

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE RUSSIAN  
FEDERATION

Federal State Autonomous Educational Institution of Higher Education  
"NORTH CAUCASUS FEDERAL UNIVERSITY"

**SUGGESTIONS FOR TEACHING**

for the performance of practical work

by discipline

"Professional Foreign"

for students of the field of study

11.03.02 Infocommunication Technologies and Communication Systems (profile)

"Intelligent Data Processing in Infocommunication Systems and Networks"

Stavropol 2026

**LESSON 1**

## SYNOPSIS

### Task 1. Read and translate the text:

### Task 1. Read and translate the text:

The history of computer viruses has begun recently, but it has already become legendary. Almost everyone knows a few fables about these creatures, but hardly anyone understands what a computer virus is.

A computer virus is an executable code able to reproduce itself. Viruses are an area of pure programming, and, unlike other computer programs, carry intellectual functions on protection from being found and destroyed. They have to fight for survival in complex conditions of conflicting computer systems.

Viruses seem to be the only alive organisms in the computer environment, and yet another their main goal is survival. That is why they may have complex crypting/decrypting engines, which is indeed a sort of a standard for computer viruses nowadays, in order to carry out processes of duplicating, adaptation and disguise.

Viruses are written by lone wolves or programmers groups. Using special programs called "Virus creators" even beginners in a computer world can build their own viruses. The aim of creation of viruses in such a way is pretty obvious: the author wants to become well-known all over the world and to show his powers. The results of the attempt can be very sad, only real professionals can go famous and stay uncaught. To write something really new and remarkable programmer should have some extra knowledge and skills.

*A computer virus group* is an informal non-profit organization, uniting programmers-authors of viruses regardless of their qualifications. Everyone can become a member of the club, if he creates viruses, studies them for the reason of creation and spreading. You don't have to know any computer language or write any program code to become a member or a friend of the group. Programming in Assembler is preferred, Pascal, C++ and other high level languages are considered to be humiliating. There are computer virus groups all over the world, few being more successful than others. It may be pretty hard to get in contact with them since

they are quite typical representatives of a computer underground world as well as (free) wares groups. Sometimes, however, creating viruses can become a respectable occupation, bringing constant income. After all, no one but the author of the virus can bring valuable information on the way it should be treated and cured.

Developers of antiviral software gain money from selling their remedy to a new widely hyped by the mass media virus. Agitation can grow so strong that all and everyone dashes to buy an antiviral protection against even a most harmless virus. The ordinal behavior of share indexes in stock exchanges while a computer virus epidemic is to fall. Somehow, the shares of high-tech companies producing antiviral software will soar up to the sky.

**Task 2. Answer the following questions:**

**Task 2. Answer the following questions:**

1. What is a computer virus?
2. Can you describe those who create viruses?
3. How can a person protect his PC from viruses?
4. What is this information about a computer virus group?
5. Who has written about viruses?
6. What is the aim of creation of viruses?
7. Why may viruses have complex engines?
8. How many viruses do you know?
9. Where is programming considered to be humiliating?
10. What can become a respectable occupation?
11. What is a harmful program for PC?

**Task 3. Match the English words given below with their Russian equivalents:**

**Task 3. Match the following words with the appropriate translation:**

- |                        |                     |
|------------------------|---------------------|
| • a history of         | • Clean program     |
| • a computer virus     | • Computer program  |
| • an executable code   | • Computer language |
| • a pure program       | • Creating a virus  |
| • computer environment | • virus creator     |

- a standard for computer
- programmer group
- a special program
- a "Virus creator"
- an aim of a virus
- a computer virus group
- a programmer-author of a virus
- a computer language
- a computer program
- a creation of a virus
- a program code
- a computer underground world
- an antiviral protection
- a harmless virus
- a computer virus epidemic
- a version of program
- a cracked version of program
- a harmful program
- a mass media virus
- Computer history
- Execution code
- the purpose of the virus
- Computer virus
- a group of computer viruses
- Computer environment
- Computer standards
- Programmer Group
- Special program
- Creators of software viruses
- Harmful program
- media virus
- software version
- Opened version of the program
- harmless virus
- Computer Underground World
- computer virus epidemic
- Antivirus protection
- program code

**Task 4. Find the sentences with the words and word combinations given below in the text:**

**Task 4. Find sentences in the text that contain the following words and expressions:**

- an area of pure programming;
- to carry out processes of duplicating, adaptation and disguise;
- a computer virus group;
- a computer underground world;
- antiviral software;
- a sphere of artificial intellect development;
- using cracked versions of programs.

**Task 5. Complete the following sentences:**

**Task 5. Complete the sentences:**

1. The history of computer viruses has begun ... .
2. A computer virus is an ... .
3. Viruses are written by ... .
4. The results of the attempt can be .... .
5. A computer virus group is ... .
6. Everyone can become ..... .
7. Developers of antiviral soft ware gain money from ... .

**Task 6. Say whether the statements given below are true or false:**

**Task 6. Determine the truth or falsity of the following sentences:**

1. A computer virus is an executable code.
2. They have to fight for survival in a real life.
3. Viruses are written by writers.
4. To write something really new and remarkable programmer shouldn't have some extra knowledge and skills.
5. You didn't have to know any language and write some programs code to become a member or a friend of the group.
6. Computer viruses didn't come for a long time.
7. Developers of antiviral software gain money from selling their remedy to a new widely hyped by the mass medina virus.

**Task 7. Translate from Russian into English:**

**Task 7. Translate sentences from Russian into English:**

1. The history of computer viruses began recently, but they have already become legendary.
2. Viruses must struggle to survive in the complex conditions of contradictory computer systems.
3. Viruses are written by "lone wolves" or groups of programmers.
4. Computer virus group is an unofficial non-profit organization that unites programmers-authors of viruses regardless of their qualifications.

5. Everyone can become a member of the club if he creates viruses, studies them because of their creation and spread.

6. However, sometimes the creation of viruses can become a representative activity that brings a constant income.

7. But do not forget that the creation, use and distribution of malicious programs for PC is a criminal offense, as well as the use of cracker versions.

**Task 8. Find the sentences in Passive Voice in the text:**

**Task 8. Find in the text of the sentence in the passive voice:**

## **LESSON 2**

### **COMPUTER VERSUS HUMAN BRAIN [2]**

**Task 1. Read and translate the text:**

**Task 1. Read and translate the text:**

The computer was developed around 1950 with the first commercial model being introduced in 1951. It came as a tool that had the effect of multiplying the power of man's mind. The computer proved as significant for the mental activity as the Lever and the Wheel have been for the physical activity. The computer as already stated is a tool for extending the power of man's mind but with some limitations. Till today, the computer has not extended all aspects of power of man's mind but only some aspects. The areas where the computer finds itself helpless are the ones involving creative thoughts and the development of original ideas. These areas, which at present do not lie within the purview of the computer use, do lie within the domain of human brain.

Not only this, the mode in which the computer has to perform and the sequence in which the data is to be processed to solve a particular problem are the things that are decided by human brain. A computer is always fed with a set of instructions (called a program) for every problem solved on the computer. In simple words, the computer does what it is asked to do. It will be possible to solve a very difficult problem on a computer in a split second only if we have a

suitable program available to do that and, of course, provided the execution of program, instructions lies within the capability of the computer.

Another obvious difference between human and machine intelligence is that human intelligence is very flexible but not tireless. Human brain gets tired very soon and makes mistakes. Also, the I.Q. (Intelligence Quotient) differs from person to person and deteriorates with ageing. Computers act relatively whereas human mind acts absolutely; while human mind adjudges, computer compares. In addition, human mind (and to some extent animal's mind) is able to respond to a variety of situations and entities. Let us take an example of a postman engaged in sorting out the mail. An average postman with a very poor I.Q. will be able to read the postal code, detect the postal mistake of incorrect stamping, and decide whether the address is correct or incorrect, whether post card is oversized and whether address is written at correct place and in correct style or not etc. without much efforts. If the same job is done with the present day computer designed for mail sorting, it will not be able to handle all these variations with a simple program. A program that would take into account all the reasonable variations instantly recognizable by the average human being would be long and complicated.

With time these aspects-the ones which are not within the purview of the computer use-too may come within the computer domain. A group of people thinks that when the science is perfected, the computers will be able to develop artificial intelligence of that level as to replace human brain but most of the current scientists believe that it is a fantasy of science-fiction only. However let me hope that humanity is able, to achieve this target which seems at present as impossible as to achieve immortality. Nevertheless, computers have greatly relieved the burden over individual's memory and are a versatile gadget, which alone will be credited to bring out at least half the sophistication in human civilization. The computers combined with laser technology are bound to bring thousands of miracles which will convert most of the fictions and fantasies of sciences into reality.

**Task 2. Answer the following questions:**

**Task 2. Answer the following questions:**

1. What are the main differences between human brain and the computer?
2. Why does the computer work faster than human brain?
3. Why is it very difficult to make the computer respond to a variety of situations?
4. How greatly in your opinion will computers change in the next 20 years?

**Task 3. Find the English equivalents for the words and word-combinations given below:**

**Task 3. Find the equivalents of the following words in the text:**

Process data, solve problems, provide, make mistakes, flexible, program execution, take into account, achieve the goal.

**Task 4. Use the right prepositions and fill in the blanks:**

**Task 4. Fill in the blanks with prepositions:**

1. The areas ... creative thoughts and the development ... original ideas do not lie ... the purview of the computer use; they do lie within the domain ... human brain.
2. The computers will be able to convert most ... the fictions and fantasies of sciences ... reality.
3. The I.Q. differs ... person ... person and deteriorates ... ageing.
4. A computer is always fed ... a set of instructions (called a program) for every problem solved ... the computer.
5. Human mind is able to respond ... to a variety ... situations.

**Task 5. Translate the following sentences into English:**

**Task 5. Translate the following sentences into English:**

1. A computer is able to remember, process and store information.
2. With the right program, a computer can solve the most difficult problem in a fraction of a second.
3. A computer is a powerful device that can turn our dreams into reality.
4. A computer is an artificial intelligence that can replace a person in boring, routine affairs.
5. All computer achievements are limited by the human mind.

## LESSON 3

### POPULAR INFECTION METHODS USED BY COMPUTER

#### VIRUSES [2]

**Task 1. Read and translate the text:**

**Task 1. Read and translate the text:**

To say that computer viruses infect your computers is not enough; every computer virus has its own special way of wrenching control from normal files. Viruses can append themselves onto, insert themselves into, or wrap themselves around normal executable program files. Some viruses combine techniques in order to achieve a higher level of adaptability. Viruses can remain resident in memory and can intercept user commands and DOS system calls. They can redirect system I/O through themselves or go for the jugular and simply replace good files with viral impersonators.

Like movies, songs, and television shows, computer programs have a beginning, middle, and an end. Usually, when a computer program is first loaded into memory, an opening title screen is displayed. That's the beginning, or top, of the program. The various functions you call up as you use the program constitute its middle, and when exiting you're at the program's end. What most users don't know is that the binary representations of computer program commands that actually make computer programs run are not necessarily stored on disks in the same order as that in which they will be used. In computer programming jargon, a program's lines of text are called *strings of text*, or just plain *strings*. While the first thing users see when they load and run a particular computer program might be a string of text saying "Welcome to FOOBAR version 9.7," the actual characters of text are usually stored either at the very beginning or at the end of the program's on-disk binary code. Therefore, were you to view a .COM or .EXE file with binary file viewer, you would most likely find a bucketful of text strings stored at the beginning and end of the program file, regardless of where or how they are actually displayed during program usage.

Computer program *compilers* (other programs that convert lists of computer commands into executable program files) store text displays and other computer commands in whatever manner is most efficient for computers to use. When programs are run, compiled executables tell computers where in memory or where on disk they can find required text strings, commands, functions, and more. Computer virus programmers, knowing intimately how their target files operate, ingeniously exploit computers' handling of binary program file executions.

There are six popular methods employed by most computer viruses to steal control from normal executable files: appending, insertion, interception, redirection, replacement, the viral shell. While other forms of system corruption surely exist, these are by far the dominant techniques preferred by rogue program authors.

**Task 2. Answer the following questions:**

**Task 2. Answer the following questions:**

1. What does every computer virus have?
2. What are strings of text?
3. What do computer program compilers store?
4. What do computer virus programmers exploit?
5. What are six popular methods used by computer viruses?

**Task 3. Find the Russian equivalents for the words and word-combinations given below:**

**Task 3. Give Russian equivalents to the following word combinations:**

Executable program files, viral impersonators, binary representation of computer program, program's on-disk binary code, binary file viewer, bucketful of text strings, computer program compiler, binary program file execution.

**Task 4. Complete the sentences according to the text:**

**Task 4. Complete the sentences:**

1. Some viruses combine techniques in order to ... .
2. Like movies, computer programs have ... .
3. Computer program compilers store ... .
4. When programs are run, compiled executables tell computers ... .

5. There are six methods used by computer viruses to steal control from normal executable files ... .

**Task 5. Retell the text:**

**Task 5. Retell the text using new words and phrases:**

## **LESSON 4**

### **THE TERM "COMPUTER SECURITY" [1]**

**Task 1. Read and translate the text:**

**Task 1. Read and translate the text:**

The term "computer security" is used very frequently, but the content of a computer is vulnerable to several risks unless the computer is connected to other computers to form a network. As the use of computer networks, especially the Internet, has become widely spread, the concept of computer security has expanded to signify issues relating to the networked use of computers and their resources.

The major technical areas of computer security are usually represented by the initials CIA: Confidentiality, Integrity, and Availability. *Confidentiality* means that information cannot be accessed by unauthorized parties. *Confidentiality* is also known as secrecy or privacy; breaches of confidentiality range from the embarrassing to the disastrous. *Integrity* means that information is protected against unauthorized changes that are not detectable to authorized users; many incidents of hacking compromise the integrity of databases and other resources. *Authentication* means that the users are those persons who they claim to be. *Availability* means that resources are accessible by authorized parties; "denial of service" attacks, which are sometimes the topic of national news, are attacks against availability. Other important factors of computer security professionals call the access control and nonrepudiation. Maintaining access control means not only that users can access only those resources and services to which they are entitled, but also that they are not denied resources that they legitimately can expect to access. Nonrepudiation implies that a person who sends a message cannot deny that he sent it and, on the contrary, that a person who has received a message

cannot deny that he received it. In addition to these technical aspects, the conceptual reach of computer security is broad and multisided. Computer security touches draws from disciplines as ethics and risk analysis, and is concerned with topics such as computer crime; the prevention, detection, and remediation of attacks; and identity and anonymity in cyberspace.

While confidentiality, integrity, and authenticity are the most important concerns of a computer security manager, privacy is perhaps the most important aspect of computer security for everyday Internet users. Although these people may feel that they have nothing to hide when they are registering with an Internet site or service, privacy on the Internet is about protecting one's personal information, even the information does not seem sensitive. Because of the ease with which information in electronic format can be shared among companies, and because small pieces of related information from different sources can be easily linked together to form a composite of, for example, a person's information seeking habits, it is now very important that individuals are able to maintain control over what information is collected about them, how it is used, who may use it, and what purpose it is used for.

**Task 2. Answer the following questions:**

**Task 2. Answer the following questions:**

1. What is the term of computer security?
2. Which are the major technical areas of compute security?
3. What do confidentiality, integrity, and authentication mean in terms of PC security?
4. What is nonrepudiation?
5. What disciplines does the term concern?
6. What is the most important aspect of computer security nowadays?
7. What is protected while surfing the Internet?

**Task 3. Match the English words given below with their Russian equivalents:**

**Task 3. Match the following keywords with the appropriate translation:**

- |                  |                                     |
|------------------|-------------------------------------|
| • Vulnerable     | • secrecy, confidentiality          |
| • Authentication | • Strict fulfillment of obligations |

- Integrity
- Nonrepudiation
- Confidentiality
- Availability
- Access control
- vulnerable, vulnerable
- accessibility, availability
- Data integrity, integrity
- Establishing compliance with the original
- Access control

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

**Task 4. Looking through the text, find the equivalents of expressions:**

often used; also known as; protected from; can be divided among; can be easily linked to a whole; for what purpose it is used.

**Task 5. Say whether the statements given below are true or false:**

**Task 5. Determine the truth or falsity of the following sentences:**

1. The major technical areas of computer security are usually rep storage devices.
2. Authentication means that the users are those persons who they claim to be.
3. Availability means that resources are accessible by any authorized or unauthorized parties.
4. Other important factors of computer security professionals call the access control and nonrepudiation.
5. The conceptual reach of computer security is not broad and multisided.
6. Privacy is perhaps the most important aspect of computer security for everyday Internet users.
7. Computer security doesn't touch such disciplines as ethic and risk analysis.

**Task 6. Complete the sentences according to the text:**

**Task 6. Complete the sentences:**

1. The term "computer security" is used very frequently, but the content ... .
2. The major technical areas of computer security are usually ... .
3. ... means that information cannot be accessed by unauthorized parties.
4. Integrity means that information is protected against ... .
5. Other important factors of computer security ... .

6. Maintaining access control means not only that users can ... .
7. Nonrepudiation implies that a person who sends a message cannot ... .
8. Computer security touches draws from disciplines as ... .
9. ... privacy is perhaps the most important aspect ... .
10. It is now very important that individuals are able to .... .

**Task 7. Translate from Russian into English:**

**Task 7. Translate from Russian into English:**

1. The term "computer security" is used quite often.
2. The main technical areas of computer security can be represented by the abbreviation CIA.
3. Confidentiality implies that information cannot be accessed by unknown parties.
4. Integrity means that the information is protected from alteration by unidentified persons.
5. Accessibility means that resources can be used by anyone.
6. In general, the term "computer security" is quite broad and multifaceted.
7. It is very important for individual users to maintain control over their personal information.
8. It is important to know who, for what purpose and how uses information about the identity of users.

**Task 8. Make the sentences negative and interrogative:**

**Task 8. Convert the following sentences into interrogative and negative forms:**

1. The term "computer security" is used very frequently.
2. The content of a computer is vulnerable to several risks unless the computer is connected to other computers to form a network.
3. The use of computer networks, especially the Internet, has become widely spread.
4. Confidentiality means that information cannot be accessed by unauthorized parties.

5. Integrity means that information is protected against unauthorized changes that are not detectable to authorized users.

6. Authentication means that the users are those persons who they claim to be.

7. Availability means that resources are accessible by authorized parties.

8. Other important factors of computer security professionals call the access control and nonrepudiation.

9. Privacy is perhaps the most important aspect of computer security for everyday Internet users.

10. It is now very important that individuals are able to maintain control over what information is collected about them, how it is used, who may use it, and what purpose it is used for.

**Task 9. Make up the sentences using the words given below:**

**Task 9. Make sentences from the following words:**

1) cannot, that, by, information, parties, means, be, confidentiality, unauthorized, unauthorized.

2) of, networks, the, especially, computer, has, use, become, the, spread, Internet, widely.

3) important, other, of, factors, computer, professionals, th, security, access, call, and, control, nonrepudiation.

4) is, perhaps, users, the, aspect, of, computer, for, important, everyday, privacy, Internet, most, security.

## **LESSON 5**

### **IS YOUR HOME COMPUTER A TARGET? [1]**

**Task 1. Read and translate the text:**

**Task 1. Read and translate the text:**

Is your home computer a popular target for computer robbers? Why? It is so, because intruders want what you've stored there. They look for the numbers of your credit cards, bank account information, and anything else they can find. By stealing that information, all thefts can use your money buying themselves goods and services.

But they need not only the money-related information. These thefts also want your computer, it means your hard disk space, your fast processor, and your Internet connection. They use resources to attack other computers on the Internet. In fact, the more computers an intruder uses, the harder it is for law enforcement to find out where the attack is really coming from. If they can't be found, they can't be stopped, and they can't be prosecuted and imprisoned.

Why do criminals pay attention to home computers? Home computers are typically not very secure and are easy to break into. When combined with high-speed Internet connections that are always turned on, they can quickly find and then attack home computers. While thefts also attack home computers connected to the Internet through dial-in connections, high-speed connections (cable modems and DSL modems) are a favorite target.

No matter how a home computer is connected to the Internet, attacks of such people are often successful. Many home computer owners don't realize that they need to pay attention to computer security. In the same way that you are responsible for having insurance when you drive a car, you also need to be responsible for your home computer's security.

The purpose is to keep computer robbers and their programs off your computer. How do they break into your computer? In some cases, they send you an e-mail with a virus. When you read such e-mail you activate the virus, creating an opening that use to enter or access your computer. In other cases, they take advantage of a defect or weakness in one of your computer's programs-a vulnerability-to gain access.

Once they're on your computer, they often install new programs that let them continue using your computer-even after you closed all the holes they used to get onto your computer in the first place. These backdoors are usually cleverly disguised so that they blend in with the other programs running on your computer.

**Task 2. Answer the following questions:**

**Task 2. Answer the following questions:**

1. Why are computer robbers paying attention to home computers?

2. What are they looking for?
3. Is it difficult to find a thief?
4. Why are the attacks of such people often successful?
5. How do intruders break into your computer?

**Task 3. Find the English equivalents in the text and make up sentences:**

**Task 3. Looking through the text, find the equivalents of expressions and make sentences with them:**

Use resources, hard disk space, high-speed Internet connection, pay attention to security, have insurance, be responsible for something, send an e-mail, activate a virus, computer program flaws.

**Task 4. Say whether the statements given below are true or false:**

**Task 4. Determine the truth or falsity of the following sentences:**

1. All thefts can use your money buying themselves goods and services.
2. These thefts also want your computer.
3. They use resources to attack other computers son the Internet.
4. The more computers an intruder uses the easier for law enforcemen to find him out.
5. Home computers are typically very secure.

**Task 5. Complete the sentences:**

**Task 5. Complete the sentences:**

1. They look for ... they can find.
2. These thefts also want your computer, it means ... .
3. In fact, the more computers an intruder uses, the harder it is ... .
4. When ... intruders can quickly find and then attack home computers.
5. Many home computer owners ... .
6. ... you also need to be responsible for your computer's security.
7. The purpose is to ... .

**Task 6. Translate from English into Russian:**

**Task 6. Translate from Russian into English:**

1. Regardless of how your computer is connected to the Internet, their attacks are often very successful.

2. Many owners of home personal computers do not realize the need to take care of computer security.

3. Just as you should carry insurance when driving a car, you should take care of the safety of your computer.

**Task 7. Make the sentences negative and interrogative:**

**Task 7. Transform the following sentences into interrogative and negative forms:**

1. But they need not the only money-related information.

2. They use resources to attack other computers on the Internet.

3. If intruders can't be found, they can't be stopped, and they can't be prosecuted and imprisoned.

4. No matter how a home computer is connected to the Internet, attacks of such people are often successful.

5. The purpose is to keep computer robbers and their programs off your computer.

6. When you read such e-mail you activate the virus, creating an opening that intruders use to enter or access your computer.

7. They take advantage of a defect or weakness in one of your computer's programs to gain access.

**Task 8. Write the plural form of the following nouns:**

**Task 8. Form the plural of the following nouns:**

target, intruder, bank account, space, Internet connection, modem, purpose, e-mail, weakness, virus, program.

## **LESSON 6**

### **THINKING ABOUT YOUR HOME COMPUTER [1]**

**Task 1. Read and translate the text:**

**Task 1. Read and translate the text:**

E-mail, instant messaging, and most web traffic go across the Internet in the clear; it means that anyone who can capture that information can read it. This is the most necessary information you ought to know. You should always select and use strong passwords and apply due care when reading all e-mail, especially its uninvited variety. These are things you ought to do. Finally, you can use a firewall, an anti-virus program, patches, and file encryption to improve the level of security on your home computer, and we'll call these things you ought to install.

#### What You Ought To Know.

Knowledge is power-Nam et ipsa scientia potestas est-Francis Bacon (1561-1626). For solving home computer security problems the starting point is your awareness of how the Internet and some of its technologies work. If you know how they work, you can evaluate solutions to the coming problems. You can also use the Internet more safely and responsibly. Here, we'll mention about trust.

