

# Unit 4

## INPUT

### 1.1. Read and translate the following words and word-combinations.

An information system, deactivate processing, encode data, digital code, transform data into digital code, an information-processing cycle, a finger touch, a machine-readable code, an encoded piece of data, source documents, a separate transcribing step, input technology, error-prone transcribing, computer processing, the point of origin, a specially encoded price tag, a human error, time-consuming, a special reading device.

### 1.2. Learn key-words and expressions.

activate (v) – активувати; викликати  
batch (n) – пакет  
batch-processing system – система опрацювання пакетами  
capture data – збирати дані  
eliminate (v) – вилучати  
encode data – закодувати дані  
enter data – вводити дані  
error prone – схильний до помилок  
finger touch – дотик пальця  
information processing – опрацювання інформації  
machine-readable code – машинний код  
memory location – комірка пам'яті  
on-line processing – оперативне опрацювання  
scan (v) – сканувати  
source document – початковий документ  
switch (v) – перемикає  
transcribed input – закодоване введення  
transform data into digital code – перетворити дані у цифровий код  
trigger (n) – тригер; запускати

#### 1.4. Read and translate the text.

### Computer System Input

Generally, an information system is activated by the input of data or information. Input can also deactivate processing, just as a light switch can turn off a light as well as turn it on. Thus, the primary role of input is to activate or deactivate information processing.

Input is a process that involves the use of a device to encode or transform data into digital codes that the computer can process. For example, if you press the letter A on the keyboard of a terminal or personal computer, you activate an information-processing cycle. The key is simply a switch that senses a finger touch and triggers a cycle to accomplish the following: (1) the keystroke is encoded, or converted into a machine-readable code, (2) the encoded piece of data is stored in a memory location for later processing, and (3) output is provided by displaying the letter *A* on the computer's monitor screen.

When learning about the process of input, it is useful to classify input into two broad categories: (1) **transcribed input** – data that are captured by transcribing from **source documents** onto another medium that is capable of being input to a computer system and (2) **direct source input** – data that are captured directly from their source without a separate transcribing step. Advances in input technology are moving the process of input away from transcription toward the capturing of data directly from their source.

For many years, the most common method of preparing data for input to a computer system involved transcribing the data into computer-readable form. Often, data exist in a source document, a form that contains the data to be processed by a computer, such as a pre-printed invoice. One of the earliest transcribing devices was the keypunch machine. **Data were entered on a keyboard and** transcribed by punching combinations of holes into specially designed cards.

There are two major drawbacks to transcribed input. The first is that the process is time consuming. By the time data go through a transcribing process, it may take hours or even days before they are input to a computer system. The second is that the process is **error prone**. Human error is the single biggest cause of mistakes in data input.

Systems that use transcribed input data are often called **batch-processing systems**. A **batch** is a collection of data to be processed. For

example, a common practice is to collect payroll data through the use of a source document called a **time card**. The time cards are collected at the end of the pay period, batched together, and input to a payroll application program.

Time-consuming and error-prone transcribing can be bypassed by entering data directly from their source. For example, the sale of merchandise at a clothing store is a transaction that might be input for computer processing. The actual data entry of the sale can be done in a variety of ways. An employee of the clothing store could press a series of keys on a cash register to activate processing. If the store's cash register is connected to a computer and the sales transaction immediately changes the inventory figure to reflect the sale, it is called **on-line transaction processing** (as opposed to batch processing) because data enter the computer directly from the point of origin. If the item in the store has a specially coded price tag, processing can be activated by scanning the price tag with a special reading device known as a **scanner**. This saves time by eliminating the step of pressing cash register keys, and it is also a more accurate way of entering data.

#### 1.5. Find synonyms.

Encode, convert, drawback, means, transform, capture, fulfil, enter, advance, gather, breakthrough, common, main, general, include, disadvantage, collect, primary, accomplish, involve, major, medium.

#### 1.6. Give English equivalents.

Перетворити дані в цифровий код, цикл опрацювання інформації, запустити цикл, збирати дані, підготувати дані до введення, введення даних з клавіатури, вхідне повідомлення (опрацювання запиту), пристрій сканування, клавіатура ПК, відчувати дотик пальця, перетворити в машинний код, зберігати в комірці пам'яті, інший запит, процес введення.

