

Examination questions on the Discrete Mathematics

1. Propositions. Compound propositions.
2. Basic logical operators
3. Precedence of logical operators.
4. Propositional equivalences.
5. Boolean equivalences.
6. The concept of tautology.
7. Logically equivalent propositions.
8. De Morgan's laws.
9. Most important logical equivalences.
10. Boolean functions.
11. Boolean expressions.
12. Most important identities in Boolean algebra.
13. Absorption law.
14. The abstract definition of a Boolean algebra.
15. Dual functions.
16. The concept of dual formula.
17. Duality principle.
18. Self-Dual functions.
19. Expansion of Boolean functions in terms of variables.
20. Expansion of logical functions in terms of variables.
21. The canonical disjunctive normal form.
22. The canonical conjunctive normal forms.
23. Theorem on the expansion of functions with respect to the variables.
24. Closed classes.
25. Functionally completeness of the set of Boolean functions.
26. Zhegalkin polynomial.
27. Completeness theorem.
28. The classes T_0 and T_1 .
29. The class of self-dual functions.
30. The precedence relation.
31. The class of monotonic functions.
32. The class of all linear functions.
33. Necessity and sufficiency conditions of functionally completeness.
34. Theorem on Functional Completeness.
35. Graphs. The concept of isomorphic graphs.
36. The homeomorphic graphs.
37. Directed and undirected graphs.
38. Graph terminology. Special types of graphs.
39. Geometrical representation of graphs.
40. Special simple graphs.
41. The Handshaking theorem.
42. Representing graphs.
43. Adjacency matrices of graphs.
44. Incidence matrices of graphs.
45. Representation of graphs by means of incidence matrices.
46. Representation of graphs by means of adjacency matrices.
47. Networks. Isomorphic networks.
48. Trees.
49. Coding. Decoding.
50. Alphabetical and uniform coding.
51. Test for unique decipherability of coding.
52. Unique decipherability recognition algorithm.
53. Prefix property of unique decipherability of coding.
54. Necessity and sufficiency of recognition algorithm for decoding