



Computer Science Paper-I
Data Structures and Algorithms-II
[CORE COURSE]

Semester – IV	Credits: 2	Subject Code: BS42101	Lectures: 48
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Course Outcomes:
At the end of this course, the learner will be able to:
<ul style="list-style-type: none"> ● Illustrate different methods of organizing the large amount of data ● Summarize well-organized data structures in solving various problems ● Compare and contrast the usage of various data structures in problem solving ● Demonstrate algorithms to solve problems using appropriate data structures

Unit 1: Algorithm Design Techniques	6
<ul style="list-style-type: none"> ● Brute-force or exhaustive search ● Divide and Conquer ● Greedy Algorithms ● Dynamic Programming ● Backtracking 	

Unit 2: Tree	10
<ul style="list-style-type: none"> ● Concept and Terminologies ● Types of Binary trees -Binary tree, skewed tree, strictly binary tree, complete binary tree, expression tree, binary search tree, Heap ● Representation –Static and Dynamic ● Implementation and Operations on Binary Search Tree -Create, Insert, Delete, Search, Tree traversals–preorder, inorder,postorder(recursive implementation), Level-order traversal using queue, Counting leaf, non-leaf ,counting nodes with degree 1 ,counting nodes with degree 2 and total nodes, Copy, Mirror. ● Applications of trees <ul style="list-style-type: none"> ○ Heap sort, implementation ○ Huffman encoding(implementation using priority queue) 	

Unit 3: Efficient Search Trees	6
<ul style="list-style-type: none"> ● Terminology: Balanced trees -AVL Trees, Red Black tree, splay tree, ● Lexical search tree -Trie ● AVL Tree-concept and rotations ● Red Black trees-concept, insertion and deletion. ● Multi-way search tree-B and B+ tree -Insertion, Deletion ● Binary Index Tree and Segment Tree 	

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Unit 4: Graph	10
<ul style="list-style-type: none">● Concept and terminologies● Graph Representation –Adjacency matrix, Adjacency list, Inverse Adjacency list, Adjacency multilist● Graph Traversals –Breadth First Search and Depth First Search (with implementation)● Applications of graph<ul style="list-style-type: none">○ Topological sorting○ Minimal Spanning Trees (Prim's and Kruskal's algorithm)○ Single source shortest path -Dijkstra's algorithm○ All pairs shortest path -Floyd Warshall algorithm	

Unit 5: Hash Table	4
<ul style="list-style-type: none">● Concept of hashing● Terminologies –Hash table, Hash function, Bucket, Hash address, collision, synonym, overflow etc.● Properties of good hash function● Hash functions : division function, MID square , folding methods	

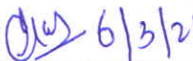

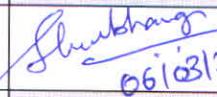
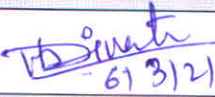
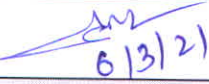
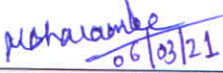

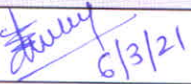
***Contact Hours:12**

Recommended Books:	
<ul style="list-style-type: none">● Debasis S.(2009).<i>Classic Data Structures</i> . Prentice Hall India Pvt. Ltd.● Horowitz E., Sahni S.,Anderson-Freed s. (2008).<i>Fundamentals of Data Structures in C</i>. Universities Press.● Kamthane A.N.(2009). <i>Introduction to Data Structures in C</i>.Pearson Education.● Wirth N. (1976).<i>Algorithms and Data Structures</i>. Pearson Education.	

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(S.Y.B.Sc(C.S) 2021-2024)

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