#### 1.7. Give Ukrainian equivalents.

Information-processing cycle, batch-processing system, on-line transaction processing, office automation technology, satellite communication system, automatic teller machine, computer-based device, fast-food industry, computer-generated image, liquid-crystal display, pianolike keyboard, computer-aided instruction, computer-aided design, cathode-ray tube, floppy disk drive, graphical user interface, long-term storage, fibre-optic cable.

**1.8. Answer the questions.**

1. In what way is an information system activated?
2. What is the primary role of input?
3. What are the two categories of classifying input?
4. What do we call systems using transcribed data input?
5. What are the advantages of direct source input?
6. What devices are used for direct source input?

**2.1. Read and translate the following words and word-combination.**

Key-switch technology, electromechanical switches, flat-sealed surface, harsh environment, fast-food restaurants, lack of speed, an average rate, a low-average human reading speed, a typewriter layout, a visual aid, a blinking box, a key-driven command.

**2.2. Learn key words and word-combinations.**

boldface (n) – жирний шрифт  
control key – клавіша керування  
data-entry terminal – термінал введення  
function key – функціональна клавіша  
help system – система допомоги  
input device – пристрій введення  
input system – система введення  
keyboard (n) – клавіатура  
keyboard template – трафарет клавіатури  
layout (n) – розміщення  
manual labour – ручна праця  
membrane keyboard – контактна клавіатура  
mode of operation – режим роботи  
numeric keypad – цифрова клавіатура  
QWERTY – клавіатура американського типу  
set of function keys – набір функціональних клавіш  
special cursor key – клавіша керування курсором  
word-processing software – програмні засоби опрацювання тексту

**2.3. Read and translate the text.**

## Keyboards

**Keyboards** are the most widely used input devices. Keyboards are found as components in such input systems as computer terminals, data-entry terminals, cash registers, and telephones.

**Construction, uses and layout.** In principle, the concept of a keyboard is straightforward, and fairly easy to design and implement. Keyboards consist of keyswitch technology coupled with electronic circuitry to encode the data that are entered by pressing keys. Electric typewriters and computers use electromechanical switches. Automatic teller machines often use membrane keyboards that have flat-sealed surfaces. Membrane keyboards are more suitable than switches for use in harsh environments. For example, such keyboards are used in fast-food restaurants, where dirt and grease might clog an ordinary keyboard.

One major drawback of using a keyboard is lack of speed. Keyboarding requires manual labour; even a fast typist (85 words per minute) only enters data at an average rate of 7 characters per second. By contrast, a low-average human reading speed is 250 words per minute; Therefore, in a typical office, typing in information consumes a great deal of the time and effort of highly paid workers. One solution is to use faster input devices, such as scanners. There is no standard layout for keyboards. On most of them, you will find the following:

1. A typewriter layout.
2. Function keys.
3. Special control keys.
4. Cursor movement keys.

In the centre of the keyboard is a type-writer layout for traditional entry of text and special characters. The most common layout is called **QWERTY**, named for the six leftmost characters in the top row of alphabetic characters.

A computer keyboard needs more keys than the typewriter layout, and these are generally found surrounding the typewriter keyboard area. In addition to a numeric keypad, you will find (1) function keys; (2) special keys labeled [Ctrl] Control, [Alt] Alternate, [Esc] Escape, [Del] Delete, and [Enter] or [Return]; and (3) four cursor movement keys to move the cursor up, down, left, and right.

**Function keys** are labeled with the characters [F1] through [F10] or [F12]. The idea behind function keys is to simplify the use of application

programs. For example, word-processing software often uses the function keys to perform special commands, such as boldface, underline, or delete a sentence or a paragraph. Pressing the [F1] key brings up a **help system** in many applications.

Function keys can be used in conjunction with other keys. Holding down the [Alt] key while pressing [F1], for example, causes a different command to be executed than pressing the [F1] key alone. By combining the function keys with the [Ctrl], Shift, and [Alt] keys, up to 36 functions can be performed.

