MINISTRY OF SCIENCE AND HIGHER EDUCATION
OF THE RUSSIAN FEDERATION
Federal State Autonomous Educational Institution
of Higher Education
"Kazan (Volga Region) Federal University"

Institute of Information Technology and Intelligent Systems
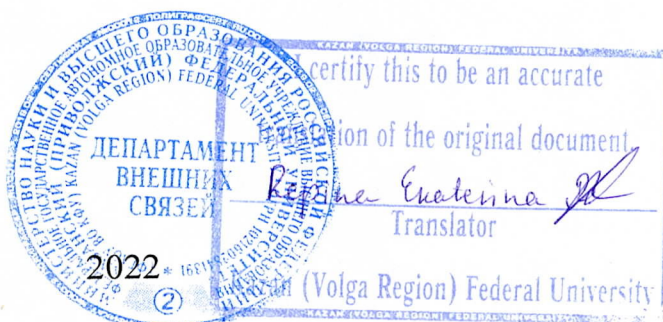
APPROVED

Vice-Rector for Academic Affairs

_____ Ye.A.Turilova

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ENTRANCE TEST PROGRAM
ON INFORMATICS AND ICT

Approval sheet of the entrance test program

The developer of the program:

Associate Professor, Department of Software Engineering _____ K.R. Khadiyev

Chairman of the Examination Committee _____ M.M. Abramsky

The program of the entrance test was discussed and approved at a meeting of the Department of Software Engineering of the Institute of Information Technology and Intelligent Systems, Protocol No.2 dated September 23, 2022.

The Entrance Test Program was recommended for approval by the Academic Board by the decision of the Educational and Methodological Commission of the Institute of Information Technology and Intelligent Systems, Protocol No. 2 dated September 23, 2022.

The program of the entrance test was approved at a meeting of the Academic Board of the Institute of Information Technology and Intelligent Systems, Protocol No.2 dated September 29, 2022.

Section 1 "Program Content"

1.   The content of the tasks is developed on the main topics of the course of Informatics and ICT, combined into the following thematic blocks:

- "Information and its coding",
- "Modeling and computer experiment",
- "Number Systems",
- "Logic and Algorithms",
- "Elements of the Theory of Algorithms",
- "Programming",
- "Architecture of computers and computer networks",
- "Processing of numerical information",
- "Technologies of information retrieval and storage".

The content of the examination work covers the main content of the course of Informatics and ICT, its most important topics.

2.   Structure

Each version of the examination test consists of two parts and includes 27 tasks, differing in form and level of complexity.

Part 1 contains 23 short-answer tasks.

In the examination test, the following types of short-answer tasks are proposed:

– tasks for computing a certain value,

–tasks to establish the correct sequence, represented as a character string according to a specific algorithm.

The answer to the tasks of Part 1 should be given as entry in the form of a natural number or a sequence of characters (letters or numbers) written without spaces and other separators.

Part 2 contains 4 tasks, the first of which is at the upper-intermediate level, the remaining 3 tasks are at the advanced level. The tasks of this part involve recording a detailed answer in any form. The tasks of Part 2 are aimed at testing the most important skills in recording and analyzing algorithms. These skills are tested at upper-intermediate and advanced levels of complexity. Also, at the advanced level, skills on the topic of Programming Technology are tested.

The exam in Informatics and ICT does not include tasks that require a simple reproduction of knowledge of terms, concepts, values, rules (such tasks are too simple to perform). When performing any of the tasks, the examinee is required to solve a thematic problem: either directly use a well-known rule, algorithm, skill, or choose the most suitable concept or algorithm from the total number of those studied and apply it in a known or a new situation.

