

**O‘ZBEKISTON RESPUBLIKASI OLIY VA O‘RTA MAXSUS**

**TA‘LIM VAZIRLIGI**

**ABU RAYHON BERUNIY NOMIDAGI TOSHKENT DAVLAT**

**TEXNIKA UNIVERSITETI**

**INGLIZ TILI**

fanidan

**O‘QUV-USLUBIY QO‘LLANMA**

**Toshkent - 2016**

Ingliz tili fanidan o‘quv-uslubiy qo‘llanma. Muallif: F.Sh.Djurayeva.

-Toshkent: ToshDTU, 2016. 88 b.

Ushbu o‘quv-uslubiy qo‘llanma ToshDTU 5310800 – Elektronika va asbobsozlik; 5310900 – Metrologiya; standartlashtirish va mahsulot sifati menejmenti; 5310000 – Texnologik jarayonlar va ishlab chiqarishni avtomatlashtirish va boshqarish; 5330200 – Informatika va axborot texnologiyalari; 5350700 – Radioelektron jihozlar va qurilmalar ta’lim yo‘nalishlari talabalari uchun “Ingliz tili”da o‘qish va so‘zlashish malakalarini rivojlantirish maqsadida tayyorlangan.

Qo‘llanma mavzular yaqinligini hisobga olgan holda III bo‘lim 18 dars (Unit)ni o‘z ichiga oladi. Har bir bo‘lim aniq mavzular bo‘yicha o‘qish, shuningdek talabalarning ayni mavzularga oid lug‘at boyligini oshirishga mo‘ljallangan bo‘lib, o‘rganilgan so‘zlarni mustahkamlovchi ko‘plab mashqlar va topshiriqlardan tashkil topgan.

Yana aytish joizki, qo‘llanma barcha texnika sohasiga qiziquvchilarga “Komputerlar”, “Ishlab chiqarish jarayonlarini avtomatlashtirish”, “Elektron komponentlar va materiallar” kabi bugungi kun uchun juda dolzarb mavzularga oid inglizcha tayanch so‘z va iboralar bilan tanishish imkonini beradi.

*Abu Rayhon Beruniy nomidagi Toshkent davlat texnika universiteti ilmiy-uslubiy kengashi qaroriga asosan chop etishga tavsiya etilgan.*

Taqrizchilar: I.A. Siddiqova, professor O‘zMU,

F.R. Jumanazarova TDTU “Xorijiy tillar” kafedrasida, katta o‘qituvchi

© Toshkent davlat texnika universiteti, 2016

# CHAPTER I COMPUTERS

## UNIT I.THE HISTORY OF COMPUTER DEVELOPMENT

The oldest form of mechanical calculating devices was the abacus<sup>1</sup>. It remained the only aid to calculation until the 17th century. After the invention of logarithms in 1614, W. Oughtred constructed the first slide-rule in 1630. B. Pascal built an adding machine in 1642 at the age of 19. Later he produced some others, one of them could add six-figure numbers. In 1671 Leibnitz invented the first machine, which performed multiplication by repeated addition.

Ch. Babbage, the English mathematician of the 19th century, was the first who conceived the idea of the automatic machine for complex calculations. He designed his Analytical Engine to perform four arithmetic operations. It was to have three parts: a store, a mill<sup>2</sup> and sequence mechanisms<sup>3</sup>. The store was to hold 1000 numbers, as well as intermediate results and instructions. The mill called up numbers from arithmetic calculations with them. It corresponded to the modern processor.

About seventy years passed before the production of the first digital computer, which was similar to Babbage's Analytical Engine. In 1937 Dr. H. Aiken of Harvard University began to work at the first completely automatic digital computer which he called the Mark 1. He completed it in 1944. The Mark 1 was mainly mechanical with some electro-magnetic devices. It was a very large computer, 51 feet long and 8 feet tall. The store had 72 counters. Each counter could hold 23 digits.

The rapidly advancing field of electronics led to construction of the first general-purpose electronic computer in 1946 at the University of Pennsylvania. It was Electronic Numerical Integrator and Computer or ENIAC, the device contained 18,000 vacuum tubes and had a speed of several hundred multiplications per minute. Its program was wired into the processor and had to be manually altered.

The first generation computers (from 1940s till 1959) were very large in size and used thousands of vacuum tubes. Though their operations were very

rapid in comparison with manual calculations, they were slow by today's standards.

The second generation computers began in 1959. The use of transistors instead of vacuum tubes made these computers smaller, more powerful, and more reliable. The second generation also saw the development of programming languages.

The third generation computers started in 1964. There were silicon chips instead of transistors. This advance made possible the invention of the microcomputer in the 1970s, which, because of its low cost, small size, ease of use, large capabilities, is the computer most characteristic of the fourth generation. The microprocessors of the fourth generation were used in computers IBM PC AT 486. There are also central processing units of the fifth generation, used in Intel Pentium 60 and Intel Pentium 66, central processing units of the sixth generation, used in computers Intel Pentium 75,90,100 and 133. Few years ago appeared central processing units of seventh and eighth generations.

Components became smaller and the system became less expensive to build.

Modern digital computers are all conceptually similar, regardless of size and shape. Nevertheless, they can be divided into several categories on the basis of cost and performance.

The first one is the personal computer or microcomputer, a relatively low-cost machine, usually of desk-top size. Sometimes they are called laptops. They are small enough to fit in a briefcase. The second is the workstation, a microcomputer with enhanced graphics and communications capabilities that make it especially useful for office work. And the server computers, a large expensive machine with the capability of serving the needs of major business enterprises, government departments, scientific research establishments. The largest and fastest of these are called supercomputers.

A digital computer is not actually a single machine, in the sense that most people think of computers. Instead it is a system composed of five distinct elements: a central processing unit, input devices, memory storage devices, output devices and a communications network, called a

«bus» that links all the elements of the system and connects the system itself to the external world. Computer speeds are measured in gigahertz today. Recently, an optical central processing unit has been invented, which is capable of executing trillions discrete operations per second or it is as fast as the speed of light.

The computer revolution is very dynamic. Today researchers in the USA, Western Europe, Japan work at the problems of artificial intelligence<sup>6</sup>, the application of natural languages, very large-scale integration (VLSI)<sup>7</sup> technologies, etc.

So, we are at the threshold of new computer era, when artificial intelligence could be invented. There are no questions with «if», the only question is «when». And time will show us either computers become our best friends or our evil enemies as it is shown in some movies.

### **Comprehensive questions:**

1. When was the first general-purpose electronic computer constructed?
2. When did the use of transistor in computers begin?
3. Are all modern digital computers conceptually similar?
4. What is laptop?
5. What is a server computer?
6. What is supercomputer?
7. How many elements can be distinguished in a computer?
8. How are computer speeds measured today?

### **VOCABULARY:**

rapidly — тез , шиддат билан –быстро,стремительно

general-purpose — кўп мақсадларда ишлатиладиган, универсал - универсальный, многоцелевой

device — қурилма,ускуна - прибор, устройство

several — бир қанча - несколько

multiplication — кўпайтириш - умножение

to wire into — *бу ерда*. ..га ёзилган - *здесь*. записана на...

manually — кўл билан - вручную

to alter — ўзгартирмоқ - изменять, менять

transistor – транзистор - транзистор

to create — яратмоқ - создавать  
to improve — яхшиламоқ, ривожлантормоқ - улучшать,  
совершенствовать  
expensive — қиммат, қиммат турадиган –дорого, дорогостоящий  
to build (past built, p.p. built) — қурмоқ - построить  
digital —рақамли - цифровой  
conceptually — концептуал;муайян фикр-қарашга эга бўлган ҳолда  
- концептуально  
similar — айнан, ўхшаш, каби - похожий, подобный  
regardless — ..га қарамасдан - невзирая на  
nevertheless — шундай бўлса ҳам; аммо - тем не менее, однако  
desk-top — десктоп, столга қўйиладиган компьютер - десктоп,  
настольный компьютер  
laptop —лептоп, ноутбук - лептоп  
to fit —мос келмоқ - подходить  
briefcase —портфель, чемодан - портфель, чемоданчик  
to enhance — яхшиламоқ, оширмоқ - улучшить, увеличить  
capability — қобилият - способность  
server — сервер - сервер  
enterprise — корхона - предприятие  
research establishment — тадқиқот муассасаси - исследовательское  
учреждение  
to be composed of — ...дан ташкил топмоқ - состоять из...  
central processing unit — марказий ҳисоблаш қурилмаси -  
центральное вычислительное устройство  
distinct —турли хил ,турлича - разный, различный  
input device —киритиш қурилмаси - устройство ввода  
memory storage device — хотира қурилмаси - устройство хранения  
информации  
output device —чиқариш қурилмаси - устройство вывода  
communication network — коммуникациялар тизими - система  
коммуникаций  
bus —*бу ерда* . шина(ғилдиракка кийдириладиган темир ёки резина  
чамбар) -*здесь*. шина

to link — боғламоқ, бириктирмоқ –привязывать, соединять

external — ташқи - внешний

## NOTES

<sup>1</sup>an abacus —абак - абак

<sup>2</sup>a mill — *бу ерда.* (мисол, масалани) ечувчи қурилма - *здесь.* решающее устройство

<sup>3</sup>a sequence mechanism — иш тартибини белгиловчи қурилма - устройство, определяющее порядок работы

<sup>5</sup>a vacuum tube — электрон лампа - электронная лампа

<sup>6</sup>artificial intelligence — сунъий интеллект - искусственный интеллект

<sup>7</sup>VLSI — ўта катта интеграл схема - сверхбольшая интегральная схема

## **1. Read the text once again and fill in the blanks with the proper dates and names:**

1. The invention of logarithms were in 1614, after ... constructed the first slide-rule in .... 2. ... built an adding machine in 1642. 3. In 1671 ... produced the first machine capable of multiplication. 4. ... was the first who conceived the idea of the automatic computer. 5. Ch. Babbage and ... worked put a coded program. 6. In 1937 ... began to work at the first completely automatic digital computer. 7. He completed his Mark 1 in.....8. The first electronic computer was constructed in ... at ... .9. In 1945 ... worked out the concept of the stored program, 10. The first generation computers began in .... 11. The second generation computers started in .... 12. The third generation computer systems beginning in ... made use of silicon chips.

## **2. Ask your groupmates:**

1) about the oldest form of mechanical calculating devices; 2) about the calculating devices of the 17th century; 3) about the main components of Babbage's machine; 4) what he/she knows about the Mark 1; 5) what he/she can say about the first electronic computer; 6) what J. Neumann's concept was; 7) what computers belong to the first generation; 8) about the difference between the 2nd and 3rd generation computers; 9) when the fourth generation computers began; 10) what problems of the fifth generation computers researchers work at.

## **UNIT II. WHAT IS A COMPUTER?**

The word computer comes from a Latin word which means to count. A computer is a machine with a complex 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 and off; magnetized or demagnetized. The machine is capable of storing and manipulating numbers, letters, and characters. The basic idea of the 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 data, which provide the information needed to solve the problem, are kept inside the computer in a place called memory.

1. Modern computers are of three types: analog, digital, and hybrid<sup>1</sup>. An analog computer uses physical analogs of numerical measurements, such as length, rotation, voltage, etc. People design analog computers for specialized fields (hydrodynamics, aerodynamics, industrial control, etc.). A digital computer is a binary machine, which represents 0 and 1 electrically. Through binary arithmetic, in which all numbers are strings of 0s and 1s, the computer can represent any letter, number or symbol on its keyboard in the binary code. If a number (for example, 100) must have seven digits for its binary representation, we say that it contains seven bits. The term bit is an abbreviation for "Binary digit". An 8-bit string is a byte. A hybrid computer is a machine which combines some of the characteristics of digital and analog computers.

2. The constituent parts of a computer are called hardware. Computers vary greatly in their internal organization, but every digital computer has a processor, memory, an input device to receive information, and an output device to transmit information



3. A processor or CPU, which is short for central processing unit, is the nerve center of any digital computer system. It coordinates and controls the activities of other units and performs all the arithmetic and logical processes. In the instruction cycle the processor carries out, four commands: fetch the instruction, fetch the data (if any) upon which the instruction is to act, carry out the instruction, store the result in the memory.

4. The computer stores and manipulates binary representations in primary memory and records results in, secondary memory. Primary memory is organized into bytes and words. A word is a larger-than-byte-sized group of bits. We need words to store large numbers. Secondary memory is organized into files.

5. All computers can accept input from many sources and send output to many directions. Microcomputers in particular can accept input directly from a keyboard<sup>1</sup> by reading a disk, by communicating with another computer over a telephone line. Other input devices are: a touch screen<sup>3</sup>, a mouse, a joystick, a light pen, etc. Output devices for microcomputers and larger computers include printers, plotters, music and speech synthesizers.

6. In all of this input and output the computer is doing only one thing at a time, but it may look as if several "things are happening" simultaneously. For example, the computer may be printing on its screen, and also sending the same text to a printer. It will look as if the two things are going at once, but in fact there is a very rapid alternation of output — first to the screen, then to the printer, then to the screen again, and so on. In a large computer, which operate at great speed, the switch from one form of output to another is so rapid that the computer can appear to be talking simultaneously to a large number of devices.

There are different kinds of computers. Some do only one job over and over again. These are special-purpose computers. But there are some computers that can do many different jobs. They are called general-purpose computers. These are the "big brains" that solve the most difficult problems of science. They answer questions about rockets and planes, bridges and ships – long before these things are even built. Computers help our space program, our business and industry, medicine and education. They are powerful tools which help to change our life and the world around us.

