English for computer science

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Unit 1 What is a computer?

➢ A computer is a machine with an intricate network of electronic circuits that operate **switches** or magnetize tiny metal cores. The switches, like the cores, are capable of being in one of two possible states, that is, on or off; magnetized or demagnetized. The machine is capable of storing and manipulating numbers, letters and characters. The basic idea of a computer is that we can make the machine do what we want by inputting signals that turn certain switches on and turn others off, or that magnetize or do not magnetize the cores.

➢ The basic job of computers is the processing of information. For this reason, computers can be defined as **devices** which accept information in the form of instructions called a **program** and characters called **data**, perform mathematical and/or logical operations on the information, and then supply results of these operations. The program, or part of it, which tells the computers what to do and the data, which provide the information needed to solve the problem, are kept inside the computer in a place called **memory**.

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Unit 1 What is a computer?

➢ Computers are thought to have many remarkable powers. However, most computers, whether large or small have three basic capabilities. First, computers have circuits for performing arithmetic operations, such as: addition, subtraction, division, multiplication and exponentiation. Second, computers have a means of communicating with the user. After all, if we couldn't feed information in and get results back, these machines wouldn't be of much use. However, certain computers (commonly minicomputers and microcomputers) are used to control directly things such as robots, aircraft navigation systems, medical instruments, etc.

➢ Some of the most common methods of inputting information are to use **punched cards, magnetic tape, disks,** and **terminals**. The computer's input device (which might be a **card reader, a tape drive** or **disk drive**, depending on the **medium** used in inputting information) reads the information into the computer.

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Unit 1 What is a computer?

➢ For outputting information, two common devices used are a printer which prints the new information on paper, or a **CRT display screen** which shows the results on a TV-like screen.

➢ Third, computers have circuits which can make decisions. The kinds of decisions which computer circuits can make are not of the type: "Who would win a war between two countries?" or "Who is the richest person in the world?" Unfortunately, the computer can only decide three things, namely: Is one number less than another? Are two numbers equal? and, Is one number greater than another?
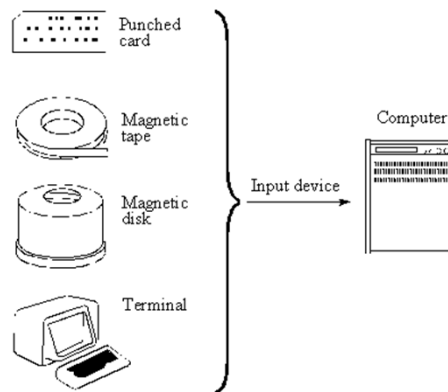
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Unit 1 What is a computer?

➤ A computer can solve a series of problems and make hundreds, even thousands, of logical decisions without becoming tired or bored. It can find the solution to a problem in a fraction of the time it takes a human being to do the job. A computer can replace people in dull, routine tasks, but it has no originality; it works according to the **instructions** given to it and cannot exercise any value judgments. There are times when a computer seems to operate like a mechanical 'brain', but its achievements are limited by the minds of human beings. A computer cannot do anything unless a person tells it what to do and gives it the appropriate information; but because electric pulses can move at the speed of light, a computer can carry out vast numbers of arithmetic-logical operations almost instantaneously. A person can do everything a computer can do, but in many cases that person would be dead long before the job was finished.

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Unit 1 What is a computer?

❖ Decide weather the following statements are true or false.
1. A computer can store or handle any data even if it hasn't received information to do so.
2. All computers accept and process information in the form of instructions and characters.
3. The information necessary for solving problems is found in the memory of the computer.
4. Not all computers can perform arithmetic operations, make decisions, and communicate in some way with the user
5. Computers can still be useful machines even if they can't communicate with the user.
6. There are many different devices used for feeding information into a computer.
7. There aren't as many different types of devices used for giving result as there are for accepting information.
8. Computers can make any type of decision they are asked to.
9. Computers can work endlessly without having to stop to rest unless there is a breakdown.

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Unit 1 **What is a computer?**

➢ Refer back to the text and find the synonyms.

1. complex   intricate…………
2. fundamental   …………………
3. a way   …………………
4. uninterested   …………………
5. accomplishments   …………………

➢   Refer back to the text and find the antonyms.