Human beings are trusting by nature. We trust very much in what we hear on the radio, see on television, and read in the newspaper. We trust in the information on the labels on packages. We trust the mail we receive. We trust our parents, our partner or spouse, and our children. We trust our co-workers. In fact, those who don't trust much are thought to be cynical. Their opinions may be all too quickly ignored or dismissed.

The Internet was built on trust. Back in the mid 1960s, computers were very expensive and slow by today's standards, but still quite useful. To share the expensive and sparse computers installed around the country, the U.S. government funded a research project to connect these computers together so that other researchers could use them remotely. This project was called the ARPAnet, named after the government research agency-ARPA, the Advanced Research Projects Agency-that funded managed the project.

#### **What You Ought To Do**

Though you are trustful, you ought to be careful. Install a firewall program, virus-checking programs and an anti-virus program. Check your home for viruses regularly and cure the infected files. Don't forget to update your anti-virus program

or change it for the most modern and effective one if necessary. Trust, but be careful.  
Now, when you are warned you are armed.

**Task 2. Answer the following questions:**

**Task 2. Answer the following questions:**

1. What is the safety of a home computer?
2. Why is it necessary to know how to secure a home computer?
3. What should be done, if the computer is infected by the Virus?
4. Why is it necessary to pay attention to it?
5. What is the Anti-virus program?
6. How does it work?
7. How do you know that the label information is valid?
8. What should I do to secure my home computer?
9. Why do you store the important items in a locked container?
10. What year was an Internet built?

**Task 3. Find the English equivalents in the text and make up sentences:**

**Task 3. Looking through the text, find the equivalents of expressions and make sentences with them:**

e-mail, get hold of information, use password, necessary caution, evaluate decisions, gullible by nature, install protection, infected files, update programs, forewarned is forearmed.

**Task 4. Say whether the statements given below are true or false.**

**Task 4. Determine the truth or falsity of the following sentences:**

1. You should always select and use strong passwords.
2. Apply due care when reading all e-mail, especially its uninvited variety.
3. You can use a firewall, an anti-virus program, patches, and file encryption to improve the level of security on your home computer.
4. Human beings are unbelieving by nature.
5. We don't trust very much in what we hear on the radio, see on television, and read in the newspaper.
6. We never trust in the information on the labels on packages.

7. Check your home for viruses from time to time and cut out the infected files.

**Task 5. Complete the sentences:**

**Task 5. Complete the sentences:**

1. You should always select and use ... .
2. ... to improve the level of security on your home computer.
3. For solving home computer security problems the starting point is ... .
4. If ... you can evaluate solutions to the coming: problems.
5. We trust very much in what we ... .
6. Those who don't trust much ... .
7. Don't forget to ... if necessary.

**Task 6. Translate from Russian into English:**

**Task 6. Translate from Russian into English:**

1. Although you are gullible, you need to be careful.
2. Install Firewall, virus scanners, and antivirus programs.
3. Regularly scan your computer and "disinfect" infected files.
4. Do not forget to update your antivirus protection or replace it with a more modern and effective one, if necessary.
5. Trust, but be careful.
6. Now that you've been warned, you're forearmed.

**Task 7. Make the sentences negative and interrogative:**

**Task 7. Convert the following sentences into interrogative and negative forms:**

1. This is the most necessary information you ought to know.
2. You should always apply due care when reading all e-mail, especially its uninvited variety.
3. If you know how they work, you can evaluate solutions to the coming problems.
4. Human beings are trusting by nature.
5. In fact, those who don't trust much are thought to be cynical.

6. Don't forget to update your anti-virus program or change it for the most modern and effective one if necessary.

## **LESSON 7**

### **"GETTING INSIDE" A COMPUTER SYSTEM [2]**

**Task 1. Read and translate the text:**

**Task 1. Read and translate the text:**

Essentially, hackers get inside a computer system by taking advantage of software or hardware weaknesses that exist in every system. Before explaining how they do this, a few definitions are in order. The term "hacker" is fairly controversial: some use this word to describe those whose intrusions into computer systems push the boundaries of knowledge without causing intentional harm, whereas "crackers" want to wreak havoc. So, the term "unauthorized user" (UU) seems more preferable for anyone who engages in unsanctioned computer access. "Getting inside" can mean one of three things: accessing the information stored on a computer, surreptitiously using a machine's processing capabilities (to send spam, for instance) or capturing information being sent between systems.

So how does a UU get inside a computer? The easiest weakness to exploit is a poorly conceived password. Password cracking programs can identify dictionary words, names and even common phrases within a matter of minutes. Many of these programs perform a "dictionary attack": they take the encryption code used by the password system and encrypt every word in the dictionary. Then the UU plugs in the encrypted words until the password match is found. If a system has complex password, the UU could try a "technical exploit", which means using technical knowledge to break into computer system (as opposed to nontechnical options such as stealing documentation about a system). This is more challenging, because the UU must learn what kind of system the target is and what the system can do. A proficient UU can do this remotely by utilizing a hypertext transfer protocol (http) that gains World Wide Web access. Web pages usually record the browser being used. The UU could write a program that takes advantage of this procedure, making

the Web page ask for even more information. With this knowledge in hand, the UU then writes a program that circumvents the protections in place in the system.

Although you cannot eliminate all possible weakness, you can take steps to protect against unauthorized access. Make sure you have the latest patches for your operating system and applications. Create a complex password with letters, numbers and symbolic characters. Consider installing a firewall program, which blocks unwanted Internet traffic. Make sure your antivirus software is up-to-date and check frequently for new virus definitions. Finally, back up your data, so you can recover important material if anything does happen.

**Task 2. Answer the following questions:**

**Task 2. Answer the following questions:**

1. What does the term "UU" mean?
2. How can "UU" get inside a computer?
3. What steps can you take to protect against unauthorized access?
4. What does "getting inside" mean?

**Task 3. Find the Russian equivalents for the words and word-combinations given below:**

**Task 3. Translate the following phrases into Russian:**

processing capabilities, poorly conceived password, password cracking programs, within a matter of minutes, dictionary attack, encrypted words, hypertext transfer protocol, firewall program, unwanted Internet traffic, to up-to-date software.

**Task 4. Translate the words given below into Russian:**

**Task 4. Translate the words into English:**

a hacker, a cracker, a password, software, hardware, unauthorized user, World Wide Web.

**Task 5. Fill in the blanks, using word-combinations from task 2:**

**Task 5. Fill in the blanks using phrases from task 2:**

1. The easiest weakness to exploit is ....
2. Programs can identify dictionary words, names and phrases within ...
3. Consider installing a ... program, which blocks ...

4. Although you cannot eliminate all possible weaknesses, you can take steps to protect against ....

5. Make sure your antivirus software is ...

**Task 6. Translate the sentences into English:**

**Task 6. Translate the following sentences into Russian:**

1. Basically, hackers penetrate a computer by taking advantage of the weaknesses of programs and hardware that exist in any system.

2. An unauthorized user can gain access to the information stored in the computer, take advantage of the software capabilities of the machine and intercept the information.

3. Special programs can crack the password in a few seconds.

4. While you can't fix all the weaknesses, you can protect your computer from unauthorized access.

## **LESSON 8**

### **SHADOW DATA (PART 1) [1]**

**Task 1. Read and translate the text:**

**Task 1. Read and translate the text:**

Have you ever thought about why some government agencies require computer data to be erased by overwriting it at least seven times or even more? Have you ever thought why classified (or secret) government agencies prefer to destroy computer hard disk drives rather than surplus them? The reasons for these levels of paranoia are valid and they are connected with the potentials of security breaches tied to shadow data.

When computer data is written to a floppy disk, zip disk, hard disk or tape, a mechanical device called a head is used to write the data. The information is stored electronically in magnetic patterns of binary ones and zeros. The patterns are in the form of sectors which are written consistently in concentric rings called tracks. The process is fast and efficient. However, it also involves the use of a mechanical device which operates with less than exact tolerance levels. Horizontal head straightening and vertical head placement is just a bit different every time the information is

written and rewritten to the same track. This situation limits the effectiveness of software data scrubbers and it creates the potential for government security breaches on well used storage devices. Thus, government agencies require multiple writes when data is destroyed with data scrubbers. However, even multiple writes can not guarantee complete removal of legacy data. The last data that remains on the track is called shadow data. However, NTI's M-Sweep Pro Software removes almost all potentials for the forensic recovery of shadow data.

Shadow data contains the leftovers of computer data that was written previously to a track and it is located slightly outside the track's last recording path. It gets a bit more complicated though. There are actually two reasons which cause shadow data to come about: mechanical issues and magnetic issues. To illustrate the mechanical issues, imagine a long, straight road of a consistent width. A car traveling along that road has a paint sprayer attached to its bumper, and paints a line as it goes. Mechanical shadow data manifests itself due to imperfections in the drive's servomechanism which causes the write arm, which holds the write head over the drive's surface, to shake horizontally to the left and right to a certain extent. This would be analogous to our vehicle weaving back and front on the road as the paint sprayer continues doing its job. The resulting painted line would not be in a straight line, but something like elongated "s" pattern. Each pass of the write head varies slightly creating new elongated "s" patterns within the bounds of the storage space assigned to the track.

The source of magnetic shadow data is analogous to the paint sprayer's nozzle being moved up and down vertically as the line is painted. If it is high, the paint spray pattern will be wide. If it is low, the paint pattern will be narrow and the painted line will be thin. With this analogy the paint over spray would be shadow data which would not be completely covered if a new line were to be painted on the road. This splatter effect is actually caused by variances in signal strength as the head moves up and down vertically as the data is written to the track.

**Task 2. Answer the following questions:**

**Task 2. Answer the following questions:**

1. Why do secret agencies need to erase by overwriting data many times?
2. What device is used to write data on floppy, zip or hard disks?
3. How hard disk is arranged?
4. What is the shadow data?
5. What are the phenomena of shadow data to come about?
6. How you can illustrate the mechanical issues of shadow data?
7. What is the source of magnetic shadow data?

**Task 3. Find the English equivalents of the words given below in the text and make sentences with them:**

**Task 3. Write definitions of the following terms and make sentences with them:**

hard disk drive, floppy diskette, zip disk, hard disk, software data, storage space.

**Task 4. Match the words:**

**Task 4. Connect the words from the left and right columns in such a way as to get terminological combinations:**

|           |            |
|-----------|------------|
| data      | placement  |
| device    | horizontal |
| alignment | storage    |
| head      | electronic |

**Task 5. Say whether the statements given below are true or false:**

**Task 5. Determine the truth or falsity of the following sentences:**

1. When computer data is written to a floppy disk, zip disk, hard disk or tape, a mechanical device called a head is used to write the data.
2. The information is stored electronically in magnetic patterns of binary ones and zeros.
3. Horizontal head straightening and vertical head placement is just the same every time the information is written.
4. Multiple writes can guarantee complete removal of legacy data.
5. There is only one reason which causes shadow data to come about.

**Task 6. Complete the sentences according to the text:**

**Task 6. Complete the sentences:**

1. The reasons for these levels of paranoia are ... .
2. The information is stored electronically in ... .
3. However, it also involves the use of a mechanical device which ... .
4. Thus, government agencies require ... .
5. The last data that remains on the track is ... .
- 6 .... can not guarantee complete removal of legacy data.
7. ... removes almost all potentials for the forensic recovery of shadow data.
8. .... that was written previously to a track and it is located slightly outside the track's last recording path.

**Task 7. Translate the sentences from Russian into English:**

**Task 7. Translate sentences from Russian into English:**

1. As a result, the line will not be straight, but will look like an elongated letter "s".
2. Each movement of the writing head is slightly different, creating a new sample of this elongated "s" within the boundaries of the memory allocated to the track.

**LESSON 9**

**SHADOW DATA (PART 2) [1]**

**Task 1. Read and translate the text:**

**Task 1. Read and translate the text:**

Finally, vertical ... (computer data, shadow data, electronic data) may also exist in the material used to store the magnetic imprint. On some storage devices the material consists of iron oxide layers which have been sprayed on the platter of a ... (hard disk drive, floppy disk, zip disk) or on plastic Mylar sheets used in the manufacture of floppy diskettes. In staying with the spray paint analogy, imagine that our road in the previous examples is porous. When the paint is sprayed onto the road, some of it may seep downward into the porous asphalt that makes up the surface of the road. Later, when another line of a different color is painted onto the road, the horizontal imperfections will also be manifested as differences in depth and the new

paint will also seep into the porous layers of asphalt. If we were to slice off layers of the asphalt, the original painted line, in some places, will be overlapped with the new color. But remnants of the original paint will also exist. When this analogy is compared to writes made to a hard disk drive, the layering occurs due to physical flaws in the ... (news media, storage media, hard disc media) and variances in the ability of the platters coating to hold a magnetic charge.

Since the write heads path will always vary slightly, within allowable tolerances, it is theoretically impossible to guarantee the secure wipe of a floppy diskette, hard disk drive or tape using a software solution. However, multiple overwrites can increase the effectiveness of a ... (security scrub, removing program, write head). But strictly speaking, some data may still remain behind after a data scrub for discovery. You should be aware, however, that the recovery of shadow data is no easy task. Specialized and very expensive equipment is required to reliably recover shadow data. The costs of the necessary equipment and the expert staff required to perform the ... (input process, data extraction process, printing process) puts the process beyond the reach of most private sector corporations. From a computer forensics standpoint, shadow data has yet to become a source of reliable computer evidence. This is, in part, because of the costs involved. Another factor pertains to the potentials of data bleed from one layer of shadow data to another. This problem taints the computer evidence and makes it difficult to differentiate one level of ... (computer data, legacy data, shadow data) from another.

If you have an interest in researching and experimenting with shadow data, basic tools are available for free download over the Internet. However, we must stress that the reliability of these methods and techniques does not produce evidence grade results from a computer forensics standpoint. Software solutions provide ... (strong results, limited success, viruses) because they rely upon the same mechanical flaws discussed above. But, such software solutions in the wrong hands could still create a security risk. We should also point out that the use of basic data recovery tools and techniques do not compare with the tools and techniques used by US

government agencies in the identification and extraction of shadow data. They are the true experts in this area.

As an additional note, older encoding methods, e.g., MFM and RLL, make the recovery of shadow data a bit less difficult. Newer hard disk drive technologies, however, make recovery of shadow data a bit less fruitful, because the drive densities require higher frequencies to write data to narrower tracks. This limits ... (access, writing, erasure) to the shadow data, because the signal strength and write frequencies are not as strong as with older technologies. Furthermore, some of the "splatter" effect is reduced with the newer ... (hard disk drive, floppy disk, zip disk) technologies because of tighter manufacturing tolerances. Finally, higher hard disk drive RPM's make the mechanical "wobble" much less pronounced than with older technologies. This does not eliminate the threat shadow data poses; enough shadow data, still exists to provide some insight into the data on a given hard drive. Today's hard disk drive technology does, however, limit the potentials of security risks tied to shadow data somewhat.

... (floppy diskettes, zip disk, mass storage devices) pose a higher level of threat, as it relates to shadow data, than computer hard disk drives. Since floppy diskettes are encoded using older encoding formats, they are more "porous" (less dense), and floppy disk heads write much less efficiently than hard disk write heads. If you want to experiment with shadow data, floppy diskettes might be a good place to start.

Modern computer forensic search tools used in computer related investigations and in computer security risk reviews will not find search terms which may exist in the form of shadow data. This is because the controllers on the drive either incapable or not set to find shadow data. This should (bring a certain level of comfort to most private sector computer users. However you should still be aware that the risk exists and that someone may be willing to pay the price to "steal" corporate and government secrets stored in the form of ... (computer data, shadow data, electronic data).

**Task 2. Answer the following questions:**

**Task 2. Answer the following questions:**

1. Where else can shadow data exist?
2. What layers have been sprayed on the platter of a hard disk drive?
3. Which is the preferable variant to experiment with shadow data?
4. Why is it theoretically impossible to guarantee the secure wipe of a floppy diskette, hard disk drive or tape using a software solution.
5. What equipment is required to reliably recover shadow data?
6. What should bring a certain level of comfort to most private sector computer users?

**Task 3. Are the sentences given below true or false:**

**Task 3. Determine the truth or falsity of the following sentences:**

1. It is theoretically impossible to guarantee the secure wipe of a floppy diskette, hard disk drive or tape using a software solution.
2. Some data may still remain behind after a data scrub for discovery.
3. Specialized and very expensive equipment is not required to reliably recover shadow data.
4. Reliability of some methods and techniques produce evidence grade results from a computer forensics standpoint.
5. The use of basic data recovery tools and techniques can be compared with the tools and techniques used by US government agencies in the identification and extraction of shadow data.
6. Newer hard disk drive technologies, however, make recovery of shadow data a bit less fruitful.
7. When the paint is sprayed onto the road, some of it may seep downward into the pores asphalt that makes up the surface of the road.

**Task 4. Find the English equivalents of the words given below in the text and make up sentences with them:**

**Task 4. Write definitions of the following terms and make sentences with them:**  
extraction, encoding, shadow data, storage devices, write heads, recovery tools.

**Task 5. Complete the sentences:**

**Task 5. Complete the sentences:**

1. When the paint is sprayed onto the road, some of it may ... .
2. When another line of a different color is painted onto the road, the horizontal imperfections will also be ... .
3. When this analogy is compared to writes made to a hard disk drive ... .
4. However, multiple overwrites can increase the effectiveness of ... .
5. .... is required to reliably recover shadow data.
6. Another factor pertains to the potentials of data ... .
7. .... a bit less fruitful, because the drive densities require higher frequencies to write data to narrower tracks.
8. .. and floppy disk heads write much less efficiently than hard disk write heads.

**Task 6. Make the sentences negative and interrogative:****Task 6. Convert the following sentences into interrogative and negative forms:**

1. When the paint is sprayed onto the road, some of it may seep downward into the pours asphalt that makes up the surface of the road.
2. If we were to slice off layers of the asphalt, the original painted line, in some places, will be overlapped with the new color.
3. It is theoretically impossible to guarantee the secure wipe of a floppy diskette, hard disk drive or tape using a software solution.
4. You should be aware, however, that the recovery of shadow data is no easy task.
5. From a computer forensics standpoint, shadow data has yet to become a source of reliable computer evidence.
6. As an additional note, older encoding methods, e.g., MFM and RLL, make the recovery of shadow data a bit less difficulty.

**LESSON 10****HOW TO PROTECT AGAINST SHADOW DATA****SECURITY RISKS [1]**

### **Task 1. Read and translate the text:**

### **Task 1. Read and translate the text:**

Probably the first ... (most effective), step in reducing your vulnerability to shadow data leakage is knowledge that it exists (on your storage device). Knowing that shadow data potentially exists will ensure that you ... (at least) weigh the risks and make informed decisions concerning the scrubbing of data, degaussing storage devices and in managing the risks.

U. S. government classified data handling instructions call for a certain specifications concerning the disposal of computer ... (storage devices). Data scrubbing through the use of multiple overwrites is one potential solution. While this procedure is not 100% fool-proof; it does ... (significantly reduces) the likelihood of shadow data becoming a threat in your organization. Using old RLL-encoded drives, Peter Gutman of the speculated, in his document "Secure Deletion of Data from Magnetic Memory Devices", that overwriting a drive 35 times with varying hexadecimal values may force the write head to vary magnetic effect on the iron oxide particles to such an extent as to remove the shadow data. Still, there is ... (no guarantees University of Auckland) that software solutions will effectively wipe out all this information because the process relies on the drive's controller, which is not suited for this purpose.

High-intensity degaussing of a hard drive platter, floppy diskette, zip disks and tape is probably the ... (the best way) to ensure the elimination of threats associated with shadow data. This is an effective process to use when storage devices are being retired from service. Be mindful that the degaussing of a hard disk drive must be performed after the platters have been removed. Otherwise, the hard disk drive will act as a protective shield and some shadow data may survive. The complete incineration of floppy diskettes, zip disks and tapes also ... (can be used) to remove any security threats associated with shadow data.

Corporate and government policies concerning the disposal of computer storage devices should always ... (take into account) the potentials of shadow data as a potential data security risk. With knowledge and proper controls in place,

shadow data should not become a security problem for most government agencies and corporations.

**Task 2. Answer the following questions:**

**Task 2. Answer the following questions:**

1. What is the most effective step in reducing your vulnerability to shadow data?
2. What are the other steps to protect from shadow data?

**Task 3. Find the words given below in the text:**

**Task 3. Find the following expressions in the text:**

Vulnerability mitigation, data wipe, storage devices, typewriter, hard drive degaussing, threat mitigation.

**Task 4. Are these statements true or false?:**

**Task 4. Determine the truth or falsity of the following sentences:**

1. Knowing that shadow data potentially exists will ensure that you at least weigh the risks.
2. Data scrubbing through the use of multiple overwrites is on potential solution.
3. Overwriting a drive 35 times with varying hexadecimal values may force the write head to vary magnetic effect on the iron oxide particles to such an extent as to remove the shadow data.
4. The degaussing of a hard disk drive can't be performed after the platters have been removed.
5. Without knowledge and proper controls in place, shadow data have become a security problem for most government agencies and corporations.

**Task 5. Complete the sentences:**

**Task 5. Complete the sentences:**

1. Knowing that shadow data potentially exists will ensure: that you ... .
2. Data scrubbing through the use of multiple overwrites ... .
3. While data scrubbing is not 100% fool-proof; it ... .

4. Still, there is no guarantee that software solutions will effectively wipe out all this information because ... .

5. High-intensity degaussing of a hard drive platter, floppy diskette, zip disks and tape is probably the ... .

6. Be mindful that the degaussing of a hard disk drive must be performed after ..... .

7. The complete incineration of floppy diskettes, zip disks and tapes also ... .

**Task 6. Find the Russian equivalents:**

**Task 6. Translate the following words into Russian:**

leakage, disposal, data scrubbing, wipe out, degaussing, incineration.

## **LESSON 11**

### **CRYPTOGRAPHY [1]**

**Task 1. Read and translate the text:**

**Task 1. Read and translate the text:**

Cryptography is ... (no longer is) a military thing that should not be messed with. It is time to demystify cryptography and make full use of the advantages it provides for the modern society. In the following, basic terminology and the main methods of cryptography ... (presented). Any opinions and evaluations presented here are speculative, and the author cannot be held responsible for them.

#### **I. Basic Terminology**

Suppose that someone wants to send a message to a receiver, mid wants ... (be sure) that no-one else can read the message. However, ... (there is a possibility ) that someone (vise opens the letter or hears the electronic communication. In cryptographic terminology, the message ... (called) plaintext or cleartext. Encoding the contents of the message in such a way that hides its contents from outsiders is called encryption. The encrypted message is called the ciphertext. The process of retrieving the plaintext from the ciphertext is called decryption. Encryption and decryption usually make use of a key, and the coding method is such that decryption ... (can be done) only by knowing the proper key.

Cryptography is the art or science of keeping messages secret. Cryptanalysis is the art of breaking ciphers, i.e. retrieving the plaintext ... (without knowledge) the proper key. People who do cryptography are cryptographers, and practitioners of cryptanalysis are crypt analysts.

Cryptography deals with all aspects of secure messaging, authentication, digital signatures, electronic money, and other applications. Cryptology ... (is a branch) of mathematics that studies the mathematical foundations of cryptographic methods.

## **II. Basic Cryptographic Algorithms**

A method of encryption and decryption is called a cipher. Some cryptographic methods rely on the secrecy of the algorithms; such algorithms are only of historical interest and are ... (do not match) for real-world needs. All modern algorithms use a key to control encryption and decryption; a message can be decrypted only if the key matches the encryption key. The key used for decryption ... (may differ) from the encryption key, but for most algorithms they are the same. There are two classes of key-based algorithms, symmetric (or secret-key) and asymmetric (or public-key) algorithms. The difference is that symmetric algorithms use the same key for encryption and decryption (or the decryption key is easily derived from the encryption key), whereas asymmetric algorithms use a different key for encryption and decryption, and the decryption key cannot be derived from the encryption key.

