 and Bluetooth 5.0 capabilities. This allows faster and more reliable wireless connectivity, which is essential for streaming, gaming, and other online activities. Some motherboards also come with built-in Ethernet ports, which provide a wired network connection for faster data transfer rates.

In conclusion, the motherboard is an essential component of any computer system, and its role in ensuring the efficient operation of the system cannot be overstated. With the advancements in technology, motherboards have become more powerful, efficient, and compact than ever before. The M.2 form factor, BIOS, and Wi-Fi 6 and Bluetooth 5.0 capabilities are just some of the latest developments in motherboard technology of multimedia applications.

**Blu-ray discs technology.** Blu-ray discs, which were introduced at the beginning of 2000s, removed optical storage to the next level with even higher capacity and faster read/write rates. They use a blue-violet laser, which has a shorter wavelength than the red laser used in CDs and DVDs, allowing b data to be stored in the same space. Blu-ray discs can store up to 50 GB of data on a dual-layer disc, making them ideal for high-definition video and large data backups. While the advantage of cloud storage and streaming services has reduced the demand for physical media in recent years, optical drives and discs remain a reliable and convenient storage solution for many applications. They also continue to be a key component in many industries, such as music, film, and data backup. The development of optical storage technology has come a long way since the early days of the CD, and it's exciting to think about what the future may hold. We continue to generate and consume more data nowadays than ever before, so advancements in optical storage undoubtedly play an important role in meeting our storage needs.

**Power Supply Unit (PSU).** A computer's power supply unit is a critical component that provides the necessary electric current to operate the system. Without it, the computer would be a lifeless box of metal and plastic. The power supply unit (PSU) is responsible for converting the alternating current (AC) from a household electrical outlet into the direct current (DC) needed by the computer's components. The PSU is typically housed in a metal box located in a corner of the computer case, with visible features such as the power-cord receptacle and cooling fan. The PSU has integrated connectors to deliver power to the motherboard, microprocessors, and SATA storage. In the past, power supplies were heavy and bulky, requiring large transformers and capacitors to convert line voltage at 120 volts and 60 hertz into 5 volts and 12 volts DC. However, modern switching power supplies are much smaller and lighter, with higher frequency current conversion that enables a small transformer to do the voltage step-down. This higher-frequency current also makes it easier to rectify and to filter, reducing the voltage variances that could



affect sensitive electronic components in the computer. Switching power supplies are designed to draw only the amount of power they require from the AC line. The voltage and current output of a power supply can be found on the label of the unit. The industry has established five standard power supplies for personal computers over time.

Types of PSUs:

1. ATX standard is the most common PSU available, usually used in desktop PCs, designed to work with the ATX motherboard form factor.

2. Entry-Level Power Supply Specification (EPS) is derived from the ATX standard, this type of PSU was designed for use in servers rather than personal computers and it provides a more stable environment for critical applications than ATX standard, making them ideal for use in mission-critical servers.

3. Small Form Factor is a PSU variant designed for use in the smaller form-factor computers and is also found in the smaller set-top boxes such as DVD players or cable boxes.

4. Windows, Mac, and Linux systems use a string of code called the Advanced Configuration and Power Interface (ACPI) to control and monitor power consumption of components inside the computer. ACPI also decides where to provide full, partial, or zero power while the machine is in sleep mode.

5. Thin Form Factor is a PSU variant designed for use with Mini ITX motherboards and smaller form-factor computers.

If you are planning to build a home PC, finding an ATX Standard PSU is your best bet as it will fit any standard computer case and motherboard combination. If you are looking to build a server, then maybe the EPS solution is the perfect fit. For smaller computer builds, a small or thin form factor PSU may be more appropriate. PC power supplies are susceptible to failure due to frequent use and overheating. Failure symptoms include a burning smell and random rebooting or failure in Windows. A stalled cooling fan in the power supply is often an early indicator of failure. Recent motherboard and chipset improvements allow users to monitor power supply fan RPMs via BIOS and Windows applications supplied by the manufacturer. New designs also offer fan control for adjusting fan speed to meet cooling needs.

Exercise 19. *Find in text 2 the words with double function (it means the word can be both a noun and a verb).*

Exercise 20. *Translate the word combinations used in the text 2.*

The backbone of the computer system, have evolved significantly, to handle high-end graphics cards, produced by leading manufacturers, intensive computing tasks, is present in virtually all computers, faster data transfer rates and more efficient use of space, are typically used for permanent storage, allow faster and more reliable wireless connectivity, role in ensuring the efficient operation of the system, the advancements in technology, removed optical storage to the next level, high-definition video and large data backups, the demand for physical media, convenient storage solution for many applications what the future may hold, undoubtedly play an important role in meeting our storage needs, with visible features such as the power-cord receptacle, to convert line voltage at 120 volts, make it easier to rectify and to filter, designed to work with the ATX motherboard form factor, ideal for use in mission-critical servers, a burning smell and random rebooting.

Exercise 21. *The words and the word combinations below are taken from text 2. Search for their English equivalents in text 2.*

Показник поломки, постійне місце зберігання, запах горілого, вбудовані порти, як висновок, високочастотний струм, без сумніву відігравати велике значення, більш стабільне середовище, важливі бізнесові додатки, контролювати споживання енергії, впливати на чутливі компоненти, перебільшувати, ознаки поломки, зручне вирішення проблеми зберігання, більш потужні та компактні ніж коли-небудь, видимі частини, перетворення змінного струму, пройти довгий шлях, найновіші розробки, ідеальне рішення, сучасна тенденція, складні обчислювальні задачі, більша швидкість передачі даних, перемістити на наступний рівень, великі об'єми резервного копіювання даних, часте використання та перегрів, зберігати в тому ж самому місці, для конкретного типу комп'ютерної системи.

Exercise 22. *Answer the questions on text 2.*

1. What are the latest advancements in the motherboard technology at present? 2. What is the gaming motherboard designed for? 3. What is the

server motherboard designed for? 4. What is the M.2 factor? 5. What is the Blu-ray technology? 6. What role does the optical storage play? 7. What is the power supply unit responsible for? 8. Where is the power supply unit placed? 9. What are the switching supplies designed for? 10. That type of the PSU would you choose while building up your own PC?

Exercise 23. *Vocabulary activity to text 3.*

Interact – взаємодіяти

ubiquitous – широко поширений

fingertip – кінчик пальця

stylus – стилус (*ручка зі спеціальним силіконовим наконечником для роботи з сенсорним екраном*)

utilize – використовувати

resistive touch screen – резистивний сенсорний екран

capacitive touch screen – ємнісний сенсорний екран

be prone – мати схильність до

smudging – забруднення

impairment – погіршення, ушкодження

character – символ

hand-held scanner – ручний сканер

slot scanner – слот (роз'єм) сканер

charge-coupled device scanner – сканер-пристрій із зарядним зв'язком

pen scanner – сканер пера

enhance – збільшувати, посилювати

editing – редагування

resolution – розширення

comprise – включати, охоплювати

docking station – док-станція (*стаціонарна конструкція з роз'ємами для деяких електронних пристроїв для з'єднання з кабелями живлення*)

review – огляд, відгук, коментар

Exercise 24. *Make up derivatives of the following words.*

Cell, use, person, introduce, electron, move, press, sense, lay, conduct, locate, nature, apply, perform, mobile, vision, vary, process, consume, equip.

