ENTRANCE EXAMINATION CONTENT
FOR THE MASTER'S DEGREE PROGRAM
IN COMPUTER SCIENCE AND ENGINEERING, CODE 09.04.01

Moscow, 2019
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1. Explanatory Note

The purpose of the admission test
Assessment of the level of development coming competencies required for the master's program training.

Form, duration of admission test. The criteria for evaluation. The structure of the admission tests
The entrance examination in the direction 04.09.01 "Computer Science and Engineering" is carried out in writing. The duration of the admission test - 120 minutes. Entrance test results are assessed on a 100 point scale. Minimum passing score, confirming the successful completion of entrance examinations, is 40. For the first 5 questions of ticket provided to 12 points. Expert checking answers, guided by evaluation criteria exhibits from 0 to 12 points. Evaluation of the response is carried out according to the following criteria: substantial completeness of response, conclusiveness and validity of the answer, understanding and awareness of the material, independence of judgment. Evaluation of responses to questions: the maximum score - 12 points, no answer - 0 points. The remaining 10 questions evaluated from 0 to 4 points. This set of questions involves the selection of the proposed response options. The correct answer can be only one answer, many of the suggested responses, or no correct answer. For a fully correct answer - 4 points, for the absence of answer or wrong answer - 0 points.

The list of accessories that applicant has the right to carry into the audience during the admission test: pen, pencil, eraser, not programmable calculator.

The structure of the written exam
Written exam for entering the master's degree in the direction of 09.04.01 - Computer Science and Engineering allows to check: development level of scientific thinking entrant, knowledge of basic issues of computer science and computer engineering, ability to independently solve professional problems of different nature and complexity.
Incoming randomly selects a ticket that consists of 15 questions. All questions are based on the materials of the following disciplines studied on the basic educational programs of higher education in the direction 09.00.00 Computer Science and Engineering:
- Computer science.
- Discrete Math,
- Decision theory,
- Math modeling,
- Programming,
- Operating Systems,
- Computers and peripheral devices.
- Databases and knowledge bases,
- Networks and Telecommunications.
- Computer graphics,
- Systems of artificial intelligence,
- Data Mining Technology
- Development of CAD and automated process control subsystems.
An appeal on the audit of the first stage of examination

The audit of a written examination at the enrollee, disagree with the assessment, it is possible dispute and argue for increasing the number of points received.

The appeal procedure is an oral interview with an expert who carried out checks written exam. Applicants give their explanations to the questions on which it has a claim to the scoring. As a result of interviewing the expert decides to change the number of points put up on specific issues. Do not exceed the maximum number of points on the issue on appeal.
2. Section Contents

Section 1. Computer science

Section 2. Discrete Math

Section 3. Math modeling

Section 4. Programming
Main stages of the decision of problems on the computer, the quality criteria of the program, the life cycle of the program, user-friendliness. Programming Technologies. Comparative characteristics of high-level languages, structured approach to the development of algorithms, basic blocking structure
used for writing algorithms. IO functions, preprocessor and his team, the program processing on the
competer compiling and linking - the creation of an executable program module. Relational operations,
logical operations assignment operator, data type conversion explicit and implicit, operator of the
condition. Loop statements, multiple-choice operator - switch arrays. Functions that return a value,
arguments to the function main (), recursive functions. Pointers link pointers and arrays, dynamic
memory allocation. Functions formatted input-output. A compound statement block, the visibility of
variables. Standard features for the work in graphical mode structure. File concept, writing and reading
from a file.

**Section 5. Operating Systems**
The history of the development of computers and operating systems. Classification of operating
systems. The architecture of operating systems. Core. Firmware. Hardware support multiprogramming
mode. Memory organization. The concept of the process. Dispatching. File system. Parallelism in
operating systems.