## NOTES

<sup>1</sup>analog computer — аналог ҳисоблашқурилмаси - аналоговое вычислительное устройство

<sup>2</sup>to rank in magnitude —микдор, ўлчам бўйича тақсимламоқ - распределить по величине

<sup>3</sup>a touch screen — сенсорли экран – сенсорный экран

## VOCABULARY

Operate - ишламоқ -работать

switches - переключателилар, алмашлаб улагичлар - переключатели

magnetized – магнитланган - намагнитченный

demagnetized – магнитсизланган–размагнитченный

perform mathematical and/or logical operations – математик

ва(ёки)мантиқий амалларни бажармоқ – выполнять математические и(или логические)операции

supply results – натижалар билан таъминламоқ – обеспечить результатами

manipulate – манипуляция қилиш - манипулировать

a binary code - иккилик тартибдаги код - двоичный код

numerical measurement - рақамли ўлчов - цифровое измерение

strings – қаторлар - строки

constituent – таркибий - составной

digitizer – рақамли датчик(ўзгартиргич) - цифровой преобразователь или датчик

graphic digitizer —график шаклдан рақамли шаклга ўтказувчи датчик - преобразователь из графической формы в цифровую

picture digitizer — тасвирни рақамли кодга ўзгартиргич датчик - преобразователь изображения в цифровой код

shift —силжиш,силжитмоқ - сдвиг, сдвигать

interrupt — узмоқ, узилиш сигнали - прерывать, сигнал прерывания

program-error interrupt —дастурдаги хатолик туфайли узилиш - прерывание из-за ошибки в программе

relate *v* — алоқа ёки муносабат ўрнатиш - устанавливать связь или отношение

relation — алоқа, муносабат - связь; отношение

wire — сим, шнур - провод

plug-wire — коммутация шнури - коммутационный шнур

dot — нуқта ; нуқта қўймоқ; пунктир билан белгиламоқ - точка; ставить точку, отмечать пунктиром

dot matrix — нуқтали матрица - точечная матрица

quality — сифат - качество

choose (chose, chosen) — танламоқ; сайламоқ - выбирать, избирать

choice *n* — 1) танлаш - выбор; 2) вариант

mode — 1) ишлаш усули - способ работы 2) иш тартиби - режим (работы)

off-line mode — автоном режим (тартиб) - автономный режим

on-line mode — но автоном режим: марказий процессор бошқаруви остида ишлаш тартиби - режим работы под управлением центрального процессора, неавтономный режим

### **1. Find out the English translations of the following words and word combinations from the text**

Электрон ярим ўтказгичларнинг мураккаб тармоқли машинаси (машина со сложной сетью электронных полупроводников); выключател (электр токини узиш) билан бошқарув (управлять выключателями); жуда майда метал ядроларни магнитламоқ (намагничивать крошечные металлические ядра); ядролар (ядра); ёқилган ёки ўчирилган (включен или выключен); магнитланган ёки магнитсизланган (намагниченный или размагниченный); хатлар, сонларни сақлаш ва назорат қилиш қудратига эга (способность хранения и управления числами, письмами); маълумотларга ишлов бериш (обработка информации); маълумотларни кўрсатмалар шаклида қабул қилиш (принимать информацию в форме инструкций); маълумотлар билан математик ва ёки мантиқий амалларни бажармоқ (выполнять математические и/или логические операции информациями); маълумотларни

киритиш ва чиқариш ускунаси (устройство ввода и вывода информации); махсус топширик компьютерлари (компьютеры специального назначения); умумий топширик компьютерлари (компьютеры общего назначения); космонавтика (космонавтика).

**2. Read the third paragraph of the text and find the information dealing with the CPU. Give the definition of the CPU, point out its functions.**

**3. Read these international words and give their Russian equivalents:** function, instruction, data, display, disc, magnetic, binary, calculations, register, programming, symbolic, automation, electronic, navigation, communication, arithmetic, logic.

**4. Give the Russian or Uzbek equivalents of the following words and translate them:**

microprocessor, programmable, operation, input, output, comparison, rotating, addressable, processing, calculation, keyword, lengthy, application, symbolic, execution, computerized, unmanned.

## **UNIT III. MICROPROCESSOR**

A microprocessor is a programmable logic device. That means that the function or logical operation may be altered by applying instructional “words” at its input. Under this term “microprocessor” we mean central processing unit (CPU) of a computer. A microprocessor chip contains a great part of computer capability.

Microprocessor itself can input and output data, usually in digital form. Later this data can be exchanged between processor and other output / input devices such as display, floppy disc drive, magnetic tapes, etc. Also microprocessor contains ALU (arithmetic logic unit) which works with arithmetic or logical operations such as addition, subtraction, comparison, rotating left or right, etc. The other part of microprocessor is directly addressable memory where we can keep a vast amount of the data.

As in the central processing unit or CPU, the task of the microprocessor is to receive data in the form of binary digits (“0” or “1”), to store data for the later processing, to perform arithmetic and logic operations on the data according to previously written instructions and to deliver the results of calculations to the user.

Generally, a typical microprocessor consists of: the arithmetic and logic unit (ALU), a decode and control unit, registers with the main register which is called an accumulator, address buffers. ALU performs arithmetic and logic operations; control unit interprets instructions from the program; buffers supplies the memory with the address.

In order for any of us to use the microprocessor we must first know how to make it work; thus it means we must know how to instruct it, how to get information into and out of the circuits, and how to communicate with the system in the language that the machine understands. So we are speaking about programming or creating software.

There are two ways to programme the modern computers: to use assembly language or high-level programming languages. What is better? High-level languages should be the way to go because they make more efficient use of the programmer. They more directly represent the logic flow of the program. Also their commands and keywords like English words, which again help with the writing of programs. However, compared with

assembly language, high-level languages make less efficient use of the computer. They require more time for execution and more memory space—both critical factors in microprocessor system. Another problem is lengthy programs in a high-level language can take a long time, even a hour, to compile from source code into machine language, the only language microprocessor understands. The best way to avoid these problems, from the programmer's point of view, is to opt special assembly language. This language is ideal for many applications because it's quicker and easier to write programs using the assembler.

Usually during the programming, the programmer uses six types of instruction which the microprocessor deals with. The first group is the move type of instruction such as Load and Store. The second group is the arithmetic instructions such as addition, subtraction, multiplying, division. The next group logical instructions such as AND, OR. Also we can work with so-called edit instruction, which rearrange the bits of data. The fifth group is the group of the control instruction which can help us to control the execution of programs.

The application of microprocessor is so numerous that it's very difficult to name all the spheres of our life where the microprocessor plays an important role. Video TV games, intelligent computer terminals, process controllers, computerized automotive electronic systems, etc. Modern airplanes depend on sophisticated microprocessor systems for navigation, communication, passenger comfort and safety. In business microprocessors will involve the distribution and control of information. In industry microprocessors are used for machine-tool control and control over the process of unmanned production. A home microprocessors help to relax working with computerized game programs or help study presenting new educational software. The microprocessor really penetrated in our everyday life and they work almost everywhere making our life better.

## VOCABULARY

a microprocessor – микропроцессор - микропроцессор

logic device - логический прибор - логическое устройство

digital form - цифровая форма - рақамли шакл - цифровая форма

output / input devices - киритиш /чиқариш қурилмаси - устройство ввода/вывода (УВВ)

floppy disc drive - эгилувчан дисклар учун дискавод - дисковод для гибких дисков

to store data - маълумотларни сақлаш - хранение информации (данных)

ALU-arithmetic-logic unit - АМҚ –арифметик мантикий қурилма - АЛУ–арифметико-логическое устройство

a decode and control unit - бошқарув қурилмаси - устройство управления (УУ)

deal with – билан иш кўрмоқ – работать с...

software - дастурий таъминот(ДТ) - программное обеспечение (ПО)

assembly language – ассемблер - ассемблер

high-level language - юқори даражали тиллар - языки высокого уровня

machine language - машина тили– машинный язык

symbolic names - рамзий белгилар - символические знаки

logic instructions - мантикий буйруқлар - логические команды

complicated – мураккаб - сложный

sophisticated – мураккаб(лашган) –сложный; усложненный

**1.Say if the following statements are true or false. If they are false, correct them:**

1. Under the term “microprocessor” we mean central processing unit of a computer.

2. Microprocessor can input and output data in digital or symbolic form.

3. Such a device as directly addressable memory is not used with microprocessor.

4. The main register is so-called accumulator.

5. To know how to make microprocessor work means to know how to instruct it.

6. There is only one way to programme the microprocessor – high – level languages.

7. High-level languages don't require much time for execution and more memory space.

8. In industry microprocessors are used to control the process of unmanned production.

## **2. Give the English equivalents of the following words and phrases:**

Дастурловчи мантикий курилма(программируемое логическое устройство); маълумотларни рақамли шаклда қайта ишлаш(обработать информацию в цифровой форме); чапга(ўннга) силжиш (сдвиг влево (вправо)); дастурий таъминотни яратиш (создание программного обеспечения); дастурни амалга ошириш вақти (время исполнения программы); микропроцессорларнинг қўлланилиши (применение микропроцессоров;

## **3. Complete the sentences according to the text:**

1. A microprocessor is a ...
2. The data can be exchanged between ...
3. ALU works with such operations as ...
4. The microprocessor receives the data in the form ...
5. A typical microprocessor consists of ...
6. So we are speaking about programming or ...
7. There are two ways to programme the modern computers; to use ...



## UNIT IV. OPERATING SYSTEMS

Today, operating systems control and manage the use of hardware devices such as the printer or mouse. They also provide disk management by letting you store information in files. The operating system also lets you run programs such as the basic word processor. Lastly, the operating system provides several of its own commands that help you to use the computer.

DOS is the most commonly used PC operating system. DOS is an abbreviation for disk operating system. DOS was developed by a company named Microsoft. MS-DOS is an abbreviation for «Microsoft DOS». When IBM first released the IBM PC in 1981, IBM licensed DOS from Microsoft for use on the PC and called it PC-DOS. From the users perspective, PC-DOS and MS-DOS are the same, each providing the same capabilities and commands.

The version of DOS release in 1981 was 1.0. Over the past decade, DOS has undergone several changes. Each time the DOS developers release a new version, they increase the version number.

Windows NT (new technology) is an operating system developed by Microsoft. NT is an enhanced version of the popular Microsoft Windows 3.0, 3.1 programs. NT requires a 386 processor or greater and 8 Mb of RAM. For the best NT performance, you have to use a 486 processor with about 16 Mb or higher. Unlike the Windows, which runs on top of DOS, Windows NT is an operating system itself. However, NT is DOS compatible. The advantage of using NT over Windows is that NT makes better use of the PC's memory management capabilities.

OS/2 is a PC operating system created by IBM. Like NT, OS/2 is DOS compatible and provides a graphical user interface that lets you run programs with a click of a mouse. Also like NT, OS/2 performs best when you are using a powerful system. Many IBM-based PCs are shipped with OS/2 preinstalled.

UNIX is a multi-user operating system that allows multiple users to access the system. Traditionally, UNIX was run on a larger minicomputer to which users accessed the systems using terminals and not PC's. UNIX allowed each user to simultaneously run the programs they desired. Unlike

NT and OS/2, UNIX is not DOS compatible. Most users would not purchase UNIX for their own use.

Windows 95 & 98 (Windows 2000) are the most popular user-oriented operating systems with a friendly interface and multitasking capabilities. The usage of Windows 95 and its enhanced version Windows 98 is so simple that even little kids learn how to use it very quickly. Windows 95 and 98 are DOS compatible, so all programs written for DOS may work under the new operating system.

Windows 95 requires 486 processors with 16 megabytes of RAM or Pentium 75-90 with 40 megabytes of free hard disk space.

### **VOCABULARY:**

to consume – фойдаланиш - потреблять

consumer- фойдаланувчи, истеъмолчи–пользователь, потребитель

to realize – тушунмоқ, англамоқ - понять, осознать

smart - ақли- умный

decade- декада, ўн йил - декада, десятилетие

top - тепа, юқориси, энг усти - верх, вершина

on top of DOS–ДОС устида, ДОС асосида - «сверху», на основе ДОС

are shipped – етказиб берилди - поставляются

compatible – бир - бирига тўғри келадиган, мос - совместимый

with a click of a mouse — сичқонча тугмасини бир марта босиш билан  
одним щелчком кнопки мыши

access - кириш мумкин бўлган(йўл) - доступ

to allow – рухсат бермоқ - позволять

multiple users–кўпгина фойдаланувчилар - многочисленные  
пользователи

simultaneously - бир пайтнинг ўзида - одновременно

to ship - таъминламоқ, етказиб бермоқ - поставлять, доставлять

to desire – истамоқ- желать

#### **1. Answer the questions:**

- 1) What problems faced programmers in the 1940's and 1950's?
- 3) What are the basic functions of operating system?
- 4) What does the abbreviation DOS mean?

5) What company developed the first version of DOS operating system? For what purpose was it done? Was the new operational system successful?

6) What is the difference between the PC-DOS and MS-DOS

7) What does the abbreviation NT stand for? Is NT DOS-compatible?  
What are the basic requirements for NT?

9) What makes UNIX so different from the other operational systems?

10) What are the special features of Windows 95, Windows 98, Windows 2000?

**2.Match the following:**

1) Like NT, ... is DOS compatible and provides a graphical user interface that lets you run programs with a click of a mouse.

2)... is the most commonly used PC operating system

3)... is a multi-user operating system that allows multiple users to access the system

4)... is an operating system developed by Microsoft, an enhanced version of the popular Microsoft Windows programs.

5) The usage of... is so simple that even little kids learn how to use it very

a) UNIX

b)DOS

c) NT

d) OS/2

e) Windows 95

3. Which of the listed below statements are true/false. Specify your answer using the text.

1) When computers were first introduced in 40's and 50's programmers had to write programs to instruct CD-ROMs, laser printers and scanners.

2) The operational system controls and manages the use of the hardware and the memory.

3) There are no commands available in operating systems, they are only in word processors.

4) Microsoft developed MS-DOS to compete with IBM's PC-DOS.

5) NT requires computers with 486 CPU and 16 M random access memory.

6) OS/2 is DOS compatible because it was developed by Microsoft.

7) Traditionally, UNIX was run by many users simultaneously.

