ДОНСКОЙ ГОСУДАРСТВЕННЫЙ ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ

УПРАВЛЕНИЕ ЦИФРОВЫХ ОБРАЗОВАТЕЛЬНЫХ ТЕХНОЛОГИЙ

Кафедра «Естественные науки»

Учебно-методическое пособие для иностранных слушателей дополнительных общеобразовательных программ
по дисциплине

«Информатика»
COMPUTER SCIENCE RECOMMENDATIONS FOR STUDYING THE DISCIPLINE

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ANNOTATION

The teaching aid is an appendix to the work program of the discipline and the fund of assessment tools for the course of computer science and is intended for use by foreign students of additional general educational programs in the study of this discipline, as well as in their preparation for the current, intermediate and final certification. The educational and methodological manual was compiled in accordance with the Order of the Ministry of Education and Science of Russia dated 03.10.2014 No. 1304 "On approval of the requirements for the development of additional general education programs that provide training for foreign citizens and stateless persons to master professional educational programs in Russian". The teaching aid contains a list of questions to be studied in the course of Computer science, guidelines and recommendations for their study, a list of recommended literature and Internet sources, as well as additional questions and practice tests. The study guide also contains a list of theoretical questions and practical tasks included in credit and examination cards, models of answers to these questions and assessment criteria.

The teaching aid is recommended for use by teachers and foreign students of additional general educational programs when studying computer science at the stage of pre-university training, as well as when preparing students for current control, intermediate and final certification in computer science.

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FOREWORD

The teaching aid is intended for independent work of foreign students of additional general education programs in preparation for training sessions, current, intermediate and final certification in computer science. The manual was compiled in accordance with the Order of the Ministry of Education and Science of Russia dated 03.10.2014 No. 1304 "On approval of the requirements for the development of additional general educational programs that provide training for foreign citizens and stateless persons to master professional educational programs in Russian."

The manual includes the material of the work program of the discipline and the fund of assessment tools in Computer science, which must be mastered in preparation for the final certification (exam). Contains a list of theoretical questions and practical tasks that are included in the exam tickets.

In order to organize independent work of foreign students in preparation for tests and exams, the educational material of the Computer science course is divided into separate topics, each of which contains a list of questions to be studied, guidelines for studying the topic, a list of additional questions and a practice test with correct answers. Foreign students should know and state in Russian the answers to the theoretical questions of the course. Each topic of the course is provided with a list of educational, educational and methodical literature and Internet sources that are recommended to use when studying the course of computer science.

1. GUIDELINES FOR THE STUDY
OF THE DISCIPLINE «COMPUTER SCIENCE»

The discipline "Computer science" refers to the block of disciplines that are mandatory for foreign students to study additional general education programs of engineering, technical and technological orientation of education. The purpose of mastering the discipline "Computer science" is to form the ability and readiness of students to continue their education in Russian in the chosen specialty in higher educational institutions of the Russian Federation:

– to know the Russian language in a volume that provides the opportunity to carry out educational activities in Russian and is necessary for communication in the educational, professional and everyday spheres;

– to possess a system of significant subject knowledge in Computer science necessary for continuing education in educational institutions of higher education of the Russian Federation in the chosen specialty (field of study) in the field of Computer science, information and communication technologies, software and hardware;

– have the skills to search and use the information necessary for the effective implementation of educational and professional tasks.

The specified system of knowledge is formed on the basis of information obtained in the study of two main sections of the course: the basics of computer science and information and communication technologies. The discipline consists of theoretical and practical parts. Each part includes classroom work with a teacher and independent work.

The program, educational and teaching materials for the Computer science course were developed on the basis of the order of the Ministry of Education and Science No. 1304 dated 03.10.2014 "On approval of the requirements for the development of additional general educational programs that provide training for foreign citizens and stateless persons to master professional educational programs in Russian » and meets the requirements for the distribution of time allocated for the study of computer science between classroom and independent work.

The discipline provides for a credit in the first semester and an exam in the second. In the first semester, 36 hours are allocated for practical classes, and 36 hours for independent work. In the second semester, 72 hours are allocated for practical classes, 72 hours for independent

work. The theoretical part of the discipline contains sections from the

thematic plan of the discipline. The topics of practical classes correspond to the knowledge, skills and abilities provided for by the results of mastering the discipline.

When presenting theoretical material, modern teaching methods and technologies are used using computer technology, educational posters and handouts. During the practical lesson, the problem is formulated, methods and algorithms for solving it are demonstrated. The teacher focuses on the main issues that students will have to study on their own; literature and Internet sources are indicated, which are recommended for use in independent work. For a deeper study and understanding of the topic of the practical lesson, students in the process of independent work are recommended to use the Internet and repeat / study the topic in their native language. The study of the course "Computer science" should begin with work on the material of the introductory course.

The main goal of the introductory course in Computer science in an accessible form, within the framework of the lexical and grammatical material and models studied in the classroom in Russian as a foreign language, is to state the main provisions of the discipline, ensuring the accumulation of the necessary amount of vocabulary and grammatical structures that contribute to the successful formation of a communicative language among foreign students. competencies in the educational and scientific sphere.

To consolidate the theoretical material and prepare for practical classes, foreign students must independently work on the educational material within the time budget allocated for independent work. For independent work, foreign students are provided with educational and methodological literature in printed or electronic form. When conducting classroom practical classes, the teacher directs and controls the independent work of students, paying attention to the most difficult questions to understand.

Successful mastering of the Computer science course requires students to attend mandatory practical classes, since skipping them can become an obstacle in mastering the subsequent sections of the course, which are logically interconnected. In practical classes, the theoretical material is consolidated when performing practical tasks, drawing up flowcharts of algorithms, writing the text of programs and their implementation on personal computers in a high-level programming language environment.

In the course of practical classes, the teacher controls the correctness of homework assignments, the degree of assimilation of theoretical material, asking questions on the topics studied. A list of questions for self-study and a list of necessary educational and methodological literature is given to students for independent work after the end of each practical lesson. The teacher also answers additional questions from foreign students on the topic of the last practical lesson and on the technology of independent homework.

Each semester provides milestone knowledge controls that allow you to objectively assess the assimilation of the studied sections of the computer science course based on the assessment of the results of control work performed in the form of written answers to control questions or in the form of test tasks.

During the first semester, students must complete five tests on the topics "Types of information. Information processes", "Number systems", "Personal computer device", "Software", "Construction of block diagrams of algorithms", which are performed in the form of testing or a written answer to the questions of the control task. Based on the results of the control, an assessment is formed according to a five-point system.

During the second semester, foreign students must complete four tests on the topics "Pascal ABC programming language", "Text editors", "Spreadsheets" and "Presentation". These works are performed by students on personal computers. Based on the results of the control, an assessment is also formed on a five-point system.

Information and methodological support of the discipline includes textbooks, educational and teaching aids, guidelines presented in the educational, methodological and information support of the discipline. These materials are available to listeners and are available in the required quantity. When preparing for practical classes, the student should use the methodological instructions on Computer science, which are posted on the SKIF portal in the Computer science section of the Natural Sciences department.

Access to the specified educational and teaching materials is possible via the local network of the university, to which the computer science room is connected, and using the Internet, for example, from the university dormitory or a Wi-Fi network from anywhere on the territory of the university.

Electronic information resources are also presented on the website of the library of electronic resources of the university

https://de.donstu.ru/elect/divisions/620/courses. There is access to educational and methodological literature located in the electronic library of the university (https://ntb.donstu.ru/catalog). Using the recommended methodological materials, foreign students should be creative in doing homework, trying to understand the essence of the tasks being solved, because the ultimate goal of the process of their implementation is the development of algorithmic thinking, which is necessary when using the acquired knowledge in their future practical activities.

Preparation for the exam in the second semester of the academic year is the final stage in studying the course of computer science. Repetition of educational material in preparation for exams should begin with a repetition of theoretical material, a repetition of the order and results of practical tasks performed in practical classes and which are stored on personal computers of the Computer science office.

A prerequisite in preparing for control measures, including intermediate and final certification, is the repetition of theoretical material according to the notes in workbooks in which foreign students took notes during practical classes, as well as in the recommended educational and teaching aids. When preparing for the answer to the second (practical question of the exam ticket), one should repeat the technology of drawing up flowcharts of algorithms and writing program texts previously studied and implemented in a programming language when performing practical work in the computer science classroom.

Questions for the theoretical part and practical tasks of the final certification (exam) can be found on the SKIF portal in the Computer science section of the Natural Sciences department. These are guidelines for preparing for the final attestation and requirements for the final attestation of foreign students of additional general education programs. The control and assessment of the knowledge, skills and abilities acquired by foreign students is carried out in accordance with the assessment tools that complement the work program of the Computer science course.

2. Organization of independent work foreign students

The training of national personnel with higher education for foreign countries is inextricably linked with the formation and development of independent work skills (SR) among foreign students, which at

present should be at least 50% of the total labor intensity of the discipline being studied. The main objective of the SR is to form in students a

sustainable need for self-education, the development of skills that contribute to the consolidation and deepening of knowledge gained in practical classes, the development of creative thinking and the ability

to project activities, the ability to apply the acquired knowledge in practice.

The effectiveness of students' independent work depends on its proper organization and appropriate control. SR control allows assessing not only the level of training of students, but also motivating them to do homework in computer science and other natural science disciplines. The result of SR is the mastery of knowledge in the field of studied disciplines by foreign students, the acquisition of skills for using the acquired knowledge in the educational process and subsequent production activities, the acquisition and development of experience in creative activity, the ability to master the key concepts of the studied discipline and scientific terminology.

The content of independent work of foreign students, its scope, forms of current, intermediate and final controls, as well as the criteria for assessing knowledge, are regulated by the relevant curriculum of disciplines and are contained in the funds of evaluation tools. Monitoring the independent work of foreign students allows you to assess the quality of their learning of educational material, as well as motivate them to study the course of computer science and other disciplines. At the same time, several aspects of the work are checked: mastering the terminology of the computer science course, the ability to listen and take notes, the ability to conduct a dialogue, the ability to work with text materials presented in Russian.

Control of the SR of foreign students in computer science is an integrative function, since not only knowledge of the subject is checked, but also the degree of their mastery of the elements of the scientific style of speech (NSW), writing, the use of sentence construction models in Russian, the presence of speech activity skills, the ability to conduct a dialogue on the studied topic. In the practice of teaching computer science at the stage of pre-university training, various types of control of independent work are used. These can be vocabulary dictations, solving examples and problems, testing, dialogue, oral survey, etc.

To evaluate the results of students' assimilation of educational material in the course of Computer science, several types and forms of control are used: current, intermediate and final controls. The form of control can be frontal, group, individual and independent, which is often

called self-control. The frontal form of control involves brief answers of several students of the study group to the questions of the teacher. The group form of control is used when checking the results of independent work of foreign students of the study group.

An individual form of control involves an assessment of the knowledge of individual students. Self-control is carried out by students on their own and, as a rule, when doing homework. To do this, in the task for the SR, answer options and evaluation criteria are given, which allows them to independently assess the degree of assimilation of the educational material and predict the grade that they can receive during the control on this topic. The current control of independent work allows you to monitor the assimilation and level of knowledge of students at all stages of studying individual topics of the Computer science course. The results obtained with this type of control make it possible to identify gaps in the knowledge of students and promptly make the necessary adjustments to the educational process. Intermediate and final controls allow with a high degree of reliability to determine the level of assimilation by foreign students of individual sections or the entire course of Computer science, to evaluate learning outcomes for a certain period of time: the current month, semester or academic year.

Oral control involves the presentation by students in Russian given for repetition or independent study of the topics of the Computer science course. As a rule, students answer the questions that were given in the assignment for independent work and the answers to which they could find in the lesson summary, in the recommended teaching and methodological materials. In the process of oral control, the knowledge of the material of the topic being studied, the skills of speech activity, the degree of knowledge of the Russian language, phonetics, knowledge of the grammatical material and vocabulary of the discipline under study, the ability to build the correct answer to the question are checked.

Written control provides a deeper and more objective test of students' knowledge. These can be, for example, vocabulary dictations, tests, tests. In written work, students show knowledge of the subject and the ability to apply it in practice. Students also show the degree of

proficiency in written language and the ability to express their thoughts in Russian as a foreign language.

At the initial stage of studying a computer science course, vocabulary dictations are used as one of the control options. To do this,

in the task for independent work, foreign students are invited to translate into their native language and learn new words and special terms (10-15 words) on the topic under study. Vocabulary dictation as one of the types of independent work control contributes to the formation of students' listening and writing skills in Russian, which they need for further education at specialized faculties of universities.

A fairly effective form of control and motivation of students to study computer science is a mini-control, which in a short period of time (5-10 minutes) allows you to assess the degree of assimilation and understanding of the main provisions of the topic being studied. Mini-controls usually contain five to ten questions. The task is given to students on a personalized form on which they write their name, group number and country. The form provides space for a short response from the audience to the questions posed. For example, to the question "*How many digits are used to write numbers in the octal number system?*" the listener should write down - "8". To the question "What numbers are used to write numbers in the binary number system?" the listener should write down - "0 and 1".

An effective form of control of independent work is a frontal survey. When answering homework questions orally, oral speech skills develop. The task for independent work includes questions studied in the previous lesson, or questions, the answers to which the student must find on their own in the recommended educational and educational literature. For some topics of the Computer science course, it is advisable for students to prepare a short speech on the topic under study, consisting of several key phrases in Russian.

An important type of control of independent work is control carried out in the format of a dialogue between students on the topic under study. For example, when studying the topic "Personal computer device", one of the students of the training group acts as a computer buyer, and the other as a manager of a computer equipment store. A dialogue takes place between them regarding the characteristics of the computer (type of operating system, size of RAM, hard disk capacity, cost of peripherals, etc.). Foreign students develop the skills of constructing an interrogative sentence and understanding the answer based on it.

At the end of the dialogue, the "buyer" and "manager" change roles. If there are difficulties with answering questions, the "manager" can seek help from the students of the training group. This form of control of independent work is positively perceived by foreign students,

and repeated repetition of educational material contributes to a deeper and more conscious perception and memorization of it. The dialogue in the store fully simulates the real situation associated with the forthcoming acquisition of personal computers by foreign students.

Testing is important in the process of monitoring the independent work of foreign students in computer science. The use of testing makes it possible to assess the level of knowledge of foreign students on certain topics of the Computer science course and allows (if necessary) to quickly make changes to the educational process. Testing allows not only to identify the problems of mastering the educational material, but also to completely eliminate the possibility of a subjective assessment of students' knowledge. Control testing is preceded by independent work on the implementation of a control-training test (CTT), which in its structure, vocabulary used and syntactic models fully corresponds to the control test. In self-executed CTT, answers are given to questions that allow students to independently assess the quality of assimilation of the corresponding section of the Computer science course.

