ADVANCED DATA STRUCTURES AND ALGORITHM

(Professional Elective-I)

Course Code: 19CT1150

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Course Outcomes: At the end of the course the student shall be able to

CO1:Classify various Heap Data Structures.

CO2:Illustrate the concepts of different Hashing techniques.

CO3:Summarize the applications of special Binary Search trees.

CO4:Explain Digital Search Tree Structure.

CO5:Apply various Pattern Matching Techniques.

UNIT-I **(10 Lectures)**

PRIORITY QUEUES: Heap Construction, Min Heap, Max Heap, Single and Double Ended Priority Queues: Leftist trees, Binomial Heaps, Fibonacci Heaps, Pairing Heaps, k-d Trees. (Text book 1)

Learning Outcomes: At the end of the unit the student will be able to

1.compare various Heap Data Structures.(L2)

2.illustrate the working of different priority queues.(L2)

3.explain various operations to be performed on priority queues.(L2)

UNIT-II **(10 Lectures)**

HASHING:Hashing, Hash Table, Hash Functions, Collision, Collision Resolution Techniques, Perfect Hash Functions, Cichelli Algorithm, Hash Functions for Extendible files. (Text book 2)

Learning Outcomes: At the end of the unit the student will be able to

1.describe the concepts of Hashing. (L2)

2.explain various Collision Resolution techniques. (L2)

3.identify appropriate Hash functions for Extendible files. (L2)

UNIT-III **(10Lectures)**

EFFICIENT BINARY SEARCH TREES: Red-Black Trees: Definition, Representation of a Red-Black Tree, Searching, inserting into, deletion from a Red-Black tree. 2-3-4 Trees, Splay trees: Bottom Up and Top Down approaches. (Text book 1)

Learning Outcomes: At the end of the unit the student will be able to

1.explain the concept of Red Black trees. (L2)

2.interpret the working principle of 2-3-4 trees. (L2)

3.compare Bottom up and Top down Splay trees. (L2)

UNIT-IV **(10 Lectures)**

DIGITAL SEARCH STRUCTURES: Digital Search trees, Trie, Binary Tries, Compressed Binary Tries, Patricia:construction and insertion, Multiway Tries. (Text book 1)

Learning Outcomes: At the end of the unit the student will be able to

1.outline the need for Digital Search trees. (L2)

2.classify Uncompressed Binary trie and Compressed Binary trie. (L2)
3.illustrate the concept of Multiway tries. (L2)

UNIT-V **(10 Lectures)**

STRING MATCHING: Exact String Matching-Straight forward Algorithms, The Knuth-Morris-Pratt Algorithm, The Boyer-Moore Algorithm, Multiple Searches. (Text book 2)

Learning Outcomes: At the end of the unit the student will be able to

1.explain the need for efficient Text Processing algorithms. (L2)
2. identify various methods to perform Substring searching. (L3)
3. make use of various Text Processing algorithms. (L3)

TEXT BOOKS:

1. Ellis Horowitz, Sartaj Sahni, Dinesh Mehta, *Fundamentals of Data structures in C++*, 2nd edition, University Press (India) Pvt.Ltd ,2007.
2. Adam Drozdek, *Data structures and algorithms in C++*, 3rd Edition, Cengage Learning, 2008

REFERENCES:

1. Langsam, Augenstein and Tanenbaum, *Data structures using C and C++*, 2nd Edition, PHI, 2009.
2. W.Savitch, *Problem solving with C++, The Object of Programming*, 5th Edition, Pearson education, 2004.
3. Mark Allen Weiss, *Data structures and Algorithm Analysis in C++*, 2nd Edition, Pearson Education,2007.

WEB REFERENCES:

1. https://nptel.ac.in/courses/106/102/106102064/