8) Windows 95 and Windows 98 are DOS compatible and have very «friendly» and convenient interface.

#### **4. Find out the English equivalents:**

Замонавий операцион тизимлар (современные операционные системы); тизимли асбоб - ускуналар (системные оборудования); фойдаланувчининг график интерфейси (графический интерфейс пользователя); кўшимча дастурлар (дополнительные программы); кўп вақтни олмоқ (поглощать много времени); дастурни ишлатиш (запускать программу);

## UNIT V. HARDWARE

What is hardware? Webster's dictionary gives us the following definition of the hardware — **the mechanical, magnetic, electronic, and electrical devices composing a computer system.**

Computer hardware can be divided into four categories:

- 1) **input hardware**
- 2) **processing hardware**
- 3) **storage hardware**
- 4) **output hardware.**

### **Input hardware**

The purpose of the input hardware is to collect data and convert it into a form suitable for computer processing. The most common input device is a **keyboard**. It looks very much like a typewriter. The **mouse** is a hand held device connected to the computer by small cable. As the mouse is rolled across the mouse pad, the cursor moves across the screen. When the cursor reaches the desired location, the user usually pushes a button on the mouse once or twice to signal a menu selection or a command to the computer.

The **light pen** uses a light sensitive photoelectric cell to signal screen position to the computer. Another type of input hardware is optic-electronic **scanner** that is used to input graphics as well as typeset characters. **Microphone** and **video camera** can be also used to input data into the computer. Electronic cameras are becoming very popular among the consumers for their relatively low price and convenience.

### **Processing hardware**

The purpose of processing hardware is retrieve, interpret and direct the execution of software instructions provided to the computer. The most common components of processing hardware are the Central Processing Unit and main memory.

The Central Processing Unit (CPU) is the brain of the computer. It reads and interprets software instructions and coordinates the processing activities that must take place. The design of the CPU affects the processing power and the speed of the computer, as well as the amount of main memory it can use effectively. With a well-designed CPU in your computer, you can perform

highly sophisticated tasks in a very short time.

**Memory** is the system of component of the computer in which information is stored. There are two types of computer memory: RAM and ROM.

**RAM** (random access memory) is the volatile computer memory, used for creating loading, and running programs and for manipulating and temporarily storing data;

**ROM** (read only memory) is nonvolatile, non-modifiable computer memory, used to hold programmed instructions to the system.

The more memory you have in your computer, the more operations you can perform.

### **Storage hardware**

The purpose of storage hardware is to store computer instructions and data in a form that is relatively permanent and retrieve when needed for processing. Storage hardware serves the same basic functions as do office filing systems except that it stores data as electromagnetic signals. The most common ways of storing data are Hard disk, floppy disk and CD-ROM.

**Hard disk** is a rigid disk coated with magnetic material, for storing programs and relatively large amounts of data.

Floppy disk (diskette) - thin, usually flexible plastic disk coated with magnetic material, for storing computer data and programs. There are two formats for floppy disks: 5.25" and 3.5". 5.25" is not used in modern computer systems because of its relatively large size flexibility and small capacity. 3.5" disks are formatted 1.4 megabytes and are widely used.

**CD-ROM** (compact disc read only memory) is a compact disc on which a large amount of digitized read-only data can be stored. CD-ROMs are very popular now because of the growing speed which CD-ROM drives can provide nowadays. **Output hardware**

The purpose of output hardware is to provide the user with the means to view information produced by the computer system. Information is output in either **hardcopy or softcopy** form. Hardcopy output can be held in your hand, such as paper with text (word or numbers) or graphics printed on it. Softcopy output is displayed on a monitor.

**Monitor** is a component with a display screen for viewing computer data, television programs, etc.

**Printer** is a computer output device that produces a paper copy of data or graphics.

**Modem** is an example of **communication hardware** — an electronic device that makes possible the transmission of data to or from computer via telephone or other communication lines.

Hardware comes in many configurations, depending on what the computer system is designed to do. Hardware can fill several floors of a large office building or can fit on your lap.

## VOCABULARY

amount – миқдор - количество	(постоянное запоминающее устройство)
capacity - сифим - вместительность	sensitive– сезувчан - чувствительный
hard disk – қаттиқ диск- жесткий диск, «винчестер»	sophisticated – мураккаб - сложный
lap - тиззалари - колени	storage hardware — маълумотларни сақловчи ускуна - устройства хранения данных
modem– модем - модем	temporarily – вақтинча - временно
mouse - объектларни экранда жойлаштириш ускунаси –сичқон - устройство для перемещения объектов на экране, «мышь»	temporary – вақтинчалик - временный
output hardware– маълумотни акс эттирувчи чиқарув ускунаси - выходные устройства отображения информации	the purpose - мақсад - цель
processing hardware - маълумотларни қайта ишлаш ускунаси - устройства обработки данных	tier - ярус -ярус
RAM–ОЭУ(Оператив эслаб қолувчи ускуна) — ОЗУ (оперативное запоминающее устройство)	to convert – айлантормоқ - преобразовывать
ROM —ДЭУ - Доимий эслаб қолувчи ускуна - ПЗУ	to direct – бошқармоқ -управлять
	to execute – бажармоқ - выполнять
	to interpret – таржима қилмоқ - переводить
	to provide – таъминламоқ - обеспечивать
	to reach – эришмоқ -достигать
	to retrieve – чиқариб олмоқ - извлекать

to roll - айлантормок, қайта  
думалатмок - катать,  
перекатывать

volatile– учар, турғун эмас -  
летучий, нестойкий

### **1.General understanding:**

1. What is the Webster's dictionary definition of the hardware?
2. What groups of hardware could be defined?
3. What is input hardware? What are the examples of input hardware?
4. What is mouse designed for? What is a light pen?
5. What is processing hardware? What are the basic types of memory used in a PC?
6. Can a PC-user change the ROM? Who records the information in ROM?
7. What is storage hardware? What is CD-ROM used for? Can a user record his or her data on a CD? What kind of storage hardware can contain more information: CD-ROM, RAM or ROM?
8. What is modem used for? Can PC-user communicate with other people without a modem?

### **2.Which of the listed below statements are true/false. Specify your answer using the text.**

- 1) Computer is an electronic device therefore hardware is a system of electronic devices.
- 2) The purpose of the input hardware is to collect data and convert it into a form suitable for computer processing.
- 3) Scanner is used to input graphics only.
- 4) The purpose of processing hardware is to retrieve, interpret and direct the execution of software instructions provided to the computer.
- 5) CPU reads and interprets software and prints the results on paper.
- 6) User is unable to change the contents of ROM.
- 7) 5.25" floppy disks are used more often because they are flexible and have more capacity than 3.5" disks.
- 5) Printer is a processing hardware because its purpose is to show the information produced by the system.



6) Modem is an electronic device that makes possible the transmission of data from one computer to another via telephone or other communication lines.

7) The purpose of storage hardware is to store computer instructions and data in a form that is relatively permanent and retrieve them when needed for processing.

### **3. Give definitions to the following using the vocabulary**

- |                |                |                |
|----------------|----------------|----------------|
| 1) CPU         | 5) Printer     | 9) Keyboard    |
| 2) ROM         | 6) Modem       | 10) Sound-card |
| 3) Floppy-disk | 7) Motherboard |                |
| 4) CD-ROM      | 8) Hard disk   |                |

### **4. Match the following:**

- 1) процессор
- 2) клавиатура
- 3) сичқон (мышь)
- 4) дискета
- 5) «винчестер»
- 6) модем
- 7) экран
- 8) ДЭУ (ПЗУ)
- 9) ОЭУ (ОЗУ)

- a) nonvolatile, non-modifiable computer memory, used to hold programmed instructions to the system.
- b) the part of a television or computer on which a picture is formed or information is displayed.
- c) rigid disk coated with magnetic material, for storing computer programs and relatively large amounts of data.
- d) an electronic device that makes possible the transmission of data to or from computer via telephone or other communication lines.
- e) a set of keys, usually arranged in tiers, for operating a typewriter, typesetting machine, computer terminal, or the like.
- f) volatile computer memory, used for creating, loading, and running programs and for manipulating and temporarily storing data; main memory.
- g) central processing unit: the key component of a computer system, containing the circuitry necessary to interpret and execute program instructions.
- h) a palm-sized device equipped with one or more buttons, used to point at and select items on a computer display screen and for controlling the cursor by means of analogous movement on a nearby surface.
- i) a thin, usually flexible plastic disk coated with magnetic material, for storing computer data and program.

## UNIT VI. TYPES OF SOFTWARE

A computer to complete a job requires more than just the actual equipment or hardware we see and touch. It requires Software — programs for directing the operation of a computer or electronic data.

Software is the final computer system component. These computer programs instruct the hardware how to conduct processing. The computer is merely a general-purpose machine which requires specific software to perform a given task. Computers can input, calculate, compare, and output data as information. Software determines the order in which these operations are performed.

Programs usually fall in one of two categories: system **software and applications software**.

**System software** controls standard internal computer activities. An operating system, for example, is a collection of system programs that aid in the operation of a computer regardless of the application software being used. When a computer is first turned on, one of the systems programs is booted or loaded into the computer's memory. This software contains information about memory capacity, the model of the processor, the disk drives to be used, and more. Once the system software is loaded, the applications software can be brought in.

System programs are designed for the specific pieces of hardware. These programs are called *drivers* and coordinate peripheral hardware and computer activities. User needs to install a specific driver in order to activate a peripheral device. For example, if you intend to buy a printer or a scanner you need to worry in advance about the driver program which, though, commonly goes along with your device. By installing the driver you «teach» your mainboard to «understand» the newly attached part.

Applications software satisfies your specific need. The developers of application software rely mostly on marketing research strategies trying to do their best to attract more users (buyers) to their software. As the productivity of the hardware has increased greatly in recent years, the programmers nowadays tend to include as much as possible in one program to make software interface look more attractive to the user.

These class of programs is the most numerous and perspective from the marketing point of view.

Data communication within and between computers systems is handled by system software. **Communications software** transfers data from one computer system to another. These programs usually provide users with data security and error checking along with physically transferring data between the two computer's memories. During the past five years the developing electronic network communication has stimulated more and more companies to produce various communication software, such as Web-Browsers for Internet.

### VOCABULARY:

aid – кўмак - помощь

to attach – қўшмоқ -присоединять

control– контрол, бошқарув - управление

developer – ишлов берувчи - разработчик

internal- ички - внутренний

mainboard – она плата - материнская плата

memory capacity– хотира сифими - вместимость памяти

peripheral – периферик - периферийный

regard – муносабат - отношение

regardless - ...га қарамай - несмотря на, безотносительно,

security– хавфсизлик - безопасность

specific – аниқ - конкретный, определенный

to boot – юкламоқ - загружать

to check – текширмоқ - проверять

to complete –бажармоқ, якунламоқ - совершать, завершать

to conduct- олиб бормоқ - проводить

to develop – ривожлантирмоқ - развивать

to handle – бошқармоқ - управлять,

to install – ўрнатмоқ - устанавливать, встраивать, инсталлировать

to require- талаб қилмоқ - требовать

to secure- хавфсизликни таъминламоқ - обеспечивать безопасность

to transfer – ўтказмоқ — переводить, переносить

Web-browser – “браузер” Интернет дунё электрон тармоғидан фойдаланувчи учун маълумотларни қидириш ва солиштиришга имконбеврувчи дастур - «браузер» (программа, позволяющая пользователю искать и считывать информацию с глобальной электронной сети Internet)

### **1.General understanding**

1. What is software?
2. In what two basic groups software (programs) could be divided?
3. What is system software for?
4. What is an operating system — a system software or application software?
5. What is a «driver»?
6. What is application software?
7. What is application software used for?
8. What is the tendency in application software market in the recent years?
9. What is the application of the communication software?

### **2.Which of the following is Software:**

1. Program
2. Mouse
3. CPU
4. Word processor
5. Modem
6. Web-browser
7. Operating system
8. Scanner
9. Printer

### **3.Which of the listed below statements are true/false. Specify your answer using the text:**

- 1) Computer programs only instruct hardware how to handle data storage.

- 2) System software controls internal computer activities.
- 3) System software is very dependable on the type of application software being used.
- 4) The information about memory capacity, the model of the processor and disk drives are unavailable for system software.
- 5) The driver is a special device usually used by car drivers for Floppy-disk driving.
- 6) It is very reasonable to ask for a driver when you buy a new piece of hardware.
- 7) Software developers tend to make their products very small and with poor interface to save computer resources.
- 8) Communication software is in great demand now because of the new advances in communication technologies.
- 9) Application software is merely a general-purpose instrument.
- 10) Web-browsers is the class of software for electronic communication through the network.

#### **4.Find English equivalents in the text:**

- 1) Дастурий таъминот операциялар бажарилиш тартибини белгилайди (Программное обеспечение определяет порядок выполнения операций).
- 2) Амалий дастурлар сиз қўйган аниқ масалани бажарадилар (сизнинг эҳтиёжингизни қондиради) (Прикладные программы выполняют поставленную вами конкретную задачу (удовлетворяют вашу потребность)).
- 3) Дастурларнинг бундай синфи – маркетинг нуқтаи назаридан энг кўп сонли ва келажаги порлоқ. (Этот класс программ — самый многочисленный и перспективный с точки зрения маркетинга).
- 4) Тизимли дастурлар компьютер тизимининг аниқ ускуналари учун мўлжалланган. (Системные программы предназначены для конкретных устройств компьютерной системы).
- 5) Компютер илк марта ёқилганда (ишга туширилганда) тизимли дастурлардан бири унинг хотирасига юкланган бўлиши керак. (Когда компьютер впервые включается, одна из системных программ должна быть загружена в его память).