At the training session, before performing the control test, the students are explained the order of its implementation and the evaluation criteria. The test contains, as a rule, ten questions and the results of the answers are evaluated as follows: the mark "5" is given for 9-10 correct answers, which is 90-100% of correct answers, "4" - for 7-8 correct answers and "3 "- for 5-6 correct answers.

When studying algorithms and programming, students are offered tasks for independent work on the development of block diagrams of algorithms for solving problems and, on their basis, the development of calculation programs in a programming language. The construction of flowcharts of algorithms and writing programs contribute to checking not only the degree of assimilation by foreign students of the elements of algorithmization and programming, but also a more conscious assimilation of the educational material of disciplines related to computer science: mathematics, engineering graphics, physics. As one of the options for independent work on the topic "Algorithms", students are invited to fill in the empty blocks of algorithms for solving problems or restore the condition of the problem according to a given flowchart.

When developing computer programs for solving problems, the knowledge of foreign students of the structure of the program, data types, rules for writing arithmetic expressions and the order of performing mathematical operations is checked. The correctness of the use of vocabulary and grammatical structures of the Russian as a

foreign language is controlled when writing the text of a program that provides an interactive mode of operation "user - computer" in Russian. As one of the control options, foreign students are offered a computer version of the program, in which a significant number (10-15) of errors were made. Students should write their own version of the program, in which the errors they noticed are corrected.

In the Computer science course, a universal form for presenting tasks to students for independent work has been developed. The task includes several logically complete fragments, in particular, the name of the topic being studied, a list of questions that a foreign student must independently master, a list of words and phrases that need to be translated into their native language and learned, a list of practical tasks for solving examples, compiling block schemes of algorithms or writing programs.

In the assignment for independent work, students are given hyperlinks to electronic resources posted on the SKIF portal in the local network of the university or on the Internet, indicating specific sections or pages for study. The use by foreign students for independent work of educational materials from the SKIF portal allows you to control the number of views they have of the given educational material. This is facilitated by the monitoring system developed by the programmers of the Department of Digital Educational Technologies (UCET), which allows keeping track of the number of views of educational material from the moment it was posted on the SKIF portal, the number of views in the current year, as well as in the current month.

According to the results of the implementation of educational tasks submitted for independent study or repetition, the results of current and intermediate controls, certification of foreign students for the past period of time is carried out. In case of unsatisfactory results of certification, additional work is carried out with the students, aimed at eliminating the causes that caused unsatisfactory results of study.

Topic 1. Information. Information processes
1.1. Questions to study

Information. The concept of information. Types of information. Information properties. Perception of information by a person. Information processes. Receipt, processing, storage, transfer and use of information. Computer science. The subject of Computer science. The development of computing technology. generations of computers.

1.2. Guidelines for studying the topic

When studying the topic "Information. Information Processes" foreign students should know the definition of information, what types of information exist, what information processes are, what computer science is. In particular, listeners should know that information is information that can be received, stored, processed, transmitted, used. The term information comes from the Latin word informatio, which means information, clarification, presentation. Types of information: textual, numerical, graphic, sound and combined (video information).

Information properties: completeness - the property of information to characterize the displayed object or process; relevance - the ability of information to meet the needs of the consumer at the right time; reliability - the property of information not to have hidden errors. Reliable information can become unreliable over time if it becomes outdated and no longer reflects the true state of affairs.

Actions performed with information are called information processes. Information processes include the processes of obtaining, transmitting, processing, storing and using information.

Computer science is the science of the structure and properties of information, methods of collecting, processing and transmitting information. Computer science studies the processes of obtaining (creating) and processing information. Computer science solves the problems associated with the use of computers. The term "Computer science" first appeared in France. It was formed by combining two words: "information" (information) and "automation" (automatique), which in translation into Russian means "automated information processing". The term "Computer science" defines the field of knowledge that deals with the processing of information using electronic computers (ЭВМ).

As a result of the development of computer technology, Computer science has become a separate field of knowledge, a separate science.

In Russia, the term "Computer science" has been used since 1982. Computer science at that time was understood as a complex scientific and engineering discipline that studied all aspects of the development,

design, creation, evaluation, operation of information processing systems, their application in various fields of science and production.

After a practical lesson and independent study of the topic "Information. Information Processes" foreign students must answer questions for self-examination and complete the proposed control and training test. Answers to self-test questions can be found in the computer science workbook, as well as in the recommended literature and Internet sources. At the end of the control-training test, the numbers of the correct answers to his questions are given.

1.3. Questions for self-examination

- What is information?
- What types of information do you know?
- What can you do with the information?
- What properties of information do you know?
- How does a person perceive information?
- What is text information? Give examples.
- What is graphic information? Give examples.
- What is numerical information? Give examples.
- What is audio information? Give examples.
- What is video information? Give examples.
- What are information processes?
- What is Computer science? What does computer science study?
- Why do you need to measure information?
- What is the name of the minimum unit of information?
- What is the name of the unit for measuring the amount of information?
- What is the relationship between byte and bit?
- What other units of measurement of information do you know?

1.4. Control-training test

Perform a control-training test on the topic "Information. Information Processes. Choose one correct answer for each test question. Check your answers. Keys (correct answers) are given at the end of the test. Before performing the test, repeat the topic "Information. Information Processes". To do this, use the literature, the list of which is given at the end of this section, and educational and methodological materials from the «УЦОТ» portal.

1. A story in a magazine is an ...
   1. sound information
   2. graphic information
   3. text information
   4. traffic information
2. Call to class is ...
   1. sound information
   2. video information
   3. text information
   4. graphic information

3. A letter to a friend is ...
   1. numerical information
   2. text information
   3. graphic information
   4. sound information
4. The start time of classes at the faculty is ...
   1. text information
   2. graphic information
   3. sound information
   4. numerical information
5. The math example is...
   1. text information
   2. numerical information
   3. sound information
   4. graphic information
6. Drawing is...
   1. numerical information
   2. sound information
   3. graphic information
   4. text information
7. Photography is...
   1. sound information
   2. video information
   3. numerical information
   4. graphic information
8. How many generations of computers (ЭВМ) do you know?

1. One
2. Two
3. Three
4. Four

9. The element base of third-generation computers is
    1. radio tubes
    2. transistors
    3. microchips
    4. processors

10. Created the first mechanical computer...
    1. Niklaus Wirth
    2. Blaise Pascal
    3. Bill Gates
    4. Steve Jobs

Answers: *1 – b, 2 – e, 3 – d, 4 – f, 5 – a, 6 – b, 7 – d, 8 – e, 9 – a, 10 – c*

When answering the questions of this test, you need to choose only one correct `answer. For example,` when answering the questions of the proposed control-training test, you should write down: 1 - c, 2 - b, etc. Check your answers. Below are the evaluation criteria for 10 questions of the test, according to the results of which you can evaluate the quality of assimilation of the educational material of the topic "Information. Information Processes" on a 5-point scale. The control test on this topic, which will be held at the practical lesson in terms of the structure and form of presentation of questions, will be similar to the proposed control-training test.

Evaluation criteria

Number of correct answers	Grade
10 – 9	«5»
8 – 7	«4»
6 – 5	«3»

1.5. Literature and Internet sources
When preparing yourself and doing homework, use the following literature and Internet sources:

1. Workbook on Computer science.
2. Моренко Б.Н., Бабакова Л.Д., Воскерчьян О.М. Информатика. Вводный курс. Учебное пособие для иностранных граждан и лиц без гражданства. [Электронный ресурс]. ДГТУ. – Ростов н/Д., 2015. – Access mode:
https://de.donstu.ru/elect/divisions/620/courses
3. Информатика и информационные технологии. Учебник для 10-11 классов / Н. Д. Угринович. – 3-е изд. – М.: БИНОМ. Лаборатория знаний, 2006. – 511 с: ил. Учить материал на стр. 12-15.
4. Шауцукова Л.З. Информатика. Теория (с задачами и решениями). Учить материал: Глава 1, пункты 1.1-1.4, 1.6-1.8. Адрес учебника в Интернете:
http://book.kbsu.ru/theory/chapter1/1_1_0.html
5. Моренко Б.Н. Электронный курс по дисциплине «Информатика и информационно-коммуникационные технологии» для иностранных слушателей дополнительных образовательных программ [Электронный ресурс] / Б.Н. Моренко, Т.А. Тюрина; ДГТУ. – Ростов н/Д., 2019. – Access mode: http://test.skif.donstu.ru
6. Моренко Б.Н. Подготовка к итоговой аттестации по информатике : учеб.-метод. пособие / Б.Н. Моренко, Л.Д. Бабакова, О.В. Николенко ; Донской гос. техн. ун-т. – Ростов-на-Дону: ДГТУ, – 2019. – 52 с.

Topic 2. Number systems
2.1. Questions to study

Representation of information in a computer. Number systems. Positional and non-positional number systems. Decimal number system. Binary number system. Binary arithmetic. Octal and hexadecimal number systems. Converting numbers from one number system to another. Measurement of information. Units of measurement of information.

2.2. Guidelines for studying the topic
When studying the topic "Number Systems", foreign students should know the basics of representing information in a computer, the existing number systems, their purpose and types, algorithms for

converting numbers from binary to decimal, octal, hexadecimal and vice versa, tables of addition and multiplication of binary numbers. Students should, in the process of independent work, learn how to translate numbers from the binary number system to decimal, octal, hexadecimal and vice versa, learn how to perform basic arithmetic operations for binary numbers. It should be noted that a computer can only process information presented in numerical form. All other information (textual, graphic, sound, etc.) must be converted into a numerical form before being processed on a computer. For example, to process textual information on a computer, each letter is encoded with a certain number when it is entered into the computer, and when output to an external device (display or printer), these numbers are used to build the corresponding images of letters (symbols).

In order to write numbers, you need to use some number system. A number system is a way of representing numbers using digits. There are two types of number systems - positional and non-positional. In the positional number system, the value of each digit depends on its position (position) in the number. An example is the common decimal number system. So, in the number 111, each digit "1", depending on the place it occupies, corresponds to the value of units, tens or hundreds.

The advantage of the positional system is the convenience of performing arithmetic operations: the set of numbers is the same for all ranks. In a non-positional number system, the value of a digit does not depend on its position in the number. An example is the Roman numeral system. So, the value of the number III is 3 - the sum of all three digits "I" and does not depend on the place occupied by each of them.

There are several number systems. In ordinary life, we use the well-known decimal number system. In this system, any number is written using ten digits: 0, 1, 2, ... 9. The number of digits in the number system is called its base. The base of the decimal system is 10.

The number system with base N=2 (binary number system) is no different from the positional number system with any base. But for a computer, this system has a significant advantage: it contains only two digits 0 and 1. Entering numbers into a computer and outputting them for reading is carried out in the decimal form familiar to people - all the necessary conversions are performed by the computer itself. To write numbers in the binary system, only two digits 0 and 1 are used. The binary system is used because it is very easy to designate binary digits

with electrical signals: 0 - no signal and 1 - there is a signal (voltage or current).

Any number in the positional system is written as a sequence of digits, for example, in the decimal system - 2019_{10}, 135_{10}, in the binary system - 1001_2, 11001011_2.

Here the indices "10" and "2" show that the number is written in decimal or binary number systems. When writing numbers in a positional number system, the value of each digit depends on its position in the number. The place for a digit in a number is called a digit. The digits are numbered from right to left, and each digit has its own degree of base.

For humans, the binary system is difficult to use. He is accustomed to the decimal system, in which he developed methods for writing numbers by their "name", developed methods for adding, multiplying and dividing any numbers. In binary notation, it is difficult to determine its value. There is a need to convert binary to decimal and vice versa. To convert a decimal number to a binary number system, you need to sequentially divide this number by "2", and write the remainder of the division from right to left. Based on the example considered, it is possible to formulate a conversion rule from decimal to binary: the number is divided sequentially by two, and the remainders in the form of 0 or 1 are written from right to left.

To process information in a computer, other number systems are also used, the basis of which is the power of the number "2". These are octal and hexadecimal number systems.

In the octal system, numbers are written using eight digits: 0, 1, 2, 3, 4, 5, 6, 7. To write numbers in the hexadecimal system, you must have sixteen different characters used as numbers. The first ten hexadecimal digits are the same as in decimal. To designate the remaining six digits, the letters of the Latin alphabet A, B, C, D, E, F are used.

The conversion of numbers from the decimal number system to octal and hexadecimal is carried out by dividing the number by "8" or "16", respectively, and writing the remainder of the division from right to left. The use of octal and hexadecimal number systems is explained by the fact that the transition to writing a binary number in any of these notation systems is very simple. When converting to the octal number system, a binary number is divided into groups of three digits (triads) from right to left, starting from the least significant digit.

To convert an octal number to a binary number system, you need to replace each octal digit with its corresponding triple of digits (triad).

To convert a hexadecimal number to a binary number system, you need to replace each digit of the hexadecimal number with the corresponding four binary digits (tetrad).

Addition, multiplication, division and subtraction of binary numbers follow the same rules as for decimal numbers. These operations are based on the use of addition, multiplication, division and subtraction tables.

To determine the amount of information, a unit of measure is used - a bit. Bit is an abbreviated phrase for "double digit" (binary digit - bit). One bit is the amount of information contained in a yes or no message (in binary 0 or 1). A bit is the smallest unit of information. Larger units are used to measure the amount of information. A number containing 8 bits is considered to be a unit of measurement of the amount of information. This unit is called a byte.

Eight binary digits (from 00000000_2 to 11111111_2) fit $2^8 = 256$ integers - this is enough to write uppercase and lowercase letters of two alphabets, for example, Russian and Latin, all numbers, punctuation marks, some other characters, as well as service codes for transmission information.

When the count goes to hundreds of thousands and millions of bytes, it becomes inconvenient to operate with such numbers. Therefore, a system of larger units for measuring the amount of information has been developed: kilobyte, megabyte, gigabyte, terabyte, etc.

2.3. Questions for self-examination

- What is a number system?
- What types of number systems do you know?
- What is the difference between a positional number system and a non-positional one?
- How do you read numbers in the binary system?
- What is the base of the number system? What does it show?
- What numbers are used in binary, octal and hexadecimal notation systems to write numbers?
- How to convert a decimal number to binary, octal and hexadecimal
  number systems?
- How to convert binary, octal and hexadecimal numbers to decimal notation?
- How is the addition of binary numbers performed?
- How is the multiplication of   binary numbers performed?

2.4. Control-training test

Perform a control-training test on the topic "Number systems". Choose one correct answer for each test question. Check your answers. Keys (correct answers to questions) are given at the end of the test. Before taking the test, review the topic "Number Systems". To do this, use the textbook "Number Systems", which is posted on the portal "SKIF" of the university.

