# 17CS1202 - DATA STRUCTURES

(Common to CSE and IT)

|  |  |  |  |
| --- | --- | --- | --- |
| **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:** | 40  60  100 |
| **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 | | |

|  |  |  |
| --- | --- | --- |
| **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. | |
| 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. | |
| **E-Resources** | 1. <https://nptel.ac.in/courses> 2. <https://freevideolectures.com/university/iitm> | |