

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

(Established by Govt. of A.P., ACT No.30 of 2008)

ANANTHAPURAMU – 515 002 (A.P) INDIA**M.TECH. IN COMPUTER SCIENCE AND ENGINEERING****COURSE STRUCTURE & SYLLABI**

| Course Code | ADVANCED DATA STRUCTURES AND ALGORITHMS (Common to M.Tech CSE, CN, SE, AI & ML) | L | T | P | C |
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| 21D58101 | | 3 | 0 | 0 | 3 |
| Semester | | I | | | |
| Course Objectives: | | | | | |
| <ul style="list-style-type: none">To understand concepts of dictionaries and hash tables.To implement lists and trees.To analyze usage of B trees, Splay trees and 2-3 trees.To understand the importance of text processing and computational Geometry. | | | | | |
| Course Outcomes (CO): Student will be able to | | | | | |
| <ul style="list-style-type: none">Understand the implementation of symbol table using hashing techniquesApply advanced abstract data type (ADT) and data structures in solving real world problemEffectively combine the fundamental data structures and algorithmic techniques in building a solution to a given problemDevelop algorithms for text processing applications | | | | | |
| UNIT - I | | Lecture Hrs: | | | |
| Dictionaries : Definition, Dictionary Abstract Data Type, Implementation of Dictionaries, Hashing: Review of Hashing, Hash Function, Collision Resolution Techniques in Hashing, Separate Chaining, Open Addressing, Linear Probing, Quadratic Probing, Double Hashing, Rehashing, Extendible Hashing. | | | | | |
| UNIT - II | | Lecture Hrs: | | | |
| Skip Lists : Need for Randomizing Data Structures and Algorithms, Search and Update Operations on Skip Lists, Probabilistic Analysis of Skip Lists, Deterministic Skip Lists, Trees: Binary Search Trees (BST), AVL Trees, 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. | | | | | |
| UNIT - III | | Lecture Hrs: | | | |
| 2-3 Trees , Advantage of 2-3 trees over Binary Search Trees, Search and Update Operations on 2-3 Trees, Analysis of Operations, B-Trees: Advantage of B- trees over BSTs, Height of B-Tree, Search and Update Operations on 2-3 Trees, Analysis of Operations, Splay Trees: Splaying, Search and Update Operations on Splay Trees, Amortized Analysis of Splaying. | | | | | |
| UNIT - IV | | Lecture Hrs: | | | |
| Text Processing: Sting Operations, Brute-Force Pattern Matching, The Boyer-Moore Algorithm, The Knuth-Morris-Pratt Algorithm, Standard Tries, Compressed Tries, Suffix Tries, The Huffman Coding Algorithm, The Longest Common Subsequence Problem (LCS), Applying Dynamic Programming to the LCS Problem | | | | | |
| UNIT - V | | Lecture Hrs: | | | |
| Computational Geometry: One Dimensional Range Searching, Two Dimensional Range Searching, Constructing a Priority Search Tree, Searching a Priority Search Tree, Priority Range Trees, Quadtrees, k-D Trees. | | | | | |
| Textbooks: | | | | | |
| 1. Mark Allen Weiss, Data Structures and Algorithm Analysis in C++, second Edition, Pearson, 2004. 2. T.H. Cormen, C.E. Leiserson, R.L.Rivest, Introduction to Algorithms, Third Edition Prentice Hall, 2009 | | | | | |
| Reference books: | | | | | |
| 1. Michael T. Goodrich, Roberto Tamassia, Algorithm Design, First Edition, Wiley, 2006. | | | | | |