UNIT 16 THE DEVELOPMENT OF COMPUTERS

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16.0 OBJECTIVES

In this unit our aim is to give you practice in reading comprehension by (a) setting a passage dealing with the development of computers, (b) giving a glossary of difficult words and (c) asking different types of questions relating to comprehension of the passage. In the vocabulary section, we have set exercises asking you to (a) find synonyms and antonyms from the passage for the words listed, and (b) match words with their definitions. The section on writing focusses (i) on sequence words (i.e. first, second, etc.) and (ii) discusses words or expressions which generally precede illustrations (for example, namely etc.). The last section on writing asks you to write a paragraph describing the applications of computers in everyday life.

16.1 READING COMPREHENSION

16.1.1 Study Guide

The passage maintains that the revolution in computer technology is commonly described as a series of generations. The writers of the passage identify four distinct stages and describe in brief technological developments associated with each stage. The writers also dwell on how computers have influenced our day to day life. After you have read the passage once, read it again with the help of the glossary we have given at the end of the passage. Answer all the questions. Check your answers with those given by us at the end of each unit.

16.1.2 Comprehension Passage

The Development of Computers

If the root of the information revolution is the explosion of information, its trunk is the development of the technical tools to make information accessible to those who would use it. Thus, the information revolution has two essential parts: the information explosion and the high-tech revolution. The term high-tech, of course, is short for high technology. The term refers to the design and use of electronic devices such as the transistor and the silicon chip in communications and computers.

The revolution in computer technology has been going on for about forty years and is commonly described as a series of generations. In the first generation, started during the second World War, computers employed vacuum tubes and relays as switching devices. The collection of switches routed electrical currents in a manner that produced calculated results. As it turns out, all digital computers today still perform calculations using switching techniques.

In the second generation, started in the late 1950s, tubes and relays were replaced by transistors. Transistors were faster, cheaper, smaller, required less energy, and produced less heat than tubes.

The third generation, born in 1964, replaced transistors with integrated circuits. An integrated circuit arranges thousands of switches on circuit boards small enough to be completely hidden by the tip of your finger. These became known as chips. Chips, too, were cheaper, cooler, and faster than their transistor forbears.

Starting in the early 1970s a fourth generation of computers saw the shrinkage of computer components to microscopic dimensions. Chips became Large Scale Integrated Circuits (LSI) and then Very Large Scale Integrated circuits (VLSI), meaning that they contained a very large number of components on a very small chip. Once again, computer switches became smaller, less expensive, cooler, and faster.

These developments have indeed been remarkable:

> If the aircraft industry had evolved as spectacularly as the computer industry over the past 25 years, a Boeing 767 would cost $500 today, and it would encircle the globe in 20 minutes on five gallons of fuel.

The results of the past four decades of technical development can be seen as four distinct trends. First, the cost of computing has decreased. This is absolutely true in the sense that the purchase price of computers has dropped. It is also relatively true in that the cost of per unit of calculation has dropped. In 1950, the cost of performing 100,000 multiplications was about $1.25.Today it is less than five cents.

Second, thanks to their inexpensiveness, computers are now readily available to almost anyone who would use one. In fact, most of us use computers when we don't know we are doing so. They are in our wristwatches, automobiles, ovens and toys.

Third, computers have become more powerful over the years of their development. Computer power is related to speed and memory capacity. Speed is measured in terms of the number of instructions per second that a computer can execute. Howard Aiken's Mark I (1944) could add three 48-digit numbers in one second, requiring about 300 instructions per second. Computer speed has increased by several orders of magnitude since the 1940s and is today measured in Millions of Instructions per Second (MIPS). Powerful computers operate at several hundred MIPS. Among the most powerful are those that operate at several thousand MIPS.

As for memory capacity, compare a very popular second-generation computer (late 1950s), the IBM 1401,with a modern microcomputer, the IBM PC AT, announced in 1984. The 1401 had a maximum memory capacity of 16,000 characters. The PC AT (which stands for Personal Computer Advanced Technology) has a maximum memory capacity of more than three million characters, almost 200 times more than the 1401.

