JAWAHARLAL NEHRUTECHNOLOGICALUNIVERSITY:KAKINADA

KAKINADA–533003, Andhra Pradesh, India

R-16 Syllabus for ECE, JNTUK

I Year-II Semester		L	T	P	C
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Data Structures (R161213)					

Prerequisite Course:

1. **Basics of programming language** in whatever language you want to learn DS.
2. **Logic building skills** - Without this, it will be too much of hard work.

Course Description and Objectives:

1. To be familiar with basic techniques handling problems with Data structures .
2. Solve problems using data structures such as linear lists, stacks, queues, hash tables.

Course Outcomes:

Upon completion of the course, the student twill be able to achieve the following outcomes.

Cos	Course Outcomes	POs
1	Use array operations in row-major , column-major representations and Sparse matrix.	7
2	Compare and contrast stack and queue with its various operations and applications.	6
3	Describe linked list with its operations and its applications.	6
4	Explain binary tree with its properties, representations and traversals.	6
5	Apply graph operations in application programs.	8
6	Apply algorithm complexities, recursive algorithms on searching and sorting techniques.	8

Syllabus:

UNIT-I: ARRAYS

Abstract Data Type, The Array as an Abstract Data Type, The Polynomial Abstract Data type-Polynomial Representation- Polynomial Addition. Spares Matrices, Introduction- Sparse Matrix Representation- Transposing a Matrix- Matrix Multiplication, Representation of Arrays.

UNIT-II: STACKS AND QUEUES

The Stack Abstract Data Type, The Queue Abstract Data Type, Evaluation of Expressions, Expression- Postfix Notation- Infix to Postfix.

UNIT-III: LINKED LISTS

Single Linked List and Chains, 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

UNIT-IV: TREES

Representation of Trees, Binary Trees, The Abstract Data Type, Properties of Binary Tress, Binary Tree Representations, Binary Tree Traversal, 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.

UNIT-V: GRAPHS

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.

UNIT-VI: SORTING

Insertion Sort, Quick Sort, Merge Sort Merging, Iterative Merge Sort, Recursive Merge Sort, Heap Sort, Summary of Internal Sorting

Text Books:

1. Data structures, Algorithms and Applications in C++, S.Sahni, University Press (India) Pvt.Ltd, 2nd edition, Universities Press Orient Longman Pvt. Ltd.

2. Data structures and Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education. Ltd., Second Edition.

3. Data structures and algorithms in C++, 3rd Edition, Adam Drozdek, Thomson

Reference Books:

1. Data structures and Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education. Ltd., Second Edition.

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.