1. Convert decimal number 73_{10} to binary number system
   - a) 1100100_2
   - c) 1010100_2
   - e) 1011100_2
   - b) 1001001_2
   - d) 1001110_2
   - f) 1011101_2

2. Convert decimal number 35_{10} to octal
   - a) 113_8
   - c) 124_8
   - e) 43_8
   - b) 34_8
   - d) 17_8
   - f) 103_8

3. Convert decimal number 111_{10} to hexadecimal
   - a) $A2_{16}$
   - c) 92_{16}
   - e) $7B_{16}$
   - b) 111_{16}
   - d) $6F_{16}$
   - f) $D2_{16}$

4. Convert binary number 1111000_2 to decimal number system
   - a) 51_{10}
   - c) 103_{10}
   - e) 75_{10}
   - b) 130_{10}
   - d) 92_{10}
   - f) 120_{10}

5. Convert octal number 104_8 to decimal number system
   - a) 68_{10}
   - c) 52_{10}
   - e) 86_{10}
   - b) 108_{10}
   - d) 81_{10}
   - f) 92_{10}

6. Convert hexadecimal number $D1_{16}$ to decimal number system
   - a) 107_{10}
   - c) 228_{10}
   - e) 92_{10}
   - b) 209_{10}
   - d) 133_{10}
   - f) 203_{10}

7. Convert binary number 101110_2 to octal number system
   - a) 23_8
   - c) 42_8
   - e) 74_8
   - b) 51_8
   - d) 56_8
   - f) 64_8

8. Convert binary number 1011110_2 to hexadecimal number system
   - a) $7E_{16}$
   - c) $3C_{16}$
   - e) $5E_{16}$

       b) $C1D_{16}$ d) $B4_{16}$ f) $3A_{16}$

9. The sum of the binary numbers 110_2 and 100_2 is
   - a) 1010_2 c) 1001_2 e) 1000_2
   - b) 1101_2 d) 1110_2 f) 1011_2

10. The product of the binary numbers 110_2 and 100_2 is
    - a) 11010_2 c) 11000_2 e) 11110_2
    - b) 10011_2 d) 10010_2 f) 10110_2

Answers: 1 – b, 2 – e, 3 – d, 4 – f, 5 – a, 6 – b, 7 – d, 8 – e, 9 – a, 10 – c

2.5. Literature and Internet sources

When preparing yourself and doing homework, use the following literature and Internet sources:

1. Workbook on Computer science.
2. Моренко Б.Н., Бабакова Л.Д. Системы счисления. Задания для самоконтроля по информатике для иностранных студентов предвузовской подготовки. [Электронный ресурс]. ДГТУ. – Ростов н/Д., 2013. – Access mode:
https://de.donstu.ru/elect/divisions/620/courses
3. Моренко Б.Н. Учебное пособие «Системы счисления» по дисциплине «Информатика» для иностранных слушателей дополнительных общеобразовательных программ [Электронный ресурс] / Б.Н. Моренко, Л.Д. Бабакова; ДГТУ. – Ростов н/Д., 2019. – Access mode:
https://de.donstu.ru/elect/divisions/620/courses
Рег. номер 5236 от 29.01.2019
4. Информатика и информационные технологии. Учебник для 10-11 классов / Н.Д. Угринович. – 3-е изд. – М.: БИНОМ. Лаборатория знаний, 2006. – 511 с: ил. Учить материал на стр. 74-80, 82-103.
5. Шауцукова Л.З. Информатика. Теория (с задачами и решениями). Учить материал: Глава 1, пункт 1.5. Глава 4, пункты 4.1 – 4.10. – Access mode:
http://book.kbsu.ru/theory/index.html

6. Моренко Б.Н. Электронный курс по дисциплине «Информатика и информационно-коммуникационные технологии» для иностранных слушателей дополнительных образовательных программ [Электронный ресурс] / Б.Н. Моренко, Т.А. Тюрина; ДГТУ. – Ростов н/Д., 2019. – Access mode: http://test.skif.donstu.ru

7. Моренко Б.Н. Подготовка к итоговой аттестации по информатике : учеб.-метод. пособие / Б.Н. Моренко, Л.Д. Бабакова, О.В. Николенко ; Донской гос. техн. ун-т. – Ростов-на-Дону: ДГТУ, – 2019. – 52 с.

Topic 3. The device of a personal computer
3.1. Questions to study

Personal computer device. Computer peripherals. Information input and output devices. Preparing the computer for work. How to turn on and off the computer. Safety rules for working on a computer.

3.2. Guidelines for studying the topic

When studying the topic "Personal Computer Device", foreign students should know that a computer consists of various interconnected devices. The minimum composition of a computer includes the following main blocks: system unit, monitor (display), keyboard and mouse. Various peripheral devices (input devices and output devices) can be connected to the system unit, which expand the capabilities of the computer. Devices are divided into internal and external. Internal devices perform the functions of processing and storing information, and external devices perform input and output functions. Internal components are located inside the system unit and are connected to the motherboard.

The system unit contains the main components of a personal computer: a motherboard, hard disk drives (hard drives), a power supply, CD-ROM drives, etc. External devices are connected to the system unit.

When studying the topic "Personal computers", foreign students should also know that the operation of a computer is based on the principles of von Neumann and includes four blocks: an arithmetic logic unit, a control unit, RAM and an input-output device. The arithmetic logic unit is used to execute commands that consist of arithmetic and

logical operations. The control device is used to organize the execution and management of programs. RAM stores data and programs. The input-output device is used to input and output information.

The arithmetic-logical unit and the control unit are combined into a single complex - a processor (microprocessor). The processor (CPU) is the main component of the motherboard. It is necessary to control all parts of the computer, as well as to perform arithmetic and logical operations. The processor consists of an arithmetic logic unit, a control unit and a memory.

The external (permanent) memory of a computer is designed to store information and exchange it with RAM. To build external memory, information carriers are used (hard drives and SSD drives, CDs, Flash drives, etc.). All computer software, as well as data and information, is stored in the external memory of the personal computer.

The keyboard is a device for entering information into a computer and controlling its operation. Letters, numbers, signs, names of commands are applied (written) on the keys. The standard keyboard contains 104 or 105 keys. Five groups of keys can be distinguished. The first group of keys is used to enter information and is called alphanumeric or alphanumeric. The second group is called functional and is used to call various functions in programs. The assignment of the keys in this group may vary depending on the program in which the user is working.

The third group of keys on the keyboard is called the additional - numeric or small numeric keypad. The keys here work in two modes, which can be changed by switching Num Lock: for entering numbers and controlling the cursor. The fourth group of keys is used to control the cursor. The fifth group includes special and register keys, which are designed to change the assignment of other keys and can be used in conjunction with them.

Output devices include monitors, printers, plotters, speakers (loudspeakers), headphones, projectors. A monitor is a device for displaying text and graphic information on the screen. The size of a monitor is measured by its diagonal size in inches.

When studying printers, you should pay attention to the principle of their operation. In particular, dot-matrix printers reproduce an image in an impact manner. A distinctive feature of such printers is the low print speed. Inkjet printers print by applying ink to paper with a cartridge. The print speed is faster than dot matrix printers. Laser printers have high print speed and high quality. Plotters are devices

that are used to output graphic documents (drawings, diagrams, photographs, posters) of large format from a computer to paper.

When studying the topic "Personal computers", foreign students should know the history of the development of computer technology - the generation of computers. The appearance of the first generation of computers dates back to the early 1950s. The main component of the first generation of computers were vacuum tubes (radio tubes). Computers were large, slow, unreliable, and consumed a lot of energy. The second generation of computers existed from the late 1950s to the early 1960s. Computers began to be produced on semiconductor elements (transistors). Programming for these computers was carried out in algorithmic languages. The third generation existed from the 1960 s to the mid-1970 s. Computers began to be produced on integrated circuits.

Reduced their size and, accordingly, the power consumption. The fourth generation of computers includes personal computers based on microprocessors (processors) that appeared in the mid-1970s. Distinctive features of fourth-generation computers are high computing power, performance, reliability and relative cheapness.

3.3. Questions for self-examination

- What is included in a personal computer?
- What components are located in the system unit?
- What is the monitor for?
- How is the size of the monitor measured?
- What types of monitors do you know?
- What is the keyboard for?
- What key groups do you know?
- What input devices do you know?
- What output devices do you know?
- What storage devices do you know?

3.4. Control-training test

Perform a control-training test on the topic "Personal computer device". Choose one correct answer for each test question. Check your answers. Keys (correct answers to questions) are given at the end of the test. Review the topic "Personal Computer Device" before running the test. To do this, use the multimedia manual, which is posted on the portal "УЦОТ" of the university.

1. The mouse is a device for

    a. information output

    b. input information

    c. text processing

    d. information storage

2. The printer is designed for
   a. monitor expansion
   b. printing texts and photos
   c. word and photo processing
   d. permanent storage of information
3. The structure of the system unit DOES NOT INCLUDE
   a. keyboard
   b. power unit
   c. motherboard
   d. HDD
4. The hard drive is for
   a. use of textual and numerical information.
   b. keyboard and monitor controls
   c. receiving and processing information
   d. information storage
5. Monitor screen dimensions measure
   a. vertically
   b. horizontally
   c. diagonally
   d. by thickness
6. The keyboard is for
   a. entering information into a computer
   b. output information to the monitor screen and printer
   c. storage and use of information
   d. text processing
7. he scanner is for
   a. storage of text and graphic information
   b. displaying text information on the monitor screen
   c. information processing
   d. entering information into a computer
8. Used to store information
   a. monitor
   b. keyboard and mouse
   c. HDD
   d. a printer

9. The minimum set of devices required to run a computer:
   a. hard disk, mouse, processor
   b. monitor, system unit, keyboard
   c. printer, monitor, keyboard, cd drive
   d. keyboard, mouse, system unit
10. Specify the correct answer:
    a. monitor - text input device
    b. mouse manipulator - audio input device
    c. printer - a device for outputting text and graphic information
    d. keyboard - input/output device for graphic information

Answers: 1 – b, 2 – b, 3 – a, 4 – d, 5 – c, 6 – a, 7 – d, 8 – c, 9 – b, 10 – c

3.5. Literature and Internet sources

When preparing yourself and doing homework, use the following literature and Internet sources:

1. Workbook on Computer science.

2. Информатика и информационные технологии. Учебник для 10-11 классов / Н.Д. Угринович. – 3-е изд. – М.: БИНОМ. Лаборатория знаний, 2006. – 511 с: ил. Учить материал на стр. 23-37.

3. Шауцукова Л.З. Информатика. Теория (с задачами и решениями). Учить материал – Глава 2, пункты 2.1-2.2, 2.7, 2.10, 2.13, 2.15, 2.17, 2.19-2.20.
   – Access mode: http://book.kbsu.ru/theory/index.html

4. Моренко Б.Н., Бабакова Л.Д, Устройство персонального компьютера. Мультимедийное пособие по информатике для иностранных студентов предвузовской подготовки. [Электронный ресурс]. ДГТУ. – Ростов н/Д., 2014. – Access mode:
   https://de.donstu.ru/elect/divisions/620/courses

5. Моренко Б.Н. Электронный курс по дисциплине «Информатика и информационно-коммуникационные технологии» для иностранных слушателей дополнительных образовательных программ [Электронный ресурс] / Б.Н.

Моренко, Т.А. Тюрина; ДГТУ. – Ростов н/Д., 2019. – Access mode: http://test.skif.donstu.ru

6. Моренко Б.Н. Подготовка к итоговой аттестации по информатике: учеб.-метод. пособие / Б.Н. Моренко, Л.Д. Бабакова, О.В. Николенко; Донской гос. техн. ун-т. – Ростов-на-Дону: ДГТУ, – 2019. – 52 с.

Topic 4. Software
4.1. Questions to study

Software. Software classification. System programs. OS. Purpose and types of operating systems. Shell programs, drivers, utilities, anti-virus programs. Application programs Text editors. Spreadsheets. Graphic editor. Database. File storage system. File types.

4.2. Guidelines for studying the topic

When studying the topic "Software", foreign students should know what a "program" and "software" are.

A program is a description of the sequence of solving a problem (processing information) in a language understandable to a computer. Software (software, software) is a set of information processing programs and documentation on the use of these programs.

Currently, there are a large number of programs for a personal computer that he uses during his work. These programs can be divided into three large groups: system programs; application programs; instrumental programs (programming systems).

System programs are a set of programs that control the operation of a personal computer, peripheral devices and provide a dialogue between the user and the computer. System programs include: operating systems, shell programs, drivers, utilities, anti-virus programs.

The operating system controls the operation of a personal computer and provides a dialogue with the user. Operating system functions: dialogue with the user; testing of personal computer components; computer startup: managing the operation of programs installed on the computer; management of peripheral devices, etc.

One of the important functions of the operating system is to support the user interface. An interface is the way a user interacts with a computer. There are three ways for a user to interact with the

operating system of a personal computer: a command line interface (MS-DOS), a graphical interface (Microsoft Windows), and a speech interface that allows you to control the computer using voice commands.

The first operating systems, such as MS-DOS (Microsoft Disc Operation System), had a command line interface (symbolic interface). Computer commands had to be written in the form of a set of specific sentences (commands), for example, to rename (rename) the print_01.txt file to print_hp.txt, one had to write: C:\>ren print_01.txt print_hp.txt

The main control device in operating systems with a command line interface was the keyboard. Commands were typed on the keyboard and displayed on the monitor screen. Communication between the user and the computer and the computer with the user was carried out through the operating system. Graphical operating systems use an interface that is based on user interaction with graphical controls. The control devices are keyboard and mouse. Graphical controls are the mouse pointer (cursor), labels, icons, etc. When you turn on the computer, the desktop appears on the monitor screen.

Graphical objects are displayed (shown) on the Desktop of a personal computer - graphic images of programs that are installed on the computer. An example of a graphical operating system is the Microsoft Windows XP ... Windows 10 operating system. When using a graphical interface, all programs, files, documents, devices, etc. displayed on the monitor screen as icons. The main element of the graphical operating system is the desktop. The desktop is a graphical environment that displays icons: windows, directories, files, shortcuts, icons, and other items.

Currently, users of personal computers use the operating systems Microsoft Windows, Mac OS, Linux Ubuntu and others.

Microsoft Windows is a commercial operating system. Currently, they use the operating systems Windows 7, 8, 10, 11, which were developed by Microsoft. Linux is a free operating system that Linus Torvalds, a student at the University of Helsinki, developed in the early 1990 s. Currently, the Linux operating system is the second most popular operating system after Windows.

When working in MS-DOS, text commands had to be entered from the keyboard (command line interface). However, this method does not provide visibility of computer control and is not convenient enough. Therefore, programs were developed that were called "shell programs".

Shell programs provide a convenient and visual way for a user to communicate with a computer. Wrappers transform an awkward command line interface into a friendly graphical or "menu" interface. Shell programs are, for example, Norton Commander (NC), Volkov Commander, FAR, Windows Commander and many others.