Exercise 25. *Read, translate and be ready to retell text 3.*

### **Text 3. EXTERNAL COMPUTER HARDWARE COMPONENTS**

**Touch Screens.** Touch screens began to be widely used in the early 2000s, especially in cell phones and personal digital assistants (PDAs). However, it wasn't until the introduction of the iPhone in 2007 that touch screens became ubiquitous and revolutionized the smartphone market. A touch screen is an electronic display screen, so it is an external input device. A user interacts with the computer, tablet, smartphone or touch-controlled appliance by using hand gestures and fingertip movements to tap pictures, moving elements or type words on the screen. The screens are pressure-sensitive and can be utilized or manipulated using fingers or a stylus. The technology of touch screens has evolved over the years, with resistive and capacitive screens being the most popular types today. Resistive touch screens are made up of two layers of conductive material with a small gap between them. When pressure is applied to the screen, the two layers start to contact, making a change in electric current that is detected by the device. Capacitive touch screens, on the other hand, use a layer of conductive material which stores electrical charges. When a finger touches the screen, the electrical charge is disrupted, and the device can detect the location of the touch. The benefits of touch screens are immense. They provide an electrical charge disrupted technology, allowing users to swipe, pinch, and tap through applications and content. Touch screens also eliminate the need for physical buttons, making devices thinner and more lightweight. They also allow multi-touch gestures, enabling users to perform difficult operations with ease. However, touch screens also have their drawbacks. They can be less accurate than traditional input devices like a mouse or keyboard, and they can be prone to smudging and fingerprints. In addition, touch screens can be difficult to use for people with mobility impairments or visual impairments.

**Barcode reader.** Barcode readers, sometimes named barcode scanners, are electronic devices that read and decode the information contained in a barcode. It looks like a vertical row of horizontal bars of varying thickness, each of which corresponds to a specific character or set of characters. Barcode readers read barcodes and convert them into numbers or characters so that software can convert the data into information. In order for the software to convert the data into information, it must be sent to a computer. A scanner converts light energy into electrical energy, which is then converted into data by a decoder and

transmitted to a computer. There are five main types of barcode scanners. These are handheld scanners, slot scanners, CCD (charge-coupled device) scanners, graphic scanners, and laser scanners. With pen scanners, you simply swipe the pen across the barcode and the optical sensor at the tip of the pen reads the barcode, while CCD scanners (light emitting diode scanners) have hundreds of small optical sensors placed one after the other on the reading head and are used in fixed locations such as cash registers and production lines and are suitable for reading large amounts of data. Image scanners (camera scanners) are a type of a barcode reader that uses a digital camera to capture an image of a barcode, which is then processed to read the barcode. Laser scanners use a combination of laser light and a mirror system for processing and are designed to read barcodes within a certain distance of the scanner.

**Computer monitor.** The basic function of a computer monitor is to provide a visual representation of the data and information that is being processed by the computer's graphics card. It can be anything from text and images to video and games. Monitors are usually connected to the computer via a video cable, such as VGA, DVI, HDMI, or DisplayPort, and they are powered by an external power source or through the computer's USB port. Modern computer monitors often have advanced features such as high refresh rates, HDR, and adaptive technology to enhance the visual experience for the user. Monitors may also have built-in speakers, USB ports, and other ports for connecting I/O units. Some monitors are made for specific uses, such as gaming or professional photo and video editing, and have features and technologies to meet those needs. Computer monitors have variety of sizes, from 12-inch portable displays up to 65-inch panels that bridge the gap between monitors and TVs. Most desktop displays can be grouped into two general categories: business monitors, and entertainment monitors. Business monitors are professional monitors with high resolution and image quality geared to graphic artists, photographers, and videographers. General-purpose monitors, and home-office monitors are equipped with videoconferencing features and/or a port selection that makes them a good substitute for a laptop's docking station. Entertainment panels comprise the vast range of gaming monitors for content creation and consumption. There are many excellent monitors available on the market from various brands, each with their own strengths and weaknesses. Some popular brands include Dell, HP, ASUS, LG, Samsung, and Acer. It's always recommended to do your research and read reviews to find the monitor that will suit your needs the most.

Exercise 26. *Translate the word combinations used in the text 3.*

Touch screens became ubiquitous, using hand gestures and fingertip movements to tap pictures, pressure-sensitive, two layers of conductive material; electrical charge is disrupted; to swipe, pinch, and tap through applications and content; eliminate the need for physical buttons, can be prone to smudging and fingerprints, mobility impairments or visual impairments, a vertical row of horizontal bars of varying thickness, at the tip of the pen, advanced features such as high refresh rates, 12-inch portable display, a good substitute for a laptop's docking station, content creation and consumption, with their own strengths and weaknesses, always recommended to do your research and read reviews.

Exercise 27. *Explain the meaning of the following words and word combinations.*

Resistive touch screen, smartphone, stylus, capacitive touch screen, drawback, barcode reader, pen scanner, CCD scanner, image scanner, laser scanner, computer monitor, external power source, I/O units, business monitor, entertainment monitor.

Exercise 28. *Make up questions to the italicized words.*

1. A user interacts with the computer, tablet, smartphone, or touch-controlled appliance ***by using hand gestures and fingertip movements to tap pictures, moving elements or type words on the screen.*** 2. Resistive touch screens are made up ***of two layers of conductive material with a small gap between them.*** 3. ***Touch screens*** can be difficult to use for ***people with mobility impairments or visual impairments.*** 4. It looks like ***a vertical row of horizontal bars of varying thickness, each of which corresponds to a specific character or set of characters.*** 5. There are ***five*** main types of barcode scanners. 6. Laser scanners use ***a combination of laser light and a mirror system for processing.*** 7. The basic function of a computer monitor is ***to provide a visual representation of the data and information.*** 8. Monitors are usually connected to the computer ***via a video cable.*** 9. Monitors may also have ***built-in speakers, USB ports, and other ports for connecting I/O units.*** 10. ***Entertainment panels*** comprise the vast range of gaming monitors for content creation and consumption.

Exercise 29. *Answer the questions below.*

1. Where and when did the touch screens begin to be widely used?  
2. That is the touch screen? 3. What happens when pressure of your

fingertip is applied to the touch screen? 4. What does the capacitive touch screen use? 5. What are the benefits of the touch screens? 6. What are the drawbacks of the touch screens? 7. What is the principle of the barcode reader operation? 8. What do the laser scanners use? 9. What is recommended to do before purchasing a computer monitor for your PC?

Exercise 30. *Search for some information on “The Future Development of Computer Hardware Components. The Most Highly Developed Areas”. Prepare an essay or a presentation revealing the main points of the topic with some specific examples.*

## GRAMMAR REVIEW

### MODAL VERBS

Exercise 31. *Refresh the meanings, forms, and functions of the English modal verbs.*

The modal verbs for revision are **can, could, may, might, must, should, would**, these ones are widely used in IT-technology literature and periodicals.

**CAN** is the most often used modal verb in English. It can be used to express ability or opportunity, to request or offer permission, and to show possibility or impossibility.

e.g. My friend can install this program rather easily.