**Special controls keys.** The Delete key [Del] is used to erase character by character. In some applications it can be used to erase a selected block of characters, such as a word, a sentence, a paragraph, or a group of cells in a spreadsheet.

The Escape key [Esc] is usually used to move from one mode of operation to another. For example, if you have instructed your word-processing software to print a document and discover that you forgot to set your continuous-form-feed paper at the top of the form, you may be able to press the [Esc] key to stop the printing, correct the mistake, and then continue. However, different applications might have other uses for the [Esc] key.

The [Enter] key, sometimes called the [Return] key, fulfils two functions depending on the program with which it is used. The [Enter] key functions as a signal to continue in most programs. Pressing the [Enter] key also positions the cursor at the beginning of the next line, which is the electronic equivalent of pressing the carriage [Return] key on a typewriter.

The Control key [Ctrl] is always used in conjunction with one or two other keys to give instructions to a program. For example, when using a word processor, pressing the D key causes the character D to appear on the screen. If you hold down the [Ctrl] key while pressing the D key, the word processor might interpret the combination as an instruction to delete a character. The [Alt] key is used in the same manner. Cursor movement keys moving the cursor around on the screen is one of the most common tasks in an application program. A *cursor is a* visual aid on a display screen. It may take the shape of a blinking box or underline, an arrow, or even a pointing finger. In word processing, for example, the cursor often blinks on and off and marks the location where the next character will appear on the screen.

You can move a cursor to any position on the screen by pressing the cursor movement keys, which are labeled with arrows. These keys can move the cursor up, down, left, or right. In fact, cursor movement is so important in an application such as word processing that it can usually be accomplished by addi-

tional key-driven commands. These commands might utilize function keys or control key commands to move the cursor forward or backward by word, line, sentence, or paragraph as well as to the beginning or end of a document.

#### 2.4. Find synonyms.

Couple, combine, enter, capture, use, apply, require, need, traditional, find, search, perform, conventional, advantage, benefit, display, show, accomplish, drawback, disadvantage, execute, discover, tag, find out, at the top, at the bottom, label, interpret, translate, shape, form.

#### 2.5. Form the plural of the following nouns.

Mouse, phenomenon, criterion, stimulus, medium, index, memorandum, means, series, stylus, analysis, spectrum.

#### Remember that initials can be made plural:

OS – OSs, GUI – GUIs, ATM – ATMs, LCD – LCDs

#### 2.6. Give English equivalents.

Основний недолік, середня швидкість читання, спільні риси, стандартне розміщення, традиційне уведення, альтернативне розміщення, режим роботи, клавіша керування курсором, виправити помилку, виконувати функції, видаляти символ за символом.

#### 2.7. Match these descriptions with the names of keys on the right.

1. A long key at the bottom of the keyboard. Each time it is pressed it produces a blank space.	ARROW KEYS
2. It moves the cursor to the beginning of a new line. It is also used to confirm commands.	RETURN
3. It stops a program with out losing the information from the main memory. Sometimes its use depends on the application.	CAPS LOCK
4. It works in combinations with other keys to produce special characters or specific actions.	SHIFT
5. It removes the character on the left of the cursor or any selected text. TAB	TAB
6. It produces UPPER-CASE characters or the upper-case characters of the keys.	ESCAPE
7. It produces upper-case letters but it does not affect numbers and symbols.	SPACE BAR
8. It moves the cursor horizontally to the right for fixed number of spaces (in tabulations and data fields).	DELETE
9. They are used to move the cursor, as an alternative to the mouse.	ALT

**2.8. Translate into English.**

1. Клавіатура призначена для введення до ПК символної інформації, а також для управління роботою ПК.
2. За своїм призначенням всі клавіші поділяються на чотири поля.
3. Перехід у режим введення великих літер здійснюється натискуванням клавіші [CAPS LOCK].
4. Натискування клавіші [ENTER] сприймається комп'ютером як вказівка приступити до виконання введеної команди.
5. Група цифрових клавіш є на всіх сучасних клавіатурах і в основному призначена для введення чисел.
6. Клавіші зі стрілками служать для переміщення курсора або прокручування тексту по екрану.

