Advanced Data Structures and Algorithms

Course Outcomes

Syllabus

Text Books

Course Outcomes

- **CO1:** Understand various operations on advanced tree data structures and asymptotic performance of algorithms.
- **CO2:** Synthesize design techniques and choose appropriate technique to solve problems.
- **CO3:**Analyze algorithm design techniques to provide optimal solution for given problem.
- **CO4:** Distinguish deterministic and non-deterministic algorithms and their performances.

Syllabus

- **UNIT I:**

Trees: Splay trees: A simple idea, splaying, Top-Down splay trees, Red-Black trees: Bottom-up insertion, Top-down-red-black trees, top-down deletion, Treaps, Suffix Arrays and Suffix Trees: Suffix Arrays, Suffix Trees, Linear-Time Construction of Suffix Arrays and Suffix Trees.

Introduction: Algorithm Specification: Pseudo code Conventions, Recursive Algorithms, Performance Analysis: Space Complexity, Time Complexity, Asymptotic Notation (Big –oh, Omega, Theta, Little –oh).

Syllabus

- **UNIT II:**

Divide and conquer: General method, Binary search, Finding the Maximum and Minimum, Merge sort, Quick sort, Strassen‘s matrix multiplication.

Greedy method: General method, knapsack problem, Job Sequencing with deadlines, Minimum cost spanning trees: Prim‘s and Kruskal‘s algorithms, Single source shortest path problem.

Syllabus

- **UNIT III:**

Dynamic Programming: General method, Multistage graph problem, All pairs shortest Path problem, 0/1 knapsack problem, Travelling sales person problem.

Backtracking: General method, 8-queens problem, sum of subsets, graph coloring, Hamiltonian cycles.