Many devices can accept different types of data for converting.

#### Using "CAN" in Present, Past, and Future

Most modal verbs behave quite irregularly in the past and the future. Study the chart below to learn how "CAN" behaves in different contexts.

Modal Use	Positive Forms 1. Present 2. Past 3. Future	Negative Forms 1. Present 2. Past 3.Future	Also use:
<b>CAN</b> <i>general ability</i>	1. I can install this program. 2. SHIFT TO <b>"COULD"</b> I could install this program when I	1. I can't install this program. 2. SHIFT TO <b>"COULD"</b> I couldn't install this program because	<b>Be able to</b>

	<p>was near Wi-Fi point.</p> <p>3. SHIFT TO "<b>BE ABLE TO</b>"</p> <p>I will be able to install this program by the time the electricity is switched on.</p>	<p>electricity was switched off.</p> <p>3. SHIFT TO "<b>BE ABLE TO</b>"</p> <p>I won't be able to install this program tomorrow.</p>	
<p><b>CAN</b> <i>ability during a specific event</i></p>	<p>1. With a burst of adrenaline, people can pick up cars.</p> <p>2. SHIFT TO "<b>BE ABLE TO</b>"</p> <p>With a sudden burst of adrenaline, he was able to lift the car off the child's leg.</p> <p>3. SHIFT TO "<b>BE ABLE TO</b>"</p> <p>With a sudden burst of adrenaline, he will be able to lift the car.</p>	<p>1. Even with a burst of adrenaline, people can't pick up something that is heavy.</p> <p>2. SHIFT TO "<b>BE ABLE TO</b>"</p> <p>Even the weightlifter wasn't able to lift the car off the child's leg.</p> <p>3. SHIFT TO "<b>BE ABLE TO</b>"</p> <p>Even three men working together won't be able to lift the car.</p>	<p><b>Be able to</b></p>
<p><b>CAN</b> <i>permission</i></p>	<p>1. I can use Susan's PC when she is out of town.</p> <p>2. SHIFT TO "<b>BE ALLOWED TO</b>"</p>	<p>1. I can't use Susan's PC when she is out of town.</p> <p>2. SHIFT TO "<b>BE ALLOWED TO</b>"</p> <p>I wasn't allowed to use Susan's PC while she</p>	<p><b>May, be allowed to</b></p>



	I was allowed to use Susan's PC while she was out of town last week. 3. I will be allowed to use Susan's PC while she is out of town next week.	was out of town last week. 3. I will be allowed to use Susan's PC while she is out of town next week.	
<b>CAN</b> <i>Requests usually refer to the near future.</i>	Can I have that IT vocabulary? Could you give me that IT vocabulary?	Can't I have that IT vocabulary? Couldn't you give me that IT vocabulary?	<b>Could, may</b>
<b>CAN</b> <i>possibility, impossibility. This use is usually a generalization or a supposition</i>	Anyone can learn high-level language if they have such an aim.	They can't learn high-level language if they do not have such an aim	<b>Could</b>

Exercise 32. *Self-study. Using Grammar References revise the basic material on modal verbs – can, could, may, might, must, should, would.*

Exercise 33. *Translate the sentences below paying special attention to modal verbs.*

1. These instruments **can** be less accurate than traditional input devices like a mouse or keyboard, and they **can** be prone to smudging and fingerprints. 2. Touch screens **can** be difficult to use for people with mobile or visual disability. 3. A computer bus **can** be divided into two types: internal and external. 4. To enable communication between the CPU and other internal devices, the computer **must** maintain a map of the different address locations in memory 5. You **should** read the comments

and reviews before purchasing a PC or a laptop. 6. This means that the processor **can** access more memory address locations and utilize more RAM if it **can** address more locations. 7. The width of a data bus **may** influence the speed of the computer. 8. The bus **might** be a critical component in a computer's architecture, allowing communication between its internal and external components. 9. The outer shell **should** protect the components from physical damage and help in heat decrease. 10. The full-tower computer case is the largest size, and it **can** accommodate larger motherboards, more drives, and larger graphics cards, but takes up more space. 11. Our team **would** prefer to reinstall software rather than to purchase a new device. 12. Computer graphics using CRT screens **could** represent awkward and low-quality images. 13. The shutter is an instrument that **must** control the duration of time the light **may** travel through the lens to the film or digital sensor placed on the back of the camera.

Exercise 34. *Insert the proper modal verb (can, could, may, might, should, would) in the gaps. Translate the sentences.*

1. Printers ... be connected directly to using platform or indirectly via a network. 2. This production technology ... significantly reduce the cost of such projects. 3. They ...choose that type of a camera rather than this cheap one. 4. Speakers are versatile and ... be paired with any sound system, others ... be exclusively designed for computer use. 5. Microphones ... also be used in speech therapy to help individuals with speech disorders to improve their vocal production and articulation. 6. If we talk about memory, then you ... know that discs that have the "CD" prefix ... store around 700 MB of data. 7. The changes in reflection are translated into digital signals that ... be interpreted as data, music, or video. 8. ...you underline the most specific parameters of this device? 9. A touch to the screen interface ... disrupt the flow of light in the area, registering as a screen touch. 10. Motherboards ... support different types of RAM including DDR3 and DDR4. 11. Modern motherboards ... support multiple CPUs, allowing higher processing power. 12. Gaming motherboards are made for high-performance computers; they are more powerful and ...have more features than motherboards for desktop and laptop computers. 13. Early computers had only a single bus, but this ... not handle the data rates. 14. A 32-bit bus, for example, refers to 32 parallel connectors that ... simultaneously transmit 32 bits.

## Unit 4. COMPUTER NETWORKS

Exercise 1. *Study the words to text 1.*

computer network – комп'ютерна мережа  
share – частина; розподіляти  
track – відслідковувати, стежити  
digital – цифровий  
interconnect – зв'язувати між собою  
computing device – обчислювальний пристрій  
exchange – обмін; обмінювати(ся)  
vary – варіювати, відрізнятися  
host – головний комп'ютер  
node – вузол (*комп'ютерної мережі*)  
server – сервер  
desktop computer – настільний комп'ютер  
laptop – ноутбук  
cell phone – мобільний телефон  
networking device – мережевий пристрій  
switch – перемикач, комутатор  
router – маршрутизатор  
gateway – шлюз  
multiple – численний  
transmission media – середовища передавання (даних)  
feature – характеристика, ознака, особливість  
modem ("MOdulator DEModulator") – модем (МОдулятор ДЕМодулятор)  
convert – перетворювати, трансформувати  
communication device – комунікаційний пристрій, пристрій зв'язку  
serve – слугувати  
entry and exit points – точки входу та виходу  
data packet – пакет даних  
wired/wireless medium – дротовий/бездротовий носій (середовище),  
засіб дротового/бездротового зв'язку  
store – зберігати  
various – різноманітний  
network route – мережевий маршрут  
data transmission – передавання даних  
hub – хаб, концентратор  
bridge – міст  
digital telephone handset – цифрова телефонна трубка

printer – принтер  
 simultaneously – одночасно, водночас  
 audio/video calls – аудіо/відеодзвінки  
 access point – точка доступу  
 peripheral device – периферійний пристрій  
 network topology – топологія мережі  
 mesh topology – змішана топологія  
 ring topology – кільцева топологія  
 bus topology – топологія шини  
 star topology – топологія "зірка"  
 tree (hybrid) topology – топологія "дерево" (гібридна топологія)  
 process – процес; обробляти  
 unidirectional – односпрямований  
 backbone wire – магістральний провід  
 maintain – підтримувати  
 secure – безпечний  
 reliable – надійний  
 branch – гілка, відгалуження  
 Local Area Network (LAN) – локальна мережа  
 Wide Area Network (WAN) – глобальна/широкомасштабна мережа

Exercise 2. *Find verbs among the words in the list below. Insert their first letters into the cells in the order the verbs appear in the exercise to obtain a resulting word.*

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Modulator, social, cooperate, mobile, operate, resource, several, maintain, personal, make, handset, use, efficient, notify, gateway, interconnect, local, router, convert, device, analyze, central, desktop, transfer, node, interconnect, hybrid, order, topology, network.

