

COURSE CODE	COURSE TITLE	L	T	P	C
UCS1302	DATA STRUCTURES	3	0	0	3

## OBJECTIVES

- To understand the concepts of ADT
- To comprehend the notion of linear and nonlinear data structures
- To design suitable data structures for different problems and implement them in a high level programming language
- To understand the different types of searching and sorting techniques
- To learn the introductory concepts of hashing techniques.

## UNIT I      LINEAR DATA STRUCTURES – LIST      10

Algorithm Analysis: Running time calculations; Abstract Data Types (ADTs); List ADT: Array implementation of lists – Linked lists – Circular linked lists – Doubly linked lists – Applications of Lists: Polynomial manipulation.

## UNIT II      LINEAR DATA STRUCTURES – STACKS AND QUEUES      8

Stack ADT: Stack model – Implementation of stacks – Applications: Balancing symbols – Infix to postfix conversion – Evaluating postfix expressions; Queue ADT: Queue model – Array implementation of queues – Applications of queues.

## UNIT III      NONLINEAR DATA STRUCTURES – TREES      9

Preliminaries: Implementation of trees – Tree traversals with an application; Binary trees: Expression trees; Binary search tree ADT; AVL trees; B-Trees; Priority Queues: Binary heap.

## UNIT IV      NONLINEAR DATA STRUCTURES – GRAPHS      9

Graph Algorithms: Definitions – Representation of graphs; Graph Traversals: Breadth first traversal – Depth first traversal; Topological sort – Shortest Path Algorithms: Dijkstra's algorithm – All pairs shortest path.

## UNIT V      SEARCHING, SORTING AND HASHING TECHNIQUES      9

Searching: Linear search – Binary search; Sorting: Selection sort – Shell sort; Hashing: Hash function – Separate chaining – Open addressing – Rehashing – Extendible hashing.

**TOTAL PERIODS: 45**

## OUTCOMES

**On successful completion of this course, the student will be able to**

- Elucidate and implement various operations of List (K3)
- Develop applications using stack and queue (K3)
- Implement the operations of balanced and unbalanced trees (K3)
- Develop applications using shortest path and traversal algorithms of graph (K3)
- Choose suitable searching and sorting algorithms to solve various computing problems (K4).

## **TEXTBOOKS**

1. M A Weiss, “Data Structures and Algorithm Analysis in C”, 2nd Edition, Pearson Education, 2002.
2. Richard F Gilberg, Behrouz A Frouzan, “Data Structures: A Pseudocode Approach with C”, 2nd Edition, Cengage India, 2007.

## **REFERENCE BOOKS**

1. A V Aho, J E Hopcroft, J D Ullman, “Data Structures and Algorithms”, Pearson Education, 1st Edition Reprint, 2003.
2. R F Gilberg, B A Forouzan, “Data Structures”, 2nd Edition, Thomson India Edition, 2005.
3. Ellis Horowitz, Sartaj Sahni, Susan Anderson Freed, “Fundamentals of Data Structures in C”, 2nd Edition, University Press, 2008.
4. S Sridhar, “Design and Analysis of Algorithms “, 1st Edition, Oxford University Press, 2014.
5. Byron Gottfried, Jitender Chhabra, “Programming with C” (Schaum’s Outline Series), 3rd Edition, McGraw Hill Higher Education, 2010.