**2.9. Answer the questions.**

1. What is the major drawback of using a keyboard?
2. What are the function keys designed for?
3. What is a cursor and what helps move it around on the screen?
4. What is the ESCAPE key used for?
5. What keys are used for scrolling text?
6. What functions does the ENTER key perform?

**3.1. Read and translate the following words and word-combinations.**

Pointing and dragging, a touch screen, a touch pad, a touch-sensitive pad, invisible beams, a sensing greed, infrared touch technology, an interactive visitor information system, gain access, a touch-screen system, great accuracy, a grid of wires, the tip of the pen, pen strokes, handwriting recognition, a pen-based computer, a caret, unwanted text.

**3.2. Read and translate the text. Write out computer terms.**

## Pointing Devices

The **mouse** is a pointing device that combines the traditional cursor movements – accomplished by pressing cursor movement keys – with the means to select an object on the display screen. For example, when confronted with choices on a menu, you point to the selection of your choice by positioning the cursor with the mouse, and then you press a button on the mouse to select your choice. In word processing, a technique called pointing and dragging can be used to select a large block of text, such as a sentence or paragraph. This is



done by pointing at the first character in the sentence or paragraph and keeping a mouse button depressed while you drag the pointer to the last character in the sentence or paragraph. The result is a highlighted block of text that can be manipulated with other commands, such as move or delete.

The original mouse was part of a research and development effort by Doug Engelbart at the Stanford Research Institute in 1967. He was working on ways to make computers easier to use and understand. The original mouse was about the size of a baseball, moved on large wheels, and had three control buttons. Its appearance led to its name. The cord looked like a tail, the three buttons looked like two eyes and a nose, and the wheels elevating the body looked like feet. Today's mice are smaller and more elegantly designed, but the name remains the same.

The most natural of all pointing devices is your finger. Pointing with a finger is used in two important pointing methods: touch screens and touch pads. The idea behind touch technology is to make a computer system easier to use. Touch technology senses the location of your finger as it nears or touches a screen or a touch-sensitive pad. For example, a touch screen might contain a menu with several selections. When you touch the part of the screen that corresponds to the selection of your choice, you activate the program that takes you to that selection.

One method for implementing touch screens involves crisscrossing the monitor screen with invisible beams of infrared light. When you touch a point on the screen, your finger interrupts the horizontal and vertical infrared beams. The Hewlett-Packard Touch screen option for personal computers uses this technology. Another method involves over-laying the screen with a thin layer of plastic that has the sensing grid built into it.

Touch screens are easy to use, especially in situations where you need information quickly. For example, Walt Disney's Experimental Prototype Community of Tomorrow (EPCOT) centre combines infrared touch technology with colour video monitors to create an easy-to-use interactive visitor information system. Visitors can gain access to a wide variety of information about the park, its attractions, and their locations by simply touching one of the many video monitors located throughout the centre.

Touch technology is limited because of its poor resolution. In addition, touch-screen systems are relatively expensive. Fingers are simply too large for great accuracy, so an electronic pen, also called a stylus, often has to be used to accomplish detailed work.

An electronic pen utilizes radio waves to communicate with a grid of wires underneath a liquid-crystal display screen. Radio waves are sent to the tip of the pen and returned for position analysis. An electronic pen looks and feels like a pen yet contains no batteries or wires, and does not need to be connected to the computer. As the tip of the pen nears the screen, the location of the pen is determined by which wires in the grid detect the pen. Software can then interpret the movement and meaning of the pen strokes.

Using a pen provides an alternative to the keyboard and mouse pointing device because the pen can combine the functions of both devices. Instead of pointing at a command with the mouse cursor, you point at the on-screen command with the pen. Scrolling is done by flicking the pen on a scroll bar. Selection is done by drawing left and right brackets with the pen. The pen also allows you to write on the screen, and software translates your hand-printed or written characters into text through a process known as handwriting recognition.

