Topics for Data Structures and Algorithms Comprehensive Exam

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1. Binary Search Trees: AVL, Red-Black, and Splay

2. Sorting algorithms- quicksort, mergesort, heapsort, radix-sort, insertion sort

3. Binary Heaps

4. Hashing: hash functions, collision resolution strategies, load factor

5. Stacks, Queues, and Linked Lists- when to use one versus the other

6. Big-O notation

7. Algorithm Complexity

8. Recurrence relations and the Master Method

9. Recursive algorithms

10. Graph Algorithms. Includes depth-first and breadth-first traversals, shortest-path algorithms, network flows, matching, minimum spanning trees, connectivity algorithms,

11. Dynamic Programming: matrix-chain multiplication, polygon triangulation, longest common subsequence, 0-1 knapsack, etc.

12. Divide and Conquer algorithms: order statistics, binary search, minimum distance points, convex-hull formation, etc.

13. Greedy Algorithms: Huffman codes, unit-task scheduling with deadlines, activity selection, fractional knapsack, etc.

14. NP completeness

15. Formal languages: Turing machines, Finite State Machines, Automata, Regular Expressions