

General questions

1. The language of first-order-logic, terms, formulas. Interpretations, truth assignments, logical consequences, predicate calculus.
2. Operating systems, concepts, structure and classifications. The characteristics of operating systems (components and functions). The system administration. Supporting of development and applications.
3. Data types, constant, variable, expression. Evaluation of parameters, parameter passing. Scope and life time. Compilation unit. Exception handling.
4. Special tools of programming languages. Tools of object-oriented programming. Functional and logical programming.
5. Representation of data structures. Operations with data structures. Classification and description of data structures. Sequential data structures: row, stack, list, and string. Simple and compound data structures.
6. Relational, ER, and object-oriented models. Database system. Functional dependencies. Relational algebra, relational calculus. SQL.
7. The ISO OSI model. Ethernet standards. Routing mechanisms of the network layer. Internet network protocols, standards, and services.
8. Physical concepts and quantities. The concept of linear momentum and angular momentum. Newton's laws. The theorem of work. The first and second laws of the thermodynamics. The kinetic model of gases.
9. Basic concepts and phenomena of electrostatics. Ohm's law. The concept of the magnetic field. Electromagnetic waves. The Bohr/Rutherford model of the atom. The effect and measurement of radioactive radiation.
10. Characteristics of passive electronic components; RC and RLC circuits; Semiconductors, p-n junctions. Characteristics of discrete semiconductors. Operation of simple discrete circuits: amplifiers, oscillators, power supplies.
11. Logic states, logic identities. Gates and truth tables. Discrete circuits for gates. IC gate circuits (TTL, CMOS, NMOS). Interfacing between logic families. Combinational logic circuits. Sequential logic circuits. A/D and D/A converters..

Specializations

Infocommunication Networks

1. Physical transmissions. Classifications of telecommunication systems. Requirements of signal transmission. Main network functions and their implementations. Typical network topologies and systems. Basics of mobile telecommunication. GPS system
2. Markov-chains, birth and death processes. The basic queueing systems. Methods for computing the system characteristics. Supporting tools.
3. Physical, administrative and algorithmic aspects of security, regulations. Foundation of cryptography. Cryptographic primitives: DSA. Digital signature.
4. The operation of RIP-protocol. Adjusting the parameters (configuring).
5. Aim and configuring traffic filtering and ACL based on a chosen example.
6. Advanced routing problems. Comparison of static and dynamic routing.