Utilities are utility programs. They provide diagnostics (checking) of personal computer components (RAM, hard drives, etc.) and optimization of the operating system. Utilities allow the user to access a large number of personal computer settings. They may be part of operating systems or distributed, for example, via the Internet. Utilities can perform the functions of file managers, archivers, programs for recovering deleted files, etc.

Drivers are special programs that enable the computer operating system to work with its components and peripherals. With the help of driver programs, a computer can work together with printers, scanners, a keyboard, a mouse, a flash drive, etc. Some drivers are already included with your computer's operating system. For example, we do not need to specifically install the driver for the keyboard, mouse, Flash drive (flash drive) and other devices.

Antivirus programs are used to protect computers from infection with a computer virus. Anti-virus programs protect a personal computer from infection with a computer virus, treat an infected computer, and restore the computer's performance after deleting or disinfecting infected files. The main signs of a computer infection with a virus are: slow operation of the computer or some programs; increase in file sizes; decrease in the amount of available RAM; appearance of new files; termination or incorrect operation of programs. unauthorized transfer of information to the Internet.

Currently, there are a large number of different anti-virus programs. Kaspersky Antivirus Dr. Web, NOD 32, Avast, Norton AntiVirus and others

Applications are called programs that provide the user with the creation and processing of various types of information. It can be textual, numerical, graphic, sound or video information. Application programs solve practical problems and are designed for direct interaction with the user.

Application programs include: text editors; spreadsheets; graphic editor; computer-aided design systems (CAD), etc.

Text editors are designed for creating text files, editing and formatting them, checking spelling, viewing on a monitor screen and printing on a printer.

Spreadsheets. When working with spreadsheets, a rectangular table is displayed on the monitor screen, the cells of which can contain numbers, text and formulas. Spreadsheet processors allow you to calculate the values of table elements using given formulas, build graphs, charts, etc. Representatives of the Microsoft Excel XP…2019 spreadsheet family.

Graphic editors allow you to create and edit drawings. In the simplest editors, you can draw, paint areas of the monitor screen, etc. Most editors allow you to process images obtained using scanners. Representatives of graphic editors - Adobe Photoshop, Corel Draw, Paint, etc.

Computer-aided design (CAD) systems allow drawing and designing various mechanisms using a computer. Among these systems, the most popular system is AutoCAD. Domestic package with similar functions - Компас 3D.

Database management systems (DBMS) allow you to manage large amounts of information - databases. Software systems of this type allow you to process arrays of information on a computer, provide input, search, sorting, a selection of records, reporting, etc. The representative of this class of programs is Microsoft Access.

Accounting programs are designed for accounting, preparation of financial statements and financial analysis of enterprises. The most common systems are 1C: Enterprise.

Tool programs (programming systems) are a set of programs for developing, debugging and implementing new software products.

Software according to the method of distribution and use can be divided into two groups: commercial and free. Free (free) software can be installed and used on any computers: at home, in offices, schools, universities, as well as commercial and government institutions without restrictions.

4.3. Questions for self-examination

– What is a program?
– What is software?
– What software groups do you know?
– What are system programs for?
– What is included in the system programs?
– What are the functions of the operating system?
– What are antivirus programs for?

– What are application programs for?
– What is included in the application programs?
– What are text editors for?
– What are the tools for?
– What are the functions of spreadsheets?
– What is a file?
– What kinds of information can a file contain?
– What operations can be performed with files?
– What are the filename requirements in MS-DOS?
– What is the function of the computer file system?
– What is the structure of a computer file system?
– What is "full filename"?

4.4. Control training test

Perform a control-training test on the topic "Software". Choose one correct answer for each test question. Check your answers. Keys (correct answers to questions) are given at the end of the test. Review the topic "Software" before taking the test. To do this, use the literature, the list of which is given at the end of the section.

1. The operating system is
   a. computer input program
   b. complex of applied and instrumental programs
   c. computer management software
   d. components of the system unit that are connected by a bus
2. Spreadsheets are part of
   a. operating systems
   b. system programs
   c. instrumental programs
   d. application programs
3. The application software includes
   a. tool programs
   b. the collection of all programs installed on the computer
   c. text and image editors
   d. OS

4. The program is
   a. the way a user interacts with a computer
   b. the sequence of solving the problem in a language understandable to the computer
   c. graphical description of the method of solving the
   d. programming system

5. Software is
   a. the collection of all programs installed on the computer
   b. graphical description of the method of solving the
   c. operating system of a modern computer
   d. complex of anti-virus programs

6. Operating systems are part of
   a. system programs
   b. application programs
   c. instrumental programs
   d. programming systems

7. Driver is:
   a. information storage device
   b. computer external device management program
   c. input device
   d. output device

8. System programs include:
   a. Wordpad text editor
   b. Paint program
   c. printer driver
   d. programming language Pascal ABC

9. The Microsoft Word text editor is part of
   a. application programs
   b. system programs
   c. instrumental programs
   d. operating system

10. The computer is controlled by
    a. operating system
    b. word processor Microsoft Word
    c. programming language
    d. utility

Answers: 1 – c, 2 – d, 3 – c, 4 – b, 5 – a, 6 – a, 7 – b, 8 – c, 9 – a, 10 – c

4.5. Literature and Internet sources

When preparing yourself and doing homework, use the following literature and Internet sources:

1. Workbook on Computer science.
2. Шауцукова Л.З. Информатика. Теория (с задачами и решениями), Учить материал: Глава 6 «Программное обеспечение компьютера», пункты 6.1-6.5, 6.8, 6.11-6.14, 6.16-6.17. Адрес учебника в Интернете: http://book.kbsu.ru/theory/index.html
3. Информатика и информационные технологии. Учебник для 10-11 классов / Н. Д. Угринович. – 3-е изд. – М.: БИНОМ. Лаборатория знаний, 2006. – 511 с: ил. Учить материал на стр. 37-39, 51-52.
4. Моренко Б. Н. Учебно-методическое пособие «Информатика. Файлы и файловая система компьютера» по дисциплине «Информатика» для иностранных слушателей дополнительных общеобразовательных программ [Электронный ресурс] / Б. Н. Моренко, Л. Д. Бабакова; ДГТУ. – Ростов н/Д., 2018. – Access mode: https://de.donstu.ru/elect/divisions/620/courses
5. Моренко Б.Н. Электронный курс по дисциплине «Информатика и информационно-коммуникационные технологии» для иностранных слушателей дополнительных образовательных программ [Электронный ресурс] / Б.Н. Моренко, Т.А. Тюрина; ДГТУ. – Ростов н/Д., 2019. – Access mode: http://test.skif.donstu.ru
6. Моренко Б.Н. Подготовка к итоговой аттестации по информатике: учеб.-метод. пособие / Б.Н. Моренко, Л.Д. Бабакова, О.В. Николенко; Донской гос. техн. ун-т. – Ростов-на-Дону: ДГТУ, – 2019. – 52 с.

Topic 5. Algorithmizing
5.1. Questions to study

Algorithms. The concept of an algorithm. Properties of algorithms. Methods for describing algorithms. Graphic description of algorithms. Block diagrams of algorithms. Designations in block diagrams. Types of

algorithms. Linear algorithms (following). Branching algorithms (branching). Cyclic algorithms.

5.2. Guidelines for studying the topic

When studying the topic "Algorithms", foreign students should know that this term comes from algorithmi - the Latin form of writing the name of the great mathematician of the 9th century Al Khorezmi, who was the first to formulate the rules for performing arithmetic operations with decimal numbers. Initially, algorithms were understood only as the rules for performing four arithmetic operations on multi-digit numbers. In the future, this concept began to be used in general to denote a sequence of actions leading to the solution of a task.

An algorithm is a strict and clear sequence of actions, the execution of which leads to a certain result.

Algorithm properties:

– Understandability for the performer (the algorithm is compiled in accordance with the system of commands of the performer).

– Definiteness (each team must define the unambiguous action of the performer).

– Finiteness (presence of the end of the algorithm after a finite number of steps).

– Efficiency (obtaining the desired result at the end of the algorithm).

– Mass character (applicability for a wide class of tasks of the same type).

Methods for describing (writing) algorithms:

– Verbal (description of the algorithm using the words of Russian or other languages). For example, 1) go to the computer; 2) turn on the monitor; 3) turn on the system unit.

- Graphical description of algorithms - description using geometric shapes - blocks.

– Writing in an algorithmic language (writing an algorithm in a programming language).

Flowcharts are one of the graphical ways to represent algorithms. A block diagram consists of blocks connected by lines.

Students should be aware that there are three main types of algorithms: linear algorithms (following), branching algorithms (branching), and round robin algorithms.

An algorithm is called linear, in which all actions are performed only sequentially (step by step).

Branching is an algorithmic construction in which the execution of an action depends on the truth or falsity of a condition. It is said that the "branch" construction is written in full form if it contains commands both for the case of the condition being met and for its non-fulfillment. The abbreviated branching construction is implemented as follows. If a direction in which there is no action is chosen, then the branch construction is not executed and the control is received by the construction following the branch.

A loop is an algorithmic construction in which the same sequence of steps is repeatedly performed, called the body of the loop. There are cycles with a condition check before the next iteration and cycles with a condition check after the next iteration. The former are called loops with a precondition, the latter are called postconditions.
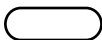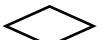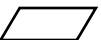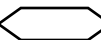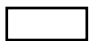
5.3. Questions for self-examination
- What is an algorithm?
- What properties of algorithms do you know?
- What is the "discreteness" of the algorithm?
- What is the "certainty" of an algorithm?
- What ways of describing algorithms do you know?
- What is a graphical way to describe algorithms?
- What blocks are used in the graphical description of algorithms?
- What kinds of algorithms do you know?
- What algorithm is called linear?
- What algorithm is called branching?
- What algorithm is called cyclic?

5.4. Control-training test
Perform a control-training test on the topic "Algorithmization". Choose one correct answer for each test question. Check your answers. Keys (correct answers to questions) are given at the end of the test. Before performing the test, repeat the topic "Algorithmization". To do this, use your computer science workbook and literature, the list of which is given at the end of the section, and educational materials from the «УЦОТ» portal.

1. The property of the algorithm is
    a. formality
    b. certainty
    c. cyclicality

    d. measurability

2. The discreteness of the algorithm means that
   a. algorithm commands must follow each other sequentially
   b. each command of the algorithm is described based on a specific performer
   c. the algorithm can be broken down into a finite number of commands (steps)
   d. the algorithm contains rules for performing certain actions

3. What element of the flowchart is represented by a figure?
   a. Decision
   b. Start, End
   c. Input Output
   d. Process

4. The algorithm is
   a. description of the sequence of actions in solving the problem
   b. personal computer instruction set
   c. rules for displaying flowcharts of algorithms
   d. graphical description of the problem solution

5. In which block should I write y:=a+b ?

   a. ⬭ b. ◇ c. ▱ d. ⬡ e. ▭

6. A linear algorithm consists only of structures
   a. branching
   b. following
   c. cycle
   d. universal type

7. The property of an algorithm that it can be used with different inputs is called
   a. limb
   b. discreteness
   c. effectiveness
   d. mass character

8. A branching algorithm consists of structures
   a. following

b. only follow and generic type
c. branching
d. universal type

9. The choice of action depending on some condition is described by the structure
   a. following
   b. branching
   c. cycle
   d. correct answers are numbered 1 and 2

10. Which element of the flowchart is indicated by the figure?
    a. Process
    b. Input Output
    c. Decision
    d. Start End

Answers: 1 – b, 2 – c, 3 – c, 4 – a, 5 – e, 6 – b, 7 – d, 8 – c, 9 – b, 10 – a

5.5. Literature and Internet sources

When preparing yourself and doing homework, use the following literature and Internet sources:

1. Workbook on Computer science.

2. Информатика и информационные технологии. Учебник для 10-11 классов / Н. Д. Угринович. – 3-е изд. – М.: БИНОМ. Лаборатория знаний, 2006. – 511 с: ил. Учить материал на стр. 146-156.

3. Шауцукова Л.3. Информатика. Теория (с задачами и решениями), Учить материал – Глава 7, пункты 7.1, 7.3-7.6, 7.8. – Access mode: http://book.kbsu.ru/theory/index.html

4. Моренко Б.Н., Л.Д. Бабакова. Информатика. Алгоритмы и алгоритмизация. Учебно-методическое пособие для иностранных слушателей дополнительных общеобразовательных программ. [Электронный ресурс] / ДГТУ. Каф. «Естественные науки», 2017.
   – Access mode:
   https://de.donstu.ru/elect/divisions/620/courses

5. Моренко Б. Н. Учебно-методические пособие «Информатика. Алгоритмы и алгоритмизация» для

иностранных слушателей дополнительных общеобразовательных программ, [Электронный ресурс] / Б. Н. Моренко, Л. Д. Бабакова; ДГТУ. – Ростов н/Д., 2017. – Access mode:

https://de.donstu.ru/elect/divisions/620/courses

6. Моренко Б.Н. Электронный курс по дисциплине «Информатика и информационно-коммуникационные технологии» для иностранных слушателей дополнительных образовательных программ [Электронный ресурс] / Б.Н. Моренко, Т.А. Тюрина; ДГТУ. – Ростов н/Д., 2019. – Access mode: http://test.skif.donstu.ru

7. Моренко Б.Н. Подготовка к итоговой аттестации по информатике: учеб.-метод. пособие / Б.Н. Моренко, Л.Д. Бабакова, О.В. Николенко ; Донской гос. техн. ун-т. – Ростов-на-Дону: ДГТУ, – 2019. – 52 с.

Topic 6. Pascal ABC programming language
6.1. Questions to study

Algorithmic language Pascal ABC. Basic features of the Pascal ABC language. Pascal language alphabet ABC. Writing arithmetic expressions and numbers. Program structure in Pascal ABC. Data types. Pascal ABC interface. Typing, debugging and running programs for execution. Linear programs (following). Variables. Identifiers. Information input and output operators. Branching programs (branching). Case...of selection statement. Cyclic programs. Loops with precondition, postcondition, parameter. Arrays in Pascal ABC. Description of arrays. Stages of solving problems using a computer.

6.2. Guidelines for studying the topic

When studying the topic "Pascal ABC Programming Language", foreign students should know the definition of what a programming language alphabet is. An alphabet is a set of symbols allowed in a language. In the Pascal ABC language, all components are formed from a set of ASCII characters.

The elements of the alphabet can be conditionally divided into groups, in particular: symbols used in identifiers; separators; Special symbols.

Identifier - the name of any program object - can include letters, numbers and underscores. As letters, you can use uppercase

and lowercase letters of the Latin alphabet. It should be borne in mind that uppercase and lowercase letters in identifiers, numbers and service words do not differ: for example, NAME, Name or nAmE will be identical (understandable by the computer). However, in comments, lowercase and uppercase letters are distinguished and are not converted when compiled.