Symmetric algorithms ... (can be separated) into stream ciphers and block ciphers. Stream ciphers can encrypt a single bit of plaintext at a time, whereas block ciphers take a number of bits (typically 64 bits in modern ciphers), and encrypt them as a single unit.

Asymmetric ciphers ... (also called) public-key algorithms or generally public-key cryptography) permit the encryption key to be public (it can even be published in a newspaper), allowing anyone to encrypt with the key, whereas only the proper recipient (who knows the decryption key) can decrypt the message. The encryption key is also called the public key and the decryption key the private key or secret key.

Modern cryptographic algorithms cannot really be executed by humans. Strong cryptographic algorithms are designed ... (to run) by computers or specialized hardware devices. In most applications, cryptography is done in computer software.

Generally, symmetric algorithms are much faster to execute on a computer than asymmetric ones. In practice they are often ... (used together), so that a public-key algorithm is used to encrypt a randomly generated encryption key, and the random key is used to encrypt the actual message using a symmetric algorithm.

**Task 2. Answer the following questions:**

**Task 2. Answer the following questions:**

1. What is a cipher?
2. What are two classes of key-based algorithms?
3. What are symmetric algorithms?
4. What are asymmetric algorithms?
5. What are stream ciphers?
6. What are block ciphers?
7. What is the proper recipient?
8. What is the encryption key?
9. What is the decryption key?

**Task 3. Find the English equivalents in the text:**

**Task 3. Find the equivalents of the following expressions in the text:**

no longer is; what should not be dealt with; now is the time (the moment has come); to take full advantage; all opinions and evaluations are theoretical (speculative); the author cannot be held responsible; kept secret; are of only historical interest; have nothing to do with real needs; at the same time; a whole series (of bits); cannot be performed by man; much faster; in large bookstores, libraries, patent offices and on the Internet; well known.

**Task 4. Say whether the statements given below are true or false:**

**Task 4. Determine the truth or falsity of the following sentences:**

1. Cryptography is still a military term.
2. In cryptographic terminology, the message is called plaintext or cleartext.

3. The process of retrieving the plaintext from the ciphertext is called decryption.
4. Encryption and decryption usually use a key, and decryption can be done only by knowing the proper key.
5. Cryptography deals only with secure messaging.
6. A message can be decrypted only if the key matches the encryption key.
7. Modern cryptographic algorithms can really be executed by humans.

**Task 5. Complete the sentences:**

**Task 5. Complete the sentences:**

1. In cryptographic terminology, the message ....
2. Encoding the contents of the message ...
3. Cryptography is the art or science of ...
4. Cryptography deals with all aspects of ...
5. All modern algorithms use a key to control ....
6. There are two classes of key-based algorithms ....
7. The difference is that symmetric whereas asymmetric algorithms use  
whereas asymmetric algorithms use ...
8. Modern cryptographic algorithms cannot ...

## **LESSON 12**

### **RISK ASSESSMENT [1]**

**Task 1. Read and translate the text:**

**Task 1. Read and translate the text:**

I. Risk assessment should be among the first steps in your design process, and will help you frame your further efforts to design a ... (security system). Making risk assessment a priority will also help you ... (convince) your executive officers to be both informed about and integral to the beginnings of your securely designed project. During the risk assessment phase of design, you may find important supporters and champions among the executive officers: you should actively recruit their participation if they're not ... (not yet involved).

II. Business majors and MBAs already know about the managerial aspects of risk assessment. This methodology is heavily used in most ... (office), especially with respect to business planning. Risk assessment is no less important in secure, ... (well-designed software ) or applications development projects. Take advantage of the fact that your managers and executives are probably already familiar with ... (risk assessment methodology ). Armed with a common language and methodology, you can inform your managers of the relative risks to which the application exposes you or your customers, and you can additionally leverage their and buy-in. This will help you in the end: if there should ever be an attack on your application, you will already have a champion to go to bat for the ... (integrity) of your application and the care with which it was designed.

III. The basic steps of risk assessment are as follows:

1. Identify protected resources.
2. Assign relative value.
3. Identify possible attackers.
4. Estimate relative frequency of each kind of attacker.
5. Carry out attack tree analysis (Identify possible attack routes).
6. Protect all possible attack routes (Protect attack routes).

IV. Protected resources include things like your customer database, customer credit card information, or personal information. If you thought about the policies regarding the privacy, disposition and handling of customer information and other social and legal issues you would understand that your risk assessment process ... (depends to a greater extent) on such things. Your executive managers must be involved in deciding these policies.

V. For each resource, assign it a relative value (i.e. your customer credit card database will probably be more valuable than your vendor contact list). Next, ... (identify) possible attackers. Frequent examples are the bored teenager, the disgruntled ex-employee, the corporate spy, or the government intelligence agent.

VI. Estimation of the skill, frequency and methods of the attacker all belong to a related process to risk assessment which Bruce Schneier calls 'attack tree

analysis'. This process helps to formalize what's otherwise a significantly subjective process of analysis and assessment, and can help to prioritize your project's security goals. If you saw chapter 21 of Bruce Schneier's book: *Secrets and Lies: Digital Security in a Networked World* you could know more about attack trees. A ... (highly recommended) resource on all of digital security).

VII. Once you knew what routes or attack you should be ... (protect) (from your attack tree analysis), you would already organize information about the... (type of security) you need to implement in your design. You may also find that this information will be helpful in writing security and privacy policies to accompany your application design efforts.

VIII. Please be very careful ... (performing) your own research about risk assessment. It is very easy to confuse this process with another process, usually called 'security assessment'. A risk assessment is a process that people undertake (sometimes aided by organization-enhancing software) to determine risks surrounding their specific efforts. On the other hand, there are many software tools available for ... (secure scores) that will analyze your network and servers for known vulnerabilities.

IX. Three tips for using these kinds of software tools: 1) if you research the producing company carefully you will be sure you can trust them with the necessary access privileges before (software installation) up mi your network, 2) test the tool in an isolated testing environment ... (before using it) and 3) strongly consider petitioning your internal Information Technology department or Help Desk for permission to run this kind of tool on your company's internal networks. Security assessment tools can be useful, but cannot be 100% effective, and though they may help you do risk assessment for extant problems with existing software, they will not be able to ... (to work for you ) in regard to designing and developing new software and applications.

**Task 2. Find the Russian equivalents:**

**Task 2. Translate into Russian:**

risk, assessment, attack tree analysis, customer database, security assessment, relative value, access privileges.

**Task 3. Are the statements given below true or false:**

**Task 3. Determine the truth or falsity of the following sentences:**

1. During the risk assessment phase of design, you may not find important supporters and champions among the executive officers.

2. Risk assessment is less important in secure, well designed software or applications development projects.

3. If there should ever be an attack on your application, you will already have a chance to go to bat for the integrity of your application and the care with which it was designed.

4. Protected resources include things like your customer database, customer credit card information, or personal information.

5. Your vendor contact list will probably be more valuable than your customer credit card database.

**Task 4. Complete the sentences:**

**Task 4. Complete the sentences:**

1. Making risk assessment a priority will also help you ... .

2. If there should ever be an attack on your application, ... .

3. Protected resources include things like ... .

4. .... which Bruce Schneier calls 'attack tree analysis'.

5. .... you would already organize information about the kind of security you need to implement in your design.

6. It is very easy to confuse ... .

7. A risk assessment is a process ... .

**Task 5. Translate the sentences given below into English:**

**Task 5. Translate sentences from Russian into English:**

1. Risk assessment is a process that people start (sometimes with the help of special software) in order to determine possible risks to their professional activities.

2. There are also special computer programs that can assess security by checking the network and servers for possible lesions.

## **LESSON 13**

### **MICROCOMPUTER AND MICROPROCESSOR [2]**

**Task 1. Read and translate the text:**

**Task 1. Read and translate the text:**

1. Since the transistor was invented, no single electronics innovation has had such an impact as microcomputer. Powered by tiny semiconductor chips containing computing elements with the same power and functions previously found only in large scale computers, these microcomputers systems are now being applied to literally thousands of applications. Microcomputers are automating assembly lines, providing the heart of sophisticated electronic games, making "intelligent" computer peripherals even faster. This revolution is occurring because microcomputers are very inexpensive, easy to implement into a system, and significantly reduce the time and cost of product development.

2. The microcomputers were the first computers to use a single microprocessor chip as the processor. Personal computers and small business computers are microcomputers. 8-bit microcomputers usually support only one user terminal and have a maximum of 64 KB of memory. 16-bit microcomputers may support several user terminals and usually have a maximum of 1 million bytes of memory. As the power of microcomputers increases, they can be used in two ways. They can be used either as a central computer (providing processing for several user terminals), or as a more powerful single computer for an individual user (see Fig. 4).

3. A microprocessor is the tiny processor used, as mentioned above, in microcomputers. The microprocessor requires a power supply and memory to be a complete computer. Microprocessors are also used in minicomputers, mainframes and peripheral devices, as well as in all industrial and consumer products which use a computer.

4. As usual processors all microprocessors have the ability to fetch (obtain from memory) and execute a limited set of instructions, to perform addition and

subtraction on a binary word, and to input (take in) and output (put out) binary data. After fetching an operational code from the program in memory, while this operation is being executed, the program counter is automatically incremented by one unit. At the completion of the instruction, it is then ready with the address for the following program instruction. In many situations the microprocessors have many more capabilities that application requires.

5. In conclusion some words more about single-chip microcomputers. They, where control functions and memory circuits reside on one chip, are beginning to appear in consumer appliances. One of their attractions is the fact that programmable read-only memories (PROMs) that can be included on these chips require no electrical power to retain data. In addition to providing permanent storage, PROMs also allow one type of micro to be stocked as a standard component that can be programmed individually to provide a variety of control functions.

6. Just as computer circuits have grown smaller, so too have memory circuits. Moreover, new technologies such as the bubble memory and Josephson-junction memory show the ability for providing more compact memories that retain data with little or no applied power. These new memories allow micros to be used where power is not always available and conventional read-only memories do not have enough capacity.

**Task 2. Answer the following questions:**

**Task 2. Answer the following questions:**

1. What is the reason for advent of microcomputers?
2. What component do the microcomputers use as the processor?
3. What is a microprocessor?
4. Where are microprocessors used?
5. What ability has the microprocessors?
6. What new progressive technologies are used in memory units?
7. What memories are used in microcomputers?

**Task 3. Find the English equivalents for the following words given below in the text:**

**Task 3. Find the equivalents of the following words in the text:**

In addition, standard, element, limited set of commands, peripherals, individual user, no innovation, more powerful, literally thousands of applications, hold data.

**Task 4. Translate the words given below into Russian:**

**Task 4. Read the following words and phrases and translate them into Russian:**

ability, variety, mainframes, reduce, retain, addition, literally, impact, conclusion, innovation, large-scale, permanent, assembly, consumer, counter.

**Task 5. Make the sentences interrogative:**

**Task 5. Put the following sentences in the question form:**

1. In many situations the microprocessors have many more capabilities that application requires.
2. The microprocessor requires a power supply and memory to be a complete computer.
3. Microcomputers are automating assembly lines, providing the heart of sophisticated electronic games, making "intelligent" computer peripherals even faster.
4. This revolution is occurring because microcomputers are very inexpensive, easy to implement into a system, and significantly reduce the time and cost of product development.
5. New technologies such as the bubble memory and Josephson-junction memory show the ability for providing more compact memories that retain data with little or no applied power.

**Task 6. Complete the sentences according to the text:**

**Task 6. Complete the following sentences according to the text:**

1. These new memories allow micros to be used where power is not always available and conventional read-only memories .....
2. Control functions and memory circuits reside on one chip, are beginning to appear .....
3. A microprocessor is the tiny processor used, as mentioned above, in .....

4. The microcomputers were the first computers to use .....
5. Microprocessors are also used in minicomputers, mainframes and peripheral devices, as well as in all .....

## **LESSON 14**

### **KINDS OF PROGRAMS [2]**

**Task 1. Read and translate the text:**

**Task 1. Read and translate the text:**

There are two main kinds of programs which are subdivided as well. They are control programs and systems service programs.

Control Programs, There are some control programs to handle interruptions, I/O operations, transition between different jobs and different phases of the same job, initial program loading (IPL), and symbolic assignment of I/O devices.

Actually, the control program consists of three components:

1. IPL Loader. When system operation is initiated, the hardware IPL reads in this program which then clears unused core storage to zeros, generally performs some housekeeping operations, and then reads in the Supervisor.

2. The Supervisor. It is resident in the low order part core storage whenever any job is being run. It can handle execution of any I / O operations and can provide standard processing for all interrupts, it may also queue I / O operations so that the operation will start as soon as the required channel and device are free.

3. Job Control. When the end of a job is sensed, the user normally turns control over to the Supervisor which then reads in the Job Control program. This program senses and processes all cards; after the new job is loaded, it turns control over to the new job. This system of operation eliminates the necessity of operation intervention between jobs, something which is of particular importance on large computers where the average job time may be less than one minute.

The control program is a large program occupying thousands of bytes. It is usually stored on a magnetic tape or a magnetic disk.

The particular unit on which the program resides is called the System Resident unit.

System Service Programs. They are used to maintain the library: to place new programs into the library, to delete, replace, or change existing programs, to read programs from the library into memory, to link segments of programs written at different times into one program, etc. They are called Librarian and Linkage Editor.

There are three libraries maintained by the Librarian program: 1) core image library, 2) relocatable library, 3) source statement library.

The core image programs includes the processors and control programs and as many of the application programs as the user desires. The relocatable library contains modules which are stored in such a way that each module can be arbitrarily relocated and still be executed correctly. A module may be a complete program or it may be a relatively independent part of a larger program. The source statement library contains macro definitions a sort of collection of standard type statement which can be incorporated into a program to provide some special functions.

**Task 2. Answer the following questions:**

**Task 2. Answer the following questions:**

1. What are control programs?
2. What does the control program consist of?
3. What does IPL Loader mean?
4. What is the Supervisor?
5. What is Job control?
6. What are System Service Programs used for?

**Task 3. Translate the words given below into Russian:**

**Task 3. Read the following words and phrases and translate them into Russian:**

arbitrarily, relocatable, execute, statement, delete, exist, maintain, subdivide, interrupt, assignment, resident, provide, queue, sense, load, intervention, occupy.

**Task 4. Make the sentences interrogative:**

**Task 4. Put the following sentences in the question form:**

1. The relocatable library contains modules which are stored in such a way that each module can be arbitrarily relocated and still be executed correctly.
2. The control program is a large program occupying thousands of bytes.

3. There are three libraries maintained by the Librarian program.
4. The source statement library contains macro definitions.
5. There are two main kinds of programs which are subdivided as well.

**Task.5. Fill in the blanks with the following words given below:**

**Task 5. Instead of blanks, insert the following words in the sentences:**

independent, stored, user, called, the application programs.

1. The core image programs include the processors and control programs and as many of ..... as the user desires.
2. A module may be a complete program or it may be a relatively ..... part of a larger program.
3. It is usually ..... on a magnetic tape or a magnetic disk.
4. The particular unit on which the program resides is ..... the System Resident unit.
5. When the end of a job is sensed, the ..... normally turns control over to the Supervisor which then reads in the Job Control program.

## **LESSON 15**

### **COBOL [4]**

**Task 1. Read and translate the text:**

**Task 1. Read and translate the text:**

COBOL is an acronym for Cumon Business Oriented Language. It is internationally accepted programming language developed for general commercial use. COBOL is a problem oriented high-level language in which the source program is written using statements in English.

A COBOL program is written in four divisions: Identification Division, Environment Division, Data Division, Procedure Division. The Identification Division contains descriptive information that identifies the program being compiled. The Environment Division deals with the specification of the computer to be used for operating the object program, including such information as the size of memory, the number of tape decks, printers and other peripheral devices that will be used; a description of the computer to be used for compiling the source program is

also given here. The Data Division is used to allocate labels to all units of data on which operations are to be performed. All input and output files are defined and associated with the peripheral units to be used for input and output. The Procedure Division gives the step-by-step instructions necessary to solve the problem. These steps are specified by means of instructions expressed in English statements which can be recognized by the compiler and translated into a sequence of machine code instructions capable of being used by the computer to solve the problem.

The advantages of using COBOL are that it is relatively simple to learn, and programs can be quickly written and tested; programmers can easily understand programs not written by themselves, and thus associated documentation can be simplified; and programs can be used on other machines, within the limitations noted above.

The disadvantages are: (1) the relative inefficiency of the resulting object program as compared with a program written in machine code or a machine oriented language and (2) the lack of flexibility imposed by the restrictions on the type of instructions and methods for performing operations in a highly standardized language.

**Task 2. Answer the following questions:**

**Task 2. Answer the following questions:**

1. What is COBOL?
2. How many divisions does a COBOL program have?
3. Can you name them?
4. What does the Procedure Division give?
5. What are the advantages of using COBOL?
6. What are the disadvantages of this program?

**Task 3. Find the English equivalent for the words given below in the text:**

**Task 3. Find the equivalents of the following words in the text:**

recognize, accept, use, include, distribute, compare, contain, relative, related, related, procedure, depict, divide, simplify.

**Task 4. Translate the following words given below into Russian:**

**Task 4. Read the following words and phrases and translate them into Russian:**

relative, associate, simplify, compare, lack, recognize, capable, thus, impose, contain, descriptive, include, allocate, compile, division.

**Task 5. Make the sentences interrogative:**

**Task 5. Put the following sentences in the question form:**

1. The advantages of using COBOL are that it is relatively simple to learn, and programs can be quickly written and tested.
2. The Data Division is used to allocate labels to all units of data on which operations are to be performed.
3. COBOL is an acronym for Common Business Oriented Language.
4. All input and output files are defined and associated with the peripheral units to be used for input and output.
5. It is internationally accepted programming language developed for general commercial use.

**Task 6. Fill in the blanks with the following words given below:**

**Task 6. Instead of blanks, insert the following words into sentences according to meaning:**

flexibility, environment, COBOL, necessary, understand.

1. Programmers can easily ..... programs not written by themselves.
2. The lack of ..... imposed by the restrictions on the type of instructions and methods for performing operations in a highly standardized language.
3. The Procedure Division gives the step-by-step instructions ..... to solve the problem.
4. The ..... Division deals with the specification of the computer to be used for operating the object program.
5. A ..... program is written in four divisions.

**LESSON 16**

**TECHNOLOGY OF AUTOMATA – BASED PROGRAMMING**

**INTRODUCTION [1]**

**Task 1. Read and translate the text:**

**Task 1. Read and translate the text:**

In recent years a great attention has been paid to the development of the technology of programming for the embedded systems and real-time systems. These systems have special requirements for the quality of software. One of the most well-known approaches for this field of tasks is synchronous programming. Simultaneously with the progress of synchronous programming in Europe, in Russia an approach called "automata-based programming" or "state-based programming" is being created. This method could be considered as a type of synchronous programming. It contains such phases of software developing as designing, implementing, debugging and documenting.

Today it has become one of the main terms in software development. After introduction of the term "input action" the term "automaton without outputs" could be brought in. After addition of the term "output action", the term "automaton" could be brought in. It is the finite determined automation. That is why, the sort of programming, which is based on this term was called "automata-based programming" in paper. So the process of software creation could be named "automata software design". The feature of this approach is automata. It is defined with the help of transition graphs. For distinguishing of the codes of these graphs the term "state coding" is to be introduced. When using "multiple state coding" with the help of single variable it is possible to distinguish amount of states which is equal to the amount of variables values.

This allows to introduce in programming the term "program observability". Programming is to be performed using the concept of "state", not the concept of "flag variables". It allows to understand and specify the task and its parts (subtasks) better. It is necessary to note that in automata-based programming debug is performed with the help of drawing up the protocols (logging) in the terms of automata.

In this approach there is a formal and isomorphic method of transfer from the transition graph to the software source code. So when using programming languages of the high level, the most suitable way is to use construction which is similar to

construction "switch" of the programming language "C". That is why the technology of "automata-based programming" in paper was called as "Switch-technology". Nowadays this technology is been developed in several variants, for different types of task to be solved and for various types of computing devices.

### **Slate-Based Programming**

Henceforth automata approach was spread to the event-based (reactive) systems. In systems of this kind all limitations, mentioned above are taken away. It is obvious from the name of these systems that events are used among the input actions. The Role of output actions could be played by arbitrary functions. Any real-time operating system could be used as an environment. For programming for event-based systems with the help of automata a procedural approach to software developing was used. So this kind of programming was called as "state-based programming". Using this method output actions are assigned to the arcs, loops or nodes of the transition graphs (mixed automata are to be used-Moore-Mealy automats). This allows to present sequences of actions, which are reactions to corresponding input actions, in the compact form. On the features of programming for the reactive systems is that liquidation of logic in the event handlers and forming of a system of interacting automata, which are called from these handlers, causes logic centralization. Automata in such a system can interact by nesting, by calling ability and with the help of state numbers interchange.

The system of interconnected automata forms is a system-independent part of software. At the same time system-dependent part is formed by functions of input and output actions, event handlers and so on. Another important feature of this approach is that automata in it is used thrice; for specification, for implementation (they stay in the source code) and for drawing up the protocol, which is performed.

Last property allows to verify the propriety of automata system functioning. Logging is performed automatically, it is based on the created program. This mechanism could be also used for large scale tasks and for a task with difficult, smeared software logic.

Any drawn up protocol could be considered as the action script. For the large tasks it is impossible to use sequence diagrams, cooperation diagrams, which are parts of UML language. That is because usage of UML language listed diagrams are suggested to be drawn up manually on the phase of developing. In automata-based programming protocols will be build automatically at the run-time.

Automata approach is offered to be used not only for controlling system developing, but also for objects of control modeling. This method was APPROVED BYd on the task of developing of controlling system for a ship diesel generator. Mentioned system was specified with help of more than thirteen interacting automata. For describing of a model of the diesel generator automata was also used, while designing each automaton was provided with four following documents:

- verbal description ("expectancies declaration");
- bonds scheme, which explains on the human language all symbols which are involved in automaton's interface;
- state transition graph with symbolic indication of events, input and output actions;
- source code of program module, which realizes state transition graph (also without usage of meaningful identifiers and comments).

These documents replace self documenting programs, which contains meaningful identifiers and comments. These standard facilities cannot ensure understandability and clearness of the source code for further developing, modifying and enlarging. This problem for difficult logic cannot be solved also with the help of self documenting state transition graphs.

This project had been implemented for computing system with architecture ix86. Henceforward described approach was evolved by N.I. Tukkel developing systems for micro-controllers.

Advantage of automata technology is that all design may be done on personal computer using Switch-technology and only on last phase of developing software could be ported to a microcontroller.

**Task 2. Answer the following questions:**

**Task 2. Answer the following questions:**

1. Has a great attention been paid in recent years?
2. Have these systems special requirements for the quality of software?
3. Could this method be considered as a type of synchronous programming?
4. The term event in programming has been used wider and wider in programming, hasn't it been?
5. Were formal methods of program developing for such kind of devices offered?
6. Did henceforth automata approach spread to the event based systems?
7. Any real-time operating system used as an environment, didn't it?
8. Did this method APPROVED BY on the task of developing of controlling system for a generator?
9. Did mentioned system specify with help of more than thirteen interacting automata?

**Task 3. Make up the sentences:****Task 3. Make sentences:**

- That is why, the sort of programming
- These methods are
- In recent years great attention has been
- This method
- Automata in such a system
- So the process of software
- paid to the development of the technology of programming for the embedded systems and real-time systems.
- could be considered as a type of synchronous programming.
- creation could be named "automata software design".
- which is based on this term was called "automata-based programming" in paper.
- can interact by nesting, by calling ability and with the help of state numbers inter change.

- based on the giving specification for the developing project with the help of set of connected transition graphs.

**Task 4. Find the sentences with the words and word-combinations given below in the text:**

**Task 4. Find sentences in the text that contain the following words and expressions:**

- a technology of programming;
- synchronous programming;
- a software development;
- computing devices;
- a searing mode;
- input actions;
- an automata system;
- standard facilities;
- a computing system.