1. large   …………………
2. receiving   …………………
3. reject   …………………
4. unusual   …………………
5. small   …………………

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Unit 1 **What is a computer?**

➢ Complete the following statements with the appropriate words.

core	Device	data
circuit	terminal	switch
program	memory	medium
CRT display		

➢ 1. Every computer has ………………… for performing arithmetic operations, operating ………………… or magnetized ………………… .

➢ 2. A …………………with a screen is normally referred to as a ………………… unit.

➢ 3. A computer is a ………………… that processes information in the form of ………………… and …………………and can store this information in a ………………… .

➢ 4. Card readers, tape drives, or disk drives are different ………………… for inputting information.

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Unit 2 History of computers

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

➢ During the 17th and 18th centuries many people tried to find easy ways of calculating. J. Napier, a Scotsman, devised a mechanical way of multiplying and dividing, which is how the modern **slide rule** works. Henry Briggs used Napier's ideas to produce **logarithm tables** which all mathematicians use today. **Calculus**, another branch of mathematics, was independently invented by both Sir Isaac Newton, an Englishman, and Leibnitz, a German mathematician.

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Unit 2 History of computers

➢ The first real calculating machine appeared in 1820 as the result of several people's experiments. This type of machine, which saves a great deal of time and reduces the possibility of making mistakes, depends on a series of ten-toothed gear wheels. In 1830 Charles Babbage, an Englishman, designed a machine that was called 'The Analytical Engine'. This machine, which Babbage showed at the Paris Exhibition in 1855, was an attempt to cut out the human being altogether, except for providing the machine with the necessary facts about the problem to be solved. He never finished this work, but many of his ideas were the basis for building today's computers.

➢ In 1930, the first **analog** computer was built by an American named Vannevar Bush. This device was used in World War II to help aim guns. Mark I, the name given to the first **digital** computer, was completed in 1944. The men responsible for this invention were Professor Howard Aiken and some people from IBM.

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Unit 2 History of computers

This was the first machine that could figure out long lists of mathematical problems, all at a very fast rate. In 1946 two engineers at the University of Pennsylvania, J. Eckert and J. Mauchly, built the first digital computer using parts called **vacuum tubes**. They named their new invention ENIAC. Another important advancement in computers came in 1947, when John von Newmann developed the idea of keeping instructions for the computer inside the computer's memory.

➤ The first generation of computers, which used vacuum tubes, came out in 1950. Univac I is an example of these computers which could perform thousands of calculations per second. In 1960, the second generation of computers was developed and these could perform work ten times faster than their predecessors. The reason for this extra speed was the use of **transistors** instead of vacuum tubes. Second-generation computers were smaller, faster and more dependable than first-generation computers.

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Unit 2 History of computers

The third-generation computers appeared on the market in 1965. These computers could do a million calculations a second, which is 1000 times as many as first-generation computers. Unlike second-generation computers, these are controlled by tiny integrated circuits and are consequently smaller and more dependable. Fourth-generation computers have now arrived, and the integrated circuits that are being developed have been greatly reduced in size. This is due to **microminiaturization**, which means that the circuits are much smaller than before; as many as 1000 tiny circuits now fit onto a single **chip**. A chip is a square or rectangular piece of silicon, usually from 1/10 to 1/4 inch, upon which several layers of an integrated circuit are etched or imprinted, after which the circuit is encapsulated in plastic, ceramic or metal. Fourth-generation computers are 50 times faster than third-generation computers and can complete approximately 1,000,000 instructions per second.

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Unit 2 History of computers

> At the rate computer technology is growing, today's computers might be obsolete by 1988 and most certainly by 1990. It has been said that if transport technology had developed as rapidly as computer technology, a trip across the Atlantic Ocean today would take a few seconds.

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Unit 2 History of computers

❖ Decide weather the following statements are true or false.