Fourth, computers have found increasing numbers of diverse applications. At first used for governmental, military and scientific purposes, they are now used for everything from guarding homes to helping salespeople be more convincing. They are used to pick mates and have been used to assist in marrying couples when the bride, the groom and the minister were geographically separated. They control aircraft and ventures into space. They monitor biofeed back and help people learn how to relax. It would be impossible to compile an exhaustive list of different computer applications today. The number of things for which computers can be used is growing faster than one can write them down, even with a computer.

(From: *Using Microcomputers* by Richard W.Brightman and Jeffry M. Dinsdale, 1987.)

16.1.3 Glossary

root : ordinarily and popularly, the underground part of a plant; the source, cause, basis, occasion of anything.

Information revolution : name given to the present era because of the impact of computer technology on society. Sometimes called the computer revolution.

Information explosion : increase in the growth and diversification of all forms of information.

trunk : stem of a tree; source of development.

accessible : within reach, approachable.

technology : knowledge and methods used to create a product

electronic devices : electronic apparatus such as semi conductors, valves and filters whereby current can be allowed to flow or can be halted by electronic switches working at a very high speed.

silicon chip : tiny portion of a silicon wafer with thousands of electronic components and circuit patterns etched on its surface.

series : a set of things in line or succession.

generations : stages

vacuum tubes : device for controlling flow of electric current. Dominant electronic element found in computers prior to the advent of the transistor.

relays : magnetically operated switches used in pre-electronic computers.

routed : transmitted.

digital computers : devices that manipulate digital data and perform arithmetic and logic operation on such data. They represent information by one of two electronic states: on or off. these are represented by the two digits 1 and 2 respectively.

integrated circuit : miniature circuit on a single semi-circuit conductor chip: Also, a functionally ready chip after it has been mounted in its package.

circuit board : thin insulating board used to mount and connect various electronic components and microchips in a pattern of conductive lines. This circuit pattern is etched into the board's surface. Also called printed circuit board.

chips : small component that contains a large amount of electronic circuitry. They are building blocks of a computer and perform various functions such as doing arithmetic, serving as computers memory, or controlling other chips.

forbears : ancestors

shrinkage : becoming smaller

microscopic dimension : very small size.

large scale integrated circuits : a large number of (usually over 100) of integrated circuits on one silicon chip.

very large scale integrated circuits : a large number (usually between 1000 and 1 million) of components on one chip.

evolved : developed gradually.

spectacularly : marvellously, (noteworthy manner)

encircle : form a circle around; or go round.

fuel : material for burning (e.g. wood, coal, oil, uranium).

decade : period of ten years

distinct : clearly marked

computing : act of using computer equipment for processing data.

relatively : comparatively.

readily : without difficulty.

ovens : enclosed box - like space which is heated for cooking food.

magnitude : dimensions

character : any symbol, digit, letter or punctuation mark-including the blank character-stored or processed by computing equipment.

diverse : of different kinds

applications : Tasks to be performed by a computer programme or system. Broad examples of computer applications are engineering design, numerical control,airline seat reservations, business, forecasting and hospital administration Accounts receivable, mailing list, or electronic spreadsheet programmes are examples of applications that run on small business computers.

guarding : protecting

pick : choose

mates : partners in marriage

groom : bride-groom

minister : Christian priest or clergyman.

ventures : undertakings in which there is risk.

monitor : control

biofeed-back : automatic control of living organisms.

compile : collect information and arrange (in a block, list, report etc.)

exhaustive : complete; thorough.

16.1.4 Comprehension Questions

Exercise 1

Answer the following :

1. What has made the benefits of information explosion available to the people?
2. Name two factors responsible for the information revolution.
3. What role did relays and vacuum tubes play in computers?
4. In which decade of 20th century did the first generation of computers begin?
5. What was the integrated circuit?
6. Which one feature distinguished most the fourth generation computer from the third generation computer?
7. Have the aircraft and computer industries made similar progress during the past 25 years ?
8. What are the consequences of reductions in the computer price?
9. In what ways has the computer advanced over the years?
10. How in IBM PC AT more powerful than IBM 1401?

11. Which instances do the writers of the passage mention to show that computers have influenced our daily life?

Exercise 2

Use the information in the text you have read and complete the following table:

Generation chart of computers

Generation	Period	Electronic Equipment used	Main features
First			
Second			
Third			
Fourth			

False Statements

Exercise 3

Identify the false statements by writing 'F' against them.