**Task 5. Complete the sentences according to the text:**

**Task 5. Complete the sentences:**

1. These systems have ... .
2. Nowadays a technology is been ... .
3. The term event in the programming has been .... .
4. In work formal methods ... .
5. These methods are based ... .
6. ... it is based on the created program.
7. This paper describes ... .
8. ... which contains meaningful identifiers and comments.
9. Any drawn up protocol could be .... .
10. This project had been ... .

**Task 6. Are the sentences given below true or false:**

**Task 6. Determine the truth or falsity of the following sentences:**

1. These methods could be considered as a type of synchronous programming.
2. That is why the sort of programming, which is based on this term was called "state-based programming" in paper.
3. That is why the technology of "state-based programming" in paper was called as "switch-technology".
4. So this kind of programming was called as "state-based programming".
5. After addition of the term "output action", the term "input action" could be brought in.
6. Using offered approach, programming is to be performed using the concept of "state" and of "flag variables".
7. Henceforward described approach was evolved by N. I. Tukkel developing systems for microcontrollers.
8. In automata-based programming protocols will be build automatically at the real-time.

**Task 7. Make up the sentences:**

**Task 7. Make sentences:**

1. Event, the, the, has, term, in, used, been, programming, and, wider, in, programming.
2. The, after, of, term, "automaton", brought, be, addition, "output action", the, term, could, in.
3. This, been, for, project, system, had, with, ix86 architecture, implemented, computing.
4. Of, is, advantage, that, may, all, technology, be, personal, on, automata, design, done, using, computer.

**Task 8. Make the sentences negative and interrogative:**

**Task 8. Convert the following sentences into interrogative and negative forms:**

1. In recent years a great attention has been paid to the development of the technology of programming for the embedded systems and real - time systems.
2. The process of software creation could be named "automata software design".

3. This allows to introduce in programming the term "program observability".
4. It allows to understand and specify the task and its parts better.
5. The technology of "automata-based programming" in paper was called as "Switch-technology".
6. In 1996 Russian Fund for Fundamental Investigations in the context of publishing project N° 96-01-14066.
7. Henceforth automata approach was spread to the event-based (reactive) systems.
8. Last type of interaction is described in work.
9. Last property allows to verify the propriety of automata system functioning.
10. Logging is performed automatically.
11. This mechanism could be also used for large scale tasks.
12. Mentioned system was specified with help of more than thirteen interacting automata.
13. These documents replace self documenting programs.
14. This project had been implemented for computing system with architecture ix86.

## **LESSON 17**

### **PROGRAMMING LANGUAGES [2]**

**Task 1. Read and translate the text:**

**Task 1. Read and translate the text:**

1. In order to communicate with each other, men use languages. In the same way, 'languages' of one sort or another are used in order to communicate instructions or commands to a computer.

2. When the user wishes to communicate with the computer, he uses a spectrum of languages.

Let us discuss the three lowest members of this spectrum, beginning with the first three from the bottom: machine language, mnemonic machine language, and assembly language.

3. A machine language which is sometimes called as a basic programming language or autocode refers to instructions written in a machine code. This machine code can be immediately obeyed by a computer without translation. The machine code is the coding system adopted in the design of a computer to represent the instruction repertoire of the computer. The actual machine language is generated by software, not a programmer. The programmer writes in a programming language which is translated into the machine language.

4. A mnemonic machine language uses symbolic names for each, part of instruction that is easier for the programmer to remember than the numeric code for the machine. A mnemonic is an alphanumeric name, usually beginning with a letter rather than a number to refer to fields, files, and subroutines in a program. For example, the operation 'multiplication' might be represented as MULT, the 'load' instruction as L, DISP NAME ADDR in the mnemonic form means 'display name and address', etc.

5. An assembly language is the most machine-dependent language used by programmers today. There are four advantages to using an assembly language rather than machine language. They are the following: 1) it is mnemonic, e.g., we write ST instead of the bit configuration 0101 0000 for the STORE instruction; 2) addresses are symbolic, not absolute as in a machine language; 3) reading is easier; 4) introduction of data to a program is easier.

6. A disadvantage of assembly language is that it requires the use of an assembler to translate a source program into object code (program) in order to be directly understood by the computer. The program written in assembly language is called an assembler. The assembler usually uses such instructions as A (ADD), L (LOAD), ST (STORE), START, TEST, BEGIN, USING, BALR (Branch And Link Register), DC (Define Constant), DS (Define Storage), END, etc. Let us consider some of them.

7. The USING instruction is a pseudo-op. A pseudo-op is an assembly language instruction that specifies an operation of the assembler; it is distinguished from a machine-op which represents to the assembler a machine instruction. So,

USING indicates to the assembler which general register to use as a base and what its contents will be. This is necessary because no special registers are set aside for addressing, thus the programmer must inform the assembler which register(s) to use and how to use them. Since addresses are relative, he can indicate to the assembler the address contained to the base register. The assembler is thus able to produce the machine code with the correct base register and offset.

8. BALR is an instruction to the computer to load a register with the next address and branch to the address in the second field. It is important to see the distinction between the BALR which loads the base register, and the USING which informs the assembler what is in the base register. Hence, USING only provides information to the assembler but does not load the register. Therefore, if the register does not contain the address that the USING says it should contain, 'a program error may result.

9. START is a pseudo-op that tells the assembler where the beginning of the program is and allows the user to give a name to the program, e.g., it may be the name TEST. END is a pseudo-op that tells the assembler that the last card of the program has been reached.

10. Note that in the assembler instead of addresses in the operand fields of the instruction there are symbolic names. The main reason for assemblers coming into existence was to shift the burden<sup>2</sup> of calculating specific addresses from the programmer to the computer.

**Task 2. Answer the following questions:**

**Task 2. Answer the following questions:**

1. Which languages are the best for machine?
2. Which languages are the best for programmer?
3. What language do you call a machine language?
4. What advantages to using the assembly language do you know?
5. What is a disadvantage of the assembly language?
6. Which program can the computer directly understand?
7. What is a source program?

8. What is an object program?

**Task.3. Find the English equivalent for the words given below in the text:**

**Task 3. Find the equivalents of the following words in the text:**

to, move, assembler, demand, autocode, bottom, refer to, present, cause, error, allow.

**Task 4. Translate the following words given below into Russian:**

**Task 4. Read the following words and phrases and translate them into Russian:**

obey, assembly, wish, distinction, base register, mnemonic, subroutines, distinguish, multiplication, display name and address, hence, load, operand fields.

**Task 5. Make the sentences interrogative:**

**Task 5. Put the following sentences in the question form:**

1. When the user wishes to communicate with the computer, he uses a spectrum of languages.
2. The main reason for assemblers coming into existence was to shift the burden<sup>2</sup> of calculating specific addresses from the programmer to the computer.
3. BALR is an instruction to the computer to load a register with the next address and branch to the address in the second field.
4. The assembler is thus able to produce the machine code with the correct base register and offset.
5. A disadvantage of assembly language is that it requires the use of an assembler to translate a source program into object code (program) in order to be directly understood by the computer.

**Task 6. Use the right prepositions and fill in the blanks:**

**Task 6. Instead of blanks, insert the appropriate prepositions and words from the text into the sentences:**

in order to, from, with, of, for, by, in.

1. The actual machine language is generated ..... software, not a programmer.
2. The program written ..... assembly language is called an assembler.
3. .... communicate with each other, men use languages.

4. Let us discuss the three lowest members ..... this spectrum, beginning ..... the first three ..... the bottom: machine language, mnemonic machine language, and assembly language.

5. This is necessary because no special registers are set aside ..... addressing.

## **LESSON 18**

### **MEMORY OR STORAGE UNIT [2]**

**Task 1. Read and translate the text:**

**Task 1. Read and translate the text:**

1. The part of a digital computer which stores information is called storage or memory. The computer's memory stores the numbers to be operated on; it stores intermediate results that are generated during the course of a computation; and it stores the final results. The instructions themselves are also stored in the computer's memory.

2. There are two important factors about the memory unit: an access time and a capacity. The time required to transmit one computer word out of the memory to where it will be used is called the memory access time; it usually amounts to a few millionths of a second or less in modern fast computers. The speed of modern computers is the speed of access to their memories. The capacity of a computer is the quantity of data that its memory unit can hold.

3. There are many ways of memorizing information in memory cells of a digital computer. External memory or storage units may use magnetic tapes, magnetic drums, magnetic disks and floppy disks. The magnetic drum and magnetic disk are called a Direct Access; or Random Access, Storage Device (DASD).

4. The magnetic disk is very similar to the magnetic drum but is based upon the use of a flat disk with a series of concentric circles of magnetizable material, one read/write head being for each concentric circle, i.e., for each track. Memory units on magnetic disks may store more than 100,000,000 bytes. The magnetic disk is illustrated in Figure 1.

5. Internal or main memory units were constructed of magnetic cores about

8 hundredths of an inch in diameter, each core storing one 'yes' or 'no', that is, each core representing one bit of information.

6. Information that is stored inside a computer is stored in registers, electronic units of hardware in which the positioning of physical objects stores information. Each register holds one machine word consisting usually of 32 bits or 4 bytes. Registers hold information temporarily during processing. The slower models of registers use magnetic cores; the faster models use special electronic circuits or film memory devices.

7. Usually the registers are of three types:

7.1. General-Purpose Registers are sixteen registers, each being able to contain one word. These registers are used for storing the integer operands taking part in binary arithmetic operations.

7.2 Floating-Point Registers are four registers, each being able to contain a doubleword. These registers hold the operands taking part in arithmetic operations on floating-point numbers.

7.3. Control Registers form a group of registers differing from one model to another.

8. The development of semiconductor integration technology has led to creation of memories on LSI circuits. For constructing memory units on LSI circuits either bipolar or MOS memory are used. The access time of bipolar memory is about 100 nanoseconds, while the access time of MOS memory is 500 nanoseconds. But on the other hand the density of memorizing elements allocation in the latter is very high and amounts to 4 thousand memorizing elements for one chip. The latest achievements of modern electronics are creation of memories on electronic circuits made by spraying layers of different memorizing materials.

9. Nowadays the main memory RAM which is regularly used in microcomputers can accept new instructions or information from a peripheral device. Terms synonymous with the computer's working memory RAM are: core, core storage, main memory, main storage, primary storage, read / write memory. Other memories, such as ROM or PROM, which are used in microcomputers as well,

store instructions or information permanently. ROM, PROM, ERROM, and EEPROM are all together called firmware which is 'hard' software.

**Task 2. Answer the following questions:**

**Task 2. Answer the following questions:**

1. What is the general purpose of the memory or storage unit?
2. What information is stored in the computer memory?
3. Where is information stored inside the computer?
4. What is the memory access time?
5. What ways of memorizing words in a computer do you know?
6. What has led to creation of memories on LSI circuits?
7. What are the latest achievements of modern electronics?
8. What memories are used in microcomputers?

**Task 3. Find the Russian equivalents for the words and word-combinations given below in the text:**

**Task 3. Find the equivalents of the following words and expressions in the text:**

the numbers to be operated on, a magnetic core, an access time, a computer's memory, intermediate results, Large Scale Integration, during processing, by spraying layers, the latest achievements, floating-point numbers.

**Task 4. Make the sentences interrogative:**

**Task 4. Put the following sentences in the question form:**

1. The development of semiconductor integration technology has led to creation of memories on LSI circuits.
2. The latest achievements of modern electronics are creation of memories on electronic circuits made by spraying layers of different memorizing materials.
3. There are two important factors about the memory unit.
4. Internal or main memory units were constructed of magnetic cores.
5. The magnetic disk is very similar to the magnetic drum.

## **LESSON 19**

### **MONITORS [2]**

**Task 1. Read and translate the text:**

### **Task 1. Read and translate the text:**

Computer Monitors are similar to televisions because they both display images on a screen. Monitors are used more than any other part of a computer, yet many people treat them as an afterthought when purchasing a computer. Don't! Regardless of what you're doing on your computer, you're staring at the monitor. Therefore, shop for a good monitor that's easy to look at and won't cause eye strain.

Monitors come in various sizes usually ranging from 14" to 21" and above and are usually referred to by their size. For example: most people have 15" or 17" SVGA color monitors. The size of a monitor is based on the diagonal distance from one corner of the monitor tube to the other. This doesn't mean the visible part of the monitor tube, but rather the actual corner of the tube. Therefore, you may see a monitor that is labeled as 14", but the visible part of the tube is less than 14". In monitors, this is perfectly normal, and almost every manufacturer labels or sizes them this way regardless of the size. So when you're looking for monitors, don't be too shocked when your monitor turns out to be a little smaller than the name or label implies. If you're curious, most television manufacturers refer to their television by the size of the display (corner to corner) that is actually showing and not by the tube's actual size.

The "Dot Pitch" of a monitor is very important because this number indicates how clear the image on your monitor will be. Have you ever adjusted the focus on a camera so it's almost right, but not quite, and the picture doesn't look as good as it could? This is how the dot pitch works. The lower the dot pitch number, the better the image will be. The dot pitch, measured in millimeters, actually indicates how close the dots (that make up the letter or image on the screen) are together. An average dot pitch is 0.28 while 0.26 or 0.25 is considered great so pay attention to the numbers.

Therefore, when you're shopping for monitors (or the monitor that comes with the computer) look at the dot pitch because monitors with a poor or less than average dot pitch will appear out of focus and may cause eye strain.

In the last couple of years, monitor manufacturers have begun producing what is called "Flat-Square tube" monitors (also called Flat screen monitors). There are several advantages of flat tube monitors compared to curved tube monitors and they are as follows:

1. Less glare on the front on the monitor.
2. More accurate colors along the edges or corners of the monitor front.
3. More stable graphics along the edges or corners of the monitor front.
4. A more realistic image (especially with highly graphical images).

If you can purchase a flat screen monitor for little or no difference in price then do it.

Whether you realize it or not, your television actually displays the image by a combination of vertical and horizontal lines. This is called resolution and all televisions and computer monitors use this to display what you see. Your television has one resolution, and it adjusts everything to that resolution so all the images you see fit nicely on your television screen. However, most computer monitors can display or use many resolutions, and are therefore more flexible to display many different types of images. Higher resolutions (more lines on the screen) give you more detailed images while lower resolutions give you less detailed images. When you're looking at resolutions they are usually written as horizontal lines by vertical lines (640 x 480, 800 x 600, and 1024 x 768).

When it's time to shop for a monitor (or the monitor that comes with your computer) you'll need to pay attention to what resolution the monitor can handle. When shopping for monitors you're likely to see the letters VGA and SVGA written everywhere. These letters simply indicate the type of monitor it is and what resolutions the monitor is capable of displaying. VGA (Video Graphics Array) is a standard that IBM developed some years ago for displaying information on the monitor in a certain way and resolution. VGA by default uses a resolution of 640 x 480. SVGA (Super Video Graphics Array) is a newer standard based on VGA that gives you a higher resolution of 800 x 600. SVGA is considered absolutely the bare

minimum for any monitor buyer these days. Today's monitors can handle resolutions higher than the SVGA resolution (800 x 600), but they're still called SVGA.

The Vertical Refresh Rate (also called a vertical scan rate) indicates the number of full screens the monitor can "paint" in one second. The vertical refresh rate is often written in terms of Hz such as 72Hz. Since most humans can perceive a "flicker" effect when the vertical refresh rate drops to or below 60Hz, you should buy a monitor that can display a minimum of 72Hz in every resolution (at least the standard three resolutions mentioned above). The more resolutions your monitor can handle, the more flexible it will be to do the things your want. Most monitors today will do this, but not all, so be careful. The net effect of using a monitor with a vertical refresh rate of 60 Hz or less is sometimes headaches and eyestrain.

Better quality monitors are now supporting even higher resolutions such as 1280 x 1024 or 1600 x 1280. These resolutions pack so much information on the screen at once that you will usually need a larger (17" or above) monitor to appreciate the fine detail you'll see.

**Task 2. Answer the following questions:**

**Task 2. Answer the following questions:**

1. Why is it very important to choose a monitor that you are buying very carefully?
2. What important characteristics of monitors do you know?
3. Do you have a computer at home? What kind of monitor have you chosen for it and why?
4. What health dysfunctions can a monitor with vertical refresh rate less than 60Hz or equal cause?

**Task 3. Use the right prepositions and fill in the blanks:**

**Task 3. Fill in the blanks with prepositions:**

1. There are several advantages of flat tube monitors compared ... curved tube monitors.
2. The size of a monitor is based ... the diagonal distance from one corner

of the monitor tube to the other.

3. When shopping ... monitors you're likely to see the letters VGA and SVGA written everywhere.

4. The letters VGA and SVGA indicate the type of monitor and what resolutions the monitor is capable ... displaying.

5. Monitors come in various sizes usually ranging from 14" to 21" and are usually referred ... by their size.

**Task 4. Find the Russian equivalents for the words and word-combinations given below:**

**Task 4. Give Russian equivalents to the following word combinations:**

dot Pitch, "Flat-Square tube" monitors, curved tube monitors, resolution, Vertical Refresh Rate, by default, dot pitch number, vertical scan rate, a "flicker" effect, flat screen monitors.

**Task 5. Say what these abbreviations mean:**

**Task 5. Decipher the following abbreviations and translate them into Russian:**  
VGA, SVGA, Hz, IBM.

**Task 6. Translate these words into Russian:**

**Task 6. Translate the following words into Russian:**

resolution, monitor, screen, dot pitch, vertical scan rate.

**Task 7. Retell the text:**

**Task 7. State the main idea of the text. Try to cover the following points:**

1. Sizes.
2. Dot Pitch.
3. Flat screen.
4. Resolution.

## **LESSON 20**

### **THE MOUSE [2]**

**Task 1. Read and translate the text:**

**Task 1. Read and translate the text:**

The Mouse device is a practical aid for facilitating work with your PC. Also

the Mouse is an effective and fun 1001 for your computer. If you have never used, a computer before the Mouse will speed your learning process. If you are an experienced user, you will be amazed at the increased speed, ease and pleasure. The Mouse provides the cursor control thus simplifying orientation on the display with user complex programs.

When personal computers first became popular, the most common device used to transfer information from the user to the computer was the keyboard.

However, when the more advanced graphics became to develop, users found that a keyboard did not provide the design capabilities of graphics and text representation on the display.

The Mouse is an opto-mechanical input device. The Mouse has three or two buttons which control the cursor movement across the screen.

Each software program uses these buttons differently.

The Mouse's primary functions are to help user to draw, point and select images on your computer display by moving your Mouse across the screen.

In general software programs require to press one or more buttons sometimes keeping them depressed or double-click them to issue changes in commands and to draw or to erase images.

When you move the Mouse across a flat surface, the ball located on the bottom side of the Mouse turns two rollers.

One is tracking the Mouse's vertical movements, the other is tracking horizontal movements. The Mouse has economically designed so it fits comfortably in your hand.

The Mouse slopes gently towards the front, so your fingers rest comfortable on the three buttons which respond easily, and click when pressed.

Especially this feature is helpful when you must "double-click" the buttons to activate commands. The rotating ball glides easily, giving the user good control over the textual and graphical images. Hardware installation is required to utilize your mouse. There are some precautions to take so do the following steps in the order shown.

1. Turn off all the power to your computer and its peripherals.
  2. Select a serial port (COM 1 or COM2), which is not in use.
  3. Find the connector of the compute designed for the unused serial port. This connector must be the standard one in order, to connect it with the standard mouse.
  4. Remove the mouse from the package. There is a connector on the end of the cable opposite the mouse.
  5. Plug the connector on the mouse's cable into the 9 - 25 pin connector on the computer. The two connectors are polarized and so will only fit together one way.
- Installation of the hardware is the first step for using your mouse.
- Now the software you have that can utilize and mouse must be told there is a mouse and what kind of mouse it is.

The software procedure is completely dependent on the program being used. In general, you will find an INSTALL or MODIFY or CONFIG or MOUSE program that permits you to modify certain characteristics of a given program. The mouse is also known as a "digitizer" which may help you with programs.

**Task 2. Answer the following questions:**

**Task 2. Answer the following questions:**

1. What is the Mouse?
2. What does the mouse provide?
3. How many buttons does the mouse have?
4. What controls the cursor movement across the screen?
5. Are there any precautions to work with the mouse?
6. What are the Mouse's primary functions?

**Task 3. Give the synonyms and antonyms to the words given below:**

**Task 3. Select synonyms and antonyms for these words in the text:**

supply, great, device, data, help, equipment, to astonish, slightly, program, output, to decrease, always, inexperienced, to loose, to forbid, to fix.

**Task 4. Which sentences are false according to the text:**

**Task 4. Read these sentences and indicate which sentences correspond to the content of the text, and which are incorrect:**

1. The Mouse gives users very small freedom of the option.
2. The Mouse provides the cursor control thus simplifying orientation on the display user complex programs.
3. However, when the more advanced graphics became to develop users, users found that a keyboard provides the design capabilities of graphics and text representation on the display.
4. The Mouse's primary functions are to help user draw, point and select images on your computer display by moving your Mouse across the screen.

**Task 5. Complete the sentences according to the text:**

**Task 5. Complete the sentences by choosing the correct version of the word:**

keyboard, device, aid, PC, gives, freedom, transfer, user buttons, movement, screen.

1. Usually every computer is provided by a .... .
2. The Mouse ... is a practical ... for facilitating work with your ... .
3. The Mouse device ... users large ... of the option.
4. When personal computers first became popular the most common device used to ... information from the ... user to the computer was the keyboard.
5. The Mouse has three or two ... which control the cursor across the .... .

## **LESSON 21**

### **INFORMATION, MACHINE WORDS, INSTRUCTIONS, ADDRESSES AND REASONABLE OPERATIONS [2]**

**Task 1. Read and translate the text:**

**Task 1. Read and translate the text:**

1. Information is a set of marks or signs that have meaning. These consist of letters or numbers, digits or characters, typewriter signs, other kinds of signs, and so on. And computer reacts differently to different digits or characters, and reacts to them as units that have meaning. For example, information for an analog computer has to be in the form of distances, or rotations, or voltages, or other physical variables. And for a digital computer information has to be in the form of digits or numbers.

2. Any information may be represented by the binary system, including two digits: one (1) and zero (0). Each 1 and 0 is a separate binary digit called a bit. A bit is the smallest part of information. Bits are typically grouped in units that are called bytes. A byte is the basic unit of information used in modern computers and consists of eight bits.

3. The bytes are handled usually in standard groups called machine words or just words. There are two basic types of information or words that can be put into a memory cell or location: words that are numerical quantities and words that are Computer instructions. Regularly, an instruction to the machine is expressed as a word; and so the same set of characters may have meaning sometimes as a number, sometimes as an instruction. And the speed of 96,000 characters per second is the same as a speed of 8,000 words per second. Most human beings could not take even 12-digit number per second.

4. Physically, the set of bits is a set of arrangements of some physical equipment. One of the ways of storing information in a computer is storing by using a set of small magnetically polarized spots on a magnetic surface.

5. The computer is told what operations to perform by means of instructions. An instruction is a command to the computer. It consists of a verb (an operational code), and a noun (an operand). For example, if the computer is instructed "Add 365 the number of times (once) stated in the register R", and if the register R stores the code for number 3, then the computer will perform that operation three times. An instruction word looks like a number, and there is no way to tell from the word itself whether it is a quantity or an instruction. The computer must be told exactly which address contains an instruction and which contains a quantity.

6. An address is the name of particular memory location or cell. Each memory location (word or byte) has its own unique address or number just like a post office box. For example, if the computer contains 100 memory cells, their respective address might be the numbers from 1 to 100 (or 0 through 99). And instead of saying "A word is in a memory cell", the computer personnel say, "The contents of an address is a word."

7. Reasonable operations are mathematical and logical. Mathematical operations include arithmetic and algebraic operations. Arithmetic operations are addition, subtraction, multiplication, division, taking a square root, etc.; and algebraic operations are called raising to a power as well as differentiating and integrating.

