

DATA STRUCTURES

II B. TECH- I SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
A6CS05	ESC	L	T	P	C	CIE	SEE	Total
		3	-	-	3	40	60	100

COURSE OBJECTIVES

1. Understand basic concepts about stacks, queues and their applications.
2. The student should be able to choose appropriate data structures, understand the performance, and use it to design algorithms for a specific problem.
3. Understand basic concepts of singly linked lists and singly linked lists.
4. Write programs for sorting and searching and hashing.
5. Use advanced data structures like Tress and Graphs for efficient problem solving.
6. Introduces pattern matching algorithms.

COURSE OUTCOMES

At the end of the course, student will be able to:

1. Solve problems using data structures such as stacks and Queues.
2. Solve problems using singly linked lists and double linked list.
3. Compare various types of searching and sorting techniques in terms of implementation, operation and performance.
4. Implement Tree data structure and its variants.
5. Identify the importance and application of Graph data Structure with problem solving techniques.

UNIT - I	Introduction to Data Structures, Stacks & Queues	CLASSES: 14
Introduction: Introduction to Data Structures, abstract data types, The Stack ADT: Stack operations, implementing the Stack using Array, Stack Applications: Balanced Delimiters, Evaluating Postfix Expressions, The Queue ADT: Queue operations, Implementing the Queue using Array, Circular Queue operations, Implementing the Circular Queue using Array, Priority Queues: Priority Queue operations, The Priority Queue ADT Implementation.		
UNIT - II	Linked Lists	CLASSES: 12
Linked List ADT - Singly Linked Lists (Insertion, Deletion and Traversing), Doubly Linked Lists (Insertion, Deletion and Traversing), Circular Linked Lists (Insertion, Deletion and Traversing), Stacks implementation Using Linked list, Queues Implementation Using Linked list.		
UNIT - III	Searching and Sorting	CLASSES: 8
Searching: Linear Search - Binary search. Sorting: Bubble Sort - Selection Sort - Insertion Sort - Quick Sort - Merge Sort - Heap sort, comparison of sorting methods.		
UNIT - IV	Trees	CLASSES: 14
Trees –Terminology, Representation of Trees ,Binary Tree, Binary Tree traversals, Binary search trees: operations-Insertion, Delete and Searching – AVL Trees: operations- Insertion, Delete and Searching, B-Trees, B-Tree of order m, height of a B-Tree, insertion, deletion and searching Red-Black Trees, Splay Trees, Comparison of Search Trees.		
UNIT - V	Graphs & Text Processing	CLASSES: 12
Graphs: Introduction, Definition, Terminology, Graph ADT, Graph traversals- DFS and BFS, Dijkstra's Algorithm, Bellman Ford Algorithm, Floyd Warshall Algorithm.		

Text Processing: Pattern matching algorithms-Brute force, Knuth Morris-Pratt algorithm, Tries-Standard Tries, Compressed Tries, and Suffix tries.

TEXT BOOKS

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

REFERENCE BOOKS

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

WEB REFERENCES

1. <https://hackr.io/tutorials/learn-data-structures-algorithms>
2. <https://www.geeksforgeeks.org/fundamentals-of-algorithms/>
3. <https://www.udemy.com/introduction-to-algorithms-and-data-structures-in-c/>
4. <https://leetcode.com>