10 Arabic numerals from 0 to 9 are used as digits. In identifiers, they can be present in any position except the first one. The underscore character can be in any position. The length of the identifier can be any, but only the first 63 characters are significant, and for these characters all identifiers must be unique.

Any place in the program where you can put one delimiter, you can put any number and in any combination. This allows you to more visually represent the structure of the program. Comments are enclosed in curly braces { } or brackets of the form (* *) and can span any number of lines.

Special characters that perform certain functions in the language can be divided into three categories: punctuation marks, operation marks, reserved words.

Operation signs are intended to denote arithmetic and logical operations. They are of two types: consisting of non-alphabetic characters (eg + - *, etc.) and literal operations (eg not, div. mod, etc.), which are reserved words.

Reserved words include auxiliary words (for example, begin, end, repeat, etc.). Service words can only be used for their intended purpose and cannot be redefined.

When learning the Turbo Pascal language, you should pay attention to the data types used in it. They can be integer or real, integer data types are values that can be used in arithmetic expressions and occupy from 1 to 4 bytes in memory.

Real types are real values that can be used in arithmetic expressions and occupy 4 to 6 bytes of memory. Pascal ABC allows floating-point and fixed-point representations of real values.

Real values can be displayed in fixed point form, such as 7.32, 456.721, or 0.015, or in floating point form, i.e. a pair of numbers of the form <mantissa>E<order> (7.32E+00, 4.56721E+02, 1.5E-02).

A program written in Pascal ABC may have the following sections: program header; label declaration section; constant declaration section; type declaration section; variable declaration section; procedure and function declaration section; program body (required part). The program header consists of the reserved word program and the name

of the program (with a list of parameters enclosed in parentheses). The title ends with a semicolon. Sections must be in the order listed above.

Pascal ABC has some peculiarities in program structure. Thus, the program header is optional and is ignored by the compiler. The order of partitions is arbitrary, you can create several identical partitions. The only rule that must be observed is that in any place of the program, you can use only elements (labels, types, constants, variables, subroutines, etc.) that were previously defined in the program text.

The body of the program begins with the word begin, and ends with the word end with a dot, which is a sign of the end of the program.

When learning the Pascal ABC programming language, keep in mind that branching algorithms can be implemented using a conditional statement. The conditional operator allows you to check a certain condition and, depending on the results of the check, perform one or another action. First, the condition is evaluated, if the result is TRUE (true), then Operator_1 is executed, if the result is FALSE (false), on the contrary, Operator_2 is executed. In a conditional statement, after then, as well as after else, according to the syntax, there can be only one statement.

If, when a given condition is fulfilled (or not fulfilled), it is necessary to perform not one action, but several, then they must be combined into a compound operator, i.e. enclose this sequence of actions in operator brackets begin... end.

If the number of conditions in the branching algorithm is more than three, then it is recommended to use a selection operator. Depending on the value of the variable, the statement marked with the corresponding constant is executed. It is possible to use an abbreviated form of the Case statement, in which the else line is missing. In this case, if no value matches the value of the ordinal variable, control is transferred to the statement following end. If for several values, you need to perform the same operator, you can list them separated by commas, or specify a range.

It should be noted that the Pascal ABC programming language allows you to work with texts. It is the main mode for the dialogue of the personal computer with the user.

A coordinate system is used to construct an image on the screen. The countdown starts from the upper left corner of the monitor screen, which has coordinates (0,0). The X value increases from left to right, the Y value increases from top to bottom.

When studying the topic "Pascal ABC Programming Language", foreign students must master the steps of solving problems on a

computer. In particular, they should know that solving a problem on a computer consists of several stages, among which the main ones are the following: 1) setting the problem; 2) formalization (mathematical formulation of the problem); 3) choice of solution method; 4) development of an algorithm; 5) drawing up a program; 6) debugging; 7) calculation and processing of the result.

1. Statement of the problem. Includes: collection of information about the task; formulation of the condition of the problem; determination of the ultimate goals of solving the problem; determination of the form for issuing results; description of the data.

2. Formalization (Analysis and study of the problem). Includes: analysis of existing analogues of the problem solution; analysis of hardware and software; development of a mathematical model; development of data structures.

3. Algorithm development. Includes: choice of algorithm design method; choice of the form of the algorithm; selection of tests and testing method.

4. Programming. Includes: choice of programming language; writing the algorithm in the chosen programming language.

5. Testing and debugging. Includes: syntax debugging; debugging the logical structure; test calculations and analysis of test results.

6. Analysis of the results of solving the problem and refinement of the mathematical model with repeated execution of steps 2 - 5 (if necessary).

7. Maintenance of the program. Includes: finalization of the program to solve specific problems; drawing up documentation for the solved problem, for a mathematical model, for an algorithm, for a program, for a set of tests, for using the program.

A mathematical model is a system of mathematical relationships - formulas, equations, inequalities, etc., reflecting the essential properties of an object or phenomenon.

Program development involves writing a program, testing it, and fixing errors.

Debugging a program is the process of finding and eliminating errors in a program based on the results of its run on a computer. When debugging, errors are corrected, the program's performance is checked.

Testing is the verification of the correct operation of the program as a whole or its components. Testing determines the presence of errors, and debugging finds out the reason for the incorrect operation

of the program. A test is a certain set of initial data and an accurate description of all the results of the program.

6.3. Questions for self-examination

- What is the alphabet of a programming language?
- What is included in the Pascal ABC alphabet?
- What arithmetic signs are used in Pascal ABC?
- What is a linear program?
- What is a Forking Program?
- What are real and whole numbers?
- What are the rules for writing numbers in Pascal ABC?
- What arithmetic functions do you know?
- How to write a number in exponential form?

6.4. Control-training test

Perform a control-training test on the topic "Pascal ABC programming language". Choose one correct answer for each test question. Check your answers. Keys (correct answers to questions) are given at the end of the test. Review the Pascal ABC Programming Language topic before taking the test. To do this, use the literature, the list of which is given at the end of the section, and educational materials from the «УЦОТ» portal.

1. The standard sin x function in Pascal ABC is written as
    a. *sin {x}*
    b. *sin [x]*
    c. *sin (x)*
    d. *sinus (x)*
2. To write numbers in Pascal ABC use
    a. Roman numerals.
    b. Arabic numerals.
    c. uppercase numbers.
    d. binary numbers.
3. Specify the correct name of the sign :=
    a. name designation
    b. assign a value
    c. colon-equals
    d. identical equality
4. The Pascal ABC language developed
    a. Blaise Pascal.

   b. Von Neumann.
   c. Peter Norton.
   d. Niklaus Wirth.

5. Specify the correct representation of the division sign in Pascal ABC
   a. **/**
   b. **:**
   c. del
   d. **:**delete

6. As a separator between the integer and the real part of the number, use
   a. point.
   b. comma.
   c. semicolon.
   d. apostrophe.

7. Specify the correct notation for the "not equal" sign in Pascal ABC
   a. ≠
   b. #
   c. < >
   d. < = >

8. Using the "div" operation in calculations allows you to determine
   a. the absolute value of a number.
   b. remainder of the division.
   c. number exponent.
   d. integer from division.

9. The words "and, begin, program ..." and others used in the Pascal ABC language are called
   a. English (American).
   b. turbopascal.
   c. official.
   d. software.

10. Specify the correct notation for the multiplication sign in Pascal ABC
    a. ·
    b. mod

c. x

d. *

Answers: 1 – c, 2 – b , 3 – b, 4 – d, 5 – a, 6 – a, 7 – c, 8 – d, 9 – c, 10 – d

6.5. Literature and Internet sources

When preparing yourself and doing homework, use the following literature and Internet sources:

1. Workbook on Computer science.
2. Моренко Б.Н. Подготовка к итоговой аттестации по информатике: учеб.-метод. пособие / Б.Н. Моренко, Л.Д. Бабакова, О.В. Николенко; Донской гос. техн. ун-т. – Ростов-на-Дону: ДГТУ, – 2019. – 52 с.
3. Моренко Б.Н., Бабакова Л.Д. Линейные программы в Pascal ABC. Методические указания к лабораторно-практическим работам для иностранных студентов предвузовской подготовки. [Электронный ресурс]. ДГТУ. – Ростов н/Д., 2016. – Access mode:
https://de.donstu.ru/elect/divisions/620/courses

4. Моренко Б.Н., Бабакова Л.Д. Ветвления в Pascal ABC. Методические указания для практических работ по языку программирования Pascal ABC для иностранных студентов предвузовской подготовки. [Электронный ресурс]. ДГТУ. – Ростов н/Д., 2016. – Access mode:
https://de.donstu.ru/elect/divisions/620/courses

5. Моренко Б.Н., Бабакова Л.Д. Информатика. Циклические программы в Pascal ABC. Учебно-методическое пособие для иностранных слушателей дополнительных общеобразовательных программ [Электронный ресурс]. ДГТУ. – Ростов н/Д., 2018. – Access mode:
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6. Моренко Б.Н., Бабакова Л.Д. Информатика. Оператор выбора в Pascal ABC. Методические указания для слушателей дополнительных общеобразовательных программ. [Электронный ресурс]. ДГТУ. – Ростов н/Д., 2017. – Access mode: https://de.donstu.ru/elect/divisions/620/courses

7. Моренко Б.Н., Бабакова Л.Д. Массивы в Pascal ABC. Методические указания к лабораторно-практическим работам для иностранных студентов предвузовской подготовки. [Электронный ресурс]. ДГТУ. – Ростов н/Д., 2017. – Access mode:
https://de.donstu.ru/elect/divisions/620/courses

Topic 7. Text information processing technology
7.1. Questions to study

Text information processing technology. Text editors. Basic objects in a text editor. Entering text from the keyboard. Text editing and formatting. Operations with text. Creating and working with tables. Work with graphics.

7.2. Guidelines for studying the topic

When studying the topic "Text Information Processing Technology", foreign students should pay attention to working with text editors, in particular: know the basic features of text editors, how to create documents, set page parameters, assign a clipboard, edit, insert special characters, work with the formula editor, formatting options, basic paragraph options, ways to create tables, methods for editing and formatting them. Modern text editors also allow you to include graphic objects in the text: drawings, diagrams, photographs, etc.

To work with texts on a computer, software tools called text editors or word processors are used. There are a large number of text editors, varying in their capabilities, from very simple educational ones to powerful, multifunctional software tools called publishing systems that are used to prepare books, magazines and newspapers for printing. The main purpose of text editors is to create text files, edit texts, view them on the monitor screen, change the format of a text document, and print it on a printer.

The text typed on the computer keyboard is reproduced on the display screen in the working field of the editor. Special icon - the cursor indicates the place on the screen that the user can currently influence (create, change characters, etc.) using the editor. Working with a text editor, you can get information on the screen about the current state

of the cursor, i.e. its coordinates on the screen (line number and position in the line), as well as the page number of the text, its format, the font used, etc.

The interface of almost every text editor allows you to have on the screen a menu of editor control commands, changing operating modes, asking for help, text formatting, printing, etc. As a rule, the menu has not only a text form, but also the form of icons indicating the command being executed.

The functionality of most modern text editors allows the user to perform the following operations: type text from the keyboard; correct symbols, insert a new symbol in place of an erroneous one; insert and delete groups of characters within lines, without re-typing the entire line, but shifting part of it to the left / right in insert mode; copy a fragment of text using a certain part of memory - the so-called "buffer" (or "pocket", as programmers say) for temporary storage of copied fragments of text; delete one or more lines, copy and move them to another place in the text; expand lines of typed text, to insert a new fragment there; insert fragments from other texts, view texts and detect words or groups of words found in this text, previously selected by the user; save the typed text (and, if necessary, all intermediate versions of this text) as a file on a magnetic disk or other storage device; format the text (i.e. change the length of the line, line spacing, align text to the edge or middle of the line, etc.); change fonts, their size, make selections by underlining or using different letter styles (italic, bold, etc.); print the prepared text on the printer.

Most text editors have a text spelling control mode. In this case, a large spelling dictionary is stored in the computer's memory. Thanks to this, it becomes possible to automatically search for spelling errors in the text and then correct them.

Foreign students should pay attention and learn the basic terms associated with working on the text.

A font is a complete set of characters in a particular style, including uppercase and lowercase letters, punctuation marks, special characters, numbers, and arithmetic symbols. Each font has its own name, such as *Times New Roman, Arial, Courier*, etc.

Editing is a transformation that adds, removes, moves, or corrects the content of a document. Editing a document is usually done by adding, deleting, or moving characters, individual words, or text fragments.

Formatting is a transformation that changes the way a document is presented. At the beginning of working on a document, it is advisable

to set the page parameters: its format (size), orientation, margin size, etc.

Paragraph formatting. A paragraph is one of the main objects of a text document. In computer documents, a paragraph is any text that ends with a control character (marker) for the end of a paragraph. Entering the end of a paragraph is provided by pressing the *Enter* key.

In the process of formatting a paragraph, its alignment parameters are set (alignment reflects the location of the text relative to the borders of the page margins), indents (the entire paragraph can have indents to the left and right) and intervals (the distance between the lines of the paragraph), the indent of the red line.

7.3. Questions for self-examination

- What are text editors for?
- What type of software are text editors?
- What programs do you know for creating text documents?
- What is the keyboard for?
- What is text editing?
- What is text formatting?
- What structural elements of the text do you know?
- What text editors are included with Microsoft Windows?
- What extensions do text files have documents?

7.4. Control-training test

Perform a control-training test on the topic "Text Information Processing Technology". Choose one correct answer for each test question. Check your answers. Keys (correct answers) are given at the end of the test. Before performing the test, review the topic "Text Information Processing Technology". To do this, use the literature listed at the end of this section.