8. Logical operations include comparing, selecting, sorting, matching, etc. These are operations which may be performed either on numbers, or on expressions consisted of letters such as ordinary words. And a very important logical operation performed by a computer is determining, i.e., which of two operations is to be performed next.

**Task 2. Answer the following questions:**

**Task 2. Answer the following questions:**

1. What is information?
2. What does a set of marks consist of?
3. What is one of the ways of storing information in a computer?
4. What is a byte?
5. What is a bit?
6. How many bits does a byte usually contain?
7. What is an instruction?
8. By means of what is the computer told what operations to perform?
9. What are machine words?
10. What does a machine word consist of?
11. What are addresses?
12. What is a reasonable operation?
13. What do mathematical operations include?
14. What do logical operations include?
15. In what system is information represented for the modern electronic computer?
16. What are the two basic types of words that are put into a memory?

**Task 3. Find the English equivalents for the words given below in the text:**

**Task 3. Translate the following words and phrases into English:**

physical equipment, speed per second, numerical quantities, numerical measurements, binary system, any information, one of the methods, a special memory cell using physical analogies, other physical variables.

**Task 4. Find the antonyms in the (a) group and the synonyms in the (b) group:**

**Task 4. Find synonyms in a group of words (a), antonyms in a group of words (b), and translate them:**

a) to perform; to compute; to take in; a figure; to arrange; to show; to carry out; a digit; to calculate; little; to display; small; to receive; to position; instruction; data; location; command; information; cell;

b) inside; to the right; addition; multiplication; simple; to the left; 1 division; outside; small; complex; big; subtraction; differentiating; at the right; integrating; at the left; the right-hand column; the left-hand column.

**Task 5. Complete the following sentences:**

**Task 5. Complete the following sentences:**

1. Information is a set of marks or signs that ..... .
2. Reasonable operations are ..... .
3. Logical operations include ... .
4. And a very important logical operation is ..... .
5. Physically, the set of bits is a set of arrangements of some ..... .
6. Determining means which of two operations is to be performed ..... .
7. The computer must be told exactly which address contains ... and which contains .... .
8. The computer is told what operations to perform by means of ... .
9. Any information may be represented by the binary systems including two digits: ... and... .
10. A bit is the smallest part of ..... .

**LESSON 22**

**FROM CALCULI TO MODERN COMPUTER [2]**

**Task 1. Read and translate the text:**

### **Task 1. Read and translate the text:**

Although the first modern automatic computers began to work in 1944, the story of the development of ideas, devices, and machines entering into that automatic computer goes back a long time into the past. Problems of calculating with numbers, and recording numbers, have pressed upon human beings for more than five thousand years. Probably the first of the ideas to deal with numbers is the idea of using small objects, such as pebbles, seeds, or shells, to count with, to supplement the fingers. People, however, find it troublesome to count only in units-it takes too much time and effort. So early a second idea appears: the idea of composing a new unit equal to ten of the old units. The *source* of this idea is clearly the fact that a man has ten fingers; with this idea you could designate 87 by referring to all the fingers Of 8 men, and than 7 more fingers on one more man. In order to deal with numbers in their physical form of counted objects, a third idea appears: a specialized, convenient place upon which to lay out the counted objects. Such a place may be a smooth piece of ground, slab of stone, or a board.

It becomes convenient to mark off areas on the slab according to the size of unit you are dealing with-you have one area for or- binary units, one area for tens, one area for hundreds, and so on. These developments gave birth to the abacus, the first computing machine. This device consisted of a slab divided into areas, and a supply of small stones for use as counters or objects to keep track of numbers. The Greek word for slab was abax, and the Latin word for the small stones was calculi, and so the first computing machine, the abacus was invented, consisting originally of a slab and counting stones, and later on, a frame of rods strung with beads, for keeping track of numbers while calculating.

The system of numbering and the abacus go hand in hand together. The abacus is still the most widely used computing machine in the world.

Then appeared the Arabic positional notation for numerals which reached Western Europe in the 1200's. Just as the small counting stones or calculi could be used in any area on the slab, so the digits 1, 2, 3, 4, 5, 6, 7, 8, 9 could be used in any position of a numeral. Just as the position on the slab answered the question as to

whether units, tens, hundreds, etc., were being counted so the place or column or position of the digit (as in 4786 with its four places) answered the question as to what kinds of units were there being counted. And-this was the final key idea-just as a place on the slab could be empty, so the digit 0 could mark "none" in place or column of a number.

That idea, by the way, required centuries to develop. The Romans did not have a numeral for zero; but about 300 B.C. in Babylon a symbol for zero was used. Then the Hindus developed the numerical notation that we call Arabic. The Arabs used the word "sifr" meaning "vacant" about .D. for "zero" . About .D. the Arabic word was translated into Latin giving rise subsequently to the two English words "cipher" and "zero".800 A1200 A

The first machine which would add numbers mechanically was invented by the French mathematician and philosopher Blasé Pascal in 1642. It contained geared counter wheels which could be set at any one of ten positions from 0 to 9. Each gear had a little tooth for nudging the next counter wheel when it passed from 9 to 0 so as to carry 1 into the next column.

Some 30 years later, in 1673, another mathematician, G.W. Leibnitz, invented a device which would control automatically the amount of adding to be performed by a given digit, and in this way he invented the first multiplying machine.

Pascal's and Leibnitz's machines and their improved successors have given rise to electric-powered but hand-operated adding machines and desk calculating machines which are found throughout offices today.

The idea of an automatic machine which would not only add, subtract, multiply, and divide but perform a sequence of steps automatically, was probably first conceived in 1812 by Charles Babbage, a professor of mathematics at Cambridge University, England. Babbage intended that his machine should compute the values of the tabulated mathematical functions and print out the results. No attention would be needed from the human operator, once the starting data and the method of computation had been set into the machine.

**Task 2. Answer the following questions:**

**Task 2. Answer the following questions:**

1. When did the first computers begin to work?
2. What was the first idea to deal with numbers?
3. What was a second idea?
4. What is a third idea according to the text?
5. What is the Greek word for slab?
6. Is the abacus still used?

**Task 3. Find the English equivalents for the words given below in the text:**

**Task 3. Find the English equivalents of the following words in the text:**

disturbing, delimiting, equal, mechanism, plate, intending, sequential, application, free, abacus.

**Task 4. Translate the following words into Russian:**

**Task 4. Read the following words and phrases and translate them into Russian:**

device, record, object, supplement, however, troublesome, compose, equal, source, designate, refer to, to deal with, smooth, convenient, according to, abacus, slab, frame.

**Task 5. Make the sentences interrogative:**

**Task 5. Put the following sentences in the question form:**

1. The first machine which would add numbers mechanically was invented by the French mathematician and philosopher Blaise Pascal in 1642.
2. The Romans did not have a numeral for zero.
3. That idea, by the way, required centuries to develop.
4. Then appeared the Arabic positional notation for numerals<sup>5</sup> which reached Western Europe in the 1200's.
5. The first modern automatic computers began to work in 1944.

**Task 6. Fill in the blanks with the following words given below:**

**Task 6. Instead of blanks, insert the corresponding words from the text:**

idea, abacus, hand, troublesome, goes back.

1. The development of ideas, devices, and machines entering into that automatic computer ..... a long time into the past.

2. The source of this ..... is clearly the fact that a man has ten fingers.
3. People, however, find it ..... to count only in units-it takes too much time and effort.
4. These developments gave birth to the ..... .
5. The system of numbering and the abacus go hand in ..... together.

## **LESSON 23**

### **MINIATURIZATION [2]**

**Task 1. Read and translate the text:**

**Task 1. Read and translate the text:**

There are several advantages in making computers as small as one can. Sometimes weight is particularly important. And modern aircraft, for example, carries quite, a load of electronic apparatus. If it is possible to make any of these smaller, and therefore lighter, the aircraft can carry a bigger load. This kind of consideration applies to space satellites and to all kinds of computers that have to be carried about.

But weight is not the only factor. The smaller the computer the faster it can work. The signals go to and from at a very high but almost constant speed. So if one can scale down all dimensions to, let us say, one tenth, the average lengths of the current - paths will be reduced to one tenth. So, very roughly speaking, scaling down of all linear dimensions in the ratio of one to ten also gives a valuable advantage, the speed of operation is scaled up 10 times. Other techniques allow even further speed increases.

The increase of operation is a real advantage. There are some applications in which computers could be used which require very fast response times. Many of these are military, of course; but most military applications also have applications in engineering sooner or later. For example, automatic blind handing of aircraft requires continuous computer calculations which result in control of the aircraft flight. The more immediate the responses are, the more stable that control can be.

Another advantage is that less power is required to run the computer. In space vehicles and satellites this is an important matter; but even in a trial application, we

need not waste power. Sometimes a computer takes so much power that cooling systems, which require still more power, has to be installed to keep the computer from getting too hot, which would increase the risk of faults developing. So a computer, which does not need to be cooled, saves power on two counts.

Another advantage is reliability. Mini-computers have been made possible by the development of integrated circuits. Instead of soldering bits of wire to join separate components such as resistors and capacitors, sometimes in the most intricate networks, designers can now produce many connected circuits in one unit, which involves no soldering and therefore no risk of broken joints at all. And now that transistors and other solid-state devices are used instead of valves, printed circuits with their solid-state components have a very long life indeed. And a computer can be built up of large numbers of similar units of this kind.

Repair of the old kind (with soldering iron and so on) is no longer needed. If one of the component circuits develops a fault, all that is needed is to locate the faulty unit, throw it away and plug in new one.

All these devices, small as they may be to the eye when hundreds of circuits can be packed on to one square inch, as much larger than they need to be to do the jobs they have to do. So the problem is one of finding ways of making these complicated patterns automatically very precisely and yet smaller and smaller. The limit is a long way off yet. Human brains have more than 100 million cells per cubic centimeter but there is no reason to think that we cannot pack solid-state devices more densely than this.

Computers could then easily be built up from these microminiaturized components to have data stores or memories as large as are needed for any job one could imagine. The main problem of very large stores is finding one's way about them, but if they are large in information capacity, but small in physical dimensions, with present-day techniques much time and cost can be saved.

**Task 2. Answer the following questions:**

**Task 2. Answer the following questions:**

1. Are there any advantages in making computers as small as one can?

2. Is it possible to make them smaller and lighter?
3. What is the speed of the computer?
4. The increase of operation is a real advantage, isn't it?
5. What are the advantages to run the computer?
6. What is the main problem in information capacity.

**Task 3. Find the Russian equivalents for the words and word-combinations given below in the text:**

**Task 3. Find Russian equivalents to the following words and expressions:**

information capacity, aircraft flight, military application, cooling system, further speed increases, fast response time, solid-state devices, continuous computer calculation.

**Task 4. Make the sentences interrogative:**

**Task 4. Put the following sentences in the question form:**

1. There are several advantages in making computers as small as one can.
2. Human brains have more than 100 million cells per cubic centimeter.
3. Mini-computers have been made possible by the development of integrated circuits.
4. The increase of operation is a real advantage.
5. Other techniques allow even further speed increases.

## **LESSON 24**

### **ARTIFICIAL INTELLIGENCE [2]**

**Task 1. Read and translate the text:**

**Task 1. Read and translate the text:**

"Artificial intelligence" is a metaphoric figure of speech designating an entire scientific trend which includes mathematicians, linguists, psychologists, engineers, and many other specialists. The essence of this trend is the intensification of man's creative activities with the aid of computers.

Artificial intelligence (AI) is machine intelligence. It refers to applications of the computer which, in operation, resemble human intelligence. There are different categories of uses which all fall into the AI area. For example, robots or machines

with sensory capabilities which detect and recognize sounds, pictures, etc, are one category. Another category is knowledge based systems, which contain a base of knowledge about a subject and can assist us in solving problems. Knowledge based systems being developed from the experience of human experts are called expert systems and can perform such tasks as medical diagnoses. AI will encompass many areas that have not been easily solved using traditional hardware and software.

AI will be incorporated into the 5th-generation computer systems. Then the average computer system should not require users to remember a lot of complex codes or commands. Rather, the user should ask: "Can you help me with this type of problem?" The master control program or operating system will be able to direct the user to the appropriate expert' system through questions and answers.

AI programming is not magical; it does however imply a change in rules and methods for the traditional application programmer. Normal application programs follow a fixed algorithm: if this - do that. Given a set of input conditions, the output can be precisely determined. AI requires program design with more imagination. New methods of program organization and construction must be developed. AI programs may require the use of heuristic techniques, which are exploratory in nature and use trial and error methods. AI programs are often programmed in the LISP programming language, which allows the program designer to concentrate on the problem-solving logic more effectively than common languages like BASIC and COBOL.

It is impossible in principle to develop an artificial intelligence as it is sometimes understood literally, because the human brain is a very sophisticated system composed of tens of billions of interconnected cells. Each cell is extremely complex in itself. A rather probable hypothesis says that an individual cell processes the signals penetrating it like a computer. Therefore, even the most sophisticated machine we may imagine cannot even be compared to the brain. Man created the machine to fulfill his own requirements. A machine cannot have either human feelings, desires or emotions. Can anyone imagine a machine in love with someone? And what about the experience a person receives during his life in society through

dealing all the time with purely human problems? A machine, in general, cannot think, either logically or figuratively.

But nevertheless (nevertheless), the research trend of artificial intelligence will acquire ever greater importance as time goes by, because the programming and technical means of artificial intelligence will ensure us of the opportunity to associate directly with the machine without the aid of a huge crowd of engineers, economists, biologists, chemists, and many other specialists. The question of AI acquires special importance for economic planning and management. In conditions when production is becoming automated, management must become automated as well.

One of the trends in AI now being intensively, developed is to design so-called thinking robots, capable of a certain amount of independent activities.

The model of creative processes in computers gave birth -to the term "artificial intelligence". But that doesn't mean that the computers possess it. The "intelligence" has been packaged in it by an expert who developed the programme for solving some practical creative problem. Man differs from the machine in that he does not simply fulfill the programs stored in his memory, but also develops them himself, depending on the goals facing him.

**Task 2. Answer the following questions:**

**Task 2. Answer the following questions:**

1. What is artificial intelligence?
2. What are the categories of artificial intelligence?
3. Is it possible to develop an AI as it is understood literally?
4. Can a machine in general think logically or figuratively?
5. What does the question of AI acquire?
6. What is the difference between a man and a machine?

**Task 3. Find the English equivalents for the words and word-combinations given below in the text:**

**Task 3. Find the equivalents of the following words in the text:**

artificial, solution, creative, capable, realize, whole, essence, help, appropriate, purpose, purely (without impurities), guarantee.

**Task 4. Translate the following words and word-combinations into Russian:**

**Task 4. Read the following words and phrases and translate them into Russian:**

capable, birth, solve, creative, differ, depend on, designate, resemble, encompass, incorporate, average, appropriate, application, determine, concentrate on, artificial.

**Task 5. Make the sentences interrogative:**

**Task 5. Put the following sentences in the question form:**

1. The essence of this trend is the intensification of man's creative activities with the aid of computers.

2. Artificial intelligence (AI) is machine intelligence.

3. There are different categories of uses which all fall into the AI area.

4. Each cell is extremely complex in itself.

5. AI will encompass many areas that have not been easily solved using traditional hardware and software.

**Task 6. Fill in the blanks with the following words given below:**

**Task 6. Instead of blanks, insert the corresponding words from the text:**

appropriate, cell, mean, penetrating, require, essence.

1. The ..... of this trend is the intensification of man's creative activities with the aid of computers.

2. The master control program or operating system will be able to direct the user to the ..... expert' system through questions and answers.

3. But that doesn't ..... that the computers possess it.

4. AI programs may ..... the use of heuristic techniques.

5. A rather probable hypothesis says that an individual ..... processes the signals ..... it like a computer.

## **LESSON 25**

### **NEWS IN THE COMPUTER FIELD [2]**

**Task 1. Read and translate the text:**

**Task 1. Read and translate the text:**

1. Holography and Computer Memory. A new polymer to coat holographic plates-reoxane-has been developed in St.Petersburg. Reoxane will bring about many changes both in holography and in other areas-computers, for instance. These machines required devices with a huge memory capacity. It is now believed that holographic memory is more suitable for these purposes, as any data from it can be retrieved (*zd.* find information) in a microsecond and the cost of this device will be comparatively moderate. The limit of reoxane memory has not been measured, but it is known that it is hundreds and possibly thousands of times larger than electronic memory.

2. Computing at the Speed of Light. A group of scientists of the Edinburgh University has been investigating the remarkable properties of an indium-antimony compound with a refractive index that varies with the intensity of light falling on it. They have found that a tiny increase in the light incidence can produce a large change in the light emerging. This brighter emerging beam persists even when the triggering light beam is reduced again in brightness. In this way the crystal acts as a switch and "remembers" the triggering light impulses. The group has incorporated these properties into new computer components, which operate on low-powered laser beams and can respond in picoseconds. So the modern electronic computer may be replaced by much faster equipment that uses optical devices. In the future such computers which include these optical devices will be probably called the optical computers.

3. Current Injection Logic Circuits. Scientists from the IBM Company have invented a new family of experimental computer circuits. Called "current injection logic" circuits, they operate in 13 trillionths of a second taking 7 picoseconds to perform their switching function and another 6 picoseconds to send an electric signal from one circuit to another. In fact, the speed of an electrical signal moving between these new circuits is only limited by the speed of light.

These circuits function at temperatures close to absolute zero ( $-273^{\circ}$  Celsius), where many metals lose all resistance to electrical current flow. But these "superconducting" circuits operate three times faster than any of circuits previously

developed. Because of their speed and low heat output, the new circuits promise a future generation of more powerful computers.

**Task 2. Answer the following questions:**

**Task 2. Answer the following questions:**

1. Where has reoxane been developed?
2. What did these machines require?
3. What do you know about the reoxane memory?
4. What can a tiny increase in light incidence produce?
5. What did scientists call a first new family of experimental computer circuits?
6. Can the speed of an electrical signal moving between these circuits be limited?

**Task 3. Find the English equivalents for the words and word-combinations given below in the text:**

**Task 3. Find the equivalents of the following words in the text:**

huge, capacity, properties, beam, comparatively, microsecond, resistance, trigger, superconductivity, scope.

**Task 4. Translate the following words and word-combinations into Russian:**

**Task 4. Read the following words and phrases and translate them into Russian:**

holographic plates, require, capacity, suitable, purpose, retrieve, comparatively, measure, remarkable, tiny, reduce, incorporate, respond, resistance, previously.

**Task 5. Make the sentences interrogative:**

**Task 5. Put the following sentences in the question form:**

1. The group has incorporated these properties into new computer components, which operate on low-powered laser beams and can respond in picoseconds.
2. The modern electronic computer may be replaced by much faster equipment that uses optical devices.
3. Scientists from the IBM Company have invented a new family of experimental computer circuits.

4. These machines required devices with a huge memory capacity.

5. Reoxane will bring about many changes both in holography and in other areas-computers, for instance.

**Task 6. Fill in the blanks with the following words given below:**

**Task 6. Instead of blanks, insert the corresponding words from the text:**

powerful, memory, impulses, measured, suitable, increase, crystal, circuits.

1. Because of their speed and low heat output, the new ..... promise a future generation of more ..... computers.

2. They have found that a tiny ..... in the light incidence can produce a large change in the light emerging.

3. In this way the ..... acts as a switch and "remembers" the triggering light .....

4. The limit of reoxane memory has not been ....., but it is known that it is hundreds and possibly thousands of times larger than electronic .....

5. It is now believed that holographic memory is more ..... for these purposes.

## LESSON 27

### SOME FACTS ABOUT ROBOTS [2]

**Task 1. Read and translate the text:**

**Task 1. Read and translate the text:**

It is estimated that by the end of the century the overwhelming majority of people will be occupied in science, education, administration and the service industry. Machines and robots will be the primary producers of material wealth.

1. A Robot Laboratory Assistant. When a research worker studies biological objects, the brain, for example, he has to operate with tremendous figures: 15 thousand million neurons, 150 thousand million interneuron elements. One cubic millimeter of blood has 5 million red blood cells.

Our scientists have developed a machine to count and determine these biological microobjects. This robot laboratory assistant does in one to three minutes

the work that usually takes a month using conventional technique. This robot, besides counting the objects, also determines their size.

2. Robot Assists Surgeon. A cybernetic device which collects information on the main physiological processes taking place in the organism of a patient undergoing an operation has been made at one of St.Petersburg's clinics. A special screen shows the patient's pulse rate, blood pressure and body temperature. It has been decided to improve the device to give recommendations to the operator of artificial heart. A computer being assembled at the clinic, after collecting and processing all the necessary information about the patient, will be able to control a "heart-lung" apparatus automatically.

3. An Underwater Robot. An underwater robot with the TV camera, the first of its kind, has been successfully tested in our country. Intended for detailed studies of the ocean bed at depths as low as 4,000 meters, it was remote-controlled from the shore and could perform previously programmed operations. It could be given "hands" adjusted delicately enough to thread a needle underwater.

4. Race Robots. Space research in our country opens up vast perspectives for robots, Artificial satellites are already circulating the globe. The orbital stations are added to them nowadays. This equipment involves maintenance, repair, part replacement and other jobs which cannot be planned beforehand. Spacecrafts fitted with robots are already in use.

The great advantage of the space robots are that they need no life support. They could be left in orbit for ever, or sent off in a moon vehicle to explore some remote area without anyone worrying about whether it would come back or not. They are also very useful for repairing the outside of a spacecraft or for assembling a space station in orbit.

5. Artificial Man for Medical Students. Science fiction has become reality at a research laboratory in California with the creation of a . . . artificial man which breathes and blinks.<sup>6</sup> ft<sup>2</sup> in

"Sim-1"-the first of a series of simulators - was created by several scientists from California universities. He is to serve as a "patient" for medical students. His

inventors believe that increasingly complex Sims will be built, shortening from eight to six the number of years of study required for a medical degree.

"Sim-1" human characteristics include ability to breathe, blink his eyes, open his jaws-which contain a full set of teeth-move his tongue and vocal cords and be affected by drugs in much the same way as a human being. Speech and mobility have not yet been built in, although the inventors say this would be no problem.

6. Robots on a Stroll. In 1910, news was received in Japan that a magic box (a robot using springs) was displayed at the World Exposition in . This news captured the interest of a boy in the fifth form of an elementary school who started to construct his own robot of tin and cardboard. Ten years passed and the boy, now a young man of 21, had already received a patent for a robot Which could speak. This was the young Aizawa who, since then, has spent all his life in making toys.London

Aizawa has created 700 robots, ranging from 2 meters tall to those of only . But he is particularly proud of eight of his creations, which are life-size robot brothers. These eight robots not only walk, but also can shake hands, wink, bow, nod and talk. Numerous requests are received by Aizawa for the services of his eight robots, which are dispatched to children's halls and children's science museums.30 centimeters

Aizawa brought out two of eight brother robots for a stroll outside his home. One is Goro. He is 165 centimeters tall and weighs . The other is Hachiro, weighing and in height.123 kilograms60 kilograms115 centimeters

**Task 2. Answer the following questions:**

**Task 2. Answer the following questions:**

1. What will be the primary producers of material wealth by the end of the century?
2. What functions does the machine have, which our scientists have developed?
3. How does Robot assist a surgeon?
4. What can you say about underwater and space Robots?

5. What is "Sim-1"?
6. What robot was displayed at the world Exposition in London?
7. What did you find out about Aizawa?

**Task 3. Find the English equivalents for the words and word-combinations given below in the text:**

**Task 3. Find the equivalents of the following words in the text:**

huge, request, ability, cell, groundwater, shimmer, distant, proud, medicine, numerous, cardboard, determine.

**Task 4. Translate the following words and word-combinations into Russian:**

**Task 4. Read the following words and phrases and translate them into Russian:**

create, shake, wink, nod, request, dispatch, rate, pressure, intend, adjust, thread, maintenance, circulate, beforehand, science fiction, capture, wealth.