1. The abacus and the fingers are two calculating devices still in use today.

2. The slide rule was invented hundreds of years ago.

3. During the early 1880s, many people worked on inventing a mechanical calculating machine.

4. Charles Babbage, an Englishman, could well be called the father of computers.

5. The first computer was invented and built in the USA.

6. Instructions used by computers have always been kept inside the computer's memory.

7. Using transistors instead of vacuum tubes did nothing to increase the speed at which calculations were done.

8. As computers evolved, their size decreased and their dependability increased.

9. Today's computers have more circuits than previous computers.

10. Computer technology has developed to a point from which new developments in the field will take a long time to come.

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Unit 2 **History of computers**

➢ Refer back to the text and find the synonyms.

1. machine ....
2. designed ....
3. a lot ....
4. errors ....
5. solve ....

➢ Refer back to the text and find the antonyms.

1. old ....
2. a few ....
3. to include ....
4. contemporaries ....
5. still in use ....

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Unit 2 **History of computers**

➢ Match the following words in column A with the statements in column B.

A	B
1. abacus	a. instrument used for doing multiplication and division
2. calculus	b. used in the first digital computers
3. analog computer	c. an instrument used for counting
4. digital computer	d. used in mathematics
5. vacuum tubes	e. circuitry of fourth-generation computers
6. transistors	f. invented by Americans in 1944
7. chip	g. made computers smaller and faster
8. microminiaturization	h. used to help aim guns
9. slide rule	i. the reduction of circuitry onto a chip
10.logarithm tables	j. a branch of mathematics text and find the synonyms.

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Unit 3 Characteristics

➢ Computers are machines designed to process, electronically, specially prepared pieces of information which are termed data. Handling or manipulating the information that has been given to the computer, in such ways as doing calculations, adding information or making comparisons is called **processing**. Computers are made up of millions of electronic devices capable of storing data or moving them, at enormous speeds, through complex circuits with different functions.

➢ All computers have several characteristics in common, regardless of make or design. Information, in the form of instructions and data, is given to the machine, after which the machine acts on it, and a result is then returned. The information presented to the machine is the **input**; the internal manipulative operations, the **processing**; and the result, the **output**. These three basic concepts of input, processing, and output occur in almost every aspect of human life whether at work or at play.

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Unit 3 Characteristics

For example, in clothing manufacturing, the input is the pieces of cut cloth, the processing is the sewing together of these pieces, and the output is the finished garment.
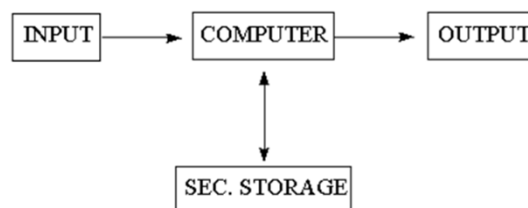

Figure 3.1

➢ Figure 3.1 shows schematically the fundamental hardware components in a computer system. The centerpiece is called either the computer, the **processor**, or, usually, the **central processing unit** (CPU). The term 'computer' includes those parts of **hardware** in which calculations and other data manipulations are performed, and the high-speed internal memory in which data and calculations are stored during actual execution of programs. Attached to the CPU are the various **peripheral**

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Unit 3 Characteristics

devices such as card readers and **keyboards** (two common examples of input devices). When data or programs need to be saved for long periods of time, they are stored on various **secondary memory** devices or **storage devices** such as magnetic tapes or magnetic disks.

➢ Computers have often been thought of as extremely large adding machines, but this is a very narrow view of their function. Although a computer can only respond to a certain number of instructions, it is not a **single-purpose** machine since these instructions can be combined in an infinite number of sequences. Therefore, a computer has no known limit on the kinds of things it can do; its versatility is limited only by the imagination of those using it.

➢ In the late 1950s and early 1960s when electronic computers of the kind in use today were being developed, they were very expensive to own and run. Moreover, their size and reliability were such that a large number of support personnel were needed to keep the equipment operating. This

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Unit 3 Characteristics

has all changed now that computing power has become portable, more compact, and cheaper.

➢ In only a very short period of time, computers have greatly changed the way in which many kinds of work are performed. Computers can remove many of the routine and boring tasks from our lives, thereby., leaving us with more time for interesting, creative work. It goes without saying that computers have created whole new areas of work that did not exist before their development.

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Unit 3 Characteristics

❖ Decide weather the following statements are true or false.

