

Министерство науки и высшего образования РФ
Федеральное государственное автономное образовательное учреждение
высшего образования
«СИБИРСКИЙ ФЕДЕРАЛЬНЫЙ УНИВЕРСИТЕТ»



УТВЕРЖДАЮ

Проректор по учебной работе

/Д.С. Гуш/

«30» октября 2023 года

ПРОГРАММА

вступительного испытания для поступающих в аспирантуру

2.3 Information Technologies and Telecommunication

шифр и наименование группы научных специальностей

**2.3.5 Mathematical and software support for computing systems,
complexes and computer networks**

шифр и наименование научной специальности

Красноярск 2023

List of questions for the entrance test

1. Algorithm concept. Equivalence of these formal models of algorithms. The concept of algorithmic undecidability.
2. Formal languages and ways of describing them. Classification of formal grammars. How to use in lexical and parsing?
3. Multiprocessor and multicomputer systems. Computing clusters. Problem-oriented parallel structures: matrix systems, systolic structures, neural networks.
4. Methods and means of transferring data to computer systems, data transfer protocols.
5. Features of the architecture of local networks (Ethernet, Token Ring, FDDI).
6. Internet network, domain organization, TCP / IP protocol family.
7. Distributed programming. Processes and synchronization. Object-oriented distributed programming Parallel programming by shared memory. Parallel programming by distributed memory.
8. Basics of constructing translators. Optimizing translator structure. Intermediate program representations. Intermediate presentation levels.
9. Analysis of the source program in the compiler. Automatic (regular) grammars and scanning, context free grammars and parsing, organization of a program symbol table with a block structure, hash functions. Automatic construction of lexical and parsers from formal descriptions of grammars.
10. Optimization of programs during compilation Optimization of basic blocks, cleaning of cycles. Analysis of control flow and data flow graphs Building a dependency graph. Global and interprocedural optimization.
11. Generation of object code (retargetable) compilers, Recycling terms optimization heuristics dynamic programming) for automatic generation of object code generators (systems BEG, Iburg, etc.).
12. Software development and maintenance technology. The life cycle of the program. Development stages, degree and ways of their automation. Modules, interaction between modules, hierarchical program structures.
13. Debugging, testing, verification and evaluation of the complexity of programs. Generation of tests. Test generation systems. Slices of programs (slice, chop) and their use when debugging programs and for generating tests.
14. Methods for the specification of programs. Schematic, structural, visual programming User interface development, multimedia interface interaction environments.

Developer:

Канд., техн., наук, профессор каф. ВТ ИКИТ СФУ
Непомнящий Олег Владимирович



ученая степень, должность, ФИО, подпись)