**Task 5. Make the sentences interrogative:**

**Task 5. Put the following sentences in the question form:**

1. Aizawa brought out two of eight brother robots for a stroll outside his home.
2. Machines and robots will be the primary producers of material wealth.
3. He is particularly proud of eight of his creations.
4. This news captured the interest of a boy in the fifth form of an elementary school.
5. He is to serve as a "patient" for medical students.

**Task 6. Fill in the blanks with the following words from the text given below:**

**Task 6. Instead of blanks, insert the corresponding words from the text:**

equipment, artificial, temperature, rate, improve, advantage, orbital, pressure.

1. The great ..... of the space robots are that they need no life support.
2. This ..... involves maintenance, repair, part replacement and other jobs.
3. A special screen shows the patient's pulse ..., blood ... and body ... .
4. The ..... stations are added to them nowadays.
5. It has been decided to ..... the device to give recommendations to the operator of ..... heart.

## **ROBOTICS AND ROBOT GENERATIONS [2]**

**Task 1. Read and translate the text:**

**Task 1. Read and translate the text:**

Robotics is the art and science of the creation and use of robots, i. e., in other words, robot technology. Today practically all sectors of the economy and industry are looking forward to introducing industrial robots. But robot building is not simple and certainly not cheap. If every sector begins to build its own robots, it will be impossible to avoid unnecessary duplication of research and development, and large sums will be wasted. Therefore the need is to concentrate all efforts in robot technology in one pair of hands, in a powerful intersectoral scientific and technical organization. Only in this way it is possible to ensure the maximum standardization of production of industrial robots and multipurpose automatic manipulators. There are two rational ways in the field of robotics.

The first one is to build standardized modules-unified elements on the basis of which it will be easy to assemble, in different combinations, robots for the most varied purposes. The second way is to create an intersectoral exchange fund of robots so that research and development of designers in different technical fields should be within the reach of all interested organizations and enterprises.

The robots are divided into three generations: programmed, adaptive and intellectual. Characteristic of the first generation-the programmed robots-is that their control system acts according to a rigid oft-repeated programme all the time. But the programmed robots are easily returned to various action programmes.

The adaptive robots, robots of the second generation, have been ready worked out and will be widely applied in production at the close of this and the beginning of the next decade. Their fundamental difference from the first robot generation is the appearance of artificial sensors, which give the adaptive robots the ability to see, to hear and feel. The possibilities of them are immeasurably greater than the robots of the first generation.

The third generation-intellectual robots-will be able to perform intricate selective operations, and carry out practically autonomous work not depending on

the operator. Robots with artificial intelligence will be able to identify objects in a pile, select the objects in the appropriate sequence and assemble them into a unit. And then we shall be able to speak, about a robot revolution in the economy, about a many-fold increase of labour productivity, and the advent of a new age of industrial production-the age fully automated enterprises and, maybe, whole branches of industry.

**Task 2. Answer the following questions:**

**Task 2. Answer the following questions:**

1. What is Robotics?
2. How is it possible to ensure the maximum standardization of industrial robots production?
3. What are two rational ways in the field of robotics according to the text?
4. What 3 generations are the robots divided into?
5. Can you characterize them?

**Task 3. Find the English equivalents for the words and word-combinations given below in the text:**

**Task 3. Find the equivalents of the following words in the text:**

creation, complex, branch, applied, sequence, emergence, guarantee, labor, purpose, artificial, collect, agree, avoid, enterprise.

**Task 4. Translate the following words and word-combinations into Russian:**

**Task 4. Read the following words and phrases and translate them into Russian:**

artificial, object, labour productivity, advent, branch, duplication, multipurpose, rational ways, divide into, ability, intricate, purpose, unify, pile.

**Task 5. Make the sentences interrogative:**

**Task 5. Put the following sentences in the question form:**

1. Robots with artificial intelligence will be able to identify objects in a pile, select the objects in the appropriate sequence and assemble them into a unit.
2. The robots are divided into three generations.
3. Robotics is the art and science of the creation and use of robots.
4. There are two rational ways in the field of robotics.

5. Today practically all sectors of the economy and industry are looking forward to introducing industrial robots.

## **LESSON 29**

### **AMD COMPANY [4]**

**Task 1. Read and translate the text:**

**Task 1. Read and translate the text:**

Advanced Micro Devices, Inc. (AMD) is a manufacturer of integrated circuits located in Sunnyvale, California. It is the second-largest supplier of x86-compatible processors. It was founded in 1969 by a group of defectors from Fairchild Semiconductor. AMD's current president and CEO is Dr. Hector Ruiz.

AMD is best known for the Athlon, Opteron, Turion64, Sempron and Duron lines of x86-compatible processors. Their more general components have been found in early and current Apple computers and numerous other electronic devices.

The company started as a producer of logic chips in 1969, and then entered the RAM chip business in 1975. That same year, it introduced a clone of the Intel 8080 microprocessor. During this period, AMD also designed and produced a series of bit-slice processor elements such as Am2900, Am29116, Am293xx which were used in various minicomputer designs.

Later AMD decided to switch gears and concentrate solely on Intel-compatible microprocessors and flash memory. In February 1982, AMD signed a contract with Intel, becoming a licensed second-source manufacturer of the 8086 and 8088 processors. This put them in direct competition with Intel for x86 compatible processors and their flash memory secondary markets.

AMD produced the 80286, or 286, under the same arrangement, but then Intel cancelled the agreement in 1986, and refused to hand over technical details of the i386 part. Jerry Sanders could have closed the company and retired at this point; instead in 1991 AMD released the Am386, its clone of the later Intel 80386 processor. It took less than a year for AMD to sell a million units. And AMD's 386DX-40 was very popular. AMD followed in 1993 with the Am486. Both sold at a significantly lower price than the Intel versions.

The same time AMD challenged the decision to cancel the agreement, and subsequently won under arbitration. A long process of legal dispute followed, that ended in 1991, when the Supreme Court of California finally sided with AMD, and forced Intel to pay over \$ 1 billion in compensation for violation of contract.

But on December 30, 1994 the Supreme Court of California finally formally denied AMD rights to use the i386's microcode. Afterwards AMD and Intel concluded an agreement, the details of which remain largely secret, which gave AMD the right to produce and sell microprocessors containing the microcodes of Intel 286, 386, and 486. But Intel keeps locking AMD processors out of the global market.

**Task 2. Answer the following questions:**

**Task 2. Answer the following questions:**

1. What is AMD?
2. Where is Advanced Micro Devices, Inc. located?
3. When was AMD founded?
4. Who founded Advanced Micro Devices, Inc.?
5. Who is the current president and CEO of AMD?
6. When did AMD enter the RAM chip business?
7. When did AMD release the Am386?
8. When did AMD sign a contract with Intel?
9. Why were AMD's 386DX-40 and Am386 so popular?
10. Why was there a dispute between Intel and AMD?
11. When did AMD's Am486 appear?

12. When was Intel forced to pay over \$ 1 billion to AMD company in compensation for violation of contract?

**Task 3. Find the English equivalents for the words and word-combinations given below in the text:**

**Task 3. Find the equivalents of the following words in the text:**

version, violation, period, meaningfully, advanced, supplier, consent, cross out, subsequently, flash, price, defector, contain.

**Task 4. Translate the following words and word-combinations into Russian:**

**Task 4. Read the following words and phrases and translate them into Russian:**

the global market, release, under arbitration, technical details, sided with AMD, the Intel versions, compatible processors, solely.

**Task 5. Make the sentences interrogative:**

**Task 5. Put the following sentences in the question form:**

1. Advanced Micro Devices, Inc. (AMD) is a manufacturer of integrated circuits located in Sunnyvale, California.

2. The same time AMD challenged the decision to cancel the agreement, and subsequently won under arbitration.

3. And AMD's 386DX-40 was very popular.

4. It took less than a year for AMD to sell a million units.

5. Afterwards AMD and Intel concluded an agreement.

## **LESSON 30**

### **DVD TECHNOLOGY [4]**

**Task 1. Read and translate the text:**

**Task 1. Read and translate the text:**

DVD is sometimes called "Digital Versatile Disc" or "Digital Video Disc". It is an optical disc storage media format that can be used for data storage, including movies with high video and sound quality. DVDs resemble compact discs as their physical dimensions are the same-12cm in diameter but they are encoded in a different format and at a much higher density, using the Universal Disk Format (UDF) file system.

In the early 1990s two high density optical storage standards were being developed: one was the MultiMedia Compact Disc (MMCD), backed by Philips and Sony, and the other was the Super Density Disc (SD), supported by Toshiba, Time-Warner, Matsushita Electric, Hitachi, Mitsubishi Electric, Pioneer, Thomson, and JVC. Later IBM's president, Lou Gerstner, acting as a matchmaker, led an effort to unite the two camps behind a single standard, anticipating a repeat of the costly format war between VHS and Betamax in the 1980s.

Philips and Sony abandoned their MMCD format and agreed upon Toshiba's SD format with two modifications that are both related to the servo tracking technology.

The first DVD players and discs were available in November 1996 in , March the , Europe and in . The first DVD movie appeared in 1996. The movie had the first test for 2.1 surround sound. In 1999 Independence Day was the first movie to introduce 5.1 surround sound. Japan 1997 in United States 1998 in 1999 in Australia

By the spring of 1999 the price of a DVD player had dropped below the US \$300. As a result Wal-Mart began to offer DVD players for sale in its stores.

As of 2006 DVD sales make up the bulk of gross sales and VHS is a slim minority. The price of a DVD player has dropped significantly. Many modern computers are sold with DVD-ROM drives stock.

**Task 2. Answer the following questions:**

**Task 2. Answer the following questions:**

1. What is DVD?
2. Do DVDs resemble compact discs?
3. What file system format is used in a DVD disc?
4. What is MMCD?
5. What is SD?
6. What companies supported high density optical storage standard SD?
7. What companies supported high density optical storage standard MMCD?
8. When did the first DVD players and discs become available?
9. When did the first DVD movie appear?
10. Why did Wal-Mart begin to offer DVD players for sale in its stores only

in 1999?

**Task 3. Find the English equivalents for the words and word-combinations given below in the text:**

**Task 3. Find the equivalents of the following words in the text:**

keep, preserve, have similarity, sound, independence, include, dimensions, available, modification, the same.

**Task 4. Translate the following words and word-combinations into Russian:**

**Task 4. Read the following words and phrases and translate them into Russian:**

optical disc, storage, data storage, including, physical dimensions, high density, support, a matchmaker, effort, to unite, abandoned, related to, the servo tracking technology, available, appeared, to introduce, bulk, minority.

**Task 5. Make the sentences interrogative:**

**Task 5. Put the following sentences in the question form:**

1. The first DVD players and discs were available in November 1996 in ,  
March the , Europe and in .Japan1997 inUnited States1998 in1999 inAustralia
2. The price of a DVD player has dropped significantly.
3. The first DVD movie appeared in 1996.
4. In the early 1990s two high density optical storage standards were being developed.
5. The movie had the first test for 2.1 surround sound.

## **LESSON 31**

### **DVD VIDEO. DVD DISCS [4]**

**Task 1. Read and translate the text:**

**Task 1. Read and translate the text:**

DVD-video discs require a DVD-drive with a MPEG-2 decoder. DVD movies are encoded using a combination of MPEG-2 compressed video and audio of varying formats. Typical data rates for DVD movies range from 3-10 Mbit / s, and the bit rate is usually adaptive. The video resolution on NTSC discs is 720x480 and on PAL discs is 720x576.

The audio data on a DVD movie can be of the format PCM, DTS, MP2, or Dolby Digital (AC-3). DVDs can contain more than one channel of audio to go together with the video content. In many cases, sound tracks in more than one language are present.

DVD Video may also include one or more subtitle tracks in various languages. They are stored as images with transparent background which are overlaid over the video during playback.

DVD Video may contain Chapters for easy navigation.

There are several possible successors to DVD being developed by different consortiums: Sony's Blu-ray Disc, Hitachi / Toshiba's HD DVD, the Holographic Versatile Disc, and Maxell's holographic disc.

The first generation of holographic media with 300 GB of storage capacity and a 160 Mbit / s transfer rate is scheduled for release in Late 2006 by Maxell and its partner, InPhase.

On April 15, 2004, in a co-operation project with TOPPAN Printing Co., the electronic giant Sony Corp. successfully developed the paper disc, a storage medium that is made out of 51 % paper and offers up to 25 GB of storage, about five times more than the standard 4.7 Gb DVD. The disc can be easily cut with scissors and recycled, offering foolproof data security and an environment-friendly storage media.

In 2006 it is not yet clear which technology will win the format war over DVD. HD DVD discs contain less information than Blu-ray discs (15GB vs. 25GB for single layer, and 30GB 50GB for dual layer), but Blu-ray requires changes in manufacturing machinery and techniques.

DVDs are made from a 0.6 mm thick disc of polycarbonate plastic coated with a much thinner reflective aluminum layer. Two such discs are glued together to form a disc. 1.2 mm

A single-layer DVD can store 4.7 gigabytes (Gb), which is around seven times as much as a standard CD disc. By employing a red laser at 650 nm, before it was 780 nm, wavelength and a numerical aperture of 0.6 before it was 0.45, the read-out resolution is increased by a factor 1.65. DVD uses a more efficient coding method. As a result, the DVD format is 47 percent more efficient with respect to CD disc.

A DVD can contain simple data, video data and audio data. There are three writing formats: plus, minus and RAM. As to the DVD disc itself, DVD discs may have one or two sides, and one or two layers of data per side; the number of sides and layers determines the disc capacity. So, there are 5 types of DVD discs:

DVD-5, DVD-9, DVD-10, DVD-14, DVD-18.

DVD-5 means single sided, single layer disc. It is 4.7 gigabytes (GB) and may contain 4.38 gigabytes (Gb) of information.

DVD-9 means single sided, double layer DVD disc which capacity is 8.5 Gb (7.92 Gb).

DVD-10 means double sided, single layer on both sides DVD disc. It is a 9.4 Gb (8.75 Gb) disc.

DVD-14 means double sided, double layer on one side, single layer on other. It is 13.3 Gb disc which can contain up to 12.3 Gb of information.

DVD-18 offers the highest capacity. It is double sided, double layer on both sides disc with 17.1 Gb and can contain up to 15.9 Gb.

The capacity of a DVD disc can be visually determined by noting the number of data sides, and looking at the data sides of the disc. Double-layered sides are sometimes gold-coloured, while single-layered sides are silver-coloured, like a CD. One additional way to tell if a DVD contains one or two layers is to look at the centre ring on the underside of the disc. If there are two barcodes, it is a dual layer disc. If there is one barcode, there is only one layer.

The "+" (plus) and "-" are similar technical standards and are partially compatible. As of 2004, both formats are equally popular, with about half of the industry supporting "+", and the other half "-". All DVD readers are supposed to read both formats, though real-world compatibility is around 90% for both formats. There is the third writing format. It is DVD-RAM (RAM-Random Access Memory). This standard is not as popular as "+" or "-".

The data transfer rate of a DVD drive is given in multiples of 1350 Kb /s, which means that a drive with 16x speed designation allows a data transfer rate of  $16 \times 1350 = 21600$  kB/s (21.09 MB/s). As CD drive speeds are given in multiples of 150 kB/s, one DVD "speed" equals nine CD "speeds", so an 8x DVD drive should have a data transfer rate similar to that of a 72x CD drive. In physical rotation terms (spins per second), one DVD speed equals three CD speeds, so an 8x DVD drive has the same rotational speed as 24 x CD drive.

**Task 2. Answer the following questions:**

**Task 2. Answer the following questions:**

1. How are DVD movies encoded?
2. What is a typical range for DVD movies?
3. What is the DVD video resolution on NTSC discs?
4. What is the DVD video resolution on PAL discs?
5. What audio formats on a DVD movie do you know?
6. How are subtitle tracks stored?
7. What possible successors to DVD are there?
8. What company successfully developed the paper disc in 2004?
9. How much information can Blu-ray discs contain?
10. How much information can HD DVD discs contain?
11. What materials are used for DVD production?
12. How much information can a single-layer DVD store?
13. What efficiency has a DVD format with respect to CD disc?
14. How many writing formats are there?
15. What determines a DVD disc capacity?
16. How many types of DVD disc are there?
17. What does DVD-5 mean?
18. What does DVD-9 mean?
19. What does DVD-10 mean
20. What does DVD-14 mean ?
21. What does DVD-18 mean?
22. How can the capacity of a DVD disc be visually determined?
23. What is DVD-RAM?
24. What can you tell about DVD speed comparing with CD speed?

**Task 3. Find the English equivalents for the words and word-combinations given below in the text:**

**Task 3. Find the equivalents of the following words in the text:**

require, decoder, variable, adaptable, subtitle, transparent, playback, move, scissors, layer, wavelength, dual, barcode, compatibility.

**Task 4. Translate the following words and word-combinations into Russian:**

**Task 4. Read the following words and phrases and translate them into Russian:**

require, content, In many cases, sound tracks, playback, possible, scissors, recycled, glue, efficient, respect, the disc capacity, to contain, the Additional, a dual layer, partially, compatible, both, means, multiples, transfer, rotation, rotational speed .

**Task 5. Make the sentences interrogative:**

**Task 5. Put the following sentences in the question form:**

1. The data transfer rate of a DVD drive is given in multiples of 1350 kB / s.
2. The first generation of holographic media with 300 GB of storage capacity and a 160 Mbit / s transfer rate is scheduled for release in Late 2006 by Maxell and its partner, InPhase.
3. Two such discs are glued together to form a 1.2 mm disc.
4. There are several possible successors to DVD being developed by different consortiums.
5. The capacity of a DVD disc can be visually determined by noting the number of data sides, and looking at the data sides of the disc.

## **LESSON 32**

### **PENTIUM I PENTIUM II PENTIUM III [4]**

**Task 1. Read and translate the text:**

**Task 1. Read and translate the text:**

The Pentium I is a fifth-generation x86 architecture microprocessor by Intel which first shipped on March 22, 1993. It is the successor to the 486 line. The Pentium was originally to be named 80586 or i586, but the name was changed to Pentium presumably because "pent" means "five" because numbers could not be trademarked. So, the original Pentium microprocessor had the internal code name P5 and has two datapaths (pipelines) that allow it to complete more than one instruction per clock cycle.

The earliest Pentiums were released at the clock speeds of 66 MHz and 60 MHz. The early versions of 60-100 MHz Pentiums had a problem in the floating point unit that, in rare cases, resulted in reduced precision of division operations.

Later on 75, 90, 100, 120, 133, 150, 166, 200, and 233 MHz versions gradually became available. 266 and 300 MHz versions were later released for mobile computing.

Intel has retained the Pentium trademark for naming later generations of processor architectures, which are internally quite different from the Pentium itself: Pentium Pro, Pentium II, Pentium III, Pentium IV, Pentium M, and Pentium D.

The Pentium brand is now used for desktop parts, the Celeron brand is used for the parts typically of lower performance and price, and the Xeon brand is used for high-performance parts suitable for servers and workstations.

The Pentium II is an x 86 architecture microprocessor produced Intel and introduced on May 7, 1997. It was based on a modified version of the P6 core first used for the Pentium Pro, but with improved 16-bit performance.

The original Klamath Pentium IIs ran at 233 and 266 MHz, were produced in a 0.35 um fabrication process and produced for that time an incredible amount of heat.

A 300 MHz version was released later in 1997. The Deschutes core Pentium IIs which debuted at 333 MHz in January 1998 were produced in a more suitable 0.25 um fabrication process and ran significantly cooler. During 1998, Pentium IIs running at 266, 300, 350, 400, and 450 MHz were also released. Pentium II based systems also saw the introduction of the new generation RAM-standard, SDRAM which replaced EDO RAM, and the introduction of the AGP graphics bus.

Unlike previous Intel processors such as the Pentium and Pentium Pro, the Pentium II was packaged in a slot-based form-factor rather than a socket one. This larger package was a compromise allowing Intel to separate the secondary cache from the processor while still keeping it on a closely coupled bus. A low-end version of the Pentium II-essentially a Pentium II with less or no level 2 cache-was marketed under the name "Celeron". The Pentium II Xeon was a high-end version intended for use on servers.

By early 1999, the Pentium III superseded the Pentium II.

The Pentium III is the sixth generation of x86 architecture microprocessor by Intel, introduced on February 26, 1999. Initial versions were very similar to the earlier Pentium II, the most notable difference being the addition of SSE instructions and the introduction of a controversial serial number which was embedded in the chip during the manufacturing process. As with the Pentium II, there was also a low-end Celeron version and a high-end Xeon version. The Pentium III was eventually superseded by the Pentium 4. An improvement on the Pentium III design is the Pentium M.

The original version of Pentium III was Katmai. It was pretty much the same as the Pentium II using a 0.25µm fabrication process, the only differences being the introduction of SSE, and an improved L1 cache controller which was the cause of the minor performance improvements over the latter PIIIs. It was first released at speeds of 450 and 500 MHz. Two more versions of 550 MHz and 600 MHz were released in 1999. The Katmai used the same slot based design as the Pentium II.

The second version of Pentium III was Coppermine. It had an integrated full-speed 256 KB L2 cache with lower latency, which improved performance over Katmai. It was built on a 0.18 µm process. Pentium III Coppermines running at 500, 533, 550, 600, 650, 667, 700, and 733 MHz were first released on October 25, 1999. From December 1999 to May 2000, Intel released Pentium IIIs running at speeds of 750, 800, 850, 866, 900, 933 and 1000 MHz(1 GHz).

A 1.13 GHz version was released in mid-2000, but famously recalled because it was not stable enough to compile the Linux kernel. Intel needed at least six months to resolve this problem and released 1.1 GHz and 1.13 GHz versions in 2001.

The third version, Tualatin, was really just a trial for Intel's new 0.13 µm process. Tualatin performed quite well, especially in variations which had 512 KB L2 cache. This version was called the Pentium III-S.

Pentium III Tualatins were released during 2001 and early 2002 at speeds of 1.0, 1.13, 1.2, 1.26, 1.33 and 1.4 GHz. Intel didn't want a repeat of the situation where the performance of a lower priced Celeron rivaled that of the more expensive Pentium III, so Tualatin never ran faster than 1.4 GHz, the introductory clock rate

of the Pentium 4. Later on, it was proved that the design was good for at least 1.7 GHz.

**Task 2. Answer the following questions:**

**Task 2. Answer the following questions:**

1. What is the Pentium I?
2. What company created the Pentium I?
3. When was the Pentium I introduced?
4. What model of computer was the predecessor of the Pentium I?
5. What were the clock speeds of the earliest Pentiums?
6. What problem did the early versions of 60-100 MHz Pentiums have?
7. What brand is used for the parts typically of lower performance and price?
8. What brand is used for desktop parts?
9. What brand is used for high-performance parts suitable for servers and workstations?
10. What is the Pentium II?
11. When did the Pentium II appear?
12. What was the first version of Pentium II?
13. What was the original clock rate of the Klamath?
14. When was a 300 MHz version of Pentium II released?
15. What was the distinctive feature of Pentium II comparing with the Pentium and Pentium Pro computers?
16. What is the brand name for a low - end version of the Pentium II?
17. What is the brand name for a high-end version of the Pentium II?
18. When was the Pentium II superseded by the Pentium III?
19. What is the Pentium III?
20. When did the Pentium III appear?
21. What are the most notable differences in the Pentium III?
22. What was the original version of Pentium III?
23. What was the second version of Pentium III? What were the main features of the second version of Pentium III?

24. Why was a 1.13 GHz version recalled?
25. What was the third version of Pentium III?
26. When was the third version of Pentium III released?
27. Why did Tualatin never run faster than 1.1 GHz?
28. What was the introductory clock rate of the Pentium IV?

**Task 3. Find the English equivalents for the words and word-combinations given below in the text:**

**Task 3. Find the equivalents of the following words in the text:**

successor, presumably internal, cycle, gradually, trademark, hold, suitable, previous, minor, initial, gather material, make a decision, excellent.