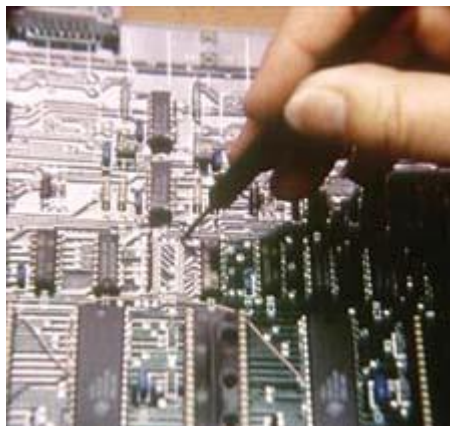
## CHAPTER II AUTOMATION OF MANUFACTURING PROCESSES

### UNIT VII. MANUFACTURING PROCESSES OF ELECTRONIC PRODUCTS

A wide variety of processes is used during the manufacture of electronic products. The choice of process will depend on the number of products being made and the materials being used. The production system used depends on how many identical products need to be produced. There are three types of production system: one-off ,batch, high volume.

**One-off production:** This is used to produce very small amounts of items or specialized electronic products. For example, using photo-etching to make a one-off printed circuit board (PCB) to test a design. Many of the processes (such as making the PCB or soldering the circuit) might be carried out by hand.

**Batch production:**



This is the most common type of production in the electronics industry. It involves making a set quantity of the same product, then switching over to make the next product. Manufacturing is normally divided into a number of separate stages during batch production. Each stage is carried out using different machines, which are often computer-controlled. The stages in a PCB batch-production process might be:

making the PCB, drilling the holes, populating the board with components

soldering the components in place, checking the board, and mounting it into the product.

### High-volume production



This is used to produce very large numbers of identical products, such as electronic circuits for cars, washing machines and fridges.

The manufacturing process is broken down into a number of steps that are carried out in sequence on a production line. Production is often done using computer-controlled machines. For example, these might load the PCBs into chemical etch tanks, or pick and place the components on the PCB.

Production lines tend to be very expensive to set up. Thousands of products have to be sold to cover the costs of the equipment.

When developing a product, the designer must consider not only the function of the product, but also broader environmental and social issues. Making products uses resources, including the materials used in the product and the energy needed to make it. Using these resources has an impact on the environment and society. The designer of electronic products should consider a number of factors in order to reduce environmental impact, including: the material used to make the product; the life of the product; disposal: what happens to the product at the end of its life?

## VOCABULARY

process(es) -- жараён(лар) – процесс(ы)



manufacture of electronic products— электрон маҳсулотлар ишлаб чиқариш —производства электронных продуктов

produce -- ишлаб чиқармоқ - производить

a choice — танлаш - выбор

depend on— ...га боғлиқ бўлмоқ – зависеть от

identical – айнан ўхшаш,бир хил - идентичный

need – эҳтиёж сезмоқ - нуждаться

one – off – бир марталик фойдаланишга ишлаб чиқарилган маҳсулотлар –товары одноразового пользования (одноразовый)

batch - бир вақтда ишлаб чиқариладиган маҳсулотлар,количество или партия товаров производящийся в одно время

high volume- оммавий ишлаб чиқариладиган маҳсулотлар,продукты массового производства

amount -- миқдор - количество

item(s) –алоҳида қисм(лар) – отдельные части, пункты

photo-etching — фотоцинкография - фотоцинкография

asset quantity of – тўплам сони –набор количества

printed circuit board (PCB)— босма плата, тех.- нашр таглиги - печатная плата

soldering the circuit—схема ёки занжирни кавшарламоқ – пайка схем или цепей

carry out—бажармоқ- выполнять

switching— бир ҳолатдан бошқа ҳолатга ўтиш,ўзгариш - переключение

computer-controlled— компьютер орқали бошқариладиган -  
компьютерное управление

drilling the holes—тешикларни пармалаш - сверления отверстий

populating— аҳолининг кўчиб келиши - заселение

mounting--- монтаж қилиш, йиғиш – монтаж, сборка

break (broken )down into — босқичларга бўлинмоқ - разбит на этапы

in sequence on— изчилликда, кетма-кетликда - в последовательности

chemical etch tanks –кимёвий заҳарланган резервуарлар – химическое травление резервуары

cover—қопламоқ, ўрнини тўлдирмоқ - покрывать

the costs of the equipment—жиҳозлар таннари –стоимость оборудования

### **1. Guess the meaning of the following international words:**

electronics, manufacture, product, system, to test, population, designer, factor, drill, chemical, identical.

### **2. Give the English equivalents for the following:**

фотоцинкография(фотоцинкография); алоҳида қисм(лар)  
(отдельные части, пункты); босма плата, тех.- нашр таглиги  
(печатная плата); бажармоқ (выполнять); изчилликда (в  
последовательности); қопламоқ (покрывать); асбоб-ускуналар  
таннари (стоимость оборудования); заҳарланган резервуарлар  
(травленные резервуары); парма билан тешмоқ (сверление  
отверстий)

### **3. Answer the questions below:**

1. Where is used a wide variety of processes?

2. What does the production system depend on?

3. How many types of production are there in the manufacturing of electronic products?

4.How is carried out each stage of manufacturing?

5.What PCB bath production processes are explained in the text?

## **UNIT VIII. AUTOMATION**

Automation is the system of manufacture performing certain tasks, previously done by people, by machines only. The sequences of operations are controlled automatically. The most familiar example of a highly automated system is an assembly plant for automobiles or other complex products.

The term automation is also used to describe non-manufacturing systems in which automatic devices can operate independently of human control. Such devices as automatic pilots, automatic telephone equipment and automated control systems are used to perform various operations much faster and better than could be done by people.

Automated manufacturing had several steps in its development. Mechanization was the first step necessary in the development of automation. The simplification of work made it possible to design and build machines that resembled the motions of the worker. These specialized machines were motorized and they had better production efficiency.

Industrial robots, originally designed only to perform simple tasks in environments dangerous to human workers, are now widely used to transfer, manipulate, and position both light and heavy work pieces performing all the functions of a transfer machine.

In the 1920s the automobile industry for the first time used an integrated system of production. This method of production was adopted by most car manufacturers and became known as Detroit automation.

The feedback principle is used in all automatic-control mechanisms when machines have ability to correct themselves. The feedback principle has been used for centuries. An outstanding early example is the flyball governor, invented in 1788 by James Watt to control the speed of the steam engine. The common household thermostat is another example of a feedback device.

Using feedback devices, machines can start, stop, speed up, slow down, count, inspect, test, compare, and measure. These operations are commonly applied to a wide variety of production operations.

Computers have greatly facilitated the use of feedback in

manufacturing processes. Computers gave rise to the development of numerically controlled machines. The motions of these machines are controlled by punched paper or magnetic tapes. In numerically controlled machining centers machine tools can perform several different machining operations.

More recently, the introduction of microprocessors and computers have made possible the development of computer-aided design and computer-aided manufacture (CAD and CAM) technologies. When using these systems, a designer draws a part and indicates its dimensions with the help of a mouse, light pen, or other input device. After the drawing has been completed the computer automatically gives the instructions that direct a machining center to machine the part.

Another development using automation are the flexible manufacturing systems (FMS). A computer in FMS can be used to monitor and control the operation of the whole factory.

Automation has also had an influence on the areas of the economy other than manufacturing. Small computers are used in systems called word processors, which are rapidly becoming a standard part of the modern office. They are used to edit texts, to type letters and so on.

#### Automation in Industry

Many industries are highly automated or use automation technology in some part of their operation. In communications and especially in the telephone industry dialing and transmission are all done automatically. Railways are also controlled by automatic signaling devices, which have sensors that detect carriages passing a particular point. In this way the movement and location of trains can be monitored.

Not all industries require the same degree of automation. Sales, agriculture, and some service industries are difficult to automate, though agriculture industry may become more mechanized, especially in the processing and packaging of foods.

The automation technology in manufacturing and assembly is widely used in car and other consumer product industries.

Nevertheless, each industry has its own concept of automation that answers its particular production needs.

## VOCABULARY

automation – автоматлаштириш -автоматизация  
previously– аввал (роқ) - ранее  
sequence – кетма-кетлик - последовательность  
assembly plant – йиғиш заводи - сборочный завод  
non-manufacturing – ишлаб чиқарилмайдиган -  
непроизводственный  
device – қурилма, ускуна - устройство, прибор  
resemble – ўхшамок- подходить  
efficiency – самарадорлик – эффективность  
fly ball governor - марказдан қочирма регулятор - центробежный  
регулятор  
steam engine – паровоз - паровоз  
household thermostat – маиший термостат - бытовой термостат  
facilitate – осонлаштирмак - способствовать  
punched - перфорацияланган- перфорированный  
aid – ёрдам- помощь  
dimension - ўлчаш,ўлчамлар измерение, размеры

### **1.General understanding:**

1. How is the term automation defined in the text?
2. What is the most «familiar example» of automation given in the text?
3. What was the first step in the development of automaton?
4. What were the first robots originally designed for?
5. What was the first industry to adopt the new integrated system of production?
6. What is feedback principle?
7. What do the abbreviations CAM and CAD stand for?
8. What is FMS?
9. What industries use automation technologies?

### **2.Find the English equivalents of the following words and word combinations in the text:**

- 1.автоматик қурилма (автоматические устройства)

2. автоматлаштирилган ишлаб чиқариш (автоматизированное производство)
3. оддий вазифаларни бажармоқ (выполнять простые задачи)
4. ишлаб чиқаришнинг интеграллашган тизими -интегрированная система производства
6. (орқага) қайтувчи, тескари алоқа тамойили - принцип обратной связи
7. механизм жуда тезлашиши ва тўхташи мумкин – механизм может разгоняться и тормозить
8. компьютер автоматик равишда буйруқлар юборади - компьютер автоматически посылает команды
9. юқори даражада автоматлаштирилган тизим - высокоавтоматизированная система
10. носаноат тизими - непроизводственная система

## **UNITIX. ROBOTS IN MANUFACTURING**

Today most robots are used in manufacturing operations. The applications of robots can be divided into three categories:

1. material handling
2. processing operations
3. assembly and inspection.

Material-handling is the transfer of material and loading and unloading of machines. Material-transfer applications require the robot to move materials or work parts from one to another. Many of these tasks are relatively simple: robots pick up parts from one conveyor and place them on another. Other transfer operations are more complex, such as placing parts in an arrangement that can be calculated by the robot. Machine loading and unloading operations utilize a robot to load and unload parts. This requires the robot to be equipped with a gripper that can grasp parts. Usually the gripper must be designed specifically for the particular part geometry.

In robotic processing operations, the robot manipulates a tool to perform a process on the work part. Examples of such applications include spot welding, continuous arc welding and spray painting. Spot welding of automobile bodies is one of the most common applications of industrial robots. The robot positions a spot welder against the automobile panels and frames to join them. Arc welding is a continuous process in which robot moves the welding rod along the welding seam. Spray painting is the manipulation of a spray-painting gun over the surface of the object to be coated. Other operations in this category include grinding and polishing in which a rotating spindle serves as the robot's tool.

The third application area of industrial robots is assembly and inspection. The use of robots in assembly is expected to increase because of the high cost of manual labour. But the design of the product is an important aspect of robotic assembly. Assembly methods that are satisfactory for humans are not always suitable for robots. Screws and nuts are widely used for fastening in manual assembly, but the same operations are extremely difficult for an one-armed robot.



Inspection is another area of factory operations in which the utilization of robots is growing. In a typical inspection job, the robot positions a sensor with respect to the work part and determines whether the part answers the quality specifications. In nearly all industrial robotic applications, the robot provides a substitute for human labour. There are certain characteristics of industrial jobs performed by humans that can be done by robots:

1. the operation is repetitive, involving the same basic work motions every cycle,
2. the operation is hazardous or uncomfortable for the human worker (for example: spray painting, spot welding, arc welding, and certain machine loading and unloading tasks),
3. the work piece or tool is too heavy and difficult to handle,
4. the operation allows the robot to be used on two or three shifts.

## VOCABULARY

handling-*бу ерда*. ишлов бериш –*здесь*. обработка

transfer-узатиш, ўтказиб қўйиш- передача, перенос

location – жойлашув(и) - местонахождение

pickup – олмоқ- брать, подбирать

to utilize – фойдали сурадда ишлатмоқ, фойдаланишга яроқли деб топмоқ - утилизировать, находить

gripper-эгаллаш — захват

to grasp – ушламоқ- схватывать

spot welding -нуқтали пайвандлаш - точечная сварка

continuous – узлуксиз- непрерывный

arc welding – электр ёйи билан пайвандлаш - электродуговая сварка

spray painting - пуркаб бўяш — окраска распылением

frame – ром - рама

grinding – силлиқлаш - шлифование

polishing –полировкалаш; ойнадайсайқаллаш - полирование

spindle –қўл шпиндели, дуки - шпиндель ручной

labour – меҳнат - труд

hazardous – хавфли - опасный

loading and unloading – ортиш –тушириш – погрузочно-разгрузочный

### **1.General understanding:**

1. How are robots used in manufacturing?
2. What is «material handling»?
3. What does a robot need to be equipped with to do loading and unloading operations?
4. What does robot manipulate in robotic processing operation?
5. What is the most common application of robots in automobile manufacturing?
6. What operations could be done by robot in car manufacturing industry?
7. What are the main reasons to use robots in production?
8. How can robots inspect the quality of production?
9. What operations could be done by robots in hazardous or uncomfortable for the human workers conditions?

### **2.Give the English equivalents:**

Роботлардан фойдаланиш (использование роботов), йиғиш (сборка), ашёларни кўчириш (перенос вещества), материалларнинг ўрнини алмаштириш (размещение материалов), деталларни бир конвейердан олиб бошқасига жойламоқ (забирать детали с одного конвейера и поместить их на другой), курилмага қисмларини ўрнатиш (размещение частей в устройстве), деталларни юклаш ва тушириш (загрузка и выгрузка деталей), деталларни ушлаб олмоқ (захватить детали), автомобил кузовларини нуктали пайвандлаш (точечная сварка кузовов автомобилей), узлуксиз жараён (непрерывный процесс), чангитиш (напыление), кўл меҳнати (ручной труд, инсон меҳнати ўрнини босиш (замена человеческого труда)).