1. The symbol is
   a. minimum unit of text
   b. basic unit of textual information
   c. footer fragment
   d. standard typeface
2. The word is
   a. part of a sentence
   b. meaningful sequence of letters, numbers, and symbols
   c. character-limited sequence of letters

       d. the minimum unit of textual information

3. The line is
- a. complete sentence
- b. a sentence that starts with a "red" line
- c. a sentence that ends with a dot or other characters
- d. sequence of characters between the left and right text borders

4. Making changes and corrections to a text document is
- a. text formatting
- b. text editing
- c. insert text
- d. text processing

5. To split a line into two, you need to use
- a. "Delete" key
- b. "Page Up" key
- c. "Enter" key
- d. "Tab" key

6. The paragraph is
- a. a group of adjacent lines, the first of which is indented
- b. user-installed typeface
- c. default point size
- d. text field interface

7. The footer can be placed
- a. at the top of the text
- b. at the bottom of the text
- c. at the top and bottom of the text at the same time
- d. all answers are correct

8. The shift of a part of the text relative to the common edge of the text is
- a. editing
- b. alignment
- c. indent
- d. correction

9. The offer is
- a. arbitrary sequence of characters between two points
- b. arbitrary sequence of characters between dot and comma
- c. arbitrary sequence of characters between three dots

      d. arbitrary sequence of characters between text boundaries

10. Paragraph formatting is
      a. changing the content of a paragraph
      b. change the appearance of the text
      c. a specially selected fragment of the text of the current paragraph
      d. check spelling and syntax of a paragraph

Answers: *1 – a, 2 – c , 3 – d, 4 – b, 5 – c, 6 – a, 7 – d, 8 – c, 9 – a, 10 – b*

7.5. Literature and Internet sources

When preparing yourself and doing homework, use the following literature and Internet sources:

1. Workbook on Computer science.
2. Информатика и информационные технологии. Учебник для 10-11 классов / Н.Д. Угринович. – 3-е изд. – М.: БИНОМ. Лаборатория знаний, 2006. – 511 с: ил. Учить материал – Глава 9, стр. 337-354.
3. Моренко Б.Н., Бабакова Л.Д. Информатика. Текстовый редактор WordPad. Учебно-методическое пособие для иностранных слушателей дополнительных общеобразовательных программ. [Электронный ресурс] / ДГТУ. – Ростов н/Д., 2018. – Access mode:
https://de.donstu.ru/elect/divisions/620/courses
4. Моренко Б.Н. Подготовка к итоговой аттестации по информатике : учеб.-метод. пособие / Б.Н. Моренко, Л.Д. Бабакова, О.В. Николенко ; Донской гос. техн. ун-т. – Ростов-на-Дону: ДГТУ, – 2019. – 52 с.

Topic 8. Numerical information processing technology
8.1. Questions to study

Spreadsheets. The structure of spreadsheets. Built-in functions. Addressing in spreadsheets. Using spreadsheets to solve problems in the field of technical and natural sciences Using spreadsheets to build graphs and charts.

8.2. Guidelines for studying the topic

When studying the topic "Technology for processing numerical information", you need to pay attention to working with spreadsheets, in particular: what are spreadsheets, their capabilities, what is the structure of spreadsheets, the concept of a cell, address, range, sheet, book, how to set and input rules data, chart types. During independent study of the topic and in the process of practical work, students should be able to determine the address of a cell and a range, carry out the simplest formatting of cells, write down mathematical expressions, enter formulas, fill tables with function values, perform the necessary calculations, build diagrams and graphs.

Spreadsheets are used when it is necessary to repeatedly perform the same type of calculations, when creating tables, graphs and diagrams, when analyzing the results of calculations of mathematical and other calculations, etc. After studying the theoretical material, foreign students perform practical work proposed by the teacher on personal computers.

To work with numerical information, perform mathematical and other calculations, special application programs are used, which are called spreadsheets. These include Excel 2003 ... 2018 spreadsheets from Microsoft and Open Office.org Calc. Documents that are created with Microsoft Excel have an .xls extension and documents that are created with OpenOffice.org Calc have an .ods extension

When making calculations in spreadsheets, numerical, monetary, financial, percentage, fractional and other data formats are used.

Each workbook in spreadsheets consists of worksheets with which you can perform various operations. On a personal computer, a spreadsheet exists in the form of a worksheet, which has a name (eg Sheet 1, Sheet 2, Sheet 3, etc.). Each worksheet in the workbook consists of rows and columns, the number of which depends on the version number of the program. Worksheets are combined into workbooks.

A column is a vertical section of a spreadsheet. Column letter - determines its place in the spreadsheet. The letters are located on the upper border of the working field. Column headings (located at the top

of the table) are indicated by Latin letters or their combinations (A, B, C, ... AB, etc.).

The lines are arranged horizontally and are numbered from the left side of the document window from top to bottom and are numbered with Arabic numbers (1, 2, 3 and beyond).

At the intersection of a column and a row, there is a cell that has its own address. A cell is the basic unit of data storage in spreadsheets. The cell address consists of a column heading and a row heading, for example, Al, B5, E3. The cell with which some actions are performed is highlighted with a frame (cursor) and is called active. In the active cell, the user enters and edits data or formulas. The cell pointer (cursor) is a rectangle that shows the user the current (active) cell. The pointer can be moved across the spreadsheet using the keyboard or using the mouse.

In the process of working with spreadsheets, you can select several cells at the same time - a range of cells. You can select multiple cells in a column (range A2:A4), multiple cells in a row (range C1:E1), or a rectangular range (range C3:E4).

Calculations in spreadsheets are carried out using formulas. The formula can contain numeric constants, cell references and formulas connected by signs of mathematical operations, comparison operations. A formula entered into a cell must begin with an equal sign.

Spreadsheets can be formatted. Formatting in spreadsheets is changing the height of rows, changing the width of columns, changing the color of text in cells, changing the cell background, changing the frame of the created table, etc.

8.3. Questions for self-examination

- What are spreadsheets for?
- What programs for working with electronic
  tables do you know?
- What kind of software are spreadsheets?
- What are rows and columns in a spreadsheet?
- How are rows and columns labeled in spreadsheets?
- What is the basic object of a spreadsheet?
- What is a cell?
- What is an active cell?
- How is the cell address recorded in electronic tables?
- What is the shape of the   cursor in spreadsheets?

- How to write a formula into a cell?
- What types of information can a cell contain?
- What standard spreadsheet functions do you know?
- What extension do spreadsheet files have?

8.4. Control-training test

Perform a control-training test on the topic "Technology for processing numerical information." Choose one correct answer for each test question. Check your answers. Keys (correct answers to questions) are given at the end of the test. Before performing the test, repeat the topic "Technology for processing numerical information." To do this, use the literature, the list of which is given at the end of this section, and educational and methodological materials from the SKIF portal.

1. The spreadsheet is
    a. tabular data processing computer control device
    b. application program for processing code tables
    c. application program for processing numerical data
    d. program that controls the operation of a computer in tabular calculations

2. Spreadsheet rows
    a. named arbitrarily by the user
    b. denoted by lowercase Cyrillic letters
    c. denoted by letters of the Latin alphabet
    d. are numbered

3. Spreadsheet columns
    a. denoted by letters of the Latin alphabet
    b. denoted by the letters of the Russian alphabet
    c. numbered with Roman numerals
    d. are referred to by numbers and lowercase letters of the Latin alphabet

4. The address of a spreadsheet cell is denoted by
    a. two-bit RAM address allocated for the cell
    b. the name of the column and the number of the row at the intersection of which the cell is located
    c. special ASCII code character
    d. any valid .xls filename

5. The arithmetic expression 3(A1 + B1): (2B1-3A2) when recorded in a spreadsheet looks like

  a. *=3*(A1+B1)/(2*B1-*
  c. *=3(A1+B1):(2*B1-3*A2)*
  b. *=3*(A1+B1)/(2B1-3A2)*
  d. *=3*(A1+B1)/(2B*1-*

6. Which of the following expressions can be used to write in spreadsheets

  a. *−A3B8+12*
  c. *A3*B8+12*
  b. *A1=A3*B8+12*
  d. *=A3*B8+12*

7. A workbook in Microsoft Excel spreadsheets is

  a. a sequence of numbers, symbols, and spaces
  b. Microsoft Excel sheet set
  c. directory for storing and processing numerical data
  d. all answers are correct

8. The active cell is

  a. cell for recording system commands
  b. dashed cell
  c. cell in which data is entered from the keyboard
  d. cell containing formulas and/or references to other cells

9. The address of a cell in a spreadsheet is determined by

  a. worksheet number and line number
  b. column name and row number
  c. workbook number and column name
  d. spreadsheet file name with .xls extension

10. Rows in a spreadsheet are

  a. A, B, C, D, E и т.д.
  b. A, Б, В, Г и т.д.
  c. 1, 2, 3, 4 и т.д.
  d. произвольно

Answers: *1 – c, 2 – d , 3 – a, 4 – b, 5 – a, 6 – d, 7 – b, 8 – c, 9 – b, 10 –* c

8.5. Literature and Internet sources

When preparing yourself and doing homework, use the following literature and Internet sources:

1. Workbook on Computer science.

2. Информатика и информационные технологии. Учебник для 10-11 классов / Н.Д. Угринович. – 3-е изд. – М.: БИНОМ. Лаборатория знаний, 2006. – 511 с: ил. Учить материал – Глава 10, стр. 361-377.

3. Моренко Б.Н. Подготовка к итоговой аттестации по информатике : учеб.-метод. пособие / Б.Н. Моренко, Л.Д. Бабакова, О.В. Николенко ; Донской гос. техн. ун-т. – Ростов-на-Дону: ДГТУ, – 2019. – 52 с.

Topic 9. Technology for processing graphic information
.9.1. Questions to study

Graphic editor. Basic objects in the graphic editor. Computer presentations. Development of computer presentations. Requirements for computer presentations.

9.2. Guidelines for studying the topic

When studying the topic "Technology for processing graphic information", foreign students should know what graphic editors are, their capabilities, the main objects in a graphic editor, the possibility of their use in the development of computer presentations. A graphic editor is a program that allows you to create, view, process and edit digital images (drawings, photographs, pictures) on a computer. There are raster and vector graphic editors.

A raster graphics editor is a program designed to create and process raster images, which are stored in computer memory as a set of points. The image on a monitor screen is made up of individual dots called pixels. Raster graphic editors are used in the processing of digital photographs, in preparing images for printing on photographic paper, and publishing on the Internet. Currently, there are a large number of free and paid raster graphics editors, such as Microsoft Paint, Adobe Photoshop, GIMP, etc.

Vector graphic editors allow you to create and edit images that consist of separate graphic objects (graphic primitives). Graphic objects are any image that can be edited and formatted. Vector graphics editors are used to create illustrations, diagrams, flow charts, etc. Vector graphics objects are created using lines and curves that are described using mathematical formulas. Currently, there are a large number of

free and paid vector editors. Free software: GIMP, Paint.net, Inkscape. Paid programs: Adobe Illustrator, Corel Draw.

Currently, computer presentations are often used in the educational process. Computer presentations can contain various types of information: text, graphics, sound, animation, etc. The use of presentations helps to improve the skills of speech activity, develop the skills of searching, processing and systematizing educational and other information. Microsoft PowerPoint and Open Office.org Impress are used to develop computer presentations.

When developing presentations, you should follow a certain order of slides, which can be as follows. The first slide (title page) should contain the name of the topic of the lesson. The content of the presentation is given on the second slide. The following slides present the material of the report, speech or educational material of the discipline. One of the last slides contains brief conclusions on the material presented in the presentation, a list of used educational, educational and methodological literature and materials from the Internet

Presentation slides should contain only the most necessary information. The color and graphic design of the slides should be the same as possible and should not distract the attention of the audience from the content of the speech or training session. When developing a presentation, it is necessary to take into account the physiological characteristics of human perception of colors, the number of which should be limited, and their combination should be optimal. Combinations of font and presentation background colors are well perceived, for example, black on white, white on dark blue, yellow on blue.

It is not recommended to use more than three colors on one slide: in particular, one for the background of the presentation, the second for headings, and the third for text. Arial, Tahoma, Verdana and some others should be used as a font for text. It should be remembered that the graphic design of the slide affects the level and speed of perception of information, the degree of its memorization. The slide should not contain unnecessary elements that are not directly related to the topic of the speech, report or message.

It is necessary to correctly place the information on the slide: its horizontal arrangement should be considered preferable. To attract the attention of the audience, you should use pictures, graphs, diagrams. In this case, it is advisable to highlight keywords in color, bold or italic style. However, the selected text elements should not exceed 1/2-1/3 of the total surface of the slide.   You should also choose the right

number of presentation slides. For presentation, their number should not exceed 15-20.

The presentation material should provide unambiguous perception of information. The information presented on each of the slides should be perceived as a complete unit. It is advisable to highlight each block of information on a slide with separate frames. Presentation slides should contain minimal textual information. It should be replaced, if possible, with graphic information: diagrams, diagrams, drawings, photographs, etc. An image is easier to perceive and remember than text.

9.3. Questions for self-examination

- What are graphic editors for?
- What graphic editors do you know?
- What features does Paint have?
- How to get started with the Paint graphic editor?
- What is a computer presentation?
- What programs are designed to create presentations?
- What kind of software is it?
  software for creating presentations?
- What are PowerPoint templates for?
- What is a slide in a computer presentation?
- What do you know the requirements for computer
  presentations?
- What is the difference between a presentation and a
  demonstration?
- What extension do presentation files have?

9.4. Control-training test

Perform a control-training test on the topic "Technology for processing graphic information." Choose one correct answer for each test question. Check your answers. Keys (correct answers to questions) are given at the end of the test. Before performing the test, repeat the topic "Technology for processing graphic information." To do this, use the literature, the list of which is given at the end of this section, and educational and methodological materials from the SKIF portal.

1. Graphic files have the extension
   a. .txt, .doc, .docs
   b. .jpg, .gif, .png

    c. .exe, .com, .bat

    d. .avi, .mp4, .wmv

2. The graphic editor is designed for

    a. creating a graphic image of the text;

    b. editing the font style

    c. work with graphics

    d. charting

3. With Paint, you can

    a. create and edit graphics

    b. edit the type and style of the font

    c. customize the animation of graphic objects

    d. build graphs and charts

4. The minimal object of a graphical editor is

    a. familiarity (character)

    b. object (rectangle, circle, etc.)

    c. Color palette

    d. screen point (pixel)

5. Which program is a graphic editor?

    a. Adobe Reader

    b. Paint

    c. Microsoft Excel

    d. Open Office.org Calc

6. What key to hold when drawing regular geometric shapes in Paint

    a. Ctrl

    b. Shift

    c. Alt

    d. Пробел (Space)

7. One of the functions of the graphic editor is

    a. image creation

    b. editing text files

    c. performing mathematical calculations

    d. creating and editing video files

8. Monitor screen resolution is measured in

    a. millimeters

    b. inches

    c. dpi

d. pixels

9. Graphic editors are

    a. system programs

    b. application programs

    c. tool programs

    d. system and tool programs

10. The graphics editor is

    a. device for creating and editing drawings

    b. text file editor

    c. program for creating and editing drawings

    d. graphic printing device

Answers: *1 – b, 2 – c , 3 – a, 4 – d, 5 – b, 6 – b, 7 – a, 8 – d, 9 – b, 10 – c*

9.5. Literature and Internet sources

When preparing yourself and doing homework, use the following literature and Internet sources:

1. Workbook on Computer science.
2. Информатика и информационные технологии. Учебник для 10-11 классов / Н.Д. Угринович. – 3-е изд. – М.: БИНОМ. Лаборатория знаний, 2006. – 511 с: ил. Учить материал – Глава 7, стр. 304-318, 323-336
3. Моренко Б.Н., Бабакова Л.Д. Информатика. Графические возможности языка Pascal ABC. Методические указания к лабораторно-практическим работам для иностранных слушателей дополнительных общеобразовательных программ инженерно-технической и технологической направленности. [Электронный ресурс] / ДГТУ. – Ростов н/Д., 2017. – Access mode:

https://de.donstu.ru/elect/divisions/620/courses

4. Моренко Б.Н. Психолого-педагогические особенности разра-ботки компьютерных презентаций для иностранных слушателей предвузовской подготовки / Б.Н. Моренко, Л.Д. Бабакова, О. В. Николенко // Актуальные вопросы изучения русского языка как иностранного и проблемы преподавания на русском языке. Сб. материалов VII Междунар. науч.-практ. конф. (Ростов-на-Дону, 15-16 октября 2019 г.) / под общ. ред. И.А. Кондратьевой. – Ростов н/Д.: ДГТУ, 2019. – С. 102-109

5. Моренко Б.Н. Подготовка к итоговой аттестации по информатике : учеб.-метод. пособие / Б.Н. Моренко, Л.Д. Бабакова, О.В. Николенко ; Донской гос. техн. ун-т. – Ростов-на-Дону: ДГТУ, – 2019. – 52 с.

