

**Data Structures  
(Common to CSE & IT)**

<b>Course Code</b>	20ES1305	<b>Year</b>	II	<b>Semester</b>	I
<b>Course Category</b>	ES	<b>Branch</b>	IT	<b>Course Type</b>	Theory
<b>Credits</b>	3	<b>L-T-P</b>	3-0-0	<b>Prerequisites</b>	Programming for Problem Solving
<b>Continuous Internal Evaluation</b>	30	<b>Semester End Evaluation</b>	70	<b>Total Marks</b>	100

**Course Outcomes**

Upon successful completion of the course, the student will be able to

<b>CO1</b>	Understand the basic concepts of algorithm complexities, recursion and data structures.	<b>L2</b>
<b>CO2</b>	Apply suitable searching, sorting algorithms for various applications.	<b>L3</b>
<b>CO3</b>	Apply suitable data structure to solve the problems.	<b>L3</b>
<b>CO4</b>	Analyze the problem to construct an algorithm using suitable data structure.(Assignment)	<b>L4</b>

**Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO1</b>	3													
<b>CO2</b>	3								3	3		3	3	3
<b>CO3</b>	3								3	3		3	3	3
<b>CO4</b>		3							3	3		3	3	3

<b>Syllabus</b>		
<b>Unit No</b>	<b>Contents</b>	<b>Mapped CO</b>
<b>I</b>	<p><b>Introduction:</b> Algorithm Specification, Time complexity &amp; space complexity and their notations.</p> <p><b>Recursion:</b> What is Recursion, Why Recursion, Format of a Recursive function, Recursion and memory, Recursion Vs Iteration, Examples.</p> <p><b>Sorting and Searching:</b> Searching- Linear and Binary search algorithms. Sorting- Bubble, Insertion, Selection, Merge, Quick sort algorithms.</p>	<b>CO1, CO2</b>
<b>II</b>	<p><b>Linked lists:</b> Single linked list, double linked list, circular linked list, and operations on linked lists.</p>	<b>CO1, CO3, CO4</b>
<b>III</b>	<p><b>Stacks:</b> Definition, operations: array implementation, linked list implementation and applications.</p> <p><b>Queues:</b> Definition, operations: array implementation, linked list implementation and applications, Circular Queue.</p>	<b>CO1, CO3, CO4</b>
<b>IV</b>	<p><b>Trees:</b> Introduction- Terminology, representation of trees, binary trees abstract data type, Properties of binary trees, binary tree representation, binary tree traversals In order, preorder, post order, Binary search trees Definition, searching BST, insert into BST, delete from a BST, Height of a BST.</p>	<b>CO1, CO3, CO4</b>
<b>V</b>	<p><b>Graphs:</b> The Graph ADT Introduction, definition, graph representation, elementary graph operations BFS, DFS, Minimum Spanning Tree – only: Prim's and Kruskal's MST.</p>	<b>CO1, CO3, CO4</b>

### **Learning Resources**

#### **Text Books**

1. *Data Structures and Algorithm Analysis in C*, Mark Allen Weiss, Second Edition, 2002, Pearson.
2. *Introduction to Algorithms*, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, Third Edition, 2010, PHI.
3. *Data Structures and Algorithms Made Easy* by Narasimha Karumanchi, 2020, CareerMonk Publications.

#### **References**

1. *Fundamental of Data Structures in C*, Horowitz, Sahani, Anderson-Freed, Second Edition, 2008, Universities Press.
2. *Classic Data Structures*, Debasis Samantha, Second Edition, 2009, PHI.

#### **e-Resources & other digital material**

1. <http://cse.iitkgp.ac.in/pds/>
2. <http://cmpe.emu.edu.tr/bayram/courses/231/LectureNotesSlides/IQBAL/Lecture%20Notes>
3. <https://www.geeksforgeeks.org/data-structures/>
4. <https://www.programiz.com/dsa>
5. [https://www.tutorialspoint.com/data\\_structures\\_algorithms/index.htm](https://www.tutorialspoint.com/data_structures_algorithms/index.htm)
6. <https://www.youtube.com/watch?v=zWg7U0OEAoE&list=PLBF3763AF2E1C572F>
7. [https://www.youtube.com/watch?v=S47aSEqm\\_0I&list=PLgj\\_V-ZKxRKRxgFyOutPJpoLFBaQMOpK-](https://www.youtube.com/watch?v=S47aSEqm_0I&list=PLgj_V-ZKxRKRxgFyOutPJpoLFBaQMOpK-)