

**ST. ANN'S COLLEGE OF ENGINEERING & TECHNOLOGY, CHIRALA**  
**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**  
**LESSON PLAN**

**Subject: Data Structures Through C++**  
**Name: T.Y.Srinivasa Rao**

**Academic Year: 2019 – 2020**  
**Year & Sem/Section: II - I 'B'**

Unit No.	Topics Planned to be Covered	No. of Periods Required
<b>I</b>	<b>ARRAYS:</b> Abstract Data Types and the C++ Class, An Introduction to C++ Class, Data Abstraction and Encapsulation in C++, Declaring Class Objects and Invoking Member Functions, Special Class Operations, Miscellaneous Topics- ADTs and C++Classes, The Array as an Abstract Data Type, The Polynomial Abstract Data type - Polynomial Representation - Polynomial Addition. Sparse Matrices, Introduction - Sparse Matrix Representation - Transposing a Matrix - Matrix Multiplication, Representation of Arrays.	<b>11</b>
<b>II</b>	<b>STACKS AND QUEUES:</b> Templates in C++, Template Functions - Using Templates to Represent Container Classes, The Stack Abstract Data Type, The Queue Abstract Data Type, Subtyping and Inheritance in C++, Evaluation of Expressions, Expression - Postfix Notation - Infix to Postfix.	<b>11</b>
<b>III</b>	<b>LINKED LISTS:</b> Single Linked List and Chains, Representing Chains in C++, Defining a Node in C++, Designing a Chain Class in C++, Pointer manipulation in C++, Chain Manipulation Operations, The Template Class Chain, Implementing Chains with Templates- Chain Iterators- Chain Operations- Reusing a Class, Circular Lists, Available Space Lists, Linked Stacks and Queues, Polynomials, Polynomial Representation- Adding Polynomials- Circular List Representation of Polynomials, Equivalence Classes, Sparse Matrices, Sparse Matrix Representation- Sparse Matrix Input- Deleting a Sparse Matrix, Doubly Linked Lists, Generalized Lists, Representation of Generalized Lists- Recursive Algorithms for Lists- Reference Counts, Shared and Recursive Lists	<b>12</b>
<b>IV</b>	<b>TREES:</b> Introduction, Terminology, Representation of Trees, Binary Trees, The Abstract Data Type, Properties of Binary Tress, Binary Tree Representations, Binary Tree Traversal and Tree Iterators, Introduction, Inorder Traversal Preorder Traversal, Postorder Traversal, Thread Binary Trees, Threads, Inorder Traversal of a Threaded Binary Tree, Inserting a Node into a Threaded Binary Tree, Heaps, Priority Queues, Definition of a Max Heap, Insertion into a Max Heap, Deletion from a Max Heap, Binary Search Trees, Definition, Searching a Binary Search Tree, Insertion into a Binary Search Tree, Deletion from a Binary Search Tree, Height of Binary Search Tree.	<b>14</b>
<b>V</b>	<b>GRAPHS:</b> The Graph Abstract Data Type, Introduction, Definition, Graph Representation, Elementary Graph Operation, Depth First Search, Breadth First Search, Connected Components, Spanning Trees, Biconnected Components, Minimum Cost Spanning Trees, Kruskal's Algorithm, Prim s Algorithm, Sollin' s Algorithm, Shortest Paths and Transitive Closure, Single Source/All Destination: Nonnegative Edge Cost, Single Source/All Destination: General Weights, All-Pairs Shortest Path, Transitive Closure.	<b>12</b>
<b>VI</b>	<b>SORTING:</b> Insertion Sort, Quick Sort, Merge Sort Merging, Iterative Merge Sort, Recursive Merge Sort, Heap Sort.	<b>5</b>
<b>Total Number of Periods Required</b>		<b>65</b>

**TEXT BOOKS:**

1. Fundamentals of Data Structures in C++, Ellis Horowitz, Sartaj Sahni and Dinesh Mehta, 2<sup>nd</sup> Edition, Universities Press (India) Pvt. Ltd.
2. Data structures and Algorithm Analysis in C++, Allen Weiss, Pearson Education Ltd., Second Edition.
3. Data structures and Algorithms in C++, Michael T.Goodrich, R.Tamassia and Mount, Wiley student edition, John Wiley and Sons.

**REFERENCE BOOKS:**

1. Data structures and algorithms in C++, 3rd Edition, Adam Drozdek, Thomson.
2. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
3. Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.

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