## **UNIT X. NUMERICAL CONTROL**

Numerical control (NC) is a method of controlling the movements of machine components by directly inserting coded instructions in the form of numerical data (numbers and letters) into the system. The system automatically interprets these data and converts it to output signals. These signals, in turn, control various machine components, such as turning spindles on and off, changing tools, moving the work piece or the tools along specific paths, and turning cutting fluids on and off.

In numerical control, data concerning all aspects of the machining operation, such as locations, speeds, feeds, and cutting fluid, are stored on magnetic tape, cassette, floppy or hard disks, or paper or plastic tape. Data are stored on punched 25-mm (1-in.) wide paper or plastic tape, as originally developed and still used. The concept of NC control is that holes in the tape represent specific information in the form of alphanumeric codes. The presence (on) or absence (off) of these holes is read by sensing devices in the control panel, which then actuate relays and other devices (called hard-wired controls). These devices control various mechanical and electrical systems in the machine. This method eliminates manual setting of machine positions and tool paths or the use of templates and other mechanical guides and devices. Complex operations, such as turning a part having various contours and die sinking in a milling machine, can be carried out.

Numerical control has the following advantages over conventional methods of machine control:

- Flexibility of operation and ability to produce complex shapes with good dimensional accuracy, repeatability, reduced scrap loss, and high production rates, productivity, and product quality.
- Tooling costs are reduced, since templates and other fixtures are not required.
- Machine adjustments are easy to make with minicomputers and digital readouts.
- More operations can be performed with each setup, and less lead

time for setup and machining is required compared to conventional methods.

- Programs can be prepared rapidly and can be recalled at any time utilizing microprocessors.
- Less paperwork is involved.
- Faster prototype production is possible.
- Required operator skill is less, and the operator has more time to attend to other tasks in the work area.

In the next step in the development of numerical control, the control hardware mounted on the NC machine was converted to local computer control with software. Two types of computerized systems were developed: direct numerical control and computer numerical control.

A more recent definition of DNC includes the use of a central computer serving as the control system over a number of individual computer numerical control machines with onboard minicomputers. This system provides large memory and computational capabilities, thus offering flexibility, while overcoming the previous disadvantage of DNC.

Computer numerical control (CNC) is a system in which a minicomputer or microprocessor is an integral part of the control panel of a machine or equipment (onboard computer). The part program may be prepared at a remote site by the programmer. However, the machine operator can now easily and manually program onboard computers. The operator can modify the programs directly, prepare programs for different parts, and store the programs. Because of the availability of small computers with large memory, microprocessors, and program editing capabilities, CNC systems are widely used today. We cannot overstate the importance of the availability of low-cost, programmable controllers in the successful implementation of CNC in manufacturing plants.

## **VOCABULARY**

insert coded instructions – кодлаштирилган кўрсатмалар қўйиш -  
вставить закодированные инструкции

interpret – интерпретация қилмоқ(шарҳламоқ) - интерпретировать -

convert to output signals- чиқиш сигналларига айлантириш -  
преобразовывать в выходные сигналы

in turn- ўз навбатида - в очереди

turn spindles on and off- ёқиш ва ўчириш шпинделларини  
айлантирмоқ – поворачивать шпиндели включения и выключения

changing tools–инструментларни алмаштириш - смена инструментов

turn cutting fluids on and off - мойловчи –совутувчи суюқликларни  
қўшиш-узиш - включать и выключать смазочно-охлаждающих  
жидкостей

holes in the tape- лентадаги тешиklar - отверстия в ленте

flexibility of operation –ишнинг мослашуви –гибкость работы

produce complex shapes with good dimensional accuracy – мураккаб  
шаклларни аниқўлчамда ишлаб чиқариш - производить сложные  
формы с размерной точностью

high production rates - ишлаб чиқаришнинг юқори суръати – высокие  
темпы производства

tooling costs–инструментлар харажати - инструментальные затраты

digital read outs - рақамли индексациялар - цифровые индексации

direct numerical control– бевосита рақамли бошқарув - прямое  
цифровое управление

computational capabilities– ҳисоблаш имкониятлари - вычислительные  
возможности

overcome the previous disadvantages–аввалги камчиликларни бартараф  
этноқ – преодолевать предыдущие недостатки

overstate the importance - аҳамиятини оширмоқ - преувеличить  
важность

programmable controllers–дастурланадиган контроллерлар -  
программируемые контроллеры

successful implementation - муваффақиятли амалга ошириш(тадбиқ  
этиш) -успешное осуществление

**1. Answer the questions below using the information given in the text:**

1. What is numerical control and how does it work?
2. Where are stored data in numerical control?
3. What is the main concept of NC?
4. What advantages does NC have over conventional methods of machine control?
5. What do the letters DNC and CNC stand for?
6. Why are CNC systems widely used today ?

**2. Find out the Uzbek or Russian equivalents of these words and word combination from the text:** a more recent definition; an integral part of the control panel; can be prepared rapidly; utilizing microprocessors; faster prototype production; costs are reduced; machine adjustments; magnetic tape; floppy or hard disks; automatically interprets; computer numerical control; modify the programs; setup; repeatability

**3. Find out the English equivalents of these words and word combination from the text:** кодларнинг ҳарfli-рақамли шакли - форма буквенно-цифровых кодов; сезувчан қурилмалар - чувствительные устройства; бошқарув панели - панель управления; ҳаракатга келтириш релеси - реле приведения в действие hard-wired controls- бошқарувнинг симли воситалари - проводные средства управления; инструмен(асбоб)нинг траекторияси - траектории инструмента; шаблонлар— шаблонь; механик кўрсатмалар ва қурилмалар - механические инструкции и устройства; мураккаб операциялар - сложные операции; машинани бошқаришнинг анъанавий методлари билан солиштирилганда - по сравнению с традиционными методами управления машиной.

**4. Join the beginnings and ends:**

1. Numerical control (NC) is...  
... are stored on magnetic tape, cassette floppy or hard disks, or paper or

plastic tape.

2. The presence (on) or absence (off) of these holes is...

... a method of controlling the movements of machine components

3. The system automatically interprets these data and...

...and tool paths or the use of templates and other mechanical guides and devices.

4. Data concerning all aspects of the machining operation...

...read by sensing devices in the control panel.

5. This method eliminates manual setting of machine positions and...

... .. converts it to output signals electrical systems in the machine.

## **UNIT XI. HISTORY OF MEASUREMENT**

Metrology has existed in some form or another since antiquity. The earliest forms of metrology were simply arbitrary standards set up by regional or local authorities, often based on practical measures such as the length of an arm. The earliest examples of these standardized measures are length, time, and weight. These standards were established in order to facilitate commerce and record human activity.

Little progress was made with regard to proto-metrology until various scientists, chemists, and physicians started making headway during the Scientific Revolution. With the advances in the sciences, the comparison of experiment to theory required a rational system of units, and something more closely resembling modern metrology began to come into being. The discovery of atoms, electricity, thermodynamics, and other fundamental scientific principles could be applied to standards of measurement, and many inventions made it easier to quantitatively or qualitatively assess physical properties, using the defined units of measurement established by science.

Metrology was thus one of the precursors to the Industrial Revolution, and was necessary for the implementation of mass production, equipment commonality, and assembly lines.

Modern metrology has its roots in the French Revolution, with the political motivation to harmonize units all over France and the concept of establishing units of measurement based on constants of nature, and thus making measurement units available "for all people, for all time". In this case deriving a unit of length from the dimensions of the Earth, and a unit of mass from a cube of water. The result was two platinum standards for the meter and the kilogram established as the basis of the metric system on June 22, 1799. This further led to the creation of the *Système International d'Unités*, or the International System of Units. This system has gained unprecedented worldwide acceptance as definitions and standards of modern measurement units. Though not the official system of units of all nations, the definitions and specifications of SI are globally accepted and recognized. The SI is maintained under the auspices of the Meter



Convention and its institutions, the General Conference on Weights and Measures, or CGPM, its executive branch the International Committee for Weights and Measures, or CIPM, and its technical institution the International Bureau of Weights and Measures, or BIPM.

As the authorities on SI, these organizations establish and promulgate the SI, with the ambition to be able to service all. This includes introducing new units, such as the relatively new unit, the mole, to encompass metrology in chemistry. These units are then established and maintained through various agencies in each country, and establish a hierarchy of measurement standards that can be traced back to the established standard unit, a concept known as metrological traceability. The U.S. agencies holding this responsibility is known as the National Institute of Standards and Technology, or NIST; and the American National Standards Institute (ANSI).

### VOCABULARY

since antiquity – қадим замонлардан буён – с древних времен

arbitrary standards - эркин стандартлар - произвольные стандарты

authority – ҳукумат - власть

based on - асосида - на основе

establish- ўрнатмоқ - установить

facilitate commerce- тижоратни осонлаштириш - упрощении торговли

record human activity - инсон фаолиятини қайд этиш - запись человеческой деятельности.

With regard to - ...га нисбатан - в отношении к

proto-metrology - прото-метрология – прото-метрология

make headway – муваффақиятга эришмоқ - преуспевать

a rational system of units – бирликларнинг рационал тизими  
- рациональная система единиц

resemble–ўхшамоқ - походить

thermodynamics– термодинамика - термодинамика

to quantitatively or qualitatively – миқдорий ёки сифат учун - для количественного или качественного

assess – баҳоламоқ - оценить

physical properties - физик хусусиятлар - физические свойства  
precursors - аввалгилар (салафлар) – предшественники  
implementation of mass production – оммавий ишлаб чиқаришни  
тадбиқ этиш - внедрение массового производства  
assembly lines–йиғма линиялар - сборочные линии.  
constants of nature - табиат константалари - константы природы  
dimensions– ўлчамлар -размеры  
gain - эгалламоқ - приобрести  
unprecedented worldwide acceptance – беқиёс дунёвий эътироф -  
беспрецедентное всемирное признание  
maintain – қўллаб-қувватламоқ - поддерживать  
auspice – ҳомийлик - покровительство  
promulgate –оммага эълон қилмоқ - промульгировать  
encompass - қамраб олмақ - охватывать  
a hierarchy of measurement standards–эталонлар иерархияси - иерархия  
эталонов  
metrological traceability – метрологик кузатилиш -метрологическая  
прослеживаемость.

**1. Find out the English equivalents of these words and word combination from the text:**

У ёки бу шаклда (в той или иной форме); содда ихтиёрий стандартлар (просто произвольные стандарты); регионал ёки маҳаллий ҳукумат органлари (региональные или местные органы власти); практик ўлчамлар асосида ( на основе практических мер); илмий революция (научная революция); илм соҳасидаги ютуқлар билан бирга (с достижениями в области науки); тажрибани назария билан таққослаш ( сравнение эксперимента с теорией); атомларнинг кашф қилиниш (открытие атомов); бирликларни бутун Франция бўйлаб мувофиқлаштириш учун (для согласования единиц по всей Франции); Метрик Конвенция томонидан қўллаб қувватланади (поддерживается под эгидой Метрической конвенции).

**2. Match the left part with the right:**

1. the earliest forms of metrology were	a) the dimensions of the Earth.
2. a unit of length was deriving from	b) a cube of water.
3. a unit of mass was deriving from	c) the auspices of the Meter Convention and its institutions.
4. the SI is maintained under	d) simply arbitrary standards such as the length of an arm.

**3. Complete the sentences with the suggested words: measurement, fundamental, defined, easier**

The discovery of atoms, electricity, thermodynamics, and other \_\_\_\_\_ scientific principles could be applied to standards of \_\_\_\_\_, and many inventions made it \_\_\_\_\_ to quantitatively or qualitatively assess physical properties, using the \_\_\_\_\_ units of measurement established by science.

## UNIT XII.MEASUREMENTS

**Metric System** is a decimal system of physical units, named after its unit of length, the metre, the metric system is adopted as the common system of weights and measures by the majority of countries, and by all countries as the system used in scientific work.

### *Weights and Measures*

Length, capacity, and weight can be measured using standard units. The principal early standards of length were the palm or hand breadth, the foot, and the cubit, which is the length from the elbow to the tip of the middle finger. Such standards were not accurate and definite. Unchanging standards of measurement have been adopted only in modern time.

In the English-speaking world, the everyday units of linear measurement were traditionally the inch, foot, yard and mile. In Great Britain, until recently, these units of length were defined in terms of the imperial standard yard, which was the distance between two lines on a bronze bar made in 1845.

In Britain units of weight (ounces, pounds, and tons) are now also derived from the metric standard — kilogram. This is a solid cylinder of platinum-iridium alloy maintained at constant temperature at Sevres, near Paris. Copies, as exact as possible, of this standard are maintained by national standards laboratories in many countries.

**International System of Units** is a system of measurement units based on the MKS (meter-kilogram-second) system. This international system is commonly referred to as SI.

At the Eleventh General Conference on Weights and Measures, held in Paris in 1960 standards were defined for six base units and two supplementary units:

### *Length*

The metre had its origin in the metric system. By international agreement, the standard metre had been defined as the distance between two fine lines on a bar of platinum-iridium alloy. The 1960 conference redefined the metre as 1,650,763.73 wavelengths of the reddish-orange light emitted

by the isotope krypton-86. The metre was again redefined in 1983 as the length of the path travelled by light in a vacuum during a time interval of  $1/299,792,458$  of a second.

### *Mass*

When the metric system was created, the kilogram was defined as the mass of 1 cubic decimetre of pure water at the temperature of its maximum density or at 4.0 °C.

### *Time*

For centuries, time has been universally measured in terms of the rotation of the earth. The second, the basic unit of time, was defined as  $1/86,400$  of a mean solar day or one complete rotation of the earth on its axis in relation to the sun. Scientists discovered, however, that the rotation of the earth was not constant enough to serve as the basis of the time standard. As a result, the second was redefined in 1967 in terms of the resonant frequency of the caesium atom, that is, the frequency at which this atom absorbs energy: 9,192,631,770 Hz (hertz, or cycles per second).