Handwriting recognition is the process of recognizing characters (e.g., letters, numbers, and punctuation) printed or written on a display screen and translating them into digital codes that are redisplayed as text on the screen.

The first step in the recognition process is to analyze the strokes as they are received from the pen. A shape recognizer tries to determine the geometry and topology of the input, and, if necessary, resorts to comparing input character shapes against a set of prototypes for each character.

Using a pen-based computer is similar to writing on a notepad. To take notes, for example, you would use the electronic pen to write on the display. Editing the text would be accomplished in much the same manner as is done today on paper. To insert a word, you draw a caret between two words and write in your insertion. Deleting text would be as simple as drawing an X through unwanted text. Pen-based computers can be used in settings in which desktop or portable computers with keyboards are awkward or impractical, such as meetings, or when standing, walking, or moving about.

### 3.3. Give English equivalents of the following words and expressions.

Портативний комп'ютер, пристрій керування позицією, сенсорний екран, сенсорна сітка, одержати доступ, електронне перо, розпізнавання рукописного тексту, натискати клавішу, переміщення, сенсорна клавіатура, інфрачервоне світло, низька роздільна здатність, вилучати, одержати доступ, прокручувати, вставити слово, таким же чином, вставлення/вставка, сенсорна технологія.

**3.4. Give synonyms of the following verbs. Make up sentences with some of these verbs.**

Accomplish, select, point, manipulate, contain, use, need, near, connect, determine.

**3.5. Complete the sentences with the words from the box. You can use some words more than once.**

handwriting recognition   a mouse   the trackball   a joystick   an electronic pen
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1. A pointing device that combines the traditional cursor movements with the means to select an object on the screen is called \_\_\_\_\_.
2. \_\_\_\_\_ can combine the functions of the keyboard and the mouse.
3. \_\_\_\_\_ is often found in video and arcade games.
4. The pointing device that has become popular with the widespread use of portable computers is \_\_\_\_\_.
5. The most common pointing device is \_\_\_\_\_.
6. The process of recognizing characters printed or written on a display screen is called \_\_\_\_\_.

**3.6. Here are some basic mouse actions. Match the terms in the box with the explanations below.**

Click   double   click   drag
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1. Position the pointer on something, then rapidly press and release the mouse button twice. (You do this to load the program, open a document or select text or graphics.)
2. Position the pointer on something, hold down the mouse button and move the mouse to a desired position, then release the button. Do this to move an image to a new location on the screen.
3. Position the pointer on something, then press and release the mouse button. (You do this to place the insertion point, to choose an option, or to close a window)

**3.7. Answer the questions.**

1. What is the purpose of a pointing device?
2. What pointing devices are you familiar with?

3. What is the origin of the mouse?
4. How does the mouse function?
5. What is the idea behind the touch technology?
6. What are the advantages and disadvantages of touch technology?
7. Is handwriting recognition software widely used today or is it still in the developing stage?
8. What are the two methods for implementing touch screens?
9. In what situation can pen-based computers be used?
10. What are the advantages of a computer mouse over a keyboard?

**4.1. Read and translate the following words and word-combinations.**

Magnetically charged ink, predominantly, visually impaired, breakthrough, technology, formidable, interlace, expose, the optical image, the greyscale scanner, tiny photoreceptors, a separate transcribing steps, approximately, a technique for compacting data, a set of external speakers, video capture board, disk storage space, interaction with computers, expressive and effective.

**4.2. Learn key words and word-combinations.**

batch-processing program – програма, що виконується в пакетному режимі

character recognition – розпізнавання символів

convert images into digital data – перетворити зображення в цифрові дані

convert scanned text into a file – перетворити сканований текст у файл

digital data – цифрові дані

digital representation – цифрове представлення

digitized image – цифрове зображення

dots per inch (dpi) – точок на дюйм

feed – подавати

magnetic ink – магнітне чорнило

optical character recognition – оптичне розпізнавання символів

rectangular array of dots – прямокутний масив точок

translate characters into – перекладати символи в

**4.3. Read the text about scanners. First read it all the way through. Underline the basic methods of character recognition and compare your ideas with a partner.**

## Scanners

### Part 1

Scanners convert optically focused images, such as text, line drawings, or photographs into digital representations that are suitable for processing. When an image is translated into a series of Os and Is, it can then be processed like any other digital data.

