21CS302PC	DATA STRUCTURES	L	T	P	C
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PREREQUISITES: A course on "Programming for Problem Solving".

COURSE OBJECTIVES:

- Exploring basic data structures such as stacks and queues.
- Introduces a variety of data structures such as hash tables, search trees, tries, heaps, graphs.
- Introduces sorting and pattern matching algorithms.

COURSE OUTCOMES:

After completion of the course, the students should be able to:

CO1: Select the data structures that efficiently model the information in a problem.

CO2: Design programs using a variety of data structures, including trees and graphs.

CO3: Implement and know the application of algorithms for searching, sorting and pattern matching.

CO4: Assess efficiency trade-offs among different data structure implementations or combinations.

UNIT - I
Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, Stacks-Operations, array and linked representations of stacks, stack applications, Queues-operations, array and linked representations.

UNIT - II
Dictionaries: linear list representation, skip list representation, operations - insertion, deletion and searching.
Hash Table Representation: hash functions, collision resolution-separate chaining, open addressing-linear probing, quadratic probing, double hashing, Rehashing, extendible hashing.

UNIT - III
Search Trees: Introduction to trees, Tree Traversal, Binary Search Trees, Definition, Implementation, Operations- Searching, Insertion and Deletion, AVL Trees, Definition, Height of an AVL Tree, Operations – Insertion, Deletion and Searching, Red –Black, Splay Trees.

UNIT - IV
Graphs: Graph Implementation Methods. Graph Traversal Methods.
Sorting: Internal Sorting-Bubble, Quick, Insertion, Selection sort algorithms, binary heaps, Heap Sort, External Sorting- Model for external sorting, Merge Sort.

UNIT - V
Pattern Matching and Tries: Pattern matching Algorithms-Brute force, the Boyer –Moore algorithm, the Knuth-Morris-Pratt algorithm, Tries-Standard Tries, Compressed Tries, and Suffix tries.

TEXT BOOKS:

1. E. Horowitz, S. Sahni and Susan Anderson Freed, Fundamentals of Data Structures in C, 2nd Edition, Universities Press, 2017.
2. S. Tanenbaum, Y. Langsam, and M.J. Augenstein, Data Structures using C, Second Edition, PHI/Pearson Education, 2006.

REFERENCE BOOK:

1. R. F. Gilberg and B.A. Forouzan, Data Structures: A Pseudocode Approach with C, 2nd Edition, Cengage Learning, 2004.