**Questions for Entrance Test**

**for Master’s Studies in**

**1-40 80 04 Computer Science and Software Technologies**

***Information Representation in Computer Memory***

1. Information and its types and properties.
2. Integer Numbers Representation in Computer Memory.
3. Real Numbers Representation in Computer Memory.
4. Text Information Representation in Computer Memory.

***Algorithms and Programming Languages***

1. Programming Languages Classification. Programming Paradigms.
2. Structural Programming. Data Types, Operators and Control Statements in High Level Programming Languages.
3. Unit Programming. Subprogram Concept.
4. Object-Oriented Programming. Principles of Object-Oriented Programming.
5. Recursive Algorithms and Recursive Functions.

***Microprocessors Architecture***

1. Von Neumann Architecture of Computing Systems.
2. Intel Architecture of 32-bits Processors.
3. Low Level Programming and Assembly Language.
4. Addressing Types and Segment Registers.
5. Machine Instruction Format and Operands.
6. Sequence of Instructions Execution and Way of Changing this Sequence.
7. Instructions of Subprogram Calling and Returning from Subprogram.
8. Passing Parameters into Subprogram.
9. Hierarchical Memory Organization: Cache Memory and Virtual Memory.

***Algorithms and Data Structures***

1. Linear Data Structures. Representation and Basic Operations.
2. Arrays Sorting Algorithms.
3. Abstract Data Type «Dictionary». Search Trees. Hash Tables.
4. Graphs and its Representations.
5. Wide Search and Depth Search in Graph.
6. Algorithm of Shortest Path Search in Graph.

***Operating Systems Architecture***

1. Operating System Kernel Objects.
2. Processes and Threads. Multithreading Programming.
3. Shared Memory.
4. File Systems.
5. Operating Systems Security.

***Computer Networks***

1. Open Systems Interconnection Model.
2. Application Layer Protocols of Computer Networks.
3. Hypertext Transport Protocol.
4. Network Layer Protocols of Computer Networks.

***Data Bases***

1. Relational Data Bases Design. Entity-Relation Method. ER-diagrams.
2. Relational Data Bases Design. Normalization Method.
3. Data Bases Languages: Data Definition Language. Data Types.
4. Data Bases Languages: Data Manipulation Language.
5. Data Bases Languages: Data Control Language, Transaction Control Language.
6. Transactions and their Properties.
7. Postrelational Data Bases.

***Design of Computing Systems***

1. Software Systems Development Technologies.
2. Data Bases Access Technologies.
3. Parallel Computing Systems Build Principles.
4. Micro Service Architecture.
5. Information System Security: SQL-injections, Symmetric-Key Encryption and Public-Key encryption, Digital Signature Algorithms, Authorization Using HTTP-Sessions, Token-Authorization.

***Object-Oriented Design***

1. Software Lifecycle.
2. Software Development Methodologies.
3. UML. Types of Diagrams.
4. UML. Use Case Diagram.
5. UML. Class Diagram. Classes Relationships Types.
6. Object-Oriented Design Principles.
7. GRASP Design Patterns.
8. GoF Design Patterns.
9. Data Bases Interactions Design Patterns.
10. Architectural Design Patterns (Multilayered System, Data Flow, Control Based on «Call-Return» Model, Control Based on Events).
11. Model-View-Controller Design Patterns Group.

***Web-Applications Development Technologies***

1. Declarative Languages and Markup Languages. HTML. CSS. XML.
2. Graphical User Interface Development Principles.
3. Client Technologies of Web-Application Developments.
4. Server Scripting Programming Languages.
5. Server Object-Oriented Programming Languages.
6. Content Management Systems of Web-Resources.

***Computer Graphics***

1. Types of Graphical Information Representation in Computers.
2. Computing Bases of Computer Graphics (Segments, Circles and Bezier Curves Rasterization).
3. Affine Transformation.
4. Main Concepts of 3D Graphics. OpenGL.

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and System Programming S. A. Yermochenko