1. Switching techniques are no longer in use in modern computers.
2. Transistors replaced tubes and relays because transistors were more efficient.
3. The integrated circuits are as small as the transistors.
4. A Boeing 747 today can go round the world in 20 minutes.
5. The speed of a computer depends on how many instructions it can carry out in one second.
6. It is difficult to make an exhaustive list of computer applications because it is beyond the capacity of computer memory.

Contextual Reference

Exercise 4

Find out what the underlined words refer to in the text you have read, and write them in the spaces provided after each sentence.

1. its trunk is the development of technical tools (line 1)_____
2. those who would use it (line 2)_____
3. that produced calculated results (line 9)_____
4. These became known as chips (line 15) _____
5. They contained a very large number of components (line 18)_____
6. it would encircle the globe (line 21)_____
7. today it is less than five cents (line 25) _____
8. Second, thanks to their inexpensiveness (line 26)_____
9. readily available to anyone who would use one (line 26-27) _____
10. that a computer can execute (line 31)_____

16.2 VOCABULARY

16.2.1 Synonyms

Exercise 5

Read the text again and find synonyms (i.e. words having similar meanings) for the words given below:

1. approachable (para 1) _____
2. periods (para 2) _____
3. covered (para 3) _____
4. parts (para 4) _____
5. grown (para 4) _____
6. clear (para 5) _____
7. easily (para 6) _____
8. companion (para 10) _____
9. prepare (para 10) _____
10. control (para 10) _____

16.2.2 Antonyms

Exercise 6

Look at the text and find antonyms (i.e. words having opposite meanings) for the words given below:

1. expansion	(para 5) _____
2. huge	(para 5) _____
3. a few	(para 5) _____
4. neglecting	(para 5) _____
5. incomplete	(para 5) _____
6. united	(para 5) _____

Matching

Exercise 7

Think about the words and phrases in column A and match them with their definitions given in column B, by putting the appropriate letter in the bracket provided on the left of each word. The first one has been done for you.

Column 'A'		Column 'B'	
(g) 1.	Chip	a)	Storage facilities of the computer capable of storing a vast amount of data.
( ) 2.	Vacuum tubes	b)	Question-answer session between a computer system and a human.
( ) 3.	Relays	c)	to run the instructions of a programme after they are changed to the machine code by the computer.

( ) 4.	Digital computer	d)	Magnetically operated switch used in Pre-electronic computers.
( ) 5.	Transistors	e)	Symbols, digits, letters or punctuation marks stored or processed by a computing equipment.
( ) 6.	Integrated Circuit	f)	a small semi-conductor which operates circuit as an amplifier.
( ) 7.	Memory	g)	Small component that contains a large amount of electronic circuity.
( ) 8.	Instructions	h)	a part of computer programme which tells the computer what to do at that stage.
( ) 9.	Execute	i)	Miniature circuit on a simple semi-conductor chip.
( ) 10.	Characters	J)	Device for controlling flow of electrical current.
		k)	Devices in which information is represented by one of the two electronic states: on or off. These are represented by the two digits 1 and 0 respectively.

16.3 WRITING

Sequence words

Exercise 8

There are many ways of showing sequential relationships. First, then, next, after that, afterwards, later, eventually, finally, are same of the time sequence words. They are generally put at the beginning of the process or the event that they introduce.

Example

First, the cost of computing has decreased. Second, computers are now readily available. Third, computers have become more powerful over the years. Fourth, computers have found increasing number of diverse applications.

Now fill in the blanks in the following passage with appropriate sequence words.

Documentation

But why is documentation important? We can identify three reasons. _____ , anyone having to use a programme must know what it can do and what it cannot do; how to prepare data for it; and how to interpret the output ._____, most programmes have to be maintained, i.e. they have to be kept up-to-date to reflect the needs of the company or the user; made more efficient; and perhaps, modified (altered) because of some error ._____, if a team of programmers are cooperating in a given programming project, it is essential that they all know exactly what is expected of them and how their parts fits into the overall design.

Giving Examples

Exercise 9

Writers often use examples to illustrate their ideas, and state very clearly which things are examples.

Examples are generally preceded by markers such as the following :

for example, for instance, such as, that is, like, namely etc.

Example

The term 'high-tech' refers to the design and use of electronic devices such as the transistor and the silicon chip in communications and computers.

