

BSc examination topics (examples)

1. Algorithms complexity
2. Algorithm design paradigms
3. Basic data structures
 - a) list, queue,
 - b) heap
 - c) priority queues
4. Trees
 - a) binary trees
 - b) balanced trees (e.g. AVL)
 - c) B-trees
5. Sorting algorithms
6. Searching algorithms
7. Graph theory, colouring problems
8. Minimum spanning tree, greedy algorithms
9. Euler circuits and paths vs. Hamiltonian cycles and paths
10. Route problems, shortest path
11. Flows in networks
12. Deterministic and non-deterministic Turing machine
13. Regular expressions, finite automata, regular languages
14. Context free grammars, push down automata, context free languages
15. Nondeterministic finite automaton
16. Chomsky' hierarchy
17. Methods of process synchronizations
 - a) deadlock, starving
18. Interpolation and its applications
19. Solving linear equations and sets of equations
20. Solving non-linear equations and sets of equations, locating roots of equations
21. Numerical integration methods
22. Differences between high-level languages and assemblers
23. Interpretation vs. compilation
24. Properties of object-oriented programming
25. Colour models
26. Illumination models
27. Raster algorithms for line drawing. Aliasing and antialiasing
28. Spline functions
29. Algorithms of filling the area
30. Visible surface determination
31. Image filtering
32. Relative databases
 - a) normal forms
 - b) data structures
33. What is UML?
34. Software developing models
35. Goals and methods of software testing
36. Heuristic search methods