Exercise 3. *Give the initial forms of the words below. Translate the pairs.*

Networking, different, transmission, demodulator, communication, routing, wireless, interconnection, exchanging, unidirectional, reliable, effective.

Exercise 4. *Find synonyms (a) and antonyms (b) of the words.*

a) traffic, similar, share (n, v), daily, link, basic, transfer (n, v), simultaneously, multiple, exchange (n, v), common, medium, reliable, effective, route, directly, serve, branch, worldwide, provide.

b) entry point, peripheral, wired, Wide Area Network, unidirectional, connect, single, cell phone, secure, digital.

Exercise 5. *Explain the words and word combinations.*

Digital world, social network, computer network, server, desktop computer, networking device, transmission media, router, gateway, routing path, a wired/wireless medium.

Exercise 6. *Translate into Ukrainian.*

To be produced, shared and tracked worldwide in real time; networks of computers, mobile networks, social networks, airlines, railways, banks, and hospital networks; to exchange data and resources; to vary in size from small to large; different types of hosts (also called nodes), such as servers, desktop computers, laptops, and cell phones; to connect multiple computers in different settings; to set up networks with different features; to use routing paths; to be connected through a wired medium, such as cables, or through a wireless medium, such as the air; a communication network; the interconnection of computing devices; mesh, ring, bus, star and tree topologies; to process large amounts of traffic; to be transmitted in one direction; to make it cheaper and easier to maintain; multiple branches; to be usually realized in WANs.

Exercise 7. *Read text 1 and make a presentation about computer networks.*

### **Text 1. Introduction to Computer Networks**

We are living in a connected world. Information is produced, shared and tracked worldwide in real time. This is possible because almost everyone and everything in the digital world is interconnected in one way or another. A group of two or more interconnected similar things or people is called a network. Some examples of networks in our daily life include networks of computers, mobile networks, social networks, airlines, railways, banks, and hospital networks.

A computer network is an interconnection between two or more computers or computing devices. Such interconnection allows computers to exchange data and resources with each other. A basic network can connect several computers located in a room. A network can vary in size from small to large depending on the number of computers it connects. A

computer network can include different types of hosts (also called nodes), such as servers, desktop computers, laptops, and cell phones.

In addition to computers, networks include networking devices such as modems, switches, routers, gateways, etc. Networking devices are used to connect multiple computers in different settings, transfer data over different transmission media, and set up networks with different features. A modem stands for "MOdulator DEModulator" which is a device used to convert between electrical signals and digital bits. A switch is a networking device used to connect multiple computers or communication devices together. A router can receive data, analyze it and transmit it to other networks. A gateway serves as the entry and exit point of a network because all data entering or leaving the network must first pass through the gateway in order to use routing paths.

For communication, data on the network is divided into smaller pieces called packets. These packets are then transmitted over the network. Devices on a network can be connected through a wired medium, such as cables, or through a wireless medium, such as the air. In a communication network, each device that is part of the network and can receive, create, store or send data to various network routes is called a node. In data transmission, a node can be a device such as a modem, hub, bridge, switch, router, digital telephone handset, printer, computer, or server.

The interconnection of computing devices on a network allows exchanging of information simultaneously with many parties through e-mail, websites, audio/video calls, and more. The network provides sharing resources. For instance, a printer may be available to multiple computers over a network; network storage can be accessed from multiple computers. People often connect their devices through access points, thus forming a small personal network.

The location of computers and other peripheral devices in a network is called its topology. Common network topologies are mesh, ring, bus, star, and tree.

In a mesh topology, every communication device is connected to every other device in the network. Such a network can process large amounts of traffic because several nodes transfer data simultaneously. In a ring topology, each node is connected to two other devices, one on each side. The link in a ring topology is unidirectional. Thus, data can only be transmitted in one direction. In a bus topology, a single backbone wire, called a bus, is used between nodes, making it cheaper and easier to maintain. Both ring and bus topologies are less secure and less reliable.

In a star topology, each communication device is connected to a central networking device, such as a hub or switch. Star topology is considered to be very effective, efficient and fast as each device is directly connected to the main device. In a tree or hybrid topology, there are multiple branches, and each branch can have one or more basic topologies such as star, ring, and bus. Such topologies are usually realized in WANs where multiple LANs are connected.

Exercise 9. *Use text 1 to translate the word combinations:*

цифровий світ; комп'ютерна мережа; містити мережеві пристрої, такі як модеми, комутатори, маршрутизатори, шлюзи тощо; різні середовища передавання; електричні сигнали та цифрові біти; підключати декілька комп'ютерів або пристроїв зв'язку; ділитися на менші частини, що називаються пакетами; отримувати, створювати, зберігати або надсилати дані різними мережевими маршрутами; цифровий телефон, принтер, комп'ютер або сервер; обмін інформацією одночасно з багатьма сторонами через електронну пошту, веб-сайти, аудіо/відеодзвінки; забезпечити спільне використання ресурсів; сформувати невелику персональну мережу; периферійні пристрої; єдиний магістральний провід, що називається шиною; бути менш безпечним і надійним; численні локальні мережі.

Exercise 10. *Translate the sentences and pay attention to the words in bold type.*

1. Інформація **створюється, обмінюється та відстежується по всьому світу в режимі реального часу**. 2. Деякі приклади мереж у нашому повсякденному житті містять **мережі комп'ютерів, мобільні мережі, соціальні мережі, авіакомпаній, залізниці, банки та мережі лікарень**. 3. Маршрутизація складається з двох основних компонентів: визначення оптимальних **шляхів маршрутизації** та транспортування інформаційних пакетів через об'єднану мережу. 4. Комп'ютерна мережа оптимально працює, коли всі комутатори та маршрутизатори підключені до всіх інших пристроїв у мережі через **провідні або бездротові з'єднання** з необхідними налаштуваннями. 5. **У змішаній топології** кожен комунікаційний пристрій підключено до кожного іншого пристрою в мережі. 6. Така мережа може **обробляти великі обсяги трафіку**, оскільки кілька вузлів передають дані одночасно. 7. **У кільцевій топології** кожен вузол підключений до двох інших пристроїв, по одному з кожного боку. 8.