1. All information to be processed must be prepared in such a way that the computer will understand it.

2. Because of the complex electronic circuitry of a computer, data can be either stored or moved about at high speeds.

3. Not all computers can process data given to them and produce results.

4. The basic concepts of data processing are restricted to computers alone.

5. The processor is the central component of a computer system.

6. All other devices used in a computer system are attached to the CPU.

7. Memory devices are used for storing information.

8. Computers are very much restricted in what they can do.

9. Computers today cost less, are smaller, and need fewer people to operate them than in the past.

10. Computers haven't changed our working conditions very much.

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Unit 3 Characteristics

➢ Refer back to the text and find the synonyms.

1. called   ……………..…….
2. tremendous   …………………
3. ideas   …………………
4. react   …………………
5. take away   …………………

➢ Refer back to the text and find the antonyms.

1. taken away   …………………
2. wide   …………………
3. limited   …………………
4. immovable   …………………
5. after   …………………

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Unit 3 Characteristics

❖ Choose the appropriate form of the words to complete the sentences.

1. addition, add, added, additional, additionally, additive

a. Many terminals can be ………………………… to a basic system if the need arises.

b. ………………………… and subtraction are two basic mathematical operations.

c. When buying a system there is often no ………………………… charge for the programs.

2. complication, complicate, complicated, complicating, complicatedly

a. There can be many ………………………… involved in setting up a computer in an old building.

b. It is sometimes a very ………………………… process getting into a computer installation for security reasons.

c. It is sometimes very ………………………… to explain computer concepts.

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Unit 3 Characteristics

❖ Choose the appropriate form of the words to complete the sentences.

3. difference, differ, different, differently, differential, differentiate

a. There isn't a very big ………………………… in flowcharting for a program to be written in Cobol or Fortran.

b. There are many ………………………… computer manufacturers today, and a buyer must be able to ………………………… between the advantages and disadvantages of each.

c. The opinions of programmers as to the best way of solving a problem often ………………………… greatly.

4. reliably, rely on, reliable, reliability

a Computers are ………………………… machines.

b. If you don't know the meaning of a computer term, you cannot always ………………………… an all-purpose dictionary for the answer.

c. Computers can do mathematical operations quickly and ………………………… .

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Unit 3 Characteristics

➢ Complete the following statements with the appropriate words.

processing	magnetic tape	hardware
input	magnetic disk	processor
output	single-purpose	personnel
secondary memory		

➢ 1. Information ………………… takes place in the ………………… not in the ………………… device or ………………… device.

➢ 2. The …………………refers to all the electromechanical devices used in a computer installation.

➢ 3. ………………… and ………………… units are used as ………………… storage devices.

➢ 4. A computer isn't usually a ………………… machine and may require specialized ………………… to operate it and all its related equipment.

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Unit 4 Computer capabilities and limitations

➢ Like all machines, a computer needs to be directed and controlled in order to perform a task successfully. Until such time as a program is prepared and stored in the computer's memory, the computer 'knows' absolutely nothing, not even how to accept or reject data. Even the most; sophisticated computer, no matter how capable it is, must be told what to do. Until the **capabilities** and the **limitations** of a computer are recognized, its usefulness cannot be thoroughly understood.

➢ In the first place, it should be recognized that computers are capable of doing repetitive operations. A computer can perform similar operations thousands of times, without becoming bored, tired, or even careless.

➢ Secondly, computers can process information at extremely rapid rates. For example, modern computers can solve certain classes of arithmetic problems millions of times faster than a skilled mathematician. Speeds for performing **decision-making** operations are comparable to those for . arithmetic operations but input-output operations, however, involve

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Unit 4 Computer capabilities and limitations

mechanical motion and hence require more time. On a typical **computer system**, cards are read at an average speed of 1000 cards per minute and as many as 1000 lines can be printed at the same rate.

➢ Thirdly, computers may be programmed to calculate answers to whatever level of accuracy is specified by the **programmer**. In spite of newspaper headlines such as 'Computer Fails', these machines are very accurate and reliable especially when the number of operations they can perform every second is considered. Because they are man-made machines, they sometimes malfunction or break down and have to be repaired. However, in most instances when the computer fails, it is due to human error and is not the fault of the computer at all.