**Section 6. Computers and peripheral devices**
Block diagram of a computer. Purpose and major circuit blocks. Computer functions. The main
characteristics of a computer. Applications of computers of different classes. Modes of operation of
computers. The functional and structural organization of the processor. Classification processor. The
main directions in architecture processors. Pipelining calculations. Synchronous linear conveyors.
and reduced instruction set. The main features RISC- architecture. The registers in the RISC-processor.
Advantages and disadvantages of RISC. Superscalar processors. Features of the superscalar processors.
Hardware support superscalar operation. The functions and structure of the central control device.
Firmware machine with rigid logic. Firmware machine with programmable logic. Management
principles The firmware stored in the memory. Structure operating devices. Operating the device with a
rigid structure. Operating device with a backbone structure. The basis of integral operating device.
Addition and subtraction. Integer multiplication. Multiply unsigned. Multiplication of numbers with a
sign. Multiplication of integers and proper fractions. Operating the device with floating point. Systems
teams. The main stages of instruction execution. Classification of the command system architectures.
Classification but the composition and complexity of commands. Classification by place of storage
operands. Types and formats of the operands. The numerical information. The symbol information.
Logical data. Rows. Other types of information. The types of commands. data transfer commands.
arithmetic and logical processing commands. SIMD-instructions. Commands for working with strings.
conversion commands. I / O command. System Management Commands. Flow Control Commands
Command. Format commands. Command length. Bit command fields. The number of addresses in the
team. Selecting the targeting commands. Methods of addressing operands. Methods for addressing
commands to flow control commands. Hardware and software information exchange. Classification and
assignment of input-output channels. Organization of system interrupts. Interrupt Priorities. Interrupt
Controller. The controller and its role in the computer; types of controllers; organization of local and
system buses. Types of tires. Bus "processor-memory". I / O bus. The system bus. The hierarchy of
buses. The physical implementation of the tires. Mechanical aspects. Electrical aspects of the distribution
Bus protocol. Simultaneous protocol. Asynchronous protocol. Appointments and variety of peripheral
devices. Keyboard and mouse: structure and functioning. Scan codes. Display. Structure and operating in


Section 7. Database


Section 8. Networks and Telecommunications

Section 9. Computer graphics

Section 10. Systems of artificial intelligence
Section 11. Data Mining Technology

Section 12. Designing systems

Questions written exam
1. Boolean Algebra.
2. Hardware of automated systems.
3. The architecture of operating systems.
4. Data and knowledge bases.
5. Visual programming tools.
6. Calculation of network bandwidth.
8. Geometric modeling.
10. Decomposition of Boolean functions.
11. Dynamic programming.
12. Principles and methods for the design of the functional structure systems.
14. Tools of creation of expert systems.
15. Combinatorial configuration.
17. Computer simulation of complex systems.
18. Linear programming.
19. Logic programming.
20. Local area network. Their types and characteristics.
21. Software of information systems.
22. Turing machine.
23. Minimization of Boolean functions.
24. Neural networks in the management and design.
25. The non-linear programming.
27. Object-Oriented Programming.
29. Organizational-methodical maintenance of information systems (management and engineering).
30. Basics of designing algorithms.
31. The concept of the automata, the main stages of its design.
32. The software of intelligent information management systems and design.
33. Bandwidth communication channels.
34. Decomposition of Boolean functions at a given point of space.
36. Distributed databases.
37. The architecture of the static and dynamic expert systems.
38. Synthesis of logical structures.
39. System software.
40. Statistical bases of modeling.
41. The structure of the computer.
42. Graph-theoretic models in the design and management tasks.
44. Testing and Debugging Programs.
45. Technical support.
46. The formalization of the process of making design decisions.
47. An integer programming.
48. Analysis graphs cycles.
49. Expert systems and means of their realization.
50. Stages of construction of mathematical models.
51. Language modeling.
3. Recommended literature

Main literature
23. Ю. Юденков, Н. Тысячникова, И. Сандалов, С. Ермаков. Интернет-технологии в банковском бизнесе. Перспективы и риски. Учебно-практическое пособие. - Изд-во КноРус, 2015
42. Таненибаум Э. Современные операционные системы. СПб.: Питер, 2010. - 1115 с.
43. Дейтел Х.М., Дейтел П.Дж., Чофнес Д.Р. Операционные системы. Основы и принципы. СПб.: БИНОМ-ПРЕСС, 2011. - 1024 с.
34. Ивашкин Ю.А. Агентные технологии и мультиагентное моделирование систем. Москва. МФТИ, 2012, 268 с.
35. Куприянов В.В. Компьютерные системы поддержки принятия решений. Москва, МГТУ, 2010,98 стр.
38. Дюк В., Самойленко А. Data Mining: учебный курс (+CD). — СПб: Изд. Питер. 368 с.
41. Степанюк В.Л. Локальная организация интеллектуальных систем. Модели и приложения. (328 с.. ISBN: 5-9221-0395-4)
42. Вагин В.Н., Головина Е.Ю., Загорянская А.А., Фомина М.В. "Достоверный и правдоподобный вывод в интеллектуальных системах", второе издание. М.: Физматлит. 2008.
45. Гамма Э., Хелм Р., Джонсон Р., Влиссидес Дж. Приемы объектно-ориентированного