Таким чином, дані можуть *передаватися тільки в одному напрямку*. 9. У *топології шини* між вузлами використовується один магістральний дріт, який називається шиною, що *робить його дешевшим і простішим в обслуговуванні*. 10. У *топології "зірка"* кожен комунікаційний пристрій підключено до центрального мережевого пристрою, такого як концентратор або комутатор. 11. *Топологія "зірка"* вважається дуже ефективною, дієвою та швидкою, оскільки кожен пристрій безпосередньо підключено до основного пристрою. 12. У *топології "дерево" або гібридній топології* існує *кілька гілок*, і кожна гілка може мати одну або кілька основних топологій, таких як "зірка", кільцева та топологія шини. 13. Такі топології зазвичай *реалізуються в глобальних мережах*, де підключено кілька локальних мереж.

Exercise 11. *Match the terms (1 – 11) with their definitions (a – k).*

1) computer network	a) a subsystem used to connect computer components and transfer data between them
2) topology	b) a networking device used to connect multiple computers or communicating devices
3) node	c) an interconnection among two or more computers or computing devices to share data and resources
4) hub	d) the entry and exit point of a network, as all data coming in or going out of a network must first pass through it in order to use routing paths
5) modem	e) a networking device that can receive the data, analyze it and transmit it to other networks
6) gateway	f) in a communication network, each device that is a part of a network and that can receive, create, store or send data to different network routes
7) networking devices	g) a device used for conversion between electric signals and digital bits



8) access point	h) the arrangement of computers and other peripherals in a network
9) switch	i) devices used to connect multiple computers in different settings
10) bus	j) a physical layer networking device which is used to connect computers in a LAN
11) router	k) an object that serves as a connection or medium for other devices to gain access to the Internet or to other devices in the network

Exercise 12. *Fill in the correct prepositions: on, of, in, in addition to, between, over, with, into, for, through, from, to.*

1. A computer network is an interconnection ... two or more computers or computing devices. 2. A network can vary ... size ... small ... large depending ... the number ... computers it connects. 3. ... computers, networks include networking devices such as modems, switches, routers, gateways, etc. 4. Networking devices are used to connect multiple computers ... different settings, transfer data ... different transmission media, and set up networks ... different features. 5. A modem stands ... "MODulator DEModulator" which is a device used to convert ... electrical signals and digital bits. 6. ... communication, data ... the network is divided ... smaller pieces called packets. 7. ... a communication network, each device that is part ... the network and can receive, create, store or send data ... various network routes is called a node. 8. The interconnection ... computing devices ... a network allows exchanging ... information simultaneously ... many parties ... e-mail, websites, audio/video calls, and more. 9. A printer may be available ... multiple computers ... a network; network storage can be accessed ... multiple computers. 10. People often connect their devices ... access points, thus forming a small personal network. 11. The location of computers and other peripheral devices ... a network is called its topology. 12. ... a ring topology, each node is connected ... two other devices, one ... each side.

Exercise 13. *Answer the questions on computer networks.*

1. How is information produced, shared and tracked worldwide in the digital world? 2. What is called a network? Name some examples of networks in our daily life. 3. What is a computer network? What can a computer network include? 4. What are networking devices used for? 5. What functions do modems, switches, routers and gateways perform? 6. How is data transmitted over the network for communication? 7. In what way can devices on a network be connected? 8. What kind of device is called a node? 9. What does the interconnection of computing devices on a network allow? And what does the network provide? 10. How is a small personal network formed by people? 11. What is a network topology? Name common network topologies. 12. What are the main characteristics of a mesh topology? 13. What kind of link is there in a ring topology? 14. What is used between nodes in a bus topology? 15. What is each communication device connected to in a star topology and why is it considered to be very effective and fast? 16. Describe the essential features of a tree or hybrid topology. Where are such topologies usually realized?

Exercise 14. *Make questions (general, alternative, subject, special and disjunctive) on the sentences.*

1. Information is produced, shared and tracked worldwide in real time. 2. A computer network is an interconnection between two or more computers or computing devices. 3. Networks include networking devices such as modems, switches, routers and gateways. 4. A network can vary in size from small to large depending on the number of computers it connects. 5. Devices on a network can be connected through a wired medium, such as cables, or through a wireless medium, such as the air. 6. The network provides sharing resources. 7. Common network topologies are mesh, ring, bus, star, and tree. 8. Such topologies are usually realized in WANs where multiple LANs are connected. 9. A printer may be available to multiple computers over a network. 10. People often connect their devices through access points, thus forming a small personal network. 11. The location of computers and other peripheral devices in a network is called its topology. 12. Data can only be transmitted in one direction.

Exercise 15. *Translate the sentences using text 1.*

1. Комп'ютерна мережа — це взаємозв'язок між двома або кількома комп'ютерами чи обчислювальними пристроями для

обміну даними та ресурсами один з одним. 2. Розмір мережі може варіюватися від малого до великого залежно від кількості комп'ютерів, які вона з'єднує. 3. Комп'ютерна мережа може містити різні типи головних комп'ютерів (також відомих як вузли), наприклад, сервери, настільні комп'ютери, ноутбуки та мобільні телефони. 4. Окрім комп'ютерів, мережі містять такі мережеві пристрої, як модеми, комутатори, маршрутизатори, шлюзи тощо. 5. Мережеві пристрої використовуються для з'єднання кількох комп'ютерів у різних налаштуваннях, передавання даних через різні середовища передачі та налаштування мереж із різними функціями. 6. Модем розшифровується як "МОдулятор ДЕМОдулятор ", що призначений для перетворення електричних сигналів у цифрові біти. 7. Комутатор — це мережевий пристрій, що застосовується для з'єднання декількох комп'ютерів або пристроїв зв'язку. 8. Маршрутизатор може отримувати дані, аналізувати їх і передавати в інші мережі. 9. Шлюз служить точкою входу та виходу з мережі, тому що всі дані, які надходять або виходять з мережі, повинні спочатку пройти через шлюз для використання шляхів маршрутизації. 10. Для комунікації дані в мережі поділяються на менші частини, які називаються пакетами, які потім передаються мережею. 11. Пристрої в мережі можна підключати за допомогою дротового носія, наприклад кабелю, або через бездротовий носій, наприклад, повітря. 12. У комунікаційній мережі кожен пристрій, який є частиною мережі і може отримувати, створювати, зберігати або надсилати дані різними мережевими маршрутами, називається вузлом. 13. При передаванні даних вузол може бути представлений такими пристроями як модем, концентратор, міст, комутатор, маршрутизатор, цифрова телефонна трубка, принтер, комп'ютер або сервер. 14. Взаємозв'язок комп'ютерних пристроїв у мережі дозволяє обмінюватися інформацією одночасно з багатьма сторонами через електронну пошту, веб-сайти, аудіо/відеодзвінки тощо. 15. Мережа забезпечує спільне використання ресурсів. 16. Люди часто підключають свої пристрої через точки доступу, утворюючи таким чином невелику персональну мережу. 17. Розташування комп'ютерів та інших периферійних пристроїв у мережі називається топологією. 18. Поширені топології мережі: змішана, кільцева, шинна, "зірка" та "дерево"(гібридна).