Scanners trace their roots to several technologies and devices, including magnetic-ink character recognition, bar codes, and optical character recognition.

The earliest form of scanner used **magnetic-ink character recognition (MICR)**, a form of character recognition that reads text printed with magnetically charged ink. At the time MICR was developed, optical methods had not yet been developed. MICR is still predominantly used by the banking industry for processing checks. All checks contain a series of numbers printed in magnetic-ink. MICR makes check processing faster and more accurate by capturing data directly from their source without a separate transcribing step.

Another form of scanning uses **bar codes**. Supermarkets use the Universal Product Code (UPC), which consists of a series of thick and thin bar codes that represent numbers. Marking products this way greatly simplifies the information processing associated with the sale and restocking of products.

Today, bar codes are used in factories and offices. Bar codes are even starting to show up on people. They can be found on patient identification bracelets and on employee badges in hospitals.

**Optical character recognition (OCR)** is the process of examining characters on a printed page and translating them into computer text. OCR was originally designed for input to typesetting machines for the newspaper industry. It was thought that relatively untrained typists could retype copy for OCR input and feed it into a scanner, thus cutting costs, reducing mistakes, and speeding up the newspaper composition process. In 1976 Raymond Kurzweil introduced a reading machine to scan printed documents and, using electronic voice output, read them aloud to the blind or visually impaired. This OCR breakthrough technology could be trained to read the different fonts it encountered. Although the problems of reading already typeset material are still formidable, today there are a wide variety of low-cost OCR software interfaces between scanners and personal computers. These programs use various methods of character recognition to convert scanned text into a file, suitable for import into a word processor, spreadsheet, or database program.

They also interlace with most popular scanners; are able to differentiate automatically among graphics, text, and multiple columns; and handle such nuances as regular text versus boldface, italic, or underlined text.

**Image recognition.** A useful application for scanners is to capture images such as line drawings, illustrations, or photographs, and convert them into digital data that can be manipulated, retouched, cropped or resized, and printed. The **resolution** of a scanner is defined as the number of bits per unit of measure (such as inch or centimetre), simply called **dots per inch (dpi)**. Scanner resolution ranges from 75 dots per inch to thousands of dots per inch, but the most common scanner resolution is 300 dots per inch. In the simplest case of scanning an image, the scanner “looks for” black or white. When it “sees” a white point, it translates the white point into a 0; when something other than white is sensed, that is translated into a 1. In this way, the optical image is converted into a digital array of Os and Is.

A typical black-and-white photograph, however, will not usually be made up of only black and white, but will include many shades of grey. Some scanners are able to distinguish among levels of grey as well as black and white. By measuring the relative amount of reflected light, the **grey-scale scanner** can translate points in the image into a code that represent the levels of gray at each point. Colour scanners work the same way as grey-scale scanners, except that an image has to be scanned three times, instead of one. Each scan passes through a red, green, or blue filter.

## Part 2

Digitizing audio and video.

Digitized images require a great deal of disk storage. For example, a black-and-white 8.5-inch by 11-inch image, scanned and digitized, would require approximately 1 million bytes of storage. Adding greys or colours requires even more storage space. **Compression** is a technique for compacting data for more efficient storage. For example, one technique permits blank lines to be replaced by codes that indicate the lines are empty. Today, compression techniques are available that can reduce the amount of storage required for an 8.5-inch by 11-inch image from 1 million to about 100,000 bytes. Another means of inputting data into a computer is to capture sound or video images. Inputting sound such as voice or music usually requires an **audio digitizer board**, which turns analog sound waves into digital files for playback, and a set of external speakers. Like images, digitized sound re-

quires a great deal of disk storage space. One minute of uncompressed voice-quality sound can occupy one-half megabyte of disk space, and 1 minute of CD-quality music can take up to 5 megabytes.

