

ADVANCED DATA STRUCTURES

II Year II Semester: CSE/IT/CSIT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
A5CS09	PCC	L	T	P	C	CIE	SEE	Total
		3	1	-	4	30	70	100

COURSE OBJECTIVES:

1. Impart the basic concepts of data structures.
2. Understand concepts of Dictionary ADT and Hash Table.
3. Understand basic concepts of Trees and Priority Queues
4. Understand basic concepts of Graphs and traversal techniques
5. Familiarize with concepts of search trees like BST, AVL, B-Tree, Red-Black Tree and Splay Tree.
6. Understand the different text processing algorithms.

COURSE OUTCOMES

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

1. Design and implement Hash Table and Dictionary using Linked List.
2. Construct and implement Tree and Heap Data Structure.
3. Construct a graph and traverse using BFS and DFS
4. Construct and analyse Search Trees.
5. Solve search problems using Text Processing Algorithms.

UNIT-I	DATA STRUCTURES & HASHING	
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Data Structures- Definition, Linear and non linear data structures, Abstract Data Type (ADT) concept, Overview of basic data structures - the list ADT, stack ADT, queue ADT, array and linked implementation.

Hashing- Dictionaries, linear list representation, operations- insertion, deletion and searching. Hashing-hash table representation, hash functions, collision resolution-separate chaining, open addressing-linear probing, quadratic probing, double hashing, rehashing.

UNIT-II	TREE & PRIORITY QUEUE	
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Trees – Terminology, Representation of Trees, Binary tree ADT, Properties of Binary Trees, Binary Tree Representations-array and linked representations, Binary Tree traversals, Threaded binary trees, **Priority Queue**-ADT-implementation-Max Heap & Min Heap-Definition, Insertion into a Heap, Deletion from a Heap.

UNIT-III	GRAPHS & SEARCH TREES (PART-I)	
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Graphs- Introduction, Definition, Terminology, Graph ADT, Graph Representations- Adjacency matrix, Adjacency lists, Graph traversals- DFS and BFS.

Search Trees (Part I) : Binary search trees, definition, ADT, implementation, operations-searching, Insertion and deletion, balanced search trees- AVL trees, definition, height of an AVL tree, representation, operations-insertion and searching.

UNIT-IV	SEARCH TREES (PART-II)	
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Search Trees (Part II) : B-Trees, Definition, B-Tree of order m, height of a B-Tree, insertion, deletion and searching, Comparison of Search Trees. Introduction to Red-Black and Splay Trees(Elementary treatment-only Definitions and Examples), Comparison of Search Trees.

UNIT-V	TEXT PROCESSING
Text Processing-Pattern matching algorithms-Brute force, Knuth Morris-Pratt algorithm, Tries-Standard Tries, Compressed Tries, and Suffix tries.	
TEXT BOOKS:	
<ol style="list-style-type: none"> 1. E. Balagurusamy, "Programming in ANSI C", McGraw Hill Education, 6th Edition, 2012. 2. "Fundamentals of Data Structures", Illustrated Edition by Ellis Horowitz, Sartaj Sahni, Computer Science Press. 3. Data Structures using C, R.Thareja 2nd Edition, Oxford Press. 	
REFERENCE BOOKS:	
<ol style="list-style-type: none"> 1. Algorithms, Data Structures, and Problem Solving with C++", Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company 2. "How to Solve it by Computer", 2nd Impression by R. G. Dromey, Pearson Education 	
WEB REFERENCES:	
<ol style="list-style-type: none"> 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 	
E-TEXT BOOKS:	
<ol style="list-style-type: none"> 1. http://www.freetechbooks.com/algorithm-analysis-and-design-t1030.html 2. http://www.freetechbooks.com/algorithmic-problem-solving-t373.html 3. http://www.freetechbooks.com/algorithms-and-data-structures-the-basic-toolbox-t871.html 	
MOOC COURSE	
<ol style="list-style-type: none"> 1. https://www.coursera.org/specializations/data-structures-algorithms 2. https://onlinecourses.nptel.ac.in/noc16_cs06/preview 	