Exercise 16. *Study the words to text 2.*

Handheld device – кишеньковий пристрій  
tablet – планшет  
data transfer rate – швидкість передачі даних  
Personal Area Network (PAN) – персональна/особиста мережа,  
Metropolitan Area Network (MAN) – муніципальна мережа  
communicate – 1) передавати 2) підтримувати зв'язок, спілкуватися  
premises – приміщення; будівля з прилеглою ділянкою  
campus – територія університету, коледжу  
Ethernet – мережа (протокол, стандарт, технологія) Ethernet  
fiberoptics – волоконно-оптичний кабель; волоконна оптика  
Wi-Fi – стандарт Wi-Fi на бездротовий зв'язок, сертифікат Wi-Fi;  
вай-фай, безпроводний доступ в Інтернет  
secure – безпечний, надійно захищений  
authentic – справжній; автентичний  
access – доступ; отримати доступ  
shared resource(s) – ресурси спільного використання/користування;  
short-distance communication – зв'язок на коротких відстанях; зв'язок  
малого радіусу дії  
extended – *тут* підвищеної потужності  
cable television network – мережа кабельного телебачення  
cable broadband Internet services – послуги широкосмугового доступу  
до Інтернету; широкосмуговий інтернет-сервіс

Exercise 17. *Find synonyms of the words.*

Handheld device, connect, via, region, category, locate, communicate, communication, cover, secure, extend, business, branch, premises, device, differ.

Exercise 18. *Find antonyms of the words.*

Wired, short-distance, high-speed, limited, mobile, relatively, large, extended, connected, sometimes, divide, LAN, upload.

Exercise 19. *Translate the word combinations.*

To range from a network of handheld devices to millions of computers around the world; to be linked wirelessly; a network can be wired or wireless; to communicate with each other through Bluetooth; to locate at a limited distance; the area covered by a LAN; to vary from a single room to one or more buildings in the same premises; fiber optics;

relatively secure; authentic network users; to access computers and shared resources; to upload/download documents and software to and from the local server; short-distance communication; high-speed data transfer rate; to cover a larger geographic area; a cable television network; cable broadband Internet service.

Exercise 20. *Read text 2 and compare types of networks.*

## **TEXT 2. Types of Networks**

There are different types of computer networks, ranging from a network of handheld devices (such as mobile phones or tablets) connected via Wi-Fi or Bluetooth in a single room to millions of computers around the world. Some of them are linked wirelessly, while others are wired. Depending on the geographic region and data transfer rate, computer networks are divided into the following categories: **PAN (Personal Area Network)**, **LAN (Local Area Network)**, **MAN (Metropolitan Area Network)**, **WAN (Wide Area Network)**.

**A Personal Area Network (PAN)** is formed by connecting several personal devices such as computers, laptops, mobile phones, smartphones, printers, etc. All these devices are located within about 10 meters. A personal network can be wired or wireless. For example, a mobile phone connected to a laptop via USB forms a wired PAN, while two smartphones communicating with each other through Bluetooth form a wireless PAN or WPAN.

**A Local Area Network (LAN)** connects computers, mobile phones, tablets, mice, printers, etc., located at a limited distance. The geographic area covered by a LAN can vary from a single room, a floor, an office with one or more buildings in the same premises, a laboratory, a school, a college, or a university campus. The connection is made by wires, Ethernet cables, fiber optics or Wi-Fi.

A LAN is relatively secure because only authentic network users can access other computers or shared resources. Users can print documents using a connected printer, upload/download documents and software to and from the local server. Such LANs provide short-distance communication with high-speed data transfer rates. These types of networks can be extended up to 1 km. Data transfer rates of a LAN are quite high and typically ranging from 10 Mbps (called Ethernet) to 1000 Mbps (called Gigabit Ethernet), where Mbps stands for megabits per

second. Ethernet is a set of rules that define how computers and other devices connect to each other through cables on a LAN.

**A Metropolitan Area Network (MAN)** is an extended form of a LAN that covers a larger geographic area, such as a city or a town. The data transfer rate in a MAN also varies in Mbps, but it is much lower compared to the LAN. Examples of a MAN are a cable television network or cable broadband Internet services. Such a network can be extended to 30-40 km. Sometimes many LANs are connected together to form a MAN.

**A Wide Area Network (WAN)** connects computers and other LANs and MANs that are spread across different geographical locations of the country or in different countries or continents. A WAN can be formed by connecting a LAN to other LANs through a wired/wireless medium. Large businesses, educational and government organizations connect their various branches in different locations around the world through WANs. The Internet is the largest WAN that connects billions of computers, smartphones, and millions of LANs on different continents.

Exercise 21. *Translate the word combinations:*

типи комп'ютерних мереж; кишенькові пристрої (такі як мобільні телефони чи планшети), з'єднані через Wi-Fi або Bluetooth; бездротовим/дротовим способом; швидкість передачі даних; поділятися на категорії; персональна мережа; локальна мережа; муніципальна мережа; глобальна мережа; географічна зона, охоплена локальною мережею; оптоволокно; відносно безпечний; отримати доступ до комп'ютерів або спільних ресурсів; зв'язок на короткій відстані; мережа кабельного телебачення; послуги кабельного широкосмугового Інтернету; великі підприємства, освітні та державні організації; об'єднувати різні філії.

Exercise 22. *Find the Infinitives, the Participles, and the Gerunds in text 2. Identify their tense forms and functions.*

Exercise 23. *Work in pairs to discuss the questions.*

1. How do computer networks range in their size and connection?
2. What categories do they fall into?
3. How is a Personal Area Network (PAN) formed?
4. Give the examples of wired and wireless networks.
- 5.

What is a Local Area network (LAN)? 6. What area is covered by a LAN? 7. What is the LAN connection made by? 8. Why is a LAN relatively secure? 9. What kind of communication do LANs provide? 10. What is Ethernet? 11. What area does a Metropolitan Area Network (MAN) cover? 12. What is data transfer rate in a MAN? 13. Give the examples of a MAN? 14. What is a Wide Area Network (WAN)? 15. How can a WAN be formed? 16. What does a WAN allow to do? 17. What area does it cover?

Exercise 24. *Study the words to text 3.*

Web/World Wide Web (WWW) – веб, всесвітня павутина

Internet of Things (IoT) – Інтернет речей

gateway – (міжмережвий) шлюз

security camera – камера відеоспостереження

Internet Service Provider (ISP) – постачальник послуг Інтернету

Internet backbone – магістраль Інтернету

computer communications – комп'ютерний зв'язок, комп'ютерні комунікації

socialization – соціалізація, спілкування

Hypertext Markup Language (HTML) – мова гіпертекстової розмітки, мова HTML

Uniform Resource Identifier (URI) – уніфікований ідентифікатор ресурсу

Uniform Resource Locator (URL) – уніфікований покажчик ресурсу

Hypertext Transfer Protocol (HTTP) – протокол передачі гіпертексту/гіпертекстових файлів

retrieve – шукати, відшукувати інформацію; знаходити, вибирати

retrieval system – інформаційно-пошукова система, система інформаційного пошуку

imbed/embed – вбудовувати, вмонтовувати, вставляти

sophisticated – складний, ускладнений; сучасний, новітній

hyper-connected world – гіперпов'язаний світ

adjust – пристосовувати, регулювати, налаштовувати

collaborate – співпрацювати

setting – оточення, середовище

instrumentation – застосування, використання приладів, апаратури, інструментів; обладнання, оснащення інструментами; контрольно-вимірювальні прилади; приладобудування  
smart manufacturing – «розумне/інтелектуальне» виробництво  
connected logistics – зв'язана логістика  
smart digital supply chain – «розумний/інтелектуальний» цифровий ланцюжок поставок  
smart power grid – «розумна/інтелектуальна» електромережа

Exercise 25. *Find derivatives of the words.*

Add, apply, architect, wire, connect, increase, social, nation, access, science, standard, create, invent, technology, revolution, link, collect, industry, collaborate, manufacture, digit.