➢ In the fourth place, **general-purpose computers** can be programmed to solve various types of problems because of their flexibility. One of the most important reasons why computers are so widely used today is that almost every big problem can be solved by

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Unit 4 Computer capabilities and limitations

solving a number of little problems – one after another.

➢ Finally, a computer, unlike a human being, has no intuition. A person may suddenly find the answer to a problem without working out too many of the details, but a computer can only proceed as it has been programmed to.

➢ Using the very limited capabilities possessed by all computers, the task of producing a university payroll, for instance, can be done quite easily. The following kinds of things need be done for each employee on the payroll. First: Input information about the employee such as wage rate, hours worked, tax rate, unemployment insurance, and pension deductions. Second: Do some simple arithmetic and decision making operations. Third: Output a few printed lines on a cheque. By repeating this process over and over again, the payroll will eventually be completed.

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Unit 4 Computer capabilities and limitations

❖ Decide weather the following statements are true or false.

1. A computer cannot do anything until it has been programmed.

2. A computer is a useless machine if its capabilities and limitations are unknown.

3. A computer can repeat the same operation over and over again forever if permitted.

4. The speed at which different computer components function is considered to be one of the limitations of a computer.

5. Computers do not usually make mistakes unless they break down.

6. A computer can think and solve problems by itself.

7. A computer is a single-purpose machine in that it cannot be programmed to solve various types of problems.

8. Computers can solve big problems by following a series of simple steps.

9. A computer usually solves problems by doing some mathematical and decision-making operations.

10. Computers are used because they are fast and exact.

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Unit 4 Computer capabilities and limitations

➢ Refer back to the text and find the synonyms.

1. job   ……………..……

2. comprehended   …………………

3. clever   …………………

4. cases   …………………

5. salary sheet   …………………

➢ Refer back to the text and find the antonyms.

1. basic   …………………

2. exceptional   …………………

3. run well   …………………

4. slowly   …………………

5. employer   …………………

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Unit 4 Computer capabilities and limitations

❖ Choose the appropriate form of the words to complete the sentences.

1. repetition, repeat, repetitive, repeatedly, repeating

a. There are some people who .... arrive late to class whenever they're working on a program because they forget the time.

b. A computer can do .... operations without getting tired or bored.

c. .... which can be a boring and unproductive task has been eliminated with the use of computers.

d. A computer can .... the same operation over and over again accurately without becoming bored or tired.

2. comparison, compare, comparable, comparatively, comparative

a. Renting a computer isn't .... to owning one.

b. Computers can .... numbers.

c. There is sometimes very little .... to be made between two different brand-name microcomputers.

d. The difference in price of microcomputers from different manufacturers can be .... small.

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Unit 4 Computer capabilities and limitations

❖ Choose the appropriate form of the words to complete the sentences.

3. repairs, repaired, repairable, repair

a. When the computer is down it needs to be ....

b. Electronic equipment often takes a long time to ....

c. .... to a computer system are often done by the same company who manufactured the system.

4. accuracy, accurate, accurately

a. A computer is always .... in its results if well prepared.

b. .... is one of the advantages of using computers in research or in statistical analysis.

c. Computers can produce results quickly and ....

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Unit 4 Computer capabilities and limitations

➢ Match the following words in column A with the statements in column B.

A   B

1. decision-making   a. can solve different types of problems
operations

2. programmer   b. all the equipment needed input, process and
                                               output information

3. general-purpose   c. those which compare numbers
computers

4. computer system   d. decides what the program is to be

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Unit 5 Hardware and software

➢ In order to use computers effectively to solve problems in our environment, **computer systems** are devised. A 'system' implies a good mixture of integrated parts working together to form a useful whole. Computer systems may be discussed in two parts.