Topic 10. Communication technologies
10.1. Questions to study

Communication technologies. Computer networks. Classification of computer networks. Local and global computer networks. Internet. Search for information on the Internet.

10.2. Guidelines for studying the topic

Communication technologies (or information and communication technologies - ICT) are a set of methods that ensure the collection, processing, storage and dissemination of information using computer technology and telecommunications. The exchange of information is carried out through information transmission channels, for example, through computer networks.

When studying the topic "Communication Technologies", you should know that the ability to receive and transmit data between computers is used to combine them. This is how computer networks are formed. A computer network is a number of personal computers that are interconnected by communication lines. Computer networks provide sharing of hardware and software resources of the network, as well as access to its information resources (documents, databases, etc.). Computer networks allow users to quickly exchange information, while being anywhere in the world. Network functions - to connect personal computers with each other.

The exchange of information is carried out through channels of information transmission. There are wired, wireless and fiber optic communication channels. The information transmission system includes an information sender, an information transmission channel, and an information receiver. The main characteristic of information transmission channels is their capacity (information transfer rate). The bandwidth of a channel is equal to the amount of information that can be transmitted over it per unit of time. Throughput is measured in bits per second (bps or baud; 1 baud = 1 bps)

There are three types of computer networks: local, regional and global.

Local area networks unite computers that are located in the same room, one or more nearby buildings. To connect computers to each other in this case, an electrical LAN cable ("twisted pair") is used. Twisted pair is a wired communication channel that contains two pairs of conductors. The advantage of the environment is the ease of laying and low cost. Disadvantages - low information transfer rate Local network allows many users to work with one file (document) at the same time, copy files from one computer to another without using intermediate storage media, allows several users to use one printer, scanner, etc.

Regional networks unite computers that are located within the same city, district or region. To connect computers to each other in this case, use a coaxial or fiber optic cable.

Global networks unite among themselves computers of all Globe. Fiber optic cable is used to connect computers to each other in the global network, which allows you to transfer very large amounts of information at high speed. The disadvantage of fiber optic cable is its high cost and the need to use electric current / light converters and vice versa.

Currently, wireless communication lines are also widely used. They are used in cases where the use of cable channels for information transmission is impossible or too expensive due to large distances. In this case, radio waves are used to transmit information.

It should be noted that at the beginning of the development of computer networks, telephone networks were used to connect computers to each other. The main component in this network was the modem, which converted computer (digital) data into an audio analog signal for transmission over the telephone line (modulation) and converted it back into a digital signal (demodulation).

The need to form a single global information space has led to the creation of the global computer network Internet. The Internet is a global computer network that connects local, regional and other types of networks. The global Internet has huge information resources and services that are used by billions of people in all countries of the world. In order for computers to find each other in the process of exchanging information, there is a unified addressing system on the Internet, which is based on the use of an IP address. Each computer connected to the Internet has its own unique 32-bit numeric IP address. An IP address contains the network address and the address of a computer on that network. For the convenience of working on the Internet, a domain name system (DNS - Domain Name System) was introduced, which

associates a computer's numeric IP address with a unique domain name.

Domain names and IP addresses are distributed by the International Center for Domain Names and IP Addresses. The domain name system has a hierarchical structure: top-level domains, second-level domains, and so on. There are two types of top-level domains: geographical (two-letter - each country has a two-letter code) and administrative (three-letter).

There are three main ways to find information on the Internet: specifying the address of a page, following hyperlinks, and accessing a search engine. The indication of the page address is used if the address of the document or site where this document is located is known. Hyperlink navigation allows you to search for documents similar in meaning to the current document. Accessing a search engine implies the possibility of using the search engines Yandex (yandex.ru), Google (google.ru), Rambler (rambler.ru), etc.

E-mail is the most widespread service on the Internet. E-mail has several advantages over regular mail. The most important of these is the speed of message forwarding. If a letter by regular mail can reach the addressee for several days and weeks, then a letter sent by e-mail reduces the transmission time to a few seconds. Another advantage is that an e-mail can contain not only a text message, but also attachments (documents, programs, graphics, sound, video, etc.).

In order for an e-mail to reach the addressee, it must contain the e-mail address of the recipient of the letter. The email address is written in Latin letters. The email address is written in a specific form and consists of two parts separated by the @ symbol: user_name@server_name. The first part of the postal address is arbitrary and is set by the user when registering the mailbox. The second part is the domain name of the mail server where the user has registered their mailbox.

10.3. Questions for self-examination
- What types of computer networks do you know?
- What is the topology of computer networks?
- What is the difference between a local computer network and global network?
- Which communication line has a high data transfer rate?
- What is the modem for?
- What is the Internet?

- What is the address of the computer when working on the network Internet?
- What is hypertext?
- What is the name of the hypertext page viewer?
- What programs are used to find information on the Internet?

10.4. Control-training test

Perform a control-training test on the topic "Communication Technologies". Choose one correct answer for each test question. Check your answers. Keys (correct answers to questions) are given at the end of the test. Review the Communication Technology topic before taking the test. To do this, use the literature, the list of which is given at the end of this section, and educational and methodological materials from the SKIF portal.

1. A modem is a device
    a. for recording telephone conversations
    b. to connect phone to computer
    c. to connect a computer to the global network
    d. using a telephone line
2. An Internet email address can be
    a. @dstu.edu.ru
    b. skif&dstu.edu.ru
    c. dstu@skif.donstu.ru
    d. bn@@donstu.ru
3. To connect computers on a local network, use
    a. fiber optic (fiber optic) cables
    b. wires and coaxial cables
    c. telephone lines
    d. flexible plastic dielectrics
4. The speed of information transfer over a computer network is measured
    a. the number of files transferred per unit of time
    b. the number of pages of text transmitted over the network
    c. the number of bytes of information received by the user in one second
    d. the number of bits of information transmitted in one second

5. Local networks unite computers installed
   a. on the territory of the Russian Federation
   b. on the territory of one or more districts of the city
   c. in one or more rooms
   d. in several countries of the world
6. How long does it take to transfer a 1000 KB text file over a local network at 160 Kbps?
   a. 2 hours
   b. 20 minutes
   c. 1 min
   d. 50 sec
7. The modem does
   a. amplification of digital and analog signals
   b. digital signal conversion
   c. to analog and vice versa
   d. only digital signal conversion
8. The network topology characterizes
   a. kind of computer software
   b. number of computers in the local network
   c. connection diagram of computers in a local network
   d. number of computers and printers in the local network
9. Bod is
   a. LAN network protocol
   b. topology of the global computer network
   c. unit of measure for the performance of a computer's central processing unit
   d. unit of measure for the rate at which information is transmitted over a network
10. How long does it take to transfer a 4 MB file at 512 KB/min over a local network?
    a. 8 minutes
    b. 4 minutes
    c. 2 minutes
    d. 1 minute

Answers : 1 – c, 2 – c, 3 – b, 4 – d, 5 – c, 6 – d, 7 – b, 8 – c, 9 – d, 10 - a

10.5. Literature and Internet sources

When preparing yourself and doing homework, use the following literature and Internet sources:

1. Workbook on Computer science.
2. Информатика и информационные технологии. Учебник для 10-11 классов / Н.Д. Угринович. – 3-е изд. – М.: БИНОМ. Лаборатория знаний, 2006. – 511 с: ил. Учить материал – Глава 7, стр. 304-318, 323-336.
3. Моренко Б.Н. Подготовка к итоговой аттестации по информатике : учеб.-метод. пособие / Б.Н. Моренко, Л.Д. Бабакова, О.В. Николенко ; Донской гос. техн. ун-т. – Ростов-на-Дону: ДГТУ, – 2019. – 52 с.
4. Preparation for the final certification in computer science: методические указания для иностранных слушателей дополнительных общеобразователь-ных программ / Б.Н. Моренко, Л.Д. Бабакова, О.В. Николенко – Ростов-на-Дону: Донской гос. техн. ун-т, – 2023. – 57 с.

3. METHODOLOGICAL RECOMMENDATIONS
INTERIM CERTIFICATION

Intermediate attestation of foreign students based on the results of the first half of the year is carried out in the form of testing. Students are offered a test containing questions on all the studied sections of the Computer science course. Based on the results of the answers to the test questions, the mark "passed" or "not counted" is set.

Questions of interim certification
1. Information. Types of information. Information processes.
2. Number systems. Binary number system.

3. Binary arithmetic.
4. Octal and hexadecimal number systems.
5. Measurement of information.
6. Coding and decoding information.
7. Personal computer device.
8. Input devices and output devices.
9. Information storage devices.

10. Software classification.
11. Purpose of the operating system of the computer.
12. Software. System programs.
13. Software. Application programs.
14. File storage system. File types.
15. Types of algorithms. Graphic description of algorithms.
16. Linear algorithms (following).
17. Branching algorithms (branching).
18. Cyclic algorithms.

The midterm test contains 30 questions, each with only one correct answer. The control-training test, which is given below, is similar in structure to the test. We recommend that you complete it and assess the degree of your readiness for the test.

For each correct answer to a test question, the student receives 1 point. For each incorrect answer, the student receives 0 points. The mark "passed" is given to the student if he scored 13 points or more during the test. The mark "not passed" is given to the student if he scored 12 points or less.

Control training test

Complete the suggested practice test. At the end of the test, the correct answers to the questions are given.

1. Drawings, diagrams, graphs, photographs may
    1. process and store information.
    2. transmit and process information.
    3. store and transmit information.
    4. all answers are correct.
2. Example of graphical information:
    1. map of the city of Rostov.
    2. call to class.
    3. multiplication table.
    4. A letter to a friend.
3. The information storage process is
    1. Reading books.
    2. photographing.
    3. friends conversation.
    4. Watching movies.
4. The greatest amount of information a person receives through

1. hearing.
2. touch.
3. smell.
4. vision.

5. The decimal number 101_{10} in binary is written as
   1. 1110100_2
   2. 1100101_2
   3. 1010011_2
   4. 1000110_2

6. The binary number 1011100_2 in decimal notation is written as
   1. 92_{10}
   2. 73_{10}
   3. 48_{10}
   4. 63_{10}

7. The octal number 124_8 in decimal notation is written as
   1. 52_{10}
   2. 106_{10}
   3. 93_{10}
   4. 84_{10}

8. The decimal number 105 in hexadecimal is written as
   1. 92_{16}
   2. $1B2_{16}$
   3. 69_{16}
   4. 73_{16}

9. The sum of the binary numbers 111_2 and 110_2 is
   1. 1000_2
   2. 1101_2
   3. 1110_2
   4. 1011_2

10. The product of the binary numbers 11_2 and 110_2 is
    1. 10010_2
    2. 10101_2
    3. 11101_2
    4. 11110_2

11. How many bits are in 64 bytes?
    1. 1024
    2. 640

    3. 512
    4. 256

12. How many bytes are in 1 KB?
    1. 1536
    2. 512
    3. 1000
    4. 1024

13. The mouse is a device
    1. to display information on the monitor screen.
    2. to enter information into a computer.
    3. to read information.
    4. to scan information.

14. The computer system unit includes
    1. mouse.
    2. printer.
    3. keyboard.
    4. motherboard.

15. Not included in computer system block
    1. mouse manipulator.
    2. motherboard.
    3. power unit.
    4. hard disk and CD-ROM drive.

16. Monitor screen size measure
    1. vertically.
    2. horizontally.
    3. diagonally.
    4. in height.

17. The operating system is
    1. computer input program.
    2. computer control software.
    3. complex of applied and instrumental programs.
    4. components of the system unit that are connected by a bus.

18. The program is
    1. programming system.
    2. the way a user interacts with a computer.
    3. the sequence of solving the problem in a language understandable to the computer.

    4. графическое описание способа решения задачи.

19. The operating system is included
    1. system programs.
    2. application programs.
    3. instrumental programs.
    4. programming systems.
20. The computer is controlled
    1. utility.
    2. text editor.
    3. programming language.
    4. operating system.
21. Spreadsheets are part of
    1. instrumental programs.
    2. system programs.
    3. application programs.
    4. operating systems.
22. To determine the type of information contained in a file, you need to know
    1. ile size.
    2. base filename.
    3. file creation date.
    4. file name extension.
23. As a filename in MS-DOS, you can use
    1. aud_538.txt
    2. MF-faculty.txt
    3. txt.computer
    4. группа. 11.txt
24. The path to the file is C:\DOC\science.txt. What is the name of the file?
    1. C:\DOC\ science.txt
    2. DOC\ science.txt
    3. DOC\ science
    4. science.txt
25. The file name consists of two parts, which indicate
    1. file type and size.
    2. file name and type.
    3. file name and size.
    4. name and date of creation of the file.

26. The algorithm is
    1. description of the sequence of solving the problem
    2. personal computer instruction set
    3. rules for displaying flowcharts of algorithms
    4. graphical description of the problem solution
27. The choice of action depending on some conditions is described by the structure
    1. cycle
    2. following
    3. branching
    4. correct answers are numbered 1 and 2
28. To describe the repeated repetition of any action, use
    1. only linear and branching algorithms
    2. cyclic algorithms
    3. branching algorithms
    4. linear algorithms
29. n which block should the command "Output y" be written?
    1.
    2.
    3.
    4.
30. What element of the flowchart is indicated by a figure
    1. Process.
    2. Input Output.
    3. Solution.
    4. Beginning, End.

