

| COURSE CODE | COURSE TITLE | L | T | P | C |
|-------------|-----------------|---|---|---|---|
| 1151IT102 | DATA STRUCTURES | 3 | 0 | 0 | 3 |

Course Category: Program Core

A. Preamble :

This course provides an introduction to the basic concepts and techniques of Linear and non linear data Structures and Analyze the various algorithm.

B. Prerequisite Courses:

| Sl. No | Course Code | Course Name |
|--------|-------------|-------------------------|
| 1 | 1150CS201 | Problem Solving using C |

C. Related Courses:

| Sl. No | Course Code | Course Name |
|--------|-------------|----------------------------------|
| 1 | 1151IT111 | Design and Analysis of Algorithm |

D. Course Outcomes :

Upon the successful completion of the course, students will be able to:

| CO Nos. | Course Outcomes | Knowledge Level (Based on revised Bloom's Taxonomy) |
|---------|---|---|
| CO1 | Identify user defined data types, linear data structures for solving real world problems. | K2 |
| CO2 | Write modular programs on non linear data structures and algorithms for solving engineering problems efficiently. | K3 |
| CO3 | Illustrate some of the special trees and Hashing Techniques. | K2 |
| CO4 | State what is an undirected graph, directed graph and apply BFS and DFS to traverse a graph | K2 |
| CO5 | Demonstrate knowledge of sorting algorithms and their run-time complexity. | K3 |

E. Correlation of COs with POs :

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | H | | M | | L | | | | | | | |
| CO2 | M | | M | | L | | | | | | | |
| CO3 | M | | M | | L | | | | | | | |
| CO4 | M | | M | | L | | | | | | | |
| CO5 | M | | M | | L | | | | | | | |

H- High; M-Medium; L-Low

F. Course Content :

UNIT I LINEAR DATA STRUCTURE

L – 9

Introduction - Time and space complexity analysis - Abstract Data Type (ADT) – The List ADT – Array Implementation – Linked List Implementation– the Stack ADT – The Queue ADT – Applications of Stack, Queue and List.

UNIT II TREES

L – 9

Introduction to trees - Tree Traversal - Binary Trees - Definitions – Expression Tree – Binary Tree Traversals - The Search Tree ADT – Binary Search Trees - AVL Tree.

UNIT III SPECIAL TREES & HASHING

L – 9

Splay Tree – B-Tree - Priority Queue - Binary Heap –. Hashing - Separate Chaining – Open Addressing – Linear Probing – Quadratic Probing – Double Hashing –Rehashing

UNIT IV GRAPH

L – 9

Introduction to Graphs - Topological Sort – Shortest-Path Algorithms – Unweighted Shortest Paths –Dijkstra’s Algorithm – Minimum Spanning Tree – Prim’s Algorithm- Kruskal’s Algorithm – Breadth first search – Depth-First Search – Undirected Graphs – Biconnectivity.

UNIT V SORTING & SEARCHING

L – 9

Sorting algorithm- Insertion sort- Selection sort- Shell sort-Bubble sort- Quick sort- Heap sort-Merge sort- Radix sort - Searching – Linear search - Binary search.

Total: 45 Periods

G. Learning Resources

i. Text Books:

1. M. A. Weiss, “Data Structures and Algorithm Analysis in C”, Second Edition , Pearson Education, 2007.

ii. Reference:

1. A. V. Aho, J. E. Hopcroft, and J. D. Ullman, “Data Structures and Algorithms”, Pearson Education, First Edition Reprint 2003.
2. R. F. Gilberg, B. A. Forouzan, “Data Structures”, Second Edition, Thomson India Edition, 2005.
3. Ellis Horowitz, Sartaj Sahni, Dinesh Mehta, “Fundamentals of Data Structure”, Computer Science Press, 1995.

iii. Online resources

1. <http://simplenotions.wordpress.com/2009/05/13/java-standard-data-structures-big-o-notation/>
2. <http://mathworld.wolfram.com/DataStructure.html/>.