Savitribai Phule Pune University, Pune
Second Year B.C.A.(Science)
Semester III
To be implemented Academic year 2017-18

Course Code: BCA-301   **Total Contact Hours: 48 hrs. (60 Lectures)**
Course Title: Data Structure
Total Credits: 04   Total Marks: 100