To digitize video from a VCR, camcorder, or television requires a **video capture board**, which turns full-motion video signals into digitized files. Uncompressed full-motion video requires up to 1800 megabytes of disk storage space per minute.

Today, the only cost-effective way to store digitized audio and video on disk is to compress it. Several hardware techniques exist to compress, decompress, and play back digitized data. For example, a technique called **digital video interactive (DVI)** offers a 160-to-1 compression ratio. Through the use of DVI, the 1800 megabytes of disk storage required for one minute of fullmotion video could be reduced to slightly over 11 megabytes of disk storage space. Experimental techniques have been developed that can compress video data by a factor of 2000: 1.

One of the most promising areas for using captured sound and video is in **multimedia**. Sound and full-motion video bring more natural methods of communication and interaction with computers. When used for presentations, education, and training, combining text and graphics with audio and video can make interacting with computers much more expressive and effective.

#### **4.4. Translate into English the following word-combinations so that you could form compound nouns.**

Розпізнавання символів, опрацювання інформації, ідентифікаційний браслет пацієнта, комп'ютерний текст, макетування газети, програма бази даних, скляна пластинка, роздільна здатність сканера, дискова пам'ять, простір пам'яті, звукова хвиля, коефіцієнт ущільнення.

#### **4.5. Find synonyms.**

Convert, image, translate, trace, contain, precise, track, examine, face, picture, accurate, originate, cut, differentiate, transform, link, start, reduce, associate, begin, encounter, distinguish, interpret, check.

#### **4.6. Give English equivalents.**

Розпакувати дані, ущільнення даних, відтворювати цифрові дані, метод ущільнення, відеоплата, цифровий відеоформат, звукова плата, цифрове зображення, оптичне розпізнавання символів, розпізнавання

зображень, точок на дюйм, сканер штрихового коду, оптичне зображення, збирати дані, відтінки сірого, керувати такими нюансами як, перетворювати сканований текст у файл.

**4.7. Complete the sentences with the words from the box. You can use some words more than once.**

voice input device	MICR	OCR	barcode
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1. The use of \_\_\_\_\_ had led to a significant number of consumer protests because customers suspected secret price manipulation.
2. \_\_\_\_\_ is the direct reading and conversion of typed or hand-written characters into computer-readable form.
3. \_\_\_\_\_ device reads magnetic materials embedded in designated areas on paper documents.
4. \_\_\_\_\_ device codes information into digital form.
5. \_\_\_\_\_ is used predominantly for check processing in the bank industry.

**4.8. Translate into English.**

1. Сканери призначені для введення в комп'ютер графічних об'єктів (малюнків, фотографій та ін.).
2. Принцип дії сканера ґрунтується на перетворенні зображення в електричні сигнали.
3. Основною характеристикою сканера є роздільна здатність, яка як і в дисплеях та принтерах визначається кількістю точок на дюйм.
4. Сканери використовуються також і для введення текстової інформації.

**4.9. Answer the questions.**

1. What is a scanner? Give the definition in your own words.
2. What technology is used in scanners?
3. What was the purpose of developing MICR?
4. What are the advantages of MICR application?
5. In what businesses are bar codes used?
6. What is OCR? Explain in your own words.
7. What was OCR originally designed for?
8. What problems are solved with help of OCR today?
9. How is the resolution of a scanner defined?
10. Why is compression considered effective in data storage? Give the examples.



**5.1. Read the text about sensors and give the examples of their application.**

## Sensors

**Sensors** (sometimes called transducers) are instruments capable of directly encoding a physical event into data. Sensors can record changes in temperature, weight, pressure, odour, and light – all of which may be useful as input to a computer. For example, at a computer-controlled traffic signal, an electronic sensor called a pressure transducer is buried under the street. It senses the flow of traffic and inputs that data to a microprocessor that controls the traffic lights.

Today, scientists extend their sensors beyond visible light and capture data at all bands of the electromagnetic spectrum, including radio, infrared, ultraviolet, and X-ray wavelengths.