### *Temperature*

The temperature scale is based on a fixed temperature, that of the triple point of water at which it's solid, liquid and gaseous. The freezing point of water was designated as 273.15K, equaling exactly 0° on the Celsius temperature scale. The Celsius scale, which is identical to the centigrade scale, is named after the 18th-century Swedish astronomer Anders Celsius, who first proposed the use of a scale in which the interval between the freezing and boiling points of water is divided into 100 degrees. By international agreement, the term Celsius has officially replaced centigrade.

One feature of SI is that some units are too large for ordinary use and others too small. To compensate, the prefixes developed for the metric system have been borrowed and expanded. These prefixes are used with all three types of units: base, supplementary, and derived. Examples are *millimetre* (mm), *kilometre/hour* (km/h), *megawatt* (MW), and *picofarad* (pF). Because double prefixes are not used, and because the base unit name *kilogram* already contains a prefix, prefixes are used not with *kilogram* but with *gram*. The prefixes *hecto*, *deka*, *deci*, and *centi* are used only rarely,

and then usually with *metre* to express areas and volumes. In accordance with established usage, the centimetre is retained for body measurements and clothing.

In cases where their usage is already well established, certain other units are allowed for a limited time, subject to future review. These include the nautical mile, knot, angstrom, standard atmosphere, hectare, and bar.

## VOCABULARY

a decimal system – ўнлик система - десятичная система

adopted as - ...сифатида қабул қилинган - принят в качестве

capacity – сифим - емкость

linear measurement – линиялик ўлчов - линейное измерение

a solid cylinder – каттик цилиндр - твердый цилиндр

commonly referred to – одатда ..деб номлашади - обычно называют

redefine – қайта аниқламоқ - переопределить

density – зичлик - плотность

complete rotation of the earth – Ернинг тўлиқ айланиб чиқиши – полное вращение Земли

a fixed temperature – ўрнатилган температура – фиксированная температура

designate – тайинламоқ – назначать

the centigrade scale – Цельсий шкаласи - шкала Цельсия

first proposed – биринчи бор

таклиф қилинган – впервые предложен

expand – кенгайтирмоқ - расширять

in accordance with - ...га мос равишда - в соответствии с

### 1. General understanding

1. What is a MS?

2. What were the principal early standards of length?

3. Where are units of weight derived from the metric standard — kilogram in Britain nowadays?

4. How has time been universally measured for centuries?

5. What did scientists discovered on the basis of the time standard?
6. What kind of information is given about the Celsius scale according to the text?
7. What is International System of Units?

**2. Find out the Uzbek or Russian equivalents of these words and word combination from the text:** named after ; by the majority of countries; can be measured using standard units; the palm or hand breadth; the length from the elbow to the tip of the middle finger; until recently; in terms of the imperial standard yard; a solid cylinder of platinum-iridium alloy; as exact as possible; held in ; by international agreement ; wavelengths of the reddish-orange light emitted by the isotope krypton-86; the path travelled by light in a vacuum ; rotation of the earth on its axis in relation to the sun ; in terms of the resonant frequency of the cesium atom; the triple point of water at which it's solid, liquid and gaseous; the interval between the freezing and boiling points; to compensate .

**3. Join beginnings and ends according to the text:**

1. Length, capacity, and weight                      were traditionally the inch, foot, yard and mile.
2. These units of length                                      were not accurate and definite.
3. This international system was again redefined in 1983 as the length of the path travelled by light in a vacuum during a time interval of  $1/299,792,458$  of a second.
4. The freezing point of water                              was defined as  $1/86,400$  of a mean solar day or one complete rotation of the earth on its axis in relation to the sun
5. The everyday units of linear measurement can be measured using standard units
6. Such standards    were defined in terms of the imperial standard yard, which was the distance between two lines on a bronze bar made in 1845.
7. The metre    is commonly referred to as SI.

8. The second, the basic unit of time was designated as 273.15K, equaling exactly 0° on the Celsius temperature scale.



## CHAPTER III. ELECTRONIC COMPONENTS AND MATERIALS

### UNIT XIII. ELECTRONICS

Electronics is a general term for the production and processing of electric signals (consisting of moving electrons, hence the name electronics) that convey information – for example, the sound reproduction by a radio or record player and the data output of a computer. Electronics also includes the production and processing of beams of electrons, used in such devices as cathode-ray oscilloscopes, television sets, and electron microscopes.

Electric signals. Electric signals are produced by devices that convert the primary information source (which is in the form of another type of energy – sound or light, for instance) into small electric currents. For example, a microphone converts sound into an electric current, and in input unit of a computer converts data. These currents, which constitute a signal, are then transmitted along wires or, after conversion to radio waves, via radio links. On reaching a suitable receiver, they may be electronically manipulated – to reduce distortion in the signal, for instance – and are then amplified so that they can drive an output device, such as a loudspeaker, television set, or computer printer.

There are two types of electric signal: analog and digital. Analog signals vary continuously in voltage or current, corresponding to variations in the primary information source; thus the electric signals produced by a microphone are electrical “copies” of the original sound waves. Digital signals are not continuous but consist of numerous bursts of electric current between two voltage levels (one of which may be zero).

A computer uses digital signals. They consist of binary codes that represent the numbers, letters, and symbols in the input data and in the various program instructions. In the computer’s central processor, the data codes are subjected to processes of binary arithmetic or are compared with each other to obtain the results required by the program.

In modern electronics, electric signals may be processed in two main ways – by passing them through semiconductor devices (such as transistors) or by converting them into a beam of electrons, as in the formation of a picture by a television set (which also uses semiconductors).

Semiconductors. Semiconductors are substances (such as silicon and germanium) whose electrical resistance lies between that of conductors and insulators. They have this intermediate resistance because they have a few free electrons that can drift from atom to atom – unlike conductors, which have many free electrons, and unlike insulators, which have none.

The semiconductors used in electronic devices are “doped” to change their electrical properties. Doping involves introducing minute traces of other elements into the semiconductor’s crystal lattice. Silicon and germanium each have four outer electrons per atom; doping them with an element with five outer electrons, such as phosphorus, frees the fifth electron so that the semiconductor has an electron excess. It is then known as an *n*-type (negative-type), because electrons have a negative charge.

Doping with an element that has only three outer electrons, such as boron, produces a crystal lattice with spaces, known as holes, which free electrons readily fill. This type of semiconductor has a lack of free electrons, which is equivalent to an excess of positive charges, and it is therefore known as *p*-type.

If a piece of *n*-type semiconductor is joined to a piece of *p*-type, the resulting device is called a *p/n* junction diode. If the diode is then connected to a battery so that the negative terminal is joined to the *n*-type semiconductor and the positive terminal to the *p*-type, current flows through the junction.

Transistors. Transistors are arrangements of semiconductor diodes that act as amplifiers. There are two main types: junction and field-effect transistors.

### 1. Find the sentences that can't be found in the text.

The subject of electronics should, in its broadest sense, embrace all phenomena that are associated with the electron, the fundamental unit of negative electricity.

1. Electronics also includes the production and processing of beams of electrons, used in such devices as cathode-ray oscilloscopes, television sets, and electron microscopes.
2. There are two types of electric signal: analog and digital.
3. Semiconductors are substances (such as silicon and germanium) whose electrical resistance lies between that of conductors and insulators.
4. Semiconductors are materials which lie between conductors and insulators.
5. If a piece of *n*-type semiconductor is joined to a piece of *p*-type, the resulting device is called a *p/n* junction diode.
6. Transistors are arrangements of semiconductor diodes that act as amplifiers.

### 2. Find English equivalents in the text.

Ҳаракатланувчи электронлар (движущиеся электроны); электрон (катодли) осциллограф (электронный (катодный) осциллограф)); бузилишни камайтириш (уменьшать искажение); талаб қилинадиган натижалар (требуемые результаты); оралик қаршилиги (промежуточное сопротивление); кристалл панжара (кристаллическая решетка); ташқи электрон (внешний электрон); электронларнинг ортиқчалиги (избыток электронов); эркин электронлар етишмаслиги (недостаток свободных электронов).

### 3. Find Uzbek or Russian equivalents to the following expression in the text.

1. the production and processing of electric signals

\_\_\_\_\_

2. convey information

\_\_\_\_\_

3. beams of electrons

\_\_\_\_\_

4. the primary information source

\_\_\_\_\_

5. small electric currents

\_\_\_\_\_

6. are transmitted a long wires

\_\_\_\_\_

7. via radio links

\_\_\_\_\_

8. a suitable receiver

\_\_\_\_\_

9. may be electronically manipulated

\_\_\_\_\_

10. numerous bursts of electric current

\_\_\_\_\_

11. binary codes

\_\_\_\_\_

12. minute traces

\_\_\_\_\_

13. act as amplifiers

\_\_\_\_\_

**4. Fill in the missing words.**

1. Electronics is a general term for the \_\_\_\_\_ and \_\_\_\_\_ of electric signals that convey information.

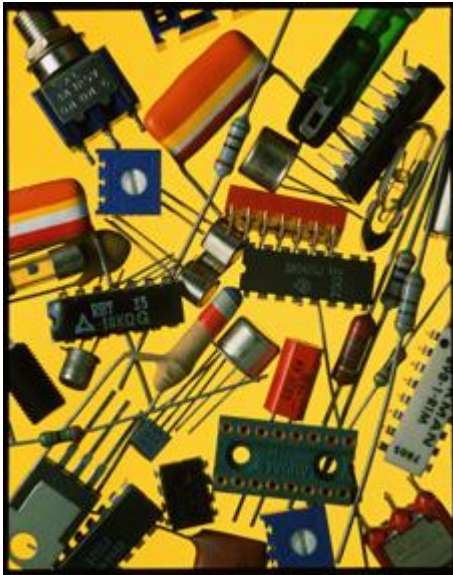
2. Electric signals are produced by devices that the primary information \_\_\_\_\_ into small electric \_\_\_\_\_.

3. Digital signals consist of \_\_\_\_\_ codes that represent the numbers, letters, and symbols in the input data and in the various program instructions.
4. In modern electronics, electric signals may be processed in two main ways: by passing them through \_\_\_\_\_ \_\_\_\_\_ or by converting them into a \_\_\_\_\_ of \_\_\_\_\_.
5. Semiconductors are substances whose electrical resistance lies between that of \_\_\_\_\_ and \_\_\_\_\_.
6. Doping involves introducing minute traces of other elements into the semiconductor's \_\_\_\_\_ \_\_\_\_\_.
7. Transistors are arrangements of semiconductor diodes that act as \_\_\_\_\_.

## UNIT XIV.INTEGRATED CIRCUITS

There are many different types of electrical and electronic components, including resistors, capacitors and diodes. Each of these has a specific use in a circuit. Electronic components can be divided into two groups: discrete electronic components and integrated circuits (ICs).

### Discrete electronic components



Discrete (meaning separate) electronic components can be selected individually and put together to make a circuit. Examples of discrete components include resistors, capacitors, diodes and transistors.

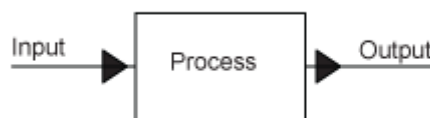
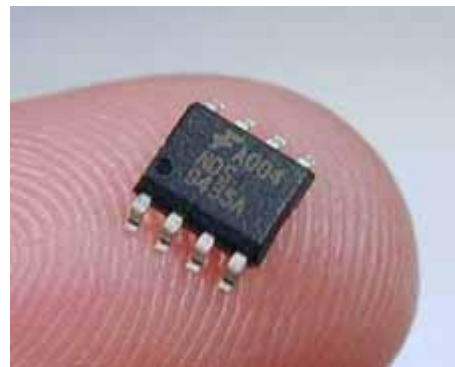
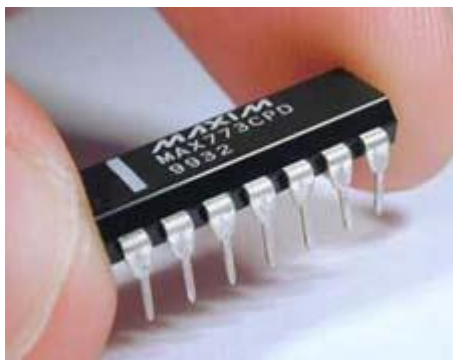
Discrete components can also be used as components in circuits that include an integrated circuit. For example, a 555 a stable integrated circuit requires two discrete resistors and a discrete capacitor to make it work.

Integrated circuits are the basic component of modern microelectronics. They are important process blocks in electronic systems. There is a wide range of integrated circuits available, including timer circuits, operational amplifiers and counter circuits.

Advantages of integrated circuits: Integrated circuits (ICs) are self-contained circuits with many separate components such as transistors, diodes, resistors and capacitors etched into a tiny silicon chip. Advantages ICs have over conventional circuits with discrete components. ICs take up

very little space, allowing products to be made much smaller. ICs normally cost much less to make than the individual components needed to do the same function. Dual-in-line configuration (DIL). The chip inside an IC is usually packaged inside a piece of black plastic with tiny pins protruding to allow connections to the circuit. In ICs the pins are arranged in a dual-in-line (DIL) configuration.

The DIL-configuration IC can be used with an IC socket. This prevents damage to the IC caused by heat when manual soldering. It also allows the IC to be changed if necessary, for example during a repair. ICs can also be configured as a surface-mount chip with either 8, 14 or 16 pins. The surface mount chip is much smaller and is designed for machines to build the circuits.