Answers to the test questions: 1-3, 2-1, 3-2, 4-4, 5-2, 6-1, 7-4, 8-3, 9-2, 10-1, 11-3, 12-4, 13-2, 14-4, 15-1, 16-3, 17-2, 18-3, 19-1, 20-4, 21-3, 22-4, 23-1, 24-4, 25-2, 26-1, 27-3, 28-2, 29-4, 30-1

4. METHODOLOGICAL RECOMMENDATIONS
FOR THE FINAL CERTIFICATION

Final certification in Computer science is held at the end of the academic year in the form of an exam. The computer science exam ticket consists of a theoretical question and a practical task. A foreign student must answer the theoretical question of the exam ticket, build a block diagram of the algorithm for solving the proposed problem (example), write a program for solving this problem (example) on a computer in Pascal ABC, test it and perform the proposed calculations. An example of an exam ticket in computer science is shown in Fig. 1.

МИНИСТЕРСТВО НАУКИ И ВЫСШЕГО ОБРАЗОВАНИЯ И РОССИЙСКОЙ ФЕДЕРАЦИИ

ФЕДЕРАЛЬНОЕ ГОСУДАРСТВЕННОЕ БЮДЖЕТНОЕ ОБРАЗОВАТЕЛЬНОЕ УЧРЕЖДЕНИЕ ВЫСШЕГО ОБРАЗОВАНИЯ «ДОНСКОЙ ГОСУДАРСТВЕННЫЙ ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ» (ДГТУ)

Факультет «Международный»
Кафедра «Естественные науки»

ЭКЗАМЕНАЦИОННЫЙ БИЛЕТ №0
на 2018/2019 учебный год

1. Информация. Виды информации.

2. Составить блок-схему алгоритма и написать программу расчёта функции **Y**:

$$y = \begin{cases} 3x+1, & при \ x > 10 \\ x^2+4 & - в \ остальных \ случаях \end{cases}$$

Зав. кафедрой _____ И.О. Фамилия _____
подпись   дата

Rice. 1. An example of an exam ticket in computer science

When answering the first (theoretical) question of the examination ticket (Fig. 1), the listener must give a short answer to it. When answering the second question of the exam ticket (practical task), it is necessary to build on paper a block diagram of the algorithm for solving the problem and, on its basis, write a program in the Pascal ABC programming language.

When debugging and testing the program, the listener must independently select several values of x and perform the calculation of the y function on the computer. Then you should carry out similar calculations, for example, on a calculator and check the correctness of

the obtained values of the y function. If the calculation results match, a conclusion is made that there are no errors in the program.

A short answer to the theoretical question of the ticket is shown as a model: "Information. Types of information" (Fig. 1). When answering, a foreign student must show knowledge of the theoretical part of the computer science course. To do this, he must give a short answer in Russian to the theoretical question of the examination paper.

5. LIST OF THEORETICAL QUESTIONS, INCLUDED IN THE EXAM TICKETS

1. Information. Types of information. Information processes.
2. Number systems. Binary number system.
3. Binary arithmetic.
4. Octal and hexadecimal number systems.
5. Measurement of information.
6. Coding and decoding information.
7. Personal computer device.
8. Input devices and output devices.
9. Information storage devices.
10. Classification of software (software).
11. Purpose of the operating system of a personal computer.
12. Software classification. System programs.
13. Software classification. Application programs.
14. File storage system. File types.
15. Types of algorithms. Graphic description of algorithms.
16. Linear algorithms (following).
17. Branching algorithms (branching).
18. Cyclic algorithms.
19. Pascal ABC programming language alphabet.
20. Program structure in Pascal ABC.
21. Linear programs in Pascal ABC.
22. Branching programs in Pascal ABC.
23. Cyclic programs in Pascal ABC.
24. Choice operator.
25. Arrays in Pascal ABC.
26. Stages of solving problems using a computer.
27. Graphic editor. Purpose and main features.

28. Text editors. Text editing and formatting.
29. Spreadsheets. Purpose and main features.
30. Computer networks. Classification of computer networks.

6. MODEL OF THE ANSWER TO A THEORETICAL QUESTION EXAMINATION TICKET

Information is information about the world around us and its properties. A person receives information through the senses: sight, hearing, smell, touch and taste. Types of information: textual information (letter, document, book, newspaper); graphic

information (photo, diagram, graph, drawing, picture, drawing); numerical information (date, time, point coordinates, temperature, body weight); sound information (call for a lesson, phone call, music); combined information or video information (for example, karaoke is sound and text information; a mathematics textbook contains text, numerical and graphic information).

7. LIST OF PRACTICAL TASKS, INCLUDED IN THE EXAM TICKETS

Draw up a block diagram of the algorithm and write a program for calculating functions:

1.
$$y = \begin{cases} x - 2, & \text{при } x > 10 \\ 5x + 1 & \text{- в остальных случаях} \end{cases}$$

2.
$$y = \begin{cases} 4x + 7, & \text{при } x \le 20 \\ x + 2 & \text{- в остальных случаях} \end{cases}$$

3.
$$y = \begin{cases} x + 10, & \text{при } x > 5 \\ x^2 + 2 & \text{- в остальных случаях} \end{cases}$$

4.
$$y = \begin{cases} a + 5b, & \text{при } a > 10 \text{ и } b < 15 \\ a + b & \text{- в остальных случаях} \end{cases}$$

5.
$$y = \begin{cases} 10a + b, & \text{при } a > 5 \text{ и } b < 20 \\ 6ab & \text{- в остальных случаях} \end{cases}$$

6.
$$y = \begin{cases} a + bc, & \text{при } a > 0, \ b < 10 \text{ и } c = 2 \\ ab + c & \text{- в остальных случаях} \end{cases}$$

7.
$$y = \begin{cases} x^2, & \text{при } x < 0 \\ x^3 - 1, & \text{при } x > 3 \\ 2x - 3 & \text{- в остальных случаях} \end{cases}$$

8.
$$y = \begin{cases} x + 3, & \text{при } x < 10 \\ x - 8, & \text{при } 10 \le x \le 20 \\ x^2 + 1, & \text{при } x > 20 \end{cases}$$

9.
$$y = \begin{cases} 2x, & \text{при } x < 0 \\ x - 8, & \text{при } 0 \le x \le 20 \\ 5x + 2, & \text{при } x > 20 \end{cases}$$

10.
$$y = \begin{cases} 13 + 10x, & \text{при } x < 10 \\ 18 + 5x, & \text{при } 10 \le x \le 50 \\ x^2 + 3, & \text{при } x > 50 \end{cases}$$

11.
$$y = \begin{cases} 3 - x, & \text{при } x < 5 \\ 1 + 2x, & \text{при } 5 \le x \le 10 \\ x + 3, & \text{при } x > 10 \end{cases}$$

12.
$$y = \begin{cases} x^3 + 5, & \text{при } x < \text{-}5 \\ \sqrt{x} - 1, & \text{при } x > 20 \\ 2x, & \text{при } \text{-}5 \le x \le 20 \end{cases}$$

13.
$$y = \begin{cases} 2x, & \text{при } x > 20 \\ x - 1, & \text{при } x < 5 \\ x + 5 & \text{ - в остальных случаях} \end{cases}$$

14.
$$y = \begin{cases} 2x - 1, & \text{при } x > 200 \\ 3x, & \text{при } x < 5 \\ \sqrt{x}, & \text{при } 5 \le x \le 200 \end{cases}$$

15.
$$y = \begin{cases} x + 2, & \text{при } x < 3 \\ x^2 - 8, & \text{при } x > 10 \\ 2x + 1, & \text{при } 3 \le x \le 10 \end{cases}$$

16.
$$y = \begin{cases} 5 + \sin x, & \text{при } x > 15 \\ x^2 - 3, & \text{при } x < 0 \\ 8x + 1, & \text{при } 0 \le x \le 15 \end{cases}$$

17.
$$y = \begin{cases} |a| + 1, & \text{при } a < 2 \\ 2a^2, & \text{при } a \geq 5 \\ a - 1, & \text{- в остальных случаях} \end{cases}$$

18.
$$y = \begin{cases} \cos 2x + 1, & \text{при } x \geq 50 \\ 4x + 7, & \text{при } x \leq 10 \\ x + 2 & \text{- в остальных случаях} \end{cases}$$

19.
$$y = \begin{cases} 2x + 1, & \text{при } x \geq 10 \\ 2x + 10 & \text{при } x \leq 0 \\ x + 5 & \text{- в остальных случаях} \end{cases}$$

20.
$$y = \begin{cases} 5x + 10, & \text{при } x > 20 \\ 3x, & \text{при } x < -10 \\ \sqrt{x}, & \text{в остальных случаях} \end{cases}$$

21.
$$y = \begin{cases} 2x, & \text{при } 0 \leq x \leq 20 \\ x^2 + 2x, & \text{при } 21 \leq x \leq 50 \\ x + 5, & \text{при } 51 \leq x \leq 70 \\ x, & \text{при } 71 \leq x \leq 90 \end{cases}$$

22. Write a program for calculating the sines of an angle from 0 to 180° in increments of 15°.

23. Write a program for calculating the tangents of angles from 30° to 60° in 5° increments.

24. Write a program to calculate the sum of a number of numbers from 10 to 20.

25. Write a program to calculate the sum of natural numbers from 1 to 50.

26. Write a program to display a sequence of integers from 10 to 50 on the monitor screen with step 5.

27. Write a program to display a sequence of integers from 10 to 50 on the monitor screen using the loop operator with a precondition.

28. Write a program to display a sequence of integers from 0 to 20 on the monitor screen using the loop operator with a postcondition.

29. Write a program to display a sequence of integers from − 10 to + 10 on the monitor screen with a step of 2 using a loop statement with a parameter.
30. Draw up a block diagram of the algorithm and write a program for calculating the area and perimeter of a triangle whose sides are a, b, c. Perform calculations for a=30, b=20.5 and c=40.2.

8. MODEL OF ANSWER TO THE PRACTICAL TASK EXAMINATION TICKET

When answering the second question of the exam ticket, according to the given conditions of the problem (example), you need to build a flowchart of the algorithm for solving it, write, debug and test the program (check the correctness of its operation).

As a sample (model), the answer to the second question of the examination ticket is given.

Task. Draw up a block diagram of the algorithm and write a program for calculating the Y function:

$$y = \begin{cases} 3x+1, & \text{при } x > 10 \\ x^2 + 4 & \text{- в остальных случаях} \end{cases}$$
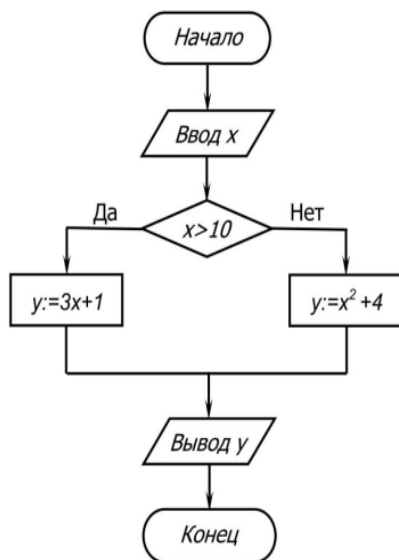
Rice. 2. Block diagram of the   algorithm for solving the problem

The program for calculating the function y must be written on paper, typed, debugged and tested on a personal computer. Calculate the values of the function y for the given values x

```
program  BranchProgram_01;
var
    x, y: integer;
begin
   write ('Введите значение x, x=');
   readln (x);
     if x>10
        then  y:=3*x+1
        else  y:=x*x+4;
   writeln ('При x=', x, ' значение функции y=', y);
end.
```

When debugging and testing a program on a computer, the student independently selects several values of x and calculates the function y. Then you should carry out similar calculations, for example, on a calculator and check the correctness of the obtained values of y. If the results of the calculations coincide, it is concluded that there are no errors in the program. Below, as an example, the results of

calculating the function y on a computer for some values of x are shown.

№№ п/п	Meaning x	Function value y
1.	5	29
2.	20	61
3.	10	104
4.	−200	40004
5.	0	4

9. CRITERIA FOR FINAL ASSESSMENT

The exam is a form of the final assessment of the quality of mastering by foreign students of the entire volume of educational material in the course of Computer science. According to the results of

the exam, which is conducted orally, students are graded "excellent", "good", "satisfactory" or "unsatisfactory".

An "excellent" grade is given to a student if:

– the student knows, understands the main provisions of the computer science course, demonstrates the ability to apply them to complete a task in which there are no explicitly specified solutions;
– the student analyzes the elements, establishes links between them, brings them into a single system, is able to put forward an idea, design and present his solution to the task, problem;
– the answer of the student on the theoretical and practical material contained in the questions of the examination ticket is complete and satisfies the requirements of the discipline program;
– the student demonstrated fluency in the conceptual apparatus, the scientific style of speech and the terminology of the relevant discipline;
– the foreign student gave the correct answers to additional questions of the teacher;
– the student correctly drew up a block diagram of the algorithm for solving the proposed problem, wrote a program in a programming language and performed calculations on a computer.

The mark "good" is given to the student if:

– the student knows and understands the basic provisions of the discipline, demonstrates the ability to apply them to complete a task in which there are no explicitly specified solutions; analyzes elements, establishes connections between them;
– the answer on the theoretical material contained in the questions of the exam ticket is complete or partially complete and meets the requirements of the program, but an accurate, confident and reasoned presentation of the material is not always given;
– the student gave the correct answers to additional questions of the teacher;
– the student has demonstrated mastery of the terminology used in the Computer science course;
– the student correctly drew up a block diagram of the algorithm for solving the proposed problem, wrote a program in a

programming language and performed calculations on a computer, independently correcting the errors made when writing the text of the program.

An "satisfactory" rating is given if:

– the student knows and reproduces the main provisions of the discipline in accordance with the task, applies them to perform a typical task in which the solution is obvious;
– the student has demonstrated basic knowledge of the most important sections of the discipline and the content of the lecture course;
– the student has difficulties in using the scientific and conceptual apparatus in the terminology of the course;
– despite the lack of knowledge, the student has a formed desire to logically clearly construct an answer, which indicates the possibility of further learning;
– a student with errors made a block diagram of the algorithm for solving the proposed problem, wrote a program in a programming language and performed calculations on a computer; with the help of a teacher, he corrected the mistakes made when writing the text of the program.

An "unsatisfactory" rating is given if:

– the student has an idea about the content of the discipline, but does not know the main provisions (topics, sections, etc.) to which the task relates, is not able to complete the task with an obvious solution, does not have the skills of oral and written communication in the field of information technology in Russian;
– does not possess the skills of using computer technology for educational purposes, the skills of setting and solving elementary applied problems using computer technology;
– the student has significant gaps in the knowledge of the basic material in the discipline;
– in the process of answering the theoretical question contained in the examination ticket, fundamental errors were made in the presentation of the material;
– in the process of preparing an answer to a practical question contained in the questions of the exam ticket, the student could not develop a flowchart of the algorithm for solving the problem

and could not write the text of the program in a programming language.