➢ The first part is **hardware** – the physical, electronic, and electromechanical devices that are thought of and recognized as 'computers'. The second part is **software** – the programs that control and coordinate the activities of the computer hardware and that direct the processing of data.
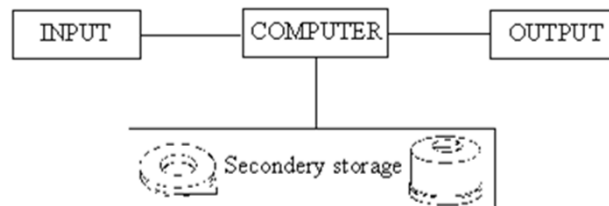
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Figure 5.1 Hardware components of a basic computer system

Unit 5 Hardware and software

➢ Figure 5.1 shows diagrammatically the basic components of computer hardware joined together in a computer system. The centrepiece is called either the computer, the processor, or usually the central processing unit (CPU). The term 'computer' usually refers to those parts of the hardware in which calculations and other data manipulations are performed, and to the internal memory in which data and instructions are stored during the actual execution of programs. The various peripherals, which include input and/or output devices, various secondary memory devices, and so on, are attached to the CPU.

➢ Computer software can be divided into two very broad categories - systems software and applications software. The former is often simply referred to as 'systems'. These, when brought into internal memory, direct the computer to perform tasks.

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Unit 5 Hardware and software

The latter may be provided along with the hardware by a systems supplier as part of a computer product designed to answer a specific need in certain areas. These complete hardware/software products are called turnkey systems.

➢ The success or failure of any computer system depends on the skill with which the hardware and software components are selected and blended. A poorly chosen system can be a monstrosity incapable of performing the tasks for which it was originally acquired.

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Unit 5 **Hardware and software**

❖ Indicate weather the following ideas are stated or not stated (S/NS) in the text.

1. A system implies a good mixture of parts working together.

2. Input and output devices operate more slowly than the decision-making devices.

3. The control unit and the arithmetic-logical unit are part of the processor.

4. The 'computer' is the hardware.

5. Software is the programs on cards, tapes and disks.

6. The processor is usually referred to as the CPU.

7. The word 'computer' means the processor and the internal memory.

8. Systems software is usually referred to as programs.

9. Complete hardware/software products are called turnkey systems.

10. Computers process specially prepared items of information.

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Unit 5 **Hardware and software**

➢ Refer back to the text and find the synonyms.

1. developed   …………….…….

2. infers   …………………

3. joined   …………………

4. chosen   …………………

➢ Refer back to the text and find the antonyms.

1. segregated   …………………

2. useless   …………………

3. narrow   …………………

4. well   …………………

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Unit 5 Hardware and software

❖ Choose the appropriate form of the words to complete the sentences.

1. integration, integrate, integrated, integrating

a. Some computer manufacturers have ……………………… both input and output devices into one terminal.

b. The success of any computer system depends on the ……………………… of all its parts to form a useful whole.

c. ……………………… input and output devices into one peripheral has reduced the area needed for a computer installation.

2. coordination, coordinate, coordinated, coordinating, coordinator

a. The control unit of a processor ……………………… the flow of information between the arithmetic unit and the memory.

b.……………………… the many activities in a computer department is the job of the department head.

c. The ……………………… of a language institute has assistants to help him and may have access to a computer to help him with the ……………………… of the many programs, timetables, space and student results.

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Unit 5 Hardware and software

❖ Choose the appropriate form of the words to complete the sentences.

3. diagram, diagrammatic, diagrammatically, diagrammed

a. Very often manufacturers provide ………… representations of the internal workings of a computer.

b. A ……………………… is a drawing that shows how something is arranged rather than what it actually looks like.

c. A few ideas have been ……………………… for you in this book.

4. interchange, interchangeable, interchangeably, interchanged

a. The words 'arithmetic-logic' and 'arithmetic-logical' can be used ………………………

b. There is often an ……………………… of ideas among computer scientists.

c. There is a big difference between an input and an output. These cannot be ………….

5. division, divide, divisible

a. It is often difficult for computer science students to ……………………… their time up proportionally between studying and programming.

b. Are all numbers ……………………… by three?

40 **c.** There is always a ……………………… of labour within a computer company.

Unit 5 Hardware and software

➢ Match the following words in column A with the statements in column B.

A   B

1. hardware   a. the computer
2. software   b. input/output and secondary memory devices
3. processor   c. short for central processing unit
4. peripherals   d. physical electronic and electromagnetic devices
5. systems software   e. hardware plus software
6. applications software   f. hardware/software packages
7. turnkey systems   g. used for a specific job
8. computer systems   h. direct the computer
9. CPU   i. the programs

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