**Shri Ramdeobaba College of Engineering & Management, Nagpur Teaching Scheme &**

**Syllabus for Semester VI, B. E. (Computer Science & Engineering)**

**Course Code : CST320 Course : Advanced Data Structures**

**L:4 Hrs,T: 1 Hr,P: 0 Hrs, Per Week Total Credits : 09**

**Course Outcomes:**

On successful completion of the course, students will be able to:

1. Understand implementation of symbol table using hashing techniques.

2. Develop and analyze algorithms for red-black trees, B-trees and Splay trees.

3. Develop algorithms for text processing applications.

4. Identity suitable data structures and develop algorithms for computational geometry problems.

**Syllabus**

**Unit-I**

**Hashing:** Review of Hashing, Hash Function, Collision Resolution Techniques in Hashing, Separate Chaining, Open Addressing, Analysis of Open and Closed Hashing, Rehashing, Hash Tables with Worst-Case O(1) Access: Perfect Hashing, Cuckoo Hashing, Hopscotch Hashing. Extendible Hashing.

**Unit-II**

**Red Black Trees:** Height of a Red Black Tree, Red Black Trees Bottom-Up Insertion, Top-Down Red Black Trees, Top-Down Deletion in Red Black Trees, Analysis of Operations.

**Splay Trees:** Splaying, Search and Update Operations on Splay Trees, Amortized Analysis of Splaying.

**Unit-III**

**B-Trees:** Advantage of B- trees over BSTs, Height of B-Tree, Search and Update Operations on B-Trees, Analysis of Operations, Introduction to B+ Trees

**Garbage Collection:** Review, Challenges, Recent Trends, Memory Management Interface,Mark-and-Sweep: Garbage Collection Algorithm, Garbage Collection in Java

**Unit-IV**

**Text Processing:** Sting Operations, Brute-Force Pattern Matching, Boyer-Moore Algorithm, Rabin-Karp Algorithm, String Matching with Finite Automata, The Knuth-Morris-Pratt Algorithm, Multiple Longest Common Subsequence Problem (MLCS)

**Unit-V**

**Computational Geometry:** One Dimensional Range Searching, Two Dimensional Range Searching, Constructing a Priority Search Tree, Searching a Priority Search Tree, Priority Range Trees, Quad-trees, k-D Trees, Applications.

**Unit-VI**

**Randomized Algorithms**: Need for Randomized Algorithms, Approaches, Randomized Quicksort, Primality Testing, Approximation Algorithm, Sum of Subset Problem.

**Textbooks**

1. Mark Allen Weiss, Data Structures and Algorithm Analysis in C++, Fourth Edition, Pearson

Education, 2002.

2. Horowitz, Sahni and Rajasekaran, Computer Algorithms, Universities Press, 2000.

3. Cormen, Leiserson, Rivest and Stein, Introduction to Algorithm, Third edition, PHI, 2009.

**References**

1. Aho,Hopcroft and Ullman, Data Structures and Algorithms, Pearson Education, 2002.

2. M T Goodrich, Roberto Tamassia, Algorithm Design, John Wiley, 2002.

3. Tanenbaum, Langram and Augestien, Data Structures using C and C++, Prentice Hall of India, 2002.