Exercise 26. *Translate the word combinations.*

The Internet of things (IoT); laptops and tablets; handheld devices; switches and gateways; smart electronic appliances; drone and security cameras; to be constantly evolving; connected through a cable or wirelessly (Wi-Fi); the Internet backbone; entertainment, socialization and e-commerce; HTML (Hypertext Markup Language); URI (Uniform Resource Identifier); URL (Uniform Resource Locator); to retrieve web pages; secure and advanced version; a vast collection of information; popular retrieval system; to be embedded with sensors; household items; sophisticated industrial tools; hyper-connected world; to adjust every interaction between connected things; industrial IoT (IIoT); industrial setting; instrumentation and control of sensors; smart manufacturing; smart cities; connected logistics; smart digital supply chains; smart power grids.

Exercise 27. *Read text 3 and speak on the advantages of the connected world and smart technologies.*

### **TEXT 3. Internet, Web, and the Internet of Things**

The Internet is a global network of computing devices, including desktop computers, laptops, servers, tablets, cell phones, other handheld devices, printers, scanners, routers, switches, and gateways. In addition, smart electronic appliances such as TV, air conditioner (AC), refrigerator, fan, light, etc. can also communicate over the network. The list of such



smart devices is constantly increasing, for example, drones, vehicles, door locks, security cameras.

The Internet is constantly evolving, and it is difficult to visualize or describe every aspect of the Internet architecture. Computers can be connected to the modem through a cable or wirelessly (Wi-Fi). This modem, either wired or wireless, connects to your local Internet Service Provider (ISP), which then connects to the national network. Many such ISPs connect together to form a regional network, and regional networks connect together to form a national network, and such country-specific networks form the Internet backbone.

Today, the Internet is a widespread network, and its influence is no longer limited to the technical areas of computer communications. It is used by everyone in society, as evidenced by the increasing use of online tools for learning, creativity, entertainment, socialization, and e-commerce.

The World Wide Web (WWW), or Web for short, is an ocean of information stored in the form of trillions of interconnected web pages and web resources. Web resources can be shared or accessed through the Internet. Sir Tim Berners-Lee, a British computer scientist, invented the revolutionary World Wide Web in 1990 by identifying three fundamental technologies that led to the creation of the Web:

- HTML (Hypertext Markup Language) is a language used to design standardized web pages so that web content can be read and understood on any computer.
- URI (Uniform Resource Identifier) or URL (Uniform Resource Locator) is a unique address or path for each resource on the web.
- HTTP (Hypertext Transfer Protocol) is a set of rules used to retrieve linked web pages on the web. A more secure and advanced version is HTTPS.

On the other hand, the web is the interlinking of collection of web pages on these computers that are accessible through the Internet. Today, the WWW provides users with access to a vast collection of information created and shared by people around the world. Today it is the most popular retrieval system.

The Internet of Things (IoT) describes a network of physical objects or “things” that are embedded with sensors, software, and other technologies to connect and exchange data with other devices and

systems over the Internet. These devices range from common household items to sophisticated industrial tools.

With low-cost computing, the cloud, big data, analytics, and mobile technologies, physical things can share and collect data with minimal human intervention. In this hyper-connected world, digital systems can record, monitor, and adjust every interaction between connected things. The physical world meets the digital world, and they collaborate. Industrial Internet of Things (IIoT) refers to the application of IoT technology in industrial setting, especially for instrumentation and control of sensors and devices that apply cloud technologies. Some common uses of IIoT are smart manufacturing, smart cities, connected logistics, smart digital supply chains, smart power grids.

*Exercise 28. Use active vocabulary of text 3 and Infinitive Constructions to translate the sentences.*

1. Мене попросили налаштувати інтелектуальні електронні прилади. 2. Ймовірно, «розумний» будинок складний у використанні та дорогий у обслуговуванні. 3. Передбачалося, що команда буде співпрацювати з різних куточків світу. 4. Інтернет речей вважають сучасною технологією з широкою сферою застосування. 5. Сподіваються, що ці складні прилади будуть протестовані в промисловому середовищі. 6. Говорять, що ці датчики використовують «розумну» електромережу. 7. Відомо, що міжнародний ІТ-форум відбудеться завтра. 8. Сайт здався нам цікавим і змістовним. 9. Новітні технології дають можливість «розумним» електронним приладам підтримувати зв'язок за допомогою мережі. 10. Всесвітня павутина дозволяє користувачам отримати доступ до великої кількості інформації, що представлена та спільно використовується людьми з усього світу.

*Exercise 29. Discuss the questions with your partners.*

1. What is the Internet? 2. What kind of devices does it combine? 3. How can computers be connected to the modem? 4. How is the Internet backbone formed? 5. Why is the Internet a widespread network? 6. What is the World Wide Web (WWW)? 7. How can web resources be shared or accessed? 8. Who and when invented the World Wide Web? 9. What fundamental technologies led to the creation of the Web? 10. Describe the main features of Hypertext Markup Language (HTML), Uniform Resource Identifier (URI) and Hypertext Transfer Protocol (HTTP). 11.

What does the web interlink? 12. What can the WWW provide users with? 13. Characterize the Internet of Things (IoT). 14. What kind of tools does the Internet of things represent? 15. What technologies allow physical things to share and collect data with minimal human intervention? 16. What can digital systems do in the hyper-connected world? 17. What does the industrial Internet of Things (IIoT) refer to? 18. What are common examples of IIoT?

Exercise 30. Match the terms (1 – 11) with their definitions (a – k).