**Task 4. Translate the following words and word-combinations into Russian:**

**Task 4. Read the following words and phrases and translate them into Russian:**

shipped on, to complete, to release, to reduce, precision of division operations, available, workstations, fabrication process, incredible amount of heat, core, to separate, rival, the introductory clock rate.

**Task 5. Make the sentences interrogative:**

**Task 5. Put the following sentences in the question form:**

1. Pentium III Tualatins were released during 2001.
2. The second version of Pentium III was Coppermine.
3. This larger package was a compromise allowing Intel to separate the secondary cache from the processor while still keeping it on a closely coupled bus.
4. The Pentium II is an x 86 architecture microprocessor produced Intel and introduced on May 7, 1997.
5. It was based on a modified version of the P6 core first used for the Pentium Pro, but with improved 16-bit performance.

## **LESSON 33**

### **PENTIUM IV [4]**

**Task 1. Read and translate the text:**

**Task 1. Read and translate the text:**

The Pentium IV is a seventh-generation x 86 architecture microprocessor produced by Intel and is their first all-new CPU design, called the NetBurst architecture, since the Pentium Pro of 1995. The original Pentium IV, codenamed «Willamette», ran at 1.4 and 1.5 GHz and was released in November 2000.

The design goal of the Pentium IV was to scale to fast clock speeds, because consumers were beginning to purchase computers based on GHz ratings. To this extent the P IV appears to be a classic example of marketing concerns driving technological development.

Intel stated in their marketing at the launch of the P IV it was an architecture designed to scale to 10 GHz. However, the architecture used in P IV encountered unsolvable thermal problems at 4 GHz. This forced Intel to abandon development of the Pentium IV in mid-2005 to focus on the cooler running Pentium M, which was repositioned for the desktop computer and small server markets. In retrospect, the Pentium III core was technologically superior to Pentium IV.

And Willamette, the first Pentium IV, suffered long delays in the design process. At that time, the Willamette was only expected to breach the 1 GHz (1000 MHz) barrier upon its introduction. However, once the Pentium III was introduced, obviously Intel could not name it as a Pentium II. Because its architecture was a relatively large departure from the Pentium WillametteIII, it was named Pentium IV, ending Intel's Roman-Numeral nomenclature system.

April 2001 brought the 1.7 GHz P IV, the first one to provide performance clearly superior to Pentium III. July saw 1.6 and 1.8 GHz models and in August 2001, Intel released 1.9 and 2.0 GHz Pentium IV. In the same month, they released a new chipset that supported much cheaper PC133 SDRAM.

The 2.0 GHz was the first P IV to provide a serious challenge to the rival Athlon Thunderbird, which until then had been unquestionably the fastest x86 CPU on the market.

In October 2001 the Athlon XP regained a clear lead for AMD, but in January 2002 Intel released Pentium IV s with their new Northwood core at 2.0 and 2.2 GHz.

A 2.4 GHz P IV was released in April 2002, a 2.53 GHz part in May and a 3.06 GHz Pentium IV arrived in November.

The 3.06 GHz processor supported Hyper-threading, first appeared in Xeon, enabling multiple threads to be run together by duplicating some parts of the processor in order to let the operating system believe that there are two logical processors. Hyper-Threading was present in all Northwood CPUs, but was disabled in the core in all but the 3.06 GHz model. In April 2003, Intel launched new variants, ranging from 2.4 to 3.0 GHz. The key difference on these new versions was that they all supported Hyper-Threading, and ran their system buses at 800 MHz.

On February 1, 2004, Intel introduced a new core codenamed «Prescott». The core uses a 90nm process. Although it is clocked at the same rate as a Northwood, benchmarks show that a Northwood runs slightly faster than a Prescott in gaming applications. However, with video editing and other multimedia software, the Prescott's extra cache gives it a clear speed advantage over the Northwood. 3.8 GHz was the fastest Prescott-based processor ever mass-produced.

Finally, the thermal problems were so severe, Intel decided to abandon the Prescott architecture altogether, and attempts to roll out a 4 GHz part were abandoned, as a waste of internal resources. Intel released a new Prescott core codenamed «Prescott 2M» by the first quarter of 2005. It features new 64-bit technology. On 14 November 2005, Intel released Prescott 2M processors with VT (Virtualization Technology, codenamed "Wonderpool") enabled. Intel only released two models of this Prescott 2M category: 662 and 672, running at 3.6 and 3.8 GHz, respectively. Intel will release the final version of Pentium 4, codenamed "Cedar Mill" at the first quarter of 2006. Cedar Mill is expected to solve overheating problems of Prescott.

**Task 2. Answer the following questions:**

**Task 2. Answer the following questions:**

1. What is the Pentium IV?
2. What was the original Pentium IV codename?
3. What was the clock speed of the original Pentium IV?

4. When was the first Pentium IV released?
5. What was the design goal of the Pentium IV?
6. What statement was made by Intel while launching the P IV?
7. Why did the P IV microprocessors never overcome the IV GHz barrier?
8. Why did Willamette, the first Pentium IV, suffer long delays in the design process?
9. When was the 1.7 GHz P IV produced?
10. When was 2.0 GHz Pentium IV released?
11. What was the main feature of the 2.0 GHz P IV?
12. When did a 3.06 GHz Pentium IV arrive?
13. When were the versions of P IV supporting Hyper-Threading technology launched by Intel?
14. What is Hyper Threading technology?
15. When "Prescott" P IV was introduced?
16. Why did Intel make decision to abandon the development of Prescott core architecture?
17. What was the fastest Intel processor ever mass-produced?
18. What was the clock speed of the fastest Intel processor?
19. When was "Prescott 2M" core introduced?

**Task 3. Find the English equivalents for the words and word-combinations given below in the text:**

**Task 3. Find the equivalents of the following words in the text:**

consumer, collide, server, explicitly, relatively, performance, indisputable, recovery, to, start, topographic mark, mass product, make it possible, accordingly, to overheat.

**Task 4. Translate the following words and word-combinations into Russian:**

**Task 4. Read the following words and phrases and translate them into Russian:**

the design goal, to purchase, To this extent, the desktop, delay, breach, to provide, a new chipset, a serious challenge to the rival, on the market, at the same rate, to roll out, features, respectively.

**Task 5. Make the sentences interrogative:**

**Task 5. Put the following sentences in the question form:**

1. The Pentium IV is a seventh-generation x 86 architecture microprocessor.
2. Hyper-Threading was present in all Northwood CPUs, but was disabled in the core in all but the 3.06 GHz model.
3. On February 1, 2004, Intel introduced a new core codenamed «Prescott».
4. The core uses a 90 nm process.
5. Cedar Mill is expected to solve overheating problems of Prescott.

**LESSON 34**

**CELERON [4]**

**Task 1. Read and translate the text:**

**Task 1. Read and translate the text:**

A Celeron is any of a large number of different budget microprocessors produced by Intel and marketed as a budget CPU line. The Celeron family complements Intel's higher-performance and more expensive Pentium CPUs family. Introduced in August 1998, the first Celeron was based on the Pentium II core. Later versions were based on the Pentium III, Pentium IV, and Pentium-M.

As a product concept, the Celeron was introduced in response to Intel's loss of the low-end market, in particular to Cyrix's 6x86 and AMD's K6 because Intel's existing low-end product, the venerable Pentium MMX, was no longer performance competitive.

The first Celeron codenamed Covington was essentially a 266MHz Pentium II manufactured without any secondary cache at all. Although clocked at 266 or 300MHz substantially higher than the old Pentium MMX, the cacheless Celerons were a good deal slower than the parts they were designed to replace. Substantial numbers were sold on first release, largely on the strength of the Intel name, but the Celeron quickly achieved a poor reputation both in the trade press and among computer professionals.

The initial market interest faded rapidly in the face of its poor performance and with sales at a very low level, Intel felt obliged to develop a substantially faster replacement as soon as possible.

Intel was well aware of the poor reputation of the original Celeron and determined not to make the same mistake twice. As the result the new Mendocino core Celeron was a good performer from the outset. Indeed, most industry analysts regarded the first Mendocino-based Celerons as too successful. Its performance was sufficiently high to not only compete strongly with rival parts, but also to attract buyers away from Intel's high-profit flagship, the Pentium II.

The key to the new Celeron's performance was cache. Where the old model had no secondary cache at all, the new part included 128KB of L2 cache as part of the chip itself.

The first Mendocino-core Celeron was clocked at 300MHz but was almost twice as fast as the old cacheless Celeron at the same clockspeed. The Mendocino also came in a mobile variant, with speeds 266, 300, 333, 366, 400, 433, and 466 MHz.

The next generation Celeron was the Coppermine-128 sometimes known as the Celeron II. It was a derivative of Intel's latest high-end part, the "Coppermine" Pentium III and was released in March 2000. Like the Mendocino, the Coppermine-128 used 128 KB of on-chip L2 cache and was restricted to a 66 MHz bus speed. It was identical to the Pentium III except for the smaller secondary cache and the much slower bus.

The next series of Celerons were based on Pentium III Tualatin core. They were nicknamed Tualeron. The series began with 1000 and 1100 MHz parts and the line continued with 1200, 1300, and 1400 MHz chips.

Tualerons were identical to their fully-fledged Pentium III sibling, except that Tualerons used a 100 MHz bus rather than the 133 MHz bus of the Pentium III processors.

The Celeron D processor is based on the Prescott core and has a larger 256 KB cache. It also features a 533 MHz bus.

Their clock speed range was from 2.13 GHz in the model 310 to 3.2 GHz in the model 350.

**Task 2. Answer the following questions:**

**Task 2. Answer the following questions:**

1. What is Celeron?
2. What company produces Celeron?
3. What was the clock rate of the first Celeron?
4. Why did Intel introduce low-end Celeron?
5. What features did the Mendocino core Celeron have?
6. What was the first Mendocino-core Celeron?
7. What was the second generation of Celeron?
8. What was the key to the new Celeron's performance?
9. When was the "Coppermine" Pentium III released?
10. What clock speeds did "Tualeron" Celeron have?
11. What were the main differences between the Pentium III "Tualeron" and Celeron "Tualeron"?
12. What is the Celeron D processor?

**Task 3. Find the English equivalents for the words and word-combinations given below in the text:**

**Task 3. Find the equivalents of the following words in the text:**

budget, addition, competitive, initial, essentially strength, determine, error, sufficiently, twice, limit, nickname, based, properties, speed.

**Task 4. Translate the following words and word-combinations into Russian:**

**Task 4. Read the following words and phrases and translate them into Russian:**

complement, in particular to, the venerable Pentium MMX, codenamed, essentially, cacheless, to replace, to release, both, the trade, at a very low level, the poor reputation, the same mistake, twice, successful, to attract, identical.

**Task 5. Make the sentences interrogative:**

**Task 5. Put the following sentences in the question form:**

1. The Celeron family complements Intel's higher-performance and more expensive Pentium CPUs family.
2. Introduced in August 1998, the first Celeron was based on the Pentium II core.
3. Later versions were based on the Pentium III, Pentium IV, and Pentium-M.
4. They were nicknamed Tualeron.
5. The next series of Celerons were based on Pentium III Tualatin core.

## **LESSON 35**

### **ATHLON 64. OPTERON [4]**

**Task 1. Read and translate the text:**

**Task 1. Read and translate the text:**

The Athlon 64 codenamed "ClawHammer", "Newcastle", "Winchester", "Venice", and "San Diego" represents AMD's entry into the consumer 64-bit microprocessor market. It was firstly released on September 23, 2003. This processor is based on the AMD64 architecture. It is AMD's first eighth generation processor core for desktop and mobile computers. Turion 64 is an example of AMD processor for mobile computers. It intended to compete with Intel's Pentium M. It is equipped with 512 or 1024 KB of L2 cache.

There are three variants: Athlon 64, Athlon 64 FX, and the dual-core Athlon 64 X2.

The Athlon 64 X2 is a processor consisting of two Athlon 64 cores joined together on one die.

The main benefit of dual core processors like the X2 is their ability to process more software "threads" at the same time.

Such processors are efficient with programs written with multiple threads and capable of utilizing dual cores include many music and video encoding applications, and especially professional rendering programs.

Having two cores, the Athlon 64 X2 has an increased number of transistors. The 1 MB L2 cache X2 processor has 233.2 million transistors whereas its Athlon 64 counterpart has only 114 million transistors.

The AMD Opteron is the first eighth-generation processor with K8 core, and the first of AMD's AMD64 processors, released on April 22, 2003. It is intended to compete in the server market, particularly in the same segment as the Intel Xeon processor.

In June 2004, it was the tenth fastest supercomputer in the world, dropping to 42-nd in November 2005. On the November 2005 list, 10% of the 500 supercomputer installations were x64 Opteron-based systems, while about 17 % were Intel x64 Xeon-based.

In multi-processor systems where there are more than one Opteron on a single motherboard, the CPUs communicate using the Direct Connect Architecture over high-speed HyperTransport links. So, each CPU can access the main memory of another processor. The Opteron approach to multi-processing is not the same as standard symmetric multiprocessing as instead of having one bank of memory for all CPUs, each CPU has its own memory. As of early 2005, most retail motherboards offer one or two CPU sockets.

The Opteron CPU directly supports up to an 8-way configuration, which can be found in mid-level servers. Enterprise-level servers use additional and expensive routing chips to support more than 8 CPUs per box. In May of 2005, AMD introduced its first "Multi-Core" Opteron CPU's. At the present time, the term "Multi-Core" at AMD in practice means "dual-core", because each physical Opteron chip actually contains two separate processor cores. This effectively doubles the compute-power. One socket can now deliver the performance of two processors; two sockets can deliver the performance of four processors, and so on. Since motherboard costs go up dramatically as the number of CPU sockets increases, multicore CPU's now allow much higher performing systems to be built with more affordable motherboards.

**Task 2. Answer the following questions:**

**Task 2. Answer the following questions:**

1. What is the AMD Opteron?
2. When was the AMD Opteron released?

3. What was the main intention of AMD'S Opteron creation?
4. Where is the Direct Connect Architecture used?
5. What is the main feature of Opteron approach to multi-processing?
6. When did AMD introduce its first "Multi-Core" Opteron CPU's?
7. What models of the Athlon 64 do you know?
8. When was the Athlon 64 released firstly?
9. What AMD eighth generation processor core for desktop and mobile computers do you know?
10. What is Turion 64?
11. How many variants of Athlon 64 are there?
12. What is the main benefit of dual core processors?

**Task 3. Find the English equivalents for the words and word-combinations given below in the text:**

**Task 3. Find the equivalents of the following words in the text:**

present, consumer, intend, compete, main, benefit, increase, segment, extremely, installations, motherboard, access, approach, retail, additional, deliver, impressive, acceptable.

**Task 4. Translate the following words and word-combinations into Russian:**

**Task 4. Read the following words and phrases and translate them into Russian:**  
software, multiple threads, dual cores, applications, rendering programs, the server market, the main memory, instead of, to support, dramatically, increase, affordable, motherboards.

**Task 5. Make the sentences interrogative:**

**Task 5. Put the following sentences in the question form:**

1. Turion 64 is an example of AMD processor for mobile computers.
2. There are three variants: Athlon 64, Athlon 64 FX, and the dual-core Athlon 64 X2.
3. Having two cores, the Athlon 64 X2 has an increased number of transistors.
4. The Opteron CPU directly supports up to an 8-way configuration, which can be found in mid-level servers.

5. Enterprise-level servers use additional and expensive routing chips to support more than 8 CPUs per box.

## LESSON 36

### SMART STUFF [3]

**Task 1. Read and translate the text:**

**Task 1. Read and translate the text:**

Increasingly over the last few years, we have become familiar with the range of small electronic gadgets that come under the heading smart' accessories. Joggers, for example, run with-heart-rate monitors, and shop assistants carry pocket-sized computers.

But these are just the first examples of a whole range of new products that promises to change our lives in all sorts of surprising ways.

As a scientist at Massachusetts Institute of Technology's Media Lab, Rosalind Picard tries out all kinds of smart accessories before they go on the market. One of these was the so-called 'frown headband'. It came as a shock to Rosalind to realize just how often she frowned. Stuck in a traffic jam recently, waiting for the cars to move forward, Rosalind kept hearing the sounds of the tiny sensor inside the band worn around her forehead-each time she frowned in frustration, the sensor gave out a signal.

Headlands that check facial expressions are just one of the things she and her colleagues have designed. Their aim is to make ready-to-wear items that both look good and give the wearer useful feedback. Body sensors, like those in Rosalind's headband, can detect physical changes that the wearer might not otherwise be aware of. Hidden inside watches, rings or shoes, these sensors can check for signs of stress, give information and offer advice.

Another computer scientist, Steven Feiner, is working on a pair of glasses that will do more than help you to see. Imagine you want to try a restaurant in a foreign city but you're not familiar with the dishes on the menu. If you are wearing a pair of Steven's glasses, all you have to do is glance above the restaurant's doorway and your glasses will immediately become windows to the Internet, offering you full

details of the meals served inside. Are you one of those people who lack confidence when giving a talk to an audience?

Look to the right and the glasses will flash your notes in front of your eyes. They could also prove useful for cooks who want to check a recipe without leaving sticky fingermarks all over their cookery books.

At the moment, Steven's invention looks more like a pair of ski goggles than a pair of glasses. It's a headset connected to a hand-held computer and a Global Positioning System (GPS) receiver, which tracks the wearer's position. Students who don't mind being stared at have tried out the Star Trek-like device on campus. But Steven says that these head-worn displays will eventually get smaller, lighter and smarter as technology improves. As they will be relatively cheap, he foresees them replacing the notebooks and manuals that workers have to carry. He predicts that they will be useful to surgeons, giving them instant access to a patient's medical notes while carrying out operations.

And, of course, this new technology has a fashionable as well as a useful application. A chemical engineer named Robert Langer has invented a new microchip that, if put inside a ring, can give off different scents according to a person's mood. That, of course, may or may not appeal to you. And, in the end, it is shoppers, not scientists, who will determine which of. These smart accessories will succeed as fashionable items and which are destined to join history's long list of crazy inventions. Steven Feiner, concerned that vanity may prevent some people from wearing his glasses, is already working on the idea of contact lenses with the same features.

It is clear, however, that as small computer displays get brighter and cheaper, they will pop up in all sorts of easily-wearable accessories, even in the buttons on your coat. What's more, this is something that's going to happen a lot sooner than we all expect.

**Task 2. Answer the following questions:**

**Task 2. Answer the following questions:**

1. What is the writer's view of Robert Langer's invention?

2. What does the writer think about "smart" accessories?
3. What is the current problem with Steven's glasses?
4. Whose idea for a smart device seems to be the best?
5. What devices mentioned in the text could improve your life?

**Task 3. Use the right prepositions and fill in the blanks:**

**Task 3. Fill in the blanks with prepositions:**

1. Look ..... the right and the glasses will flash your notes ..... front ..... your eyes.
2. He concerned that vanity may prevent ..... some people ..... wearing his glasses, is already working ..... the idea ..... contact lenses ..... the same features.
3. Stuck ..... a traffic jam recently, waiting ..... the cars to move forward, she kept hearing the sounds ..... the tiny sensor inside the band worn around her forehead.
4. She tries ..... all kinds ..... smart accessories before they go ..... the market.
5. .... the moment, his invention looks more like a pair ..... ski goggles than a pair ..... glasses.

**Task 4. Make the sentences interrogative:**

**Task 4. Ask all types of questions for the following sentences:**

1. This new technology has a fashionable as well as a useful application.
2. He is working on a pair of glasses.
3. Robert Langer has invented a new microchip.
4. They will be useful to surgeons, giving them instant access to a patient's medical notes while carrying out operations.
5. The sensor gave out a signal.

**MINISTRY OF EDUCATION AND SCIENCE OF THE RUSSIAN FEDERATION**  
**Federal State Autonomous Educational Institution**  
**Higher Education**  
**"NORTH CAUCASUS FEDERAL UNIVERSITY"**

**SUGGESTIONS FOR TEACHING**  
on the organization and conduct of independent work  
by discipline  
**"FOREIGN LANGUAGE IN THE FIELD OF PROFESSIONAL  
COMMUNICATION"**  
for students of the field of study  
11.04.02 Infocommunication Technologies and Communication Systems  
Profile  
"Technologies for building software-controlled systems and computer networks"

Stavropol, 2023

## **Table of Contents**

1. Thematic planning of extracurricular independent work.
2. Explanatory note
3. Types of independent work
4. Work with a dictionary.
5. Work with texts in the specialty.
6. Work with texts on social and domestic topics.
7. Performing exercises on the text.
8. Preparation of retellings.
9. Making annotations.
10. Composing dialogues.
11. Preparation of a message (monologue speech)
12. Project presentation.
13. Essay.
14. Evaluation tools.
15. Interactive form of conducting a practical lesson.

## **Introduction**

Independent work of undergraduates in a foreign language in the field of professional communication is an integral part of the process of mastering the foreign language training program. Independent work of undergraduates covers all aspects of learning a foreign language and largely determines the results and quality of mastering the discipline. In this regard, the planning, organization, implementation and control of the foreign language learning program are of particular importance and need methodological guidance and methodological support.

These guidelines cover the types and forms of SRS in all aspects of the language, systematize the forms of SRS control and contain methodological recommendations on certain aspects of mastering the English language: pronunciation and reading technique, vocabulary, grammar, text activity, oral and written speech, the use of educational and auxiliary literature. The content of the guidelines is universal, so these materials can be used by undergraduates of all specialties when performing specific types of SRS.

The main purpose of the guidelines is to provide undergraduates with the necessary information, methods and algorithms for the successful performance of independent work, in the formation of stable skills and abilities in various aspects of teaching English, allowing them to independently solve educational problems, perform a variety of tasks, and overcome the most difficult moments in certain types of SRS.

Using the methodological instructions, undergraduates should master the following skills and abilities: 1. correct pronunciation and reading in English; 2. productive active and passive mastering of English vocabulary; 3. mastering the grammatical structure of the English language; 4. work with educational and auxiliary literature (dictionaries and reference books on the English language); 5. prepared oral monologue statement in English within the topics studied; 6. written speech in English.

Methodical instructions for the discipline "Foreign Language in the Field of Professional Communication" for independent work are created to help you work outside of school hours. Starting to perform independent work, you must carefully read the educational goal, familiarize yourself with the requirements for the level of your training in accordance with federal state standards, brief theoretical and educational materials on the topic of independent work, answer questions to consolidate the theoretical material. You must perform all tasks for independent work

in accordance with the instructions, analyze the results obtained in the course of work according to the given methodology.

You must make a report on independent work according to the given algorithm, based on the sample.

You must submit the finished work within the deadline determined by the teacher.

A positive grade on independent work is required to receive credit on this topic of the discipline.

### **Explanatory note**

In order to stimulate professional growth, form creative activity and initiative, it is necessary to increase the role of independent work on educational material.

In the educational process, the independent work of undergraduates is one of the types of training that the student conducts himself, without direct outside help, and here the personal qualities of the undergraduates are important: only knowledge and skills of their independent acquisition and mastering in the conditions of uncertainty of the environment make this choice effective.

The problem of organizing independent work and the interest of undergraduates in it has been relevant in the educational process for a long time. At the present stage of development of Russia, within the framework of the implementation of the standards of the new generation, it is necessary to comprehensively develop the personality, and this can be achieved by increasing the role of independent work of a master's student in the educational process.

The purpose of independent work of undergraduates is:

- to teach the undergraduate student to work meaningfully and independently with educational material, to lay the foundations of self-organization and self-education in order to instill the ability to continuously improve their qualifications in the future;
- consolidation, expansion and deepening of knowledge, skills and abilities acquired by undergraduates in classroom classes under the guidance of a teacher;
- Master's students study additional materials on the discipline studied and the ability to choose the necessary material from various sources;
- education of undergraduates in independence, organization, discipline, creative activity, the need for the development of cognitive abilities and perseverance in achieving goals.

The proposed approach to mastering the material increases motivation for classroom and extracurricular activities, which provides the necessary level of knowledge in the discipline under study and allows you to increase the readiness of undergraduates to pass the test.