## VOCABULARY

discrete electronic components - дискрет электрон компонентлар – дискретные электронные компоненты

integrated circuit – интеграл схема, микросхема, чип – интегральная схема, микросхема, чип

capacitors – конденсаторлар - – конденсаторы

self-contained circuits with many separate components - кўп микдордаги алоҳида компонентли автоном схемалар - автономные схемы с большим количеством отдельных компонентов

timer circuits – таймер микросхемалари(чиплар) –микросхемы таймера

Dual-in-line configuration (DIL) – икки қаторли конфигурациялар – двухрядные конфигурации

tiny pins – майда штифтлар - крошечные штифты

operational amplifier – операцион кучайтиргич - операционный усилитель

manual soldering – қўл билан қилинадиган кавшарлаш –работа ручной пайки

counter circuits - ҳисобловчи схемалар(чиплар)

a surface-mount chip – юзага ўрнатиладиган чип - чип для поверхностного монтажа

designed for - ...учун мўлжалланган - предназначен для...

## **COMPREHENSIVE QUESTIONS**

What are Integrated circuits?

What components of ICs do you know?

What are the main functions of ICs?

What do you think about advantages of ICs?

What do DIL stand for?

**1. Give the Russian or Uzbek equivalents for the following words and word combinations:** a surface-mount chip, tiny pins, basic component, conventional circuits, in a dual-in-line (DIL) configuration, prevent damage,



arranged in, caused by heat, little space, manual soldering, a piece of black plastic, operational amplifiers, self-contained circuits, designed for machines.

**2.Say whether these sentences are true or false:**

- 1.The surface mount chip is much bigger and is designed for computers to build the circuits.
2. ICs normally cost much more expensive to make than the individual components needed to do the same function.
3. The pins in ICs are arranged in a dual-in-line (DIL) configuration.
4. An IC socket can be used with the DIL-configuration IC.
5. The chip inside an IC usually allows connections to the circuit.

## UNIT XV. TRANSISTORS

Electronics began with the development of the transistor in the 1950s. Transistors are tiny electronic switches and amplifiers. Several thousand transistors can be put on a piece of silicon with a surface area of just 1mm<sup>2</sup>.

Transistors have three main uses: as an electronic switch within a circuit; to switch on another part of a circuit when a change in resistance of a sensor device is detected; as an interface device, to receive signals from low current devices (such as ICs) and use these to turn on high current devices (such as motors). There are two main types of transistor: bipolar transistors and field effect transistors. Bipolar transistors have three leads: emitter; collector; base.

The base lead controls the transistor: once it receives a voltage of at least 0.6V, it switches the transistor on and allows (some) current to flow from the collector to the emitter. When turned on it acts as an analogue device, which can be used to amplify the current at the base leg.

Transistors are easily damaged so it is important not to mix up the three leads. To help identify the leads some transistors have a dot near the collector, and/or a tab near the emitter. Each type of transistor is identified by a code printed on the side.

A single bipolar transistor cannot have both high gain and high collector current. A Darlington pair is a special arrangement of bipolar transistors that combines a high-gain transistor with a high-current transistor. The combined transistors allow both a higher gain and a larger amount of current to flow than would be possible with a single transistor. Darlington pairs are often used to drive motors. They can be bought packaged as a single discrete component or packaged as a transistor array, consisting of several transistors in a single integrated circuit (IC) (such as ULN2803 and ULN2003).

Field-effect transistors (FETs) are digital switches that respond to an input voltage to allow an increase in either voltage or current. They have three leads:

gate; drain; source

When the gate leg receives a voltage of at least 2V it switches on fully, allowing electricity to flow from the source to the drain. The current continues to flow until the voltage at the gate leg falls below 2V.

## VOCABULARY

tiny electronic switches—майда электрон ўзгартиргичлар –крошечные электронные переключатели

amplifiers –кучайтиргичлар -усилители.

a piece of silicon – кремний бўлаги –кусок кремния

an electronic switch within a circuit –занжирдаги электрон выключатель – электронный выключатель в цепи;

an interface device - интерфейс қурилмаси –устройство интерфейса

low current devices (such as ICs) - кам қувватлитокка эга қурилмалар (масалан , микросхемалар ) – маломощные устройства тока (например, микросхемы)

to turn on high current devices (such as motors) –кучли токка эга бўлган қурилмаларни ишга тушириш учун (масалан, моторлар) – для включения сильноточных устройств (таких, как двигатели).

bipolar transistors - биполяр, икки қутбли транзисторлар – биполярные транзисторы

field effect transistors – майдонли транзисторлар – полевые транзисторы.

leads - симлар - провода

emitter – -эмиттер , тарқатгич (масалан ток,нур) - эмиттер, излучатель

collector – коллектор -коллектор

base–асос-основа

to mix up - чигаллаштириб юбормоқ - перепутать

to identify the leads—симларни аниқлаш учун - для идентификации проводов

a dot near the collector—коллектор яқинидаги нуқта -точка рядом с коллектором

**1. Make up an abstract of the text basing on the answers given in the text:**

- 1) What kind of definition is given to transistors in the text?
- 2) How can transistors be used? What is main function of transistors?
- 3) What leads do bipolar transistors have?
- 4) How do base, emitter and collector work?
- 5) What differences are there between bipolar and field-effect transistors?

**2. Translate these synonyms and memorize them:**

- |                                 |                                     |
|---------------------------------|-------------------------------------|
| 1)device, instrument, appliance | 7)in order to, so that              |
| 2)mainly, primarily, chiefly    | 8)identical, the same               |
| 3)find out, learn               | 9)earlier, before, previously       |
| 4)specific, special             | 10)in accordance with, according to |
| 5)necessitate, require          |                                     |
| 6)provide, furnish              |                                     |

**3. Give the Russian or Uzbek equivalents of the following words and word combinations:**

Development of the transistor; with a surface area of just 1mm<sup>2</sup>; to switch on another part of a circuit, a change in resistance, a sensor device is detected; to receive signals; main types of transistor; an analogue device, are easily damaged; a code printed on the side; a Darlington pair; combined transistors;

## UNIT XVI.CONDUCTORS AND INSULATORS

All substances have some ability of conducting the electric current, however, they differ greatly in the ease with which the current can pass through them. Solid metals conduct electricity with ease while non-metals do not allow it to flow freely. Thus, there are conductors and insulators.

What do the terms "conductors" and "insulators" mean? This difference is expressed by what is called electrical conductivity of the body. It depends upon the atomic constitution of the body. Substances through which electricity is easily transmitted are called conductors. Any material that strongly resists the electric current flow is known as an insulator.

Conductance, that is the conductor's ability of passing electric charges, depends on the four factors: the size of the wire used, its length and temperature as well as the kind of material to be employed.

A large conductor will carry the current more readily than a thinner one. To flow through a short conductor is certainly easier for the current than through along one in spite of their being made of similar material. Hence, the longer the wire, the greater is its opposition, that is resistance, to the passage of current.

There is a great difference in the conducting ability of various substances. Almost all metals are good electric current conductors. The best conductors are silver, copper, gold and aluminum. Nevertheless, copper carries the current more freely than iron; and silver, in its turn, is a better conductor than copper. Copper is the most widely used conductor. The electrically operated devices are connected to the wall socket by copper wires. A material which resists the flow of the electric current is called an insulator. The higher the opposition is, the better the insulator is. There are many kinds of insulation used to cover the wires. The kind used depends upon the purposes the wire or cord is meant for. The insulating materials generally used to cover the wires are rubber, asbestos, glass, plastics and others. The best insulators are oil, rubber and glass. Rubber covered with

cotton, or rubber alone is the insulating material usually used to cover desk lamp cords and radio cords. Glass is the insulator to be often seen on the poles that carry the telephone wires in city streets. Glass insulator strings are usually suspended from the towers of high voltage transmission lines. One of the most important insulators of all, however, is air. That is why power transmission line wires are bare wires depending on air to keep the current from leaking off. Conducting materials are by no means the only materials to play an important part in electrical engineering. There must certainly be a conductor, that is a path, along which electricity is to travel and there must be insulators keeping it from leaking off the conductor.

## VOCABULARY

substances – моддалар - вещества

ability of conducting the electric current –электр токини ўтказиш қобилияти – способность проведения электрического тока

differ in the ease - енгиллиги билан фаркланади - различаются по легкости,

solid metals– қаттиқ металллар - твердые металлы

electrical conductivity of the body- жисмининг электр токини ўтказувчанлиги - электропроводность тела

atomic constitution – атомик қурилиши - атомная структура

electric current flow – электр токи оқими – поток электрического тока

conductance – ўтказувчанлик - проводимость

nevertheless – шунга қарамай - тем не менее

copper wires – мисдан ясалган симлар - медные провода

cord – шнур - шнур

asbestos – асбест - асбест

glass insulator strings – шишадан ясалган изоляторлар қаторлари – строка изоляторов из стекла

high voltage transmission lines - юқори кучланиш узатиш линиялари - линии электропередачи высокого напряжения

**1. Give the Russian equivalents for the words and word combinations below:**

1) conductors; 2) insulators; 3) transmit; 4) resistance; 5) passage of current; 6) socket; 7) to connect to; 8) cord; 9) high voltage transmission line; 10) leak off.

**2. Find in the text the sentences with the following related words and translate them: conducting – conductor – conductivity – conductance**

**3. Make up sentences corresponding to the information given in the text**

Copper                      used to cover desk lamp cords

Silver                      one of the most important insulators of all

Rubber                    is the most widely used conductor

Glass a better conductor than copper

Iron                        not so good conductor as copper

Air                         the insulator usually used on the city street

poles and high voltage transmission lines

**4. State questions to the underlined words:**

1) Solid metals conduct electricity with ease.

2) Conductance depends on the four factors.

3) There are many kinds of insulation used to cover the wires.

- 4) Insulators keep electricity from leaking off the conductor.
- 5) Conductors play an important role in electrical engineering.

**5. Say whether these sentences are true or false:**

- 1) Electrical conductivity of a body depends upon its atomic constitution.
- 2) There is no difference in the conducting ability of various substances.
- 3) The longer the wire is the weaker its opposition is.
- 4) The kind of the insulating material depends upon the purpose it is meant for.
- 5) Conductors are substances through which electricity is easily transmitted.
- 6) Insulators do not allow the electric current to flow freely.



## UNIT XVII.SEMICONDUCTORS

There are materials that really occupy a place between the conductors of the electric current and the non-conductors. They are called semiconductors. These materials conduct electricity less readily than conductors but much better than insulators.

Semiconductors include almost all minerals, many chemical elements, a great variety of chemical compounds, alloys of metals, and a number of organic compounds. Like metals, they conduct electricity but they do it less effectively. In metals all electrons are free and in insulators they are fixed. In semiconductors electrons are fixed, too, but the connection is so weak that the heat motion of the atoms of a body easily pulls them away and sets them free.

Minerals and crystals appear to possess some unexpected properties. It is well known that their conductivity increases with heating and falls with cooling. As a semiconductor is heated, free electrons in it increase in number, hence, its conductivity increases as well.

Heat is by no means the only phenomenon influencing semiconductors. They are sensitive to light, too. Take germanium as an example. Its electrical properties may greatly change when it is exposed to light. With the help of a ray of light directed at a semiconductor, we can start or stop various machines, effect remote control, and perform lots of other useful things. Just as they are influenced by falling light, semiconductors are also influenced by all radiation. Generally speaking, they are so sensitive that a heated object can be detected by its radiation. Such dependence of conductivity on heat and light has opened up great possibilities for various uses of semiconductors. The semiconductor devices are applied for transmission of signals, for automatic control of a variety of processes, for switching on engines, for the reproduction of sound, protection of high-voltage transmission lines, speeding up of some chemical reactions, and so on. On the one hand they may be used to transform light and heat energy directly

into electric energy without any complex mechanism with moving parts, and on the other hand, they are capable of generating heat or cold from electricity.

Russian engineers and scientists turned their attention to semiconductors many years ago. They saw in them a means of solving an old engineering problem, namely, that of direct conversion of heat into electricity without boilers or machines. Semiconductor thermocouples created in Russia convert heat directly into electricity just as a complex system consisting of a steam boiler, a steam engine and a generator does it.

### VOCABULARY

occupy a place - жой эгалламоқ – занять место

chemical compounds – кимёвий бирикмалар - химические соединения

heat motion - иссиқлик ҳаракати - тепловое движение

unexpected properties – кутилмаган хусусиятлар - неожиданные свойства

increase with heating – қиздириш билан оширмоқ - увеличить с подогревом

sensitive to light – ёруғликка сезувчан - чувствителен к свету

generally speaking – умуман олганда - вообще говоря

transmission of signals – сигналларни узатиш - передача сигналов

switching on engines – двигателларни ишга туширмоқ - включение двигателей

the reproduction of sound – товушни қайта тиклаш - воспроизведение звука

on the one hand – бир томондан - с одной стороны

generate heat or cold - совуқ ёки иссиққа айлантириш -генерировать  
тепла или холода

turn attention to— ...га эътиборни қаратмоқ - обратить внимание на

namely – айнан - именно

direct conversion—тўғридан – тўғри ўзгартириш -прямое  
преобразование

boiler - котёл(қозон) - котёл

semiconductor thermo couples – ярим ўтказгичли термоэлементлар -  
полупроводниковые термоэлементы

### **1. Give the English equivalents for the words and word combinations below:**

1) ярим ўтказгич (полупроводник); 2) кимёвий бирикма (химическое соединение); 3) қотишма (сплав); 4) озод этиш (освободить);5) хусусият (свойство); 6)кўпай(тир)моқ (увеличивать(ся)); 7) совутиш (охлаждение); 8) сезувчан (чувствительный); 9)олиб чикмоқ,кўрсатмоқ (выставлять); 10) нур (луч); 11) ...га йўналтирмоқ (направлять на); 12) дистанцион (масофали) бошқарув (дистанционное управление); 13) топмоқ, пайқамоқ (находить, обнаруживать); 14) химоя (защита); 15) тезлашув (ускорение); 16) муҳандисликка оид муаммони ечмоқ (решитьинженерную проблему).

### **2.Join the beginnings and ends:**

1. Semiconductors are sensitive to... a) conductors of the electric current

and non-conductors.

2.Semiconductors convert heat into ... b)dependence of conductivity on heat and light.