Sometimes the markers follow the examples, separated by commas:

Example

The other category consists of application programme which instructs the computer to perform these procedures necessary to get some jobs done; pay roll, accounts payable, or word processing, for example.

Sometimes examples are given implicitly. In such cases the markers are not mentioned.

The computers' input devices, which might be a card reader, a tape drive or a disk drive, reads the information into the tape.

Read the following sentences carefully and identify the markers, the illustrations and the ideas illustrated.

1. Data come into the CPU from various input devices such as terminal key-boards, disk storage units, and tape storage units.
2. One character - a letter of the alphabet or a number, for example-requires eight bits called a byte.
3. Some computers have more than one control key. The IBM PC, for instance, has both a Control key and an alternate key.
4. The arithmetic - logical unit is that portion of the computer in which the actual arithmetic operations, namely, addition, subtraction, multiplication, division, and exponentiation, called for in the instructions are performed.

Sentences	Marker	Idea Illustrated	Illustration
1.			
2.			
3.			
4.			

Paragraph Writing

Exercise 10

In question 11 of Exercise 1 in the section on Reading comprehension you listed the instances which show how computers have influenced our daily life. Using those instances, write a brief paragraph of about 100 words on how computers help us in everyday life.

16.4 LET US SUM UP

In this unit we have given you practice in

a) Understanding a passage dealing with the development of computers and their applications.

b) identifying false statements.

c) filling in a generation chart of computers.

d) finding out objects or persons who have been referred to by certain pronouns and demonstratives used in the passage.

e) Finding out synonyms and antonyms.

f) matching technical words with their definitions.

g) sequence words.

h) words used for introducing examples.

i) writing a paragraph based on the information given in the passage.

Answer to Exercises

Exercise 1

1. Developments of technical tools have made the benefits of information explosion available to the people.
2. Explosion of information, ii) development of technical tools.
3. They routed electrical circuit in a manner that produced calculated results.
4. In the 1940s
5. Thousand of switches on a circuit board.
6. The computer components were reduced to microscopic dimensions.
7. No.
8. Firstly, cost of per unit of calculation has dropped secondly computers are readily available.
9. It has gained more speed and more memory capacity.
10. It has memory capacity of more than three million characters almost 200 times more than the 1401.
11. The following instances show how computers have affected our daily life.
    1. wristwatches, 2. automobiles, 3. Ovens, 4. todays,
    5. arranging marriage partners, 6. guarding homes,
    7. helping sales people to be more convincing,
    8. controlling aircrafts, and 9. helping people to relax, and several others.

Exercise 2

Generation	Period	Electronic Component used	Main features
First	1940s	Vacuum tubes and Relays	Expensive, slow, large-size, generated a lot of heat
Second	Late 1950s	Transistors	cheaper, faster, smaller, memory capacity 16,000 characters
Third	1964	Integrated circuits	cheaper, faster, smaller, more memory capacity
Fourth	1970s	Large scale Integrated circuit	cheapest, fastest, smallest, memory capacity -200 times more than in late 1950s.

Exercise 3

1. False, 3. False, 4. False, 6. False.

Exercise 4

1. the information revolution,
2. information,
3. manner,
4. circuit boards,
5. Very large scale circuits,
6. Boeing 767,
7. the cost of performing 100,000 multiplications,
8. computers,
9. a computer
10. number of instructions per second.

Exercise 5

1. accessible, 2. generations, 3. hidden, 4. components,
5. evolved, 6. distinct, 7. readily, 8. mates,
9. compile, 10. monitor.

Exercise 6

1. shrinkage, 2. microscopic, 3. several, 4. guarding
5. exhaustive, 6. separated .

Exersise 7

1. g, 2. j, 3. d, 4. k, 5. f, 6. i, 7. a, 8. h 9. c, 10, e.

Exercise 8

1. First, 2. Secondly, 3. finally.

Exercise 9

Paragraph	Marker	Idea illustrated	Illustration
1.	such as	input devices	terminal key-boards, disc storage units.
2.	for example	Character	a letter of the alphabet, or a number.
3.	For Instance	more than one control key	A control key and an alternated key
4.	Namely	Arithmetic Operations	Addition, subtraction, Multiplication, division, and exponentiation