Master's program
Entrance examination topics

Computer Science

1. Representation of information
2. ALU (its components, functions)
3. Arithmetic operational units
4. Digital building blocks (register, ALU, MUX, encoders)
5. Process of instruction execution
6. Control units
7. Memories (types, properties)
8. Input / Output units, buses
9. RISC and CISC computer architectures
10. Basic data types (Stack (LIFO), Queue (FIFO), Priority Queue, Lists). Representation, implementation, and operations.
11. Data storage and retrieving (Heap, Binary search tree, B-tree, Hash table)
12. Sorting algorithms (comparison-based): Bubble sort, Insertion sort, Quicksort. Algorithms and their computational complexity
13. Basic components of programming languages: data types, control statements, function calls, and parameters. Support of parallel programming
14. Object-oriented programming: Class, Object. Creating objects, initialization, inheritance, polymorphism, dynamic binding, abstract class.
15. Software development methodologies. Design and quality aspects. The role of the UML in software design. Testing software
16. Components and tasks of database management systems
17. Basics of relational database management systems: Concepts: entity, relationship, relational model, and relational algebra

Recommended literature:

Topics 1-9

Shuangbao Paul Wang: *Computer Architecture and Organization*. Springer Verlag; (December, 2021), ISBN: 9811656614

Topics 10-12

Cormen, T. H.–Leiserson, C. E.–Rivest, R. L.–Stein, C.: *Introduction to Algorithms*. 4th edition MIT Press, 2022 ISBN: 9780262046305

Topics 13-14

Michael L. Scott: *Programming Language Pragmatics*. Morgan Kaufmann; 4th edition (December 25, 2015); ISBN: 9780124104099

Ian Sommerville: *Software Engineering* (10th Edition). Pearson; 10th edition (October 2018), ISBN: 9783868943443

Topics 15-17

Avi Silberschatz, Henry F. Korth, S. Sudarshan: *Database System Concepts*. McGraw-Hill Education; 7th edition (March 2019), ISBN: 9780078022159