### **Structure and content of independent work of a master's student**

Starting to perform independent work, you should carefully read the educational goal, familiarize yourself with the requirements for the level of your training in accordance with the Federal State Educational Standard, brief theoretical and educational materials on the topic of independent work. You must perform all tasks for independent work in accordance with the instructions, analyze the results obtained in the course of work.

You must submit the finished works by the deadline determined by the teacher.

A positive grade on independent work is necessary to receive a credit on this topic of the discipline or admission to the exam.

### **Types of independent work:**

- 1) Work with a dictionary.
- 2) Work with texts on social and domestic topics.
- 3) Work with texts in the specialty.
- 4) Preparation for the retelling of the text.
- 5) Performing exercises.

- 6) Composing dialogues.
- 7) Making annotations.
- 8) Preparation of messages (monologue speech).

### **Methodical instructions for working with the dictionary**

- 1) Familiarize yourself with the construction of the dictionary and the system of abbreviations used in this dictionary from the preface.
- 2) Write down the words in the notebook in the original form with the appropriate grammatical characteristic, i.e. nouns in the singular; verbs – in the indefinite form (in the infinitive), indicating the main forms for irregular verbs.
- 3) Pay attention to the polysemy of words:
  - homonyms (different in meaning, but identical-sounding words);
  - Conversion is the formation of new words from existing ones without changing the spelling of words; the most common is the formation of verbs from the corresponding nouns;
  - internationalisms – words borrowed from other languages, mainly from Latin and Greek;
  - word formation – suffixes and prefixes.

### **Methodical instructions for working with texts in the specialty**

When working with texts, a master's student must have the ability to extract information from special texts, i.e. he must have certain skills and abilities in the field of a foreign language in general and in the field of technical translation in particular. As you know, work on technical translation includes two stages:

1. Preparatory work for translation:
  - 1) viewing reading of the original;
  - 2) text markup (in the margins);
  - 3) the use of dictionaries and reference books;
  - 4) consultation with specialists.
2. Work on the translation of the text:
  - 1) thinking about the translation;
  - 2) translation and recording of it;
  - 3) verification of the correspondence of the translation to the original;
  - 4) editing the translation without referring to a foreign text in order to free the text from expressions and phrases that are not characteristic of the Russian language;
  - 5) rewriting of the finished version of the translation.

The student must learn to do his work on his own, resorting to the help of teachers only at decisive moments.

Thus, the first task is to learn how to use the acquired language exercises of technical translation in practice and improve them. A foreign language teacher should help the student in this.

The second task is to develop students' creative skills, such as 1) practical application of the acquired technical knowledge, 2) the ability to formulate in their own words the technical information extracted from the translated text, 3) the ability to find additional technical information in order to perform a professionally correct translation, 4) the ability to get the necessary advice from a specialist, and 5) mastering the scientific and technical style in their native language.

In order to understand the literature read in the specialty, it is necessary to master a certain stock of words and expressions:

- 1) to do this, regularly read educational texts, newspapers, original literature in English in the specialty;

- 2) accurate and complete understanding of the text is carried out through learning reading, which involves the ability to independently conduct lexical and grammatical analysis of the text; 3) at the same time, develop the skills of using industry terminological dictionaries and dictionaries of abbreviations;
- 4) use the illustrative material available in the text, schemes, formulas, etc.;
- 5) apply knowledge of special, general technical, general economic subjects as the basis of semantic and linguistic guessing;
- 6) When discussing the text, you may be asked questions not only about the content, but also about expanding the information within your knowledge of the specialty. Knowledge of special disciplines will help you understand the English text in the specialty.

### **Methodical Instructions for Working with Texts on Social and Domestic Topics**

In order to successfully organize your work on reading, understanding and retelling texts in English, the following actions are recommended:

- 1) carefully study the title of the text, on the basis of which you should build a guess about the content of the text;
- 2) carefully read the text without a dictionary. Try to understand everything you can in it at the first reading;
- 3) using an English-Russian dictionary, read the text, filling in the information that you did not understand when reading the text without a dictionary;
- 4) in difficult-to-understand sentences, after establishing the knowledge of unknown words from the dictionary, pay attention to the predicate (verb-tense forms) and other grammatical features;
- 5) when translating unfamiliar words, use a guess, but check it with a dictionary;
- 6) Establish the meaning of the phrases given in the text, which will serve as supporting elements in the process of understanding the text.
- 7) read the text paragraph by paragraph;
- 8) highlight the main idea in each paragraph of the text. Then, using the analysis and synthesis of the content, independently establish the cause-and-effect relationships between the sentences and formulate the main idea of the author;
- 9) Based on the literal translation, find a literary version of the translation;
- 10) After reading and understanding all the paragraphs of the text, write down the main ideas of these paragraphs. Make a logical conclusion about the content of what you have read;
- 11) After reading the text, check your understanding of the questions or other tasks after the text.

### **Methodical instructions for performing exercises on the text**

Exercises are given to be performed in order to ensure the assimilation of the lexical and grammatical minimum. Exercises are of different types: phonetic, word-formation, grammatical, learning reading, communication practices. Each type has its own specifics:

- 1) Phonetics exercises are designed to develop phonetic skills (correct pronunciation, intonation, etc.). Do them by repeating after the teacher, or with the help of a tape recording;
- 2) exercises on word formation should be done after explaining the relevant material, while checking your variants of derivatives in the dictionary. If you need to fill in the gaps in the exercise with derivatives, first determine to which part of speech the derived word should refer and use the appropriate means (prefixes and suffixes);
- 3) To successfully complete the exercise in the Vocabulary Practice section, learn the words of this section, including their derivatives and the most common word combinations with them. Translate all the examples into Russian. Pay attention to the prepositions in the phrases;

- 4) all exercises of the student and cognitive reading provide for access to oral communication - read, translate, answer questions on the text, highlight the main idea, make retellings, replenish knowledge with the help of additional information (prepared and unprepared messages on the topic). When doing the exercises, refer to the Vocabulary List;
- 5) Paraphrasing and translation exercises should be done in writing. When translating from English into Russian, strive to ensure that the sentences are grammatically correct. When translating from Russian into English, use ready-made phrases and phrases from the texts of the lesson and "English-language exercises";
- 6) When doing grammatical exercises, carefully read the rules, study examples, use the tables "Tense forms of the English verb."

### **Methodical instructions for the preparation of retellings**

- 1) When preparing for the retelling of the text, first make a brief logical plan of it. To do this, carefully read (perhaps more than once) the text, highlighting the main information in it and focusing on the paragraphs. If necessary, use the list of meanings of unfamiliar words compiled by you.
- 2) Ask questions to the text, paying attention not only to their correct grammatical form, but also to their logical sequence. Answer these questions based on the text, and then without looking at the text.
- 3) Retell the text using its brief logical plan drawn up by you in writing. At the same time, do not try to remember word for word everything that you understood in the text you read. To do this, divide complex and long sentences into several simple ones, paraphrase lexically difficult places, simplify complex grammatical structures.
- 4) If you want to use English words for the first time when retelling, then write them with the corresponding point of your plan.
- 5) When retelling the text, make sure that when you start an English phrase, you have a clear idea of how you will end it.
- 6) Retell the main points of the text in their logical sequence, omitting secondary information if desired.

### **Guidelines for annotations**

An abstract is a brief summary of the content of an article or text, etc., often with a critical assessment of them.

Methodological advice for making an annotation:

- 1) read the work carefully;
- 2) comprehend its content;
- 3) formulate a conclusion about what this work is about, what is its novelty, practical significance;
- 4) To substantiate the annotation, use excerpts - quotes from the read work.

The abstract can be used during the report, when supplementing someone's speeches, during a conversation. Annotations play an important role in substantiating the research problem and analyzing the literature on the topic of the abstract.

### **Methodical instructions for composing dialogues**

- 1) To teach dialogical speech, use sample dialogues. If necessary, the teacher will give explanations so that you understand the sample dialogue. Next, you are presented with a sample reading. Then you read it by roles and translate it. After that, you must learn the dialogue by heart.
- 2) When composing your dialogues, replace individual elements of the dialogue with material known to them and reproduce the dialogue with modifications. Then act out the dialogue,

substituting your expressions into the dialogue. In this way, the structure of the dialogue and the necessary learning material are remembered.

3) Use fully or partially learned dialogues in new situations proposed by the teacher

### **Methodical instructions for preparing a message (monologue speech)**

When preparing a report, it is advisable to use the following recommendations:

- 1) Understand the essence of the topic that is offered to you;
- 2) select the necessary literature (try to use several books for more complete information);
- 3) carefully study the material of the textbook on this topic in order to make it easier to navigate in the literature you need and not to make elementary mistakes;
- 4) study the selected material, highlighting the most important in the course of reading;
- 5) Make a message plan;
- 6) Write the text of the report.

Remember:

- 1) choose only interesting and understandable information;
- 2) do not use words and special expressions that are unclear to you;
- 3) the information must relate to the topic;
- 4) Don't make the message very cumbersome.

At the end of the message, if possible, list the literature that you used in the preparation. Never read the message! In order not to get lost, use a plan. Speak loudly, clearly and take your time. In especially important places, pause or change the intonation - this will make it easier for the audience to perceive it.

### **Project-presentation**

Any technology, including the creation of a computer presentation, has its own rules, principles, and techniques. What is a computer presentation? A presentation is a set of color slide pictures on a certain topic, which is stored in a file of a special format with the PP extension. The term "presentation" (sometimes they say "slide film") is associated, first of all, with the information and advertising functions of pictures, which are designed for a certain category of viewers (users). What is the advantage of presentations?

- 1) Sequence of presentation. With the help of slides that replace each other on the screen, it is much easier to keep the attention of the audience than running with a pointer between posters hung throughout the hall. Unlike ordinary slides passed through an overhead projector, computer slides allow you to quickly return to any of the issues already considered or even change the sequence of presentation.
- 2) Synopsis. A presentation is not only what the audience sees and hears, but also notes for the speaker: what not to forget, how to place accents. These notes are visible only to the speaker: they are displayed on the screen of the control computer.
- 3) Multimedia effects. Presentation slides are not just an image. Like any computer document, it can contain animation elements, audio and video fragments.
- 4) Copyability. Copies of an electronic presentation are created instantly and do not differ from the original. If desired, listeners can receive all the materials shown.
- 5) Transportability. Floppy disks with a presentation are much more compact than a roll of posters and will suffer much less from frequent travel to one or another "event". Moreover, the presentation file can be sent by e-mail.

If the whole process of working on a presentation is built chronologically, then it begins with making a decision to conduct a presentation and planning, then - the selection of content and the creation of a presentation, conducting and the final work after its completion - analysis.

### **Some rules for organizing the material in the presentation**

- 1) The main information is at the beginning.
- 2) The thesis of the slide is in the title.
- 3) Animation is not entertainment, but a method of transmitting information. Animation is also a means of attracting and holding attention.
- 4) The transformation of one slide into another allows you not to lose the logic of the visual story.
- 5) If something is simple, you need to draw even more simply.
- 6) Visual appeal and emotionality. Good performance is the key to attention and understanding, respect for the audience, and a pleasant viewing experience

### **Essay**

The word "essay" came to the Russian language from French and historically goes back to the Latin word *exagium* (weighing). The French *ezzai* can be literally translated by the words experience, trial, attempt, sketch, essay.

An essay is a prose composition of small volume and free composition, expressing individual impressions and considerations on a specific occasion or issue and knowingly not claiming a definitive or exhaustive interpretation of the subject.

In the "Explanatory Dictionary of Foreign Words" by L.P. Krysin, it is defined as "an essay that treats some problems not in a systematic scientific form, but in a free form".

The "Great Encyclopedic Dictionary" gives the following definition of an essay: "it is a genre of philosophical, literary-critical, historical-biographical, journalistic prose, combining an emphatically individual position of the author with a relaxed, often paradoxical presentation focused on colloquial speech."

The "Concise Literary Encyclopedia" specifies: "An essay is a prose work of small volume and free composition, treating a particular topic and representing an attempt to convey individual impressions and considerations that are in one way or another connected with it."

### **Features of an essay**

- 1) The presence of a specific topic or issue is the expression of individual impressions and considerations on a specific occasion or issue.
- 2) The purpose of the essay is to develop skills such as independent creative thinking and written presentation of one's own thoughts - writing it is extremely useful, as it allows the author to learn how to clearly and competently formulate thoughts, structure information, use basic concepts, highlight cause-and-effect relationships, illustrate experience with relevant examples, and argue their conclusions.

### **Essay Structure and Outline**

The structure is determined by the requirements:

- 1) the author's thoughts on the problem are presented in the form of brief theses (T);
- 2) the thought must be supported by evidence, so the thesis is followed by arguments (A). It is better to give two arguments in favor of each thesis: one argument seems unconvincing, three arguments can "overload" the presentation made in a genre focused on brevity and imagery. Thus, the essay acquires a circular structure (the number of theses and arguments depends on the topic, the chosen plan, the logic of the development of thought):

Introduction

thesis, arguments

thesis, arguments

thesis, arguments

Conclusion.

When writing an essay, it is also important to take into account the following points: The introduction and conclusion should focus on the problem (in the introduction it is raised, in the conclusion - the author's opinion is summarized). It is necessary to highlight paragraphs, red lines, establish a logical connection between paragraphs: this is how the integrity of the work is achieved. Style of presentation: emotionality, expressiveness, artistry.

### **Features of an essay**

It is possible to distinguish some general features (features) of the genre, which are usually listed in encyclopedias and dictionaries:

- 1) Small volume. Of course, there are no strict boundaries. The volume is from three to seven pages of computer text. For example, at Harvard Business School, essays are often written on only two pages. In Russian universities, the volume of up to ten pages is allowed, however, typewritten text.
- 2) A specific topic and its emphatically subjective interpretation. The topic of an essay is always concrete. It cannot contain many topics or ideas (thoughts), and reflects only one option, one thought. And develops it. This is the answer to one question.
- 3) Free composition is an important feature of the genre.

### **Essay writing rules**

Of the formal rules, only one can be named - the presence of a title.

The internal structure can be arbitrary. Since this is a small form of written work, it is not necessary to repeat the conclusions at the end, they can be included in the main text or in the title.

The argumentation may precede the formulation of the problem. The formulation of the problem may coincide with the final conclusion.

### **Assessment tools**

The Fund of Assessment Tools is the central element of the system for assessing the level of formation of competencies of students and graduates, determined by a specific educational program of higher education. Assessment tools for an educational program are a necessary database of assessment tools, including: - FOS at the level of work programs of academic disciplines (modules) for current monitoring of progress and intermediate certification of students. The objectives of the FAT are:

- control and management of the process of acquisition by students of the necessary knowledge, skills, skills and the level of competence formation determined by the educational program of higher education;
- control and management of the achievement of the goals of the educational program of higher education;
- assessment of students' achievements in the process of studying disciplines (modules) and practices with the definition of results and planning of the necessary corrective measures. The fund of assessment tools for current monitoring of progress and intermediate certification of students in the discipline (module), which is part of the relevant work program of the discipline (module), includes:
  - a list of competencies with an indication of the stages of their formation in the process of mastering the educational program;
  - description of indicators and assessment criteria at various stages of their formation, description of assessment scales;
  - standard control tasks and other materials necessary for assessing knowledge, skills, and (or) work experience, characterizing the stages of competence formation.

## Control tasks

Choose one correct answer:

Specify the correct translation of retouch photos:

- a) touch the photos
- B) rearrange the photos
- C) Retouch photos

Choose one correct answer:

Indicate the correct translation of computer addiction:

- a) technological dependence
- b) computer affection
- c) computer adherence

Choose one correct answer:

Specify the correct transfer to store information:

- a) store information
- b) dispose information
- c) locate information

Choose one correct answer:

Indicate the correct translation of assistive technology:

- a) assistive technology
- b) attached technology
- c) out-dated technology

Choose one correct answer:

Please provide the correct translation cybercrime, cybercrime, Internet crime, network crime:

- a) cybercrime
- b) cyber iniquity
- c) crime wave

Choose one correct answer:

Indicate the correct translation of computer addiction:

- a) computer addiction
- b) computer crime
- c) computer affection

Choose one correct answer:

Specify the correct translation of the disc burner:

- a) dvd (digital video disc) recorder
- b) disc calculator
- c) disc processor

Choose one correct answer:

Specify the correct translation to upload files:

- a) download files
- b) unload files
- c) discharge files

Choose one correct answer:

Provide the correct transfer of e-waste:

- a) electronic waste
- b) electronic outbreak
- c) electronic emission

Choose one correct answer:

Please provide the correct translation of the global navigation and position system:

- a) gps (global positioning system)
- b) automatic process control system
- c) automatic information system

Choose one correct answer:

Specify the correct transfer to send email

- a) send e-mails
- b) set off e-mails
- c) transmit e-mails

Choose one correct answer:

Specify the correct translation on the helmet display:

- a) hmd (head-mounted display)
- b) parent display
- c) cranial display

Choose one correct answer:

Indicate the correct translation interactive whiteboard

- a) interactive whiteboard
- b) interactive table
- c) interactive case

Choose one correct answer:

Indicate the correct translation of the loss of the right to privacy:

- a) loss of privacy
- b) waste of privacy
- c) leakage of privacy

Choose one correct answer:

Indicate the correct translation to do the calculations:

- a) make calculations
- b) provide measurement
- c) adjust calculations

Choose one correct answer:

Provide the correct translation to publish eBooks:

- a) publish e-books
- b) place e-books
- c) install e-books

Choose one correct answer:

Specify the correct translation to retouch photos:

- a) retouch photos
- b) elaborate photos
- c) work up photos

Choose one correct answer:

Specify the correct translation of screen reader, software designed to interpret what is happening on the screen into voice messages, or in Braille:

- a) screen reader
- b) screen speaker
- c) screen announcer

Choose one correct answer:

Indicate the correct translation to surf the Internet:

- a) surf the web
- b) surf the railway
- c) surf the system

Choose one correct answer:

Specify the correct transfer to store information:

- a) store information
- b) keep information
- c) observe information

Words order of an English sentence.

Forms of the verb “to be” in Present, Past and Future

Stages in the history of education in Russia.

When did the history of higher education begin?

What knowledge is necessary for engineers of your qualification?

When and where was the first Underground built?

What are advantages of underground transport?

What are the problems of city transport?

What famous scientists do you know? In what fields of science did/do they work?

What is Marie Curie famous for?

What are Marie's greatest achievements? Where and how are the results of these discoveries used now?

What scientific achievements influenced our civilization the most?

What is Alfred Nobel famous for?

What is the greatest invention of the mankind in your opinion?

How did the invention of telephone influence our lives?

What inventions which influenced our lives do you know?

When was Moscow founded? Who founded Moscow?

What are the main problems of modern cities?

How are the problems of modern cities being solved?

What are main stages in the historical development of Moscow do you know?

How did the Normans influence Britain's civilization?

What are the main features of modern cities?

What are the main features of modern cities?

What are the sources of air pollution?

What should engineers and scientists do to decrease the amount of pollution?

What are consequences of polluted ecology?

What is the purpose of the abstract / abstract?

Why is an abstract of an article in two languages compiled?

How does the structure of an abstract differ from an abstract?

What is included in the content of the abstract? What is included in the content of the abstract?

Is it possible to retell the content of the document (conclusions, recommendations, factual material) when making an annotation?

What aspects of the content are included in the abstract?

Identify where the following speech models can be used:

1. The subject of the text is...

2. The purpose of the article is...
3. At the beginning the author touches upon...
4. Then the author goes on to say that...
5. The article ends with...

Tell us about the role of a scientist, engineer and technologist in scientific and technological progress, using the following phrases:

the essential triangle, to consist of, to make contribution to progress, to investigate the unknown, to deal with the production process, to design new products, to integrate the work

What knowledge is necessary in your future profession?

What is a design engineer responsible for?

What are major functions in a design process?

Why are metals so important in industry?

What are the main metalworking processes?

What process improves the mechanical properties of metals?

What are the external forces causing the elastic deformation of materials? Describe those forces that change the form and size of materials.

### **Criteria for evaluating written works**

For written works (tests, tests, dictations), the grade is calculated based on the percentage of correct answers:

| <b>Types of work</b> | <b>Grade "2"</b> | <b>Grade "3"</b> | <b>Grade "4"</b> | <b>Grade "5"</b> |
|----------------------|------------------|------------------|------------------|------------------|
| Test works           | 0-35 %           | 36-65%           | 66-85%           | 86-100%          |

### **Interactive form of conducting a practical lesson**

Interactive learning is a special form of organizing cognitive activity. It implies quite specific and predictable goals. The goal is to create comfortable learning conditions in which the master's student feels his success, his intellectual viability, which makes the learning process itself productive, to give knowledge and skills, as well as to create a basis for problem-solving work after the training is over. In other words, interactive learning is, first of all, interactive learning, during which there is interaction between the master's student and the teacher, between the students themselves. The objectives of interactive forms of learning are:

- awakening students' interest;
- effective assimilation of educational material;
- independent search by students for ways and options for solving the educational task (choosing one of the proposed options or finding their own option and substantiating the solution);
- establishing influence between undergraduates, learning to work in a team, tolerating any point of view, respecting everyone's right to freedom of speech, respecting their dignity;
- formation of students' opinions and attitudes;
- formation of life and professional skills;
- reaching the level of conscious competence of a master's student

The following active and interactive forms can be used to solve educational and educational tasks:

1. Active and interactive lectures;
2. discussions/projects;

3. Analysis of specific situations;
4. Business and role-playing games;
5. psychological and other trainings;
6. Computer simulations.

Discussion/project is a public discussion or free verbal exchange of knowledge, judgments, ideas or opinions on any controversial issue or problem. Its essential features are a combination of complementary dialogue and discussion-dispute, a clash of different points of view and positions. Possibilities of the group discussion method: – participants in the discussion can see the problem from different angles, comparing opposite positions; – mutual positions are clarified, which reduces resistance to the perception of new information; – a group decision with the status of a group norm is developed; – mechanisms for assigning and accepting responsibility can be used, increasing the involvement of participants in the subsequent implementation of group decisions. Various organizational forms of training can be used during the discussion.

Principles of work in an interactive lesson:

- A lesson is not a lecture, but a common work.
- All participants are equal regardless of age, social status, experience, place of work. - Each participant has the right to his own opinion on any issue.
- there is no place for direct criticism of a person (only an idea can be criticized).
- Everything said in the lesson is not a guide to action, but information for thought.

### **Topics of group and (or individual) tasks (discussions/projects).**

#### **Group creative tasks for discussion (projects):**

#### **1. «The scientist a new street to be named after».**

The discussion devoted to the choice of a scientist a street should be named after: the place where he\she was born and worked, the field of science the scientist worked in, the discovery or invention he\she made, where the results of his/her work are used now. (6.5 hours)

**2. «The education I receive».** The task includes representation of the department and specialty, the equipment the institute is provided with, the advantages of the future profession. (7 hours)

**3. «One of the greatest inventions of the mankind».** The information representation on the invention being considered as one of the greatest in the world: the name of the inventor, the country the invention was made in, how it is used now, how it influences our life. (6.5 hours)

**4. «One of the most beautiful buildings of the world».** The discussion concerning the choice of an extraordinary building either in Russia or abroad which can be added to seven creations of human hands: when and where it was built, who it was designed by, how it looks, construction materials it is built of, how the building was used before and how it is used now. (7 hours)

#### **Evaluation criteria:**

The grade "excellent" is given to a master's student if the speech is literate and expressive. Lexical and grammatical constructions are used correctly, if mistakes are made, then they are immediately corrected on their own. The volume of the statement meets the requirements. The topic is fully disclosed.

A grade of "good" is given to a master's student if there are grammatical errors in speech. The volume of the statement meets the requirements. The topic is fully disclosed. The grade

"satisfactory" is given to a master's student if there are gross grammatical errors in the speech. The volume of the statement is at least 50%. The topic is not fully covered.

The grade "unsatisfactory" is given to a master's student if the volume of the statement is less than 50%, more than 15 grammatical / lexical / phonetic errors were made in the answer. The topic is not disclosed.