Theoretical knowledge is tested indirectly through the understanding of the terminology used, the relationships of basic concepts, dimensions of units, etc. when the examinees perform practical tasks on various topics of the subject. Thus, the acquisition of theoretical material from the following sections is checked:

- units of information measurement,
- principles of coding,
- number systems,
- simulation,
- the concept of the algorithm, its properties, methods of recording,
- basic algorithmic constructions,
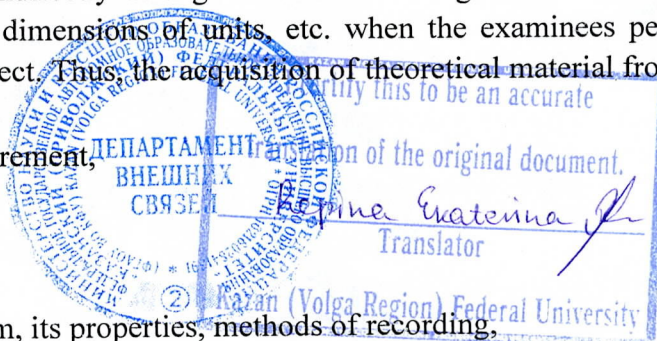
- basic concepts used in information and communication technologies.

Both parts of the examination work contain the material to test formation of skills to apply knowledge in a standard situation.

These are following skills:
- to analyze the uniqueness of the binary code,
- to form a truth table and a logical scheme for a logical function,
- to operate with data arrays,
- to estimate the message data volume,
- to search for the shortest path in a graph, to traverse the graph,
- to transfer from one number system to another,
- to use standard algorithmic constructions when programming,
- to execute formally algorithms written in natural and algorithmic languages, including programming languages,
- to determine capacity of the address space of a computer network by the subnet mask in the TCP / IP protocol,
- to evaluate the output of the well-known software,
- to formulate queries to databases and search engines.

Both parts of the examination work also include the material to test the formation of skills to apply knowledge in a new situation. These are following complex skills:
- to analyze the situation of the algorithm executor,
- to determine the number system base by the notation properties,
- to describe the binary sequence properties according to its construction algorithm,
- to transform logical expressions,
- to simulate search results on the Internet,
- to analyze the algorithm execution result,
- to analyze the program code with regard to recorded algorithm compliance with the task and to change it according to the task,
- the ability to build a game tree according to a given algorithm and give reasons for a winning strategy,
- to implement a complex algorithm using modern programming systems.

Tasks 24–27 require a detailed record of solution. Create a new document in the Word editor, type on the computer the answers to the questions in this document, save it in .pdf format and name it as "ICT. Your full name", then attach it as an attached file to the exam system. If you do not have answers for Part 2, attach a blank form and click on the "NEXT" button.

Section 2 "List of literature and information sources for preparation for the entrance exams"

- Information educational portal. Documents, materials, manuals, probes for the state exams (EGE, GIA). [Electronic resource]. – Access mode: http://egeigia.ru/,
- The official website of Rosobrnadzor "EGE-portal. We know everything about the exam." [Electronic resource]. – Access mode: http://4ege.ru,
- Methodical materials and software on informatics – Access mode: http://kpolyakov.spb.ru,
- Ugrinovich N. D. Informatics and ICT. Profile level textbook for grade 10 – BINOM. Knowledge Laboratory, 2012,
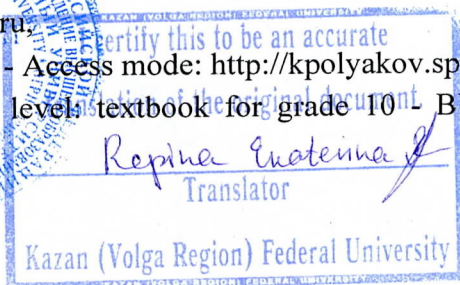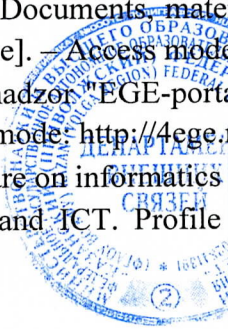
- Ugrinovich N. D. Informatics and ICT. Profile level: textbook for grade 11 - BINOM. Knowledge Laboratory, 2012,
- V. G. Davydov. Programming and Fundamentals of Algorithmization – Moscow: Vysshaya shkola, 2003