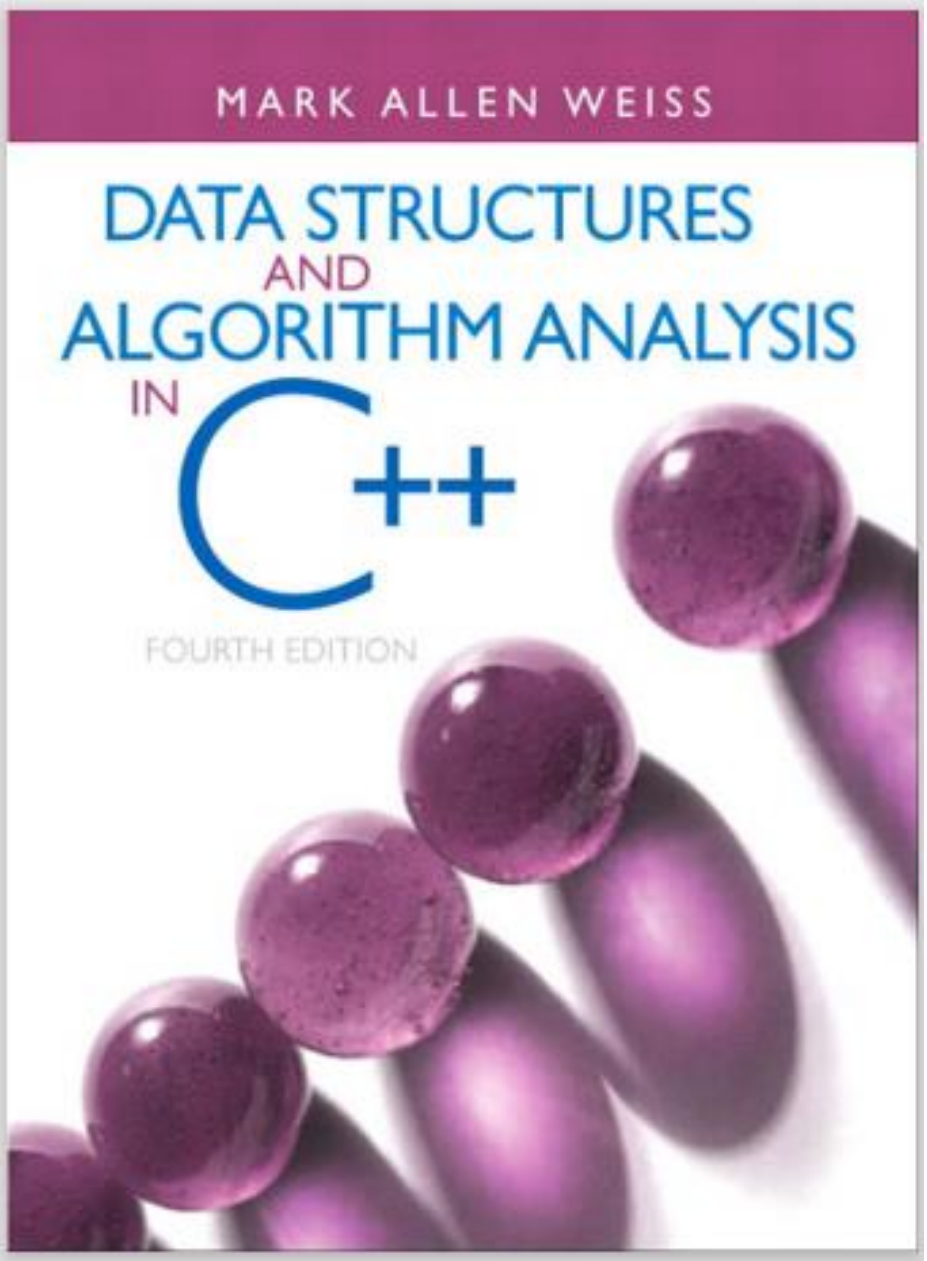
Syllabus

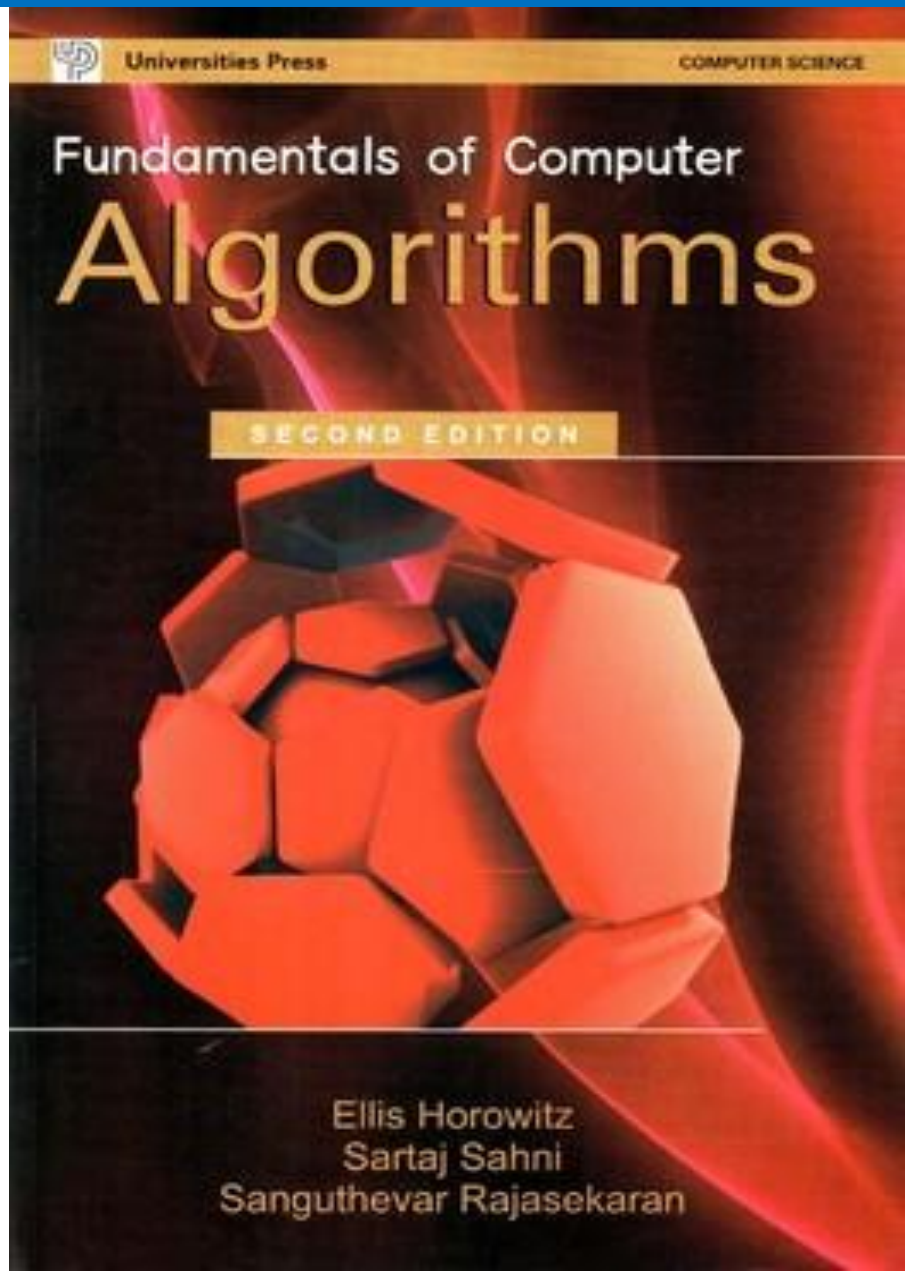
- **UNIT IV:**

Branch and Bound: The method: Least Cost (LC) Search, Control Abstractions for LC-Search, FIFO Branch-and-Bound, LC Branch-and-Bound, 0/1knapsack problem: LC Branch and Bound solution, FIFO Branch and Bound solution, Travelling sales person problem.

NP-Hard and NP-Complete problems: Basic concepts, non-deterministic algorithms, the classes NP Hard and NP Complete and Cook‘s theorem.

Text Books


MARK ALLEN WEISS
DATA STRUCTURES
AND
ALGORITHM ANALYSIS
IN
C++
FOURTH EDITION


Universities Press
COMPUTER SCIENCE
Fundamentals of Computer
Algorithms
SECOND EDITION
Ellis Horowitz
Sartaj Sahni
Sanguthevar Rajasekaran

Other Reference Books