The traditional method of using sensors involves connecting a sensing device to a computer system. A new technique combines the computer and the sensor on the same silicon chip because silicon is sensitive to the pressures, temperatures, images, sounds, and smells that must be sensed. The combined chips, called **smart sensors**, are capable of improving the performance of sensor applications because some of the data processing occurs directly in the sensor. Just as the human eye processes much information before it sends signals to the brain, a smart sensor monitors what is being sensed and only sends a signal to a larger computer when necessary.

### Test Yourself

**Match the following key terms to the appropriate definition or application:**

- A.**
1. Input
  2. Transcribed input
  3. Direct source input
  4. Keyboard
  5. Function keys
  6. Cursor movement key
  7. Pointing device
  8. Mouse

9. Touch technology
  10. Electronic pen
  11. Handwriting recognition
    - a. Keys labelled with the characters [F1] through [F10] or [F12].
    - b. Composing printed characters on an LCD screen.
    - c. Data that are captured by transcribing them from source documents onto another medium that is capable of being input to a computer system.
    - d. The use of a device to encode or transform data into digital codes that a computer can process.
    - e. A device that combines the functions of a keyboard and pointing device.
    - f. Data that are captured directly from their source without a separate transcribing step.
    - g. Typing a lengthy word-processing document.
    - h. Generally interacting with a display screen.
    - i. Moving a cursor on the display screen.
    - j. Obtaining information from a kiosk.
    - k. Pointing and dragging on a display screen.
- B.**
1. Scanner
  2. Magnetic-ink character recognition (MICR)
  3. Bar code
  4. Optical character recognition (OCR)
  5. Compression
  6. Sensor
  7. Smart sensor
  8. Word recognition
  9. Speech recognition
    - a. Recognizing connected words spoken in sentences or phrases.
    - b. Marking a product so it can be tracked in an inventory-control application.
    - c. Generally examining an image and translating the image into digital images that are suitable for processing.
    - d. Monitoring blood sugar levels in a diabetic person.
    - e. Reading typewritten characters on paper.
    - f. Responding to individually spoken words or commands.
    - g. Processing existing checks in the banking industry.

- h. Generally encoding a physical event directly into data.
- i. Compacting data for more efficient storage.

**True/False:**

- 21. The primary role of input is to activate or deactivate information processing.
- 22. Input technology is moving toward more transcribed input.
- 23. Transcribing data is a relatively error-free process.
- 24. A major drawback to using a keyboard is lack of speed.
- 25. Cursor movement is one of the most common tasks when interacting with an application program.
- 26. Selecting choices from a menu often involves the activity called pointing.
- 27. Word wrap eliminates the need for cursor movement keys.
- 28. Touch screens rely on the use of a mouse as a pointing device.
- 29. Electronic pens use light waves to communicate with the display screen.
- 30. A pen or stylus can replace the function of both a keyboard and a mouse.
- 31. Magnetic-ink character recognition is an improvement on scanners.
- 32. Bar codes are useful in inventory-control applications.
- 33. Voice templates are digital signals stored in a computer's memory.
- 34. The process of recognizing general human speech is called word recognition.
- 35. Speaker-independent voice recognition has been achieved in many practical applications.

**Multiple Choice:**

- 36. One device that can eliminate the step of keying in data is called a (an)
  - a. Key-to-disk machine.
  - b. Optical scanner.
  - c. Key punch machine.
  - d. Electronic cash register.
- 37. The single biggest cause of mistakes in data input is
  - a. Point-of-sale terminals.
  - b. Keying in the data.
  - c. Source documents.
  - d. Human error.
- 38. A computer-controlled traffic signal uses
  - a. Sensing.
  - b. Scanning.

- c. Thermostats.
  - d. Training.
39. Optical character-recognition (OCR) software can read
- a. Magnetically encoded numbers.
  - b. Any combination of numbers or letters.
  - c. Bar codes in supermarkets.
  - d. Specially coded characters or patterns.
40. The most widely used input device is a
- a. Mouse.
  - b. Keyboard.
  - c. Sensor.
  - d. Camera.
41. Mice are used to replace
- a. Bar codes.
  - b. Touch screens.
  - c. Keyboards.
  - d. Cursor movement keys.