1) hyperconnectivity	a) modernized power grids that use information and communication networks and technologies to collect information about energy production and energy consumption
2) the Internet of Things	b) a set of computer networking technologies commonly designed to connect computers through LANs, WANs, MANs using cables
3) gateway	c) an interdependent collection of communication devices, joints, and IoT technologies changing the main logistical processes to become more customer-centric
4) Wi-Fi	d) a global hypertext system for searching and using Internet resources
5) retrieval system	e) a collection of physical objects connected to the Internet and exchanging data
6) Internet	f) a technical standard allowing wireless access to the Internet
7) connected logistics	g) an information computer network that connects users all over the world
8) Ethernet	h) the speed of communicating data
9) smart power grids	i) a system providing effective data capturing, retrieval, viewing and processing
10) Web	j) a device performing routing at the network layer
11) transfer rate	k) the use of multiple systems and devices to be constantly connected to social networks and various sources of information

## GRAMMAR

### REVIEW

#### NON-FINITE VERB (INFINITIVE, GERUND, PARTICIPLE)

Exercise 31. *Memorize the forms of Infinitive.*

	Active	Passive
Indefinite (Simple)	to keep	to be kept
Continuous	to be keeping	-----
Perfect	to have kept	to have been kept
Perfect Continuous	to have been keeping	-----

Exercise 32. *Translate the sentences. Define the forms and functions of the Infinitive. It may be used as a subject, an attribute, an object, a part of a predicate, an adverbial modifier.*

1. To communicate in social networks is essential for many job activities. 2. To protect information is a significant part of a network security policy. 3. The obligation of every computer user is to know the rules of using the Internet. 4. The function of the World Wide Web is to develop and improve online tools for learning, socialization, and e-commerce. 5. IT employees need to create and present innovative projects for educational purposes. 6. Various types of networks are used to collaborate in the company. 7. The duties of network administrators are important to perform properly. 8. Advanced technologies are evolving to describe every aspect of the Internet architecture.

Exercise 33. *Translate into English using **Infinitive Complexes** after the models.*

<b>Model 1:</b>	Ви вважаєте його професіоналом? – Do you consider <b>him to be a professional?</b>
<b>Model 2:</b>	Відомо, що студент вивчає сучасні мови програмування. – <b>The student is known to learn modern programming languages.</b>

1. Представники ІТ-компанії бачили, як доповідач готував презентаційні матеріали. 2. Йому б хотілося, щоб потенційні роботодавці приймали участь у підготовці майбутніх фахівців у сфері комп'ютерних мереж. 3. Викладач не думав, що лекція про

топологию мереж виявиться такою складною. 4. Вона сподівається, що сучасне обладнання від зарубіжних постачальників допоможе компанії досягти успіхів на міжнародному ринку. 5. Які обставини змусили вас створити корпорацію з вироблення мережевих приладів? 6. Вважають, що вони дуже досвідчені спеціалісти у галузі програмування. 7. Кажуть, що вона найбільш кваліфікована з-поміж працівників цієї робочої групи. 8. Здавалося, що експерти мали різні підходи щодо налаштування сучасних типів мереж.

Exercise 34. *Memorize the forms of Gerund.*

	Active	Passive
Indefinite (Simple)	keeping	being kept
Perfect	having kept	having been kept

Exercise 35. *Translate the following sentences paying attention to the forms and functions of the Gerund. It may be used as a subject, an attribute, an object, a part of a predicate, an adverbial modifier.*

1. Sending sensitive data such as bank credentials, username, passwords or confidential documents is the main issue considered by computer network security. 2. The main function of a network administrator is monitoring company's websites. 3. Internet is based on serving numerous demands and proposals in various aspects of life. 4. Network professionals perform the functions of collaborating with various foreign representatives. 5. After solving problems of designing corporate networks, experts discuss innovative approaches in setting appropriate equipment.

Exercise 36. *Translate into English using Gerundial Complexes after the models.*

<b>Model 1:</b>	Студенти добре склали іспит з англійської мови. Викладач пишався цим. – The teacher was proud of <b>students having passed</b> the English exam well.
<b>Model 2:</b>	Ви не заперечуєте, якщо я налагоджу програму? – Do you mind <b>my debugging the program</b> ?

1. Спеціалісти хотіли, щоб це програмне забезпечення було

призначене для виявлення та усунення можливих вразливостей комп'ютерної безпеки. 2. Операційна система працює належним чином. Програмісту це подобається. 3. Науковий керівник бажає, щоб студентів направили на сучасну виробничу практику. 4. Ви не заперечуєте, якщо я оберу іншу тему для мультимедійної презентації? 5. Мало шансів, що новий співробітник компанії стане відомим розробником ефективних антивірусних програм. 6. Результати роботи щодо встановлення локальної мережі підприємства відповідали службовим потребам. Головний менеджер був задоволений цим. 7. Адміністратор була впевнена, що хакери вкрали та стерли всю секретну інформацію.

Exercise 37. Study the forms of Participle.

	Active	Passive
Present	keeping	being kept
Perfect	having kept	having been kept
Past	-----	kept

Exercise 38. Translate the sentences into English using the correct form of the Participle after the models.

<b>Model 1:</b>	Шлюзи уможливають обмін даними між системами, що використовують різні протоколи. – Gateways make communication possible between systems <b>using</b> different protocols.
<b>Model 2:</b>	Базова мережа може об'єднувати декілька комп'ютерів, розміщених у кімнаті. – A basic network may connect a few computers <b>placed</b> in a room.

1. Інтернет – це найбільша глобальна мережа, яка з'єднує мільярди комп'ютерів, смартфонів та мільйони локальних мереж з різних континентів. 2. Карта Ethernet, відома як мережева інтерфейсна карта, є мережевим адаптером, який використовується для налаштування дротової мережі. 3. IP-адреса – це унікальна адреса, яка призначена для ідентифікації кожного вузла в мережі. 4. Всесвітню павутину вважають океаном інформації, що зберігається у вигляді трильйонів взаємопов'язаних веб-сторінок і веб-ресурсів. 5. Кожному комп'ютерному серверу, на якому

розміщено веб-сайти, присвоюється ім'я проти його IP-адреси. 6. Співробітники компанії можуть друкувати документи, використовуючи підключений принтер, а також завантажувати документи та програмне забезпечення на локальний сервер. 7. Муніципальна мережа розглядається як розширена форма локальної мережі, яка охоплює більшу географічну територію, як-от місто чи селище. 8. Існують модеми, підключені як до вузлів джерела, так і до вузлів призначення.

Exercise 39. *Change the following sentences into simple ones using **Participial Complexes** after the models:*

<b>Model 1:</b>	She watched as he was testing network's performance. – She watched <b>him testing the</b> network's performance.
<b>Model 2:</b>	We noticed them as they were providing technical support. – <b>They were seen providing</b> technical support.
<b>Model 3:</b>	The employees believed that modern networks secured data transfer. – <b>Data transfer was believed secured.</b>

1. We saw that network specialists were monitoring computer infrastructure with IT staff. 2. The professor noticed as the students were commenting on his video lectures. 3. The clients observed the IT professionals as they were identifying weaknesses in computer systems. 4. The applicants heard that the employers were discussing the relevant level of work experience in computer engineering. 5. They believe that network experts follow all security protocols when installing computer systems. 6. Computer science researchers considered that they have analyzed and solved all network problems. 7. She saw the software company representatives as they were seeking professionals with the necessary technical skills. 8. The analysts heard that the scientists were considering issues relating to the technology industry.

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*Навчальне видання*

### **ФАХОВА ІНОЗЕМНА МОВА ПРИКЛАДНА МАТЕМАТИКА**

Навчальний посібник  
для здобувачів вищої освіти  
ОС «Бакалавр» спеціальності  
113 «Прикладна математика»

Автори:  
АКМАЛДІНОВА Олександра Миколаївна  
ГУРСЬКА Олена Олександрівна  
ТЕРЕМІНКО Лариса Григорівна  
ДЕНИСЕНКО Наталія Григорівна  
СОРОКУН Ганна Василівна