# 17CS1202 - DATA STRUCTURES

(Common to CSE and IT)

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| **Course Category:** | Program Core | **Credits:** | 3 |
| **Course Type:** | Theory | **Lecture - Tutorial - Practical:** | 2-2-0 |
| **Prerequisite:** | Basic Mathematics and Fundamentals of Algorithms | **Sessional Evaluation:****Univ. Exam Evaluation:****Total Marks:** | 4060100 |
| **Objectives** | * To learn the basics of algorithms and data structures.
* To acquire knowledge in different types of linear and Nonlinear Data Structures.
* To gain knowledge in sorting, searching and hashing techniques
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| **Course Outcomes** | Upon the successful completion of the course, the students will be able to: |
| CO1 | Understand the Analysis of algorithmic notations and basics of data Structures |
| CO2 | Know the concepts and applications of stacks and queues |
| CO3 | Understand the concept of Linked Lists and its applications  |
| CO4 | Be familiar with the concepts of Trees |
| CO5 | Identify the importance of Graph Traversing techniques |
| CO6 | Summarize different types of Sorting and Hashing Techniques |
| **Course Content** | UNIT-I**Introduction to Algorithm Analysis for Time and Space Requirements**: Rate of Growth, Basic Time Analysis of an Algorithm, Order Notation, More Timing Analysis, Space Analysis of an Algorithm.**Linear Data Structures:** Concepts and Terminology for Non primitive Data Structures, Storage Structures for Arrays.UNIT-II**Stacks:** Definition, Concepts, Operations on Stacks, Applications of Stacks – Recursion, Polish Notation, and Conversion of Infix Expressions to Polish Notation.**Queues:** Definition, Concepts, Operations on Queues, Simulation, Priority Queues.UNIT-III**Linked Lists:** Pointers and Linked Allocation, Linked Linear Lists, Operations on Linear Lists Using Singly Linked Storage Structures, Circularly Linked Linear Lists, Doubly Linked Linear Lists.UNIT-IV**Trees:** Definitions and Concepts, Operations on Binary Trees, Representation of Binary Trees, Sequential and linked Representations of Binary Trees, The manipulation of Arithmetic Expressions.**Search Trees:** Height-Balanced Trees, Weight-Balanced Trees.UNIT-V**Graphs:** Definition, Representation of Graphs, Breadth first Search, Depth First Search, Spanning Trees.**Searching:** Sequential Search, Binary Search.UNIT-VI**Sorting:** Selection Sort, Bubble Sort, Merge Sort, Quick Sort, Comparison of Sorting Methods.**Hash-Table Methods:** Introduction, Hashing Functions, Collision-Resolution techniques – Open addressing and Chaining. |
| **Text Books and References** | Text Books:1. An Introduction to Data Structures With Applications – John-Paul Tremblay and Paul G. Sorenson, 2/e, Tata McGraw-Hill.
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| Reference Books:1. Classic Data Structures, D. Samantha, Prentice Hall India.
2. Data Structures Using C, Aaron M. Tenenebaum, Y. Langsam, Moshe J. Augenstein, Pearson Education
3. C Programming & Data Structures, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.
4. Fundamentals of Data Structures in C, Horowitz, Sahni, Anderson-Freed, 2/e, Universities Press.
5. Data Structures and Algorithms- Concepts, Techniques and Applications, GAV PAI, Tata McGrawHill.
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| **E-Resources** | 1. <https://nptel.ac.in/courses>
2. <https://freevideolectures.com/university/iitm>
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