3. Semiconductors occupy a place between... c) heat and light.

4.Semiconductors conduct electricity... d)into electricity without machines.

5.Great possibilities for various uses of e) less effectively than metals. semiconductors are connected with ...

6.As a semiconductor is heated ... f) its conductivity increases as well.

#### **4. Insert words and expressions:**

1) Semiconductors include a great variety of (кимёвий бирикма – химические соединения),(металлар қотишмаси – сплавы металлов).

2) Minerals and crystals appear to possess some unexpected (хусусият - свойства).

Their conductivity increases with (нагревание) and falls with (совутиш - охлаждение).

3) With the help of a ray of light directed at a semiconductor, we can effect (дистанцион бошқарув – дистанционное управление).

4) The semiconductor devices are applied for (автоматик бошқарув – автоматический контроль) of a variety of processes, for the (қайта эшиттириш - воспроизведение) of sound, (ускорение) of some chemical reactions.

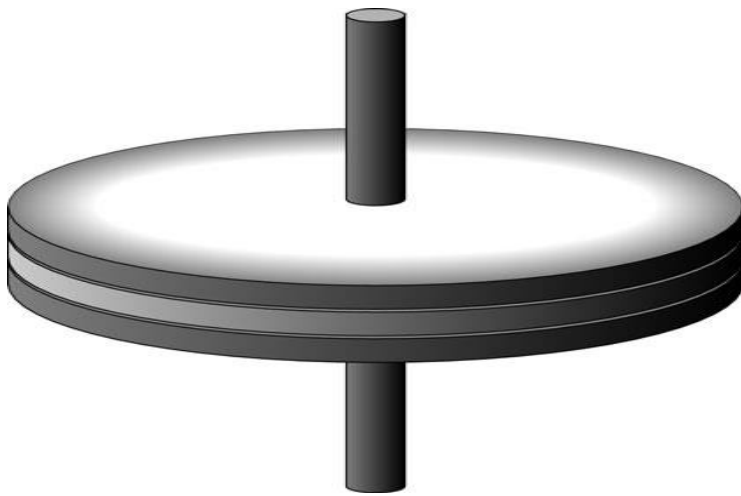
5) ( Термоэлементлар - Термоэлементы) created in Russia convert heat directly into electricity.

#### **Answer the questions:**

1) What do semiconductors include? 2) How does the atomic structure of semiconductors influence their properties? 3) What phenomena influence semiconductors? 4) What are the semiconductor devices applied for? 5) How do semiconductors help in solving engineering problems?

## UNIT XVIII.CAPACITORS

A *capacitor* is an electronic component that takes advantage of the ability of electric fields to reach out across an insulator. It consists of two flat plates made from a conducting material such as silver or aluminum, separated by a thin insulating material such as Mylar or ceramic. The two conducting plates are connected to terminals so that a voltage can be applied across the plates.



Note that because the two plates are separated by an insulator, a closed circuit *isn't* formed. Nevertheless, current flows — for a moment, anyway.

How can this be? When the voltage from a source such as a battery is connected, the negative side of the battery voltage immediately begins to push negative charges toward one of the plates. Simultaneously, the positive side of the battery voltage begins to pull electrons (negative charges) away from the second plate.

What permits current to flow is the electric field that quickly builds up between the two plates. As the plate on the negative side of the circuit fills with electrons, the electric field created by those electrons begins to push electrons away from the plate on the other side of the insulator, toward the positive side of the battery voltage.

As this current flows, the negative plate of the capacitor builds up an excess of electrons, whereas the positive side develops a corresponding deficiency of electrons. Thus, voltage is developed between the two plates of the capacitor.

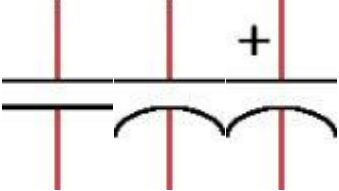
But there's a catch: This current flows only for a brief time. As the electrons build up on the negative plate and are depleted from the positive plate, the voltage between the two plates increases because the difference in charge between the two plates increases.

The voltage continues to increase until the capacitor voltage equals the battery voltage. Once the voltages are the same, current stops flowing through the circuit, and the capacitor is said to be *charged*.

At this point the magic gets even better. Once a capacitor has been charged, you can disconnect the battery from the capacitor, and the voltage will remain in the capacitor. In other words, although the voltage in the capacitor is created by the battery, this voltage isn't dependent on the battery for its continued existence. Disconnect the battery, and the voltage remains across the two plates of the capacitor.

Thus, capacitors have the ability to store charge — an ability known as *capacitance*.

Here are a few additional things you should know about capacitors before moving on:



The most common symbol used for capacitors in schematic diagrams is simply two parallel lines separated by a gap, as shown in the margin.

An alternative symbol uses a straight line and a curved line to represent the plates. The curved line is generally used on the negative side of the circuit.

Although some capacitors aren't sensitive to polarity, many others are. This sensitivity has to do with the choice of materials used to create the capacitors: With some materials, connecting the voltage in the wrong direction can damage the capacitor. Capacitors that have distinct positive and negative terminals are called *polarized capacitors*. A plus sign is used in the schematic diagram to indicate the polarity, as shown in the margin.

The insulating material between the two conducting plates is properly called *dielectric*, a term that refers to the ability of the insulating layer to become polarized by the electric field that exists between the two plates when they become charged.

## VOCABULARY

take advantage - устунликка эга - имеет преимущество

flat plate – силлик пластина - плоская пластина

mylar – майлар - майлар

voltage – кучланиш - напряжение

immediately – дархол - немедленно

push negative charges– маннфий зарядларни итармоқ – толкать

отрицательные заряды

build up – курмоқ - построить

an excess – ортиқча – избыток

a corresponding deficiency - ..га мос танқислик - соответствующий дефицит

deplete – тугамоқ - истощать

increase – кўпайиш –увеличение

existence – мавжудлик – существование

a gap – узилиш - разрыв

a margin – захира - запас.

a curved line – эгри чизик - изогнутая линия

sensitivity – таъсирчанлик - чувствительность

damage – зиён етказмоқ - наносить ущерб

polarized capacitors – кутбланган конденсаторлар - поляризованные конденсаторы

**1. Give the English equivalents for the words and word combinations below:**

Ток ўтказувчи материал (токопроводящий материал); ажратилган (разделенный); клемма (қисқич) (клемма); ёпиқ контур (замкнутый контур); батареянинг манфий кучланиши томони (отрицательная сторона напряжения батареи); электронларни (ўзига) тортмоқ манфий зарядларни (тянуть электроны (отрицательные заряды)); ...дан кўриниб турибдики (как видно из..); мувофатқ электронлар танқислигини ишлаб чиқаради (разрабатывает соответствующий недостаток электронов); икки пластина ўртасидаги кучланиш (напряжение между двумя пластинами); сеғр-жоду янада кучаяди (магия становится еще лучше); конденсаторнинг икки пластинасига кўндаланг (поперек двух пластин конденсатора); конденсаторнинг зарарланиши (повреждение конденсатора).

**2. . Fill in the preposition, if necessary:**

1. It consists of two flat plates made from a conducting material such... silver or aluminum, separated ... a thin insulating material .

2. The positive side of the battery voltage begins to pull electrons (negative charges) ... from the second plate.



3. As the plate on the negative side of the circuit fills ... electrons, the electric field created by those electrons begins ... push electrons away from the plate on the other side of the insulator, ... the positive side of the battery voltage.

4. As the electrons build ... on the negative plate and are depleted ... the positive plate, the voltage ... the two plates increases because the difference in charge between the two plates increases.

5. This voltage isn't dependent ... the battery for its continued existence.

6. The most common symbol used ... capacitors ... schematic diagrams is simply two parallel lines separated by a gap, ... shown in the margin.

7. A term that refers ... the ability ... the insulating layer to become polarized by the electric field that exists between the two plates when they become charged.

### **3. Put questions to the following sentences:**

1. The two conducting plates are connected to terminals so that a voltage can be applied across the plates.

2. When the voltage from a source such as a battery is connected, the negative side of the battery voltage immediately begins to push negative charges toward one of the plates.

3. As this current flows, the negative plate of the capacitor builds up an excess of electrons, whereas the positive side develops a corresponding deficiency of electrons. 4. This current flows only for a brief time.

5. The voltage continues to increase until the capacitor voltage equals the battery voltage.

6. Disconnect the battery, and the voltage remains across the two plates of the capacitor.

7. The most common symbol used for capacitors in schematic diagrams is simply two parallel lines separated by a gap, as shown in the margin.

8. Capacitors that have distinct positive and negative terminals are called *polarized capacitors*.

## ADABIYOTLAR

1. Вавилова М.Г. Так говорят по-английски. - М.: МГИМО, 1996.
2. Григоров В.Б. Английский язык: Учебное пособие для технических вузов. - М.: Высш. шк., 1991.
3. Современный англо-русский политехнический словарь. - Бишкек: ТКИСО, 1997.
4. Зильберман Л.И. Пособие по обучению чтению английской научной литературы (структурно-семантический анализ текста). - М.: Наука, 1981.
5. Крупаткин Я.Б. Читайте английские научные тексты. - М.: Высш. шк., 1991.
6. Курашвили Е.И. Английский язык: Пособие по чтению и устной речи для технических вузов. - М.: Высш. шк., 1991.
7. Учебник английского языка (для технических вузов) / И.В. Орловская и др. - М.: МВТУ, 1995.
8. Резник Р.В., Сорокина Т.С., Казарицкая Т.А. Практическая грамматика английского языка. - М.: Флинта, Наука, 1996.
9. Юсупов У. Инглиз тили грамматикасидан универсал қўлланма. -Т.: Akademnashr, 2011.
10. Лебедев О.В. Автомобильный терминологический англо-русский словарь. - Т.: Фан, 1994.
11. Гаппаров М., Қосимова Р. Инглиз тили грамматикаси. - Тошкент, 2008.
12. Sattarov T., Qurbanova N. English. - Т.: Адолат, 2007.
13. Халилова М., Сков Нилс. Маркетинг. Инглизча-узбекча-русча луғат.-Т.: Ўқитувчи, 1996.

- 14.Субботкина И.Г. и др. Развитие навыков технического чтения на английском языке. – М.2011
15. Абдалина Е.Н. Учебник английского языка для студентов неязыковых вузов. - Т. 1996
16. Исмаилов А.А., Саттаров Т.Қ., Жалолов Ж.Ж., Ибрагимхўжаев И.И.Инглиз тили амалий курсидан ўқув-услугий мажмуа // Нофилологик йўналишда инглиз тилини хорижий тил сифатида ҳамда филологик йўналишида инглиз тилини иккинчи хорижий тил сифатида ўқитиладиган олий таълим муассасалари илк (Basic User, Breakthrough A1) босқич талабалари учун. - Т.: ЎзДЖТУ. 2011
- 17.Ишмухамедов Р.  
Инновационтехнологияларёрдамидатаълимсамарадорлигиниоширишйўллари.- Т. 2005
18. Мухитдинова Г.Ш. Техника ОлийЎқувюртлариучун // Инглиз тили дарслиги. - Т.: Ўзбекистон. 1997

### **Интернет сайтлар**

<http://iteslj.org/>

<http://iteslj.org/Techniques/Yang-Writing.html>

<http://iteslj.org/Techniques/Ross-ListeningComprehension.html>

<http://www.teachingenglish.org.uk/think/articles/listening>

[http://www.usc.edu/dept/education/CMMR/CMMR\\_BTSA\\_home](http://www.usc.edu/dept/education/CMMR/CMMR_BTSA_home).

<http://www.teachermentors.com/MCenter%20Site/BegTchrNeeds.html>

<http://www.inspiringteachers.com/>

<http://teachnet.org/ntpi/research/prep/Cooper/><http://www.altteacher.org>

[www.examenglish.com](http://www.examenglish.com)

## MUNDARIJA

### I BO‘LIM.KOMPUTERLAR

<b>1 DARS. Komputer taraqqiyoti tarixi</b> .....	2
<b>2 DARS. Komputer nima?</b> .....	8
<b>3 DARS. Mikroprosessor</b> .....	14
<b>4 DARS. Operatsion tizimlar</b> .....	19
<b>5 DARS. Apparat ta’minoti</b> .....	23
<b>6 DARS. Dasturiy ta’minot turlari</b> .....	29

### II BO‘LIM .ISHLAB CHIQRISH JARAYONLARINI AVTOMATLASHTIRISH

<b>7 DARS. Elektron mahsulotlar ishlab chiqarish jarayonlari</b> .....	33
<b>8 DARS. Avtomatlashtirish</b> .....	38
<b>9 DARS. Robotlar ishlab chiqarishda</b> .....	42
<b>10 DARS. Raqamli boshqaruv</b> .....	46
<b>11 DARS. O‘lchov birliklari tarixi</b> .....	51
<b>12 DARS. O‘lchov birliklari</b> .....	55

### III BO‘LIM . ELEKTRON KOMPONENTLAR VA MATERIALLAR

<b>13DARS. Electronica</b> .....	59
<b>14 DARS. Integral sxemalar</b> .....	64
<b>15 DARS.Tranzistorlar</b> .....	68
<b>16 DARS. O‘tkazgichlar va izolyatorlar</b> .....	72
<b>17 DARS.ДАРС. Yarim o‘tkazgichlar</b> .....	76
<b>18 DARS. Kondensatorlar</b> .....	81

<b>ADABIYOTLAR.....</b>	<b>83</b>
<b>MUNDARIJA.....</b>	<b>85</b>
<b>QAYDLAR UCHUN.....</b>	<b>87</b>

## QAYDLAR UCHUN

## QAYDLAR UCHUN

Ingliz tili fanidan o‘quv-uslubiy qo‘llanma. Muallif:F.Sh.Djurayeva.  
-Toshkent: ToshDTU, 2016. 92 b.

**Muharrir: Sidikova K.A.**

**Musahhih: Jumanazarova F.R.**