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| **Course code** | **Course Title** | **Core/ Elective** | | | | | |
| **ES202CS** | **Data Structures** | Core | | | | | |
| L | T | P/D | Credits | CIE | SEE |
| 3 | 0 | 0 | 3 | 40 | 60 |
| **Prerequisite: Programming for Problem Solving**  **Course Objectives:** The objective of this course is to make the student   * To study the importance of structuring the data for easy access and storage. * To know the implementation of various data structures. * To acquire skills in using generic principles for data representation and manipulation with a view for efficiency, maintainability and code reuse. * To understand the basic concepts of advanced data structures   **Course Outcomes:** After completion of the course, the student will be able to   1. Understand the concept of Dynamic memory management, data types, algorithms, Asymptotic notation. 2. Describe how arrays, records, linked structures, stacks, Queue, and Graphs are represented in memory 3. Develop applications using Linear and Non-linear data structures. 4. Apply the suitable data structure for a real world problem and think critically for improvement in solutions. | | | | | | | |
| **UNIT-I**  **Introduction to Algorithms:** Introduction, Algorithm Specifications, Recursive Algorithms, Performance Analysis of an algorithm- Time and Space Complexity, Asymptotic Notations, Amortized Analysis  **UNIT-II**  **Linked Lists ADT:** Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue  **Doubly linked list:** Operations like traversing, searching, insertion, deletion, Circular Linked Lists: operations like traversing, searching, insertion, deletion.  **UNIT-III**  **Stacks and Queues:** ADT Stack, operations and its applications like Expression Conversion and evaluation, Queue ADT and its operations: Linear Queue, Circular Queue, Dequeue  **UNIT-IV**  **Trees:** Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree and their operations, Heaps.  **UNIT-V**  **Sorting and Searching:** Objective and properties of different sorting algorithms: | | | | | | | |

***Suggested Readings:***

T1. ―Fundamentals of data structure in C‖ Horowitz, Sahani & Freed, Computer Science Press.

T2. Gilberg and Forouzan: ―Data Structure- A Pseudo code approach with C‖ by

Thomson publication

T3. ―Data structure in C‖ by Tanenbaum, PHI publication / Pearson publication.

***Reference Books:***

R1. Introduction to Data Structures with Applications, Jean-Paul Tremblay, Paul G Sorenson, II Edition,

R2. Data structures and Algorithm Analysis in C, 2nd edition, M.A.Weiss, Pearson. R3. Data Structures & Algorithms; Concepts, Techniques & Algorithms‖, Pai, Tata McGraw Hill.

R4. Aho, Hopcroft and Ullman, ―Data Structures and Algorithms‖, Pearson

Education,1983.

Selection Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort, Linear and Binary Search algorithms, Hashing (linear probing, random probing, quadratic probing, rehashing, double hashing), Dictionaries

**Graph:** Basic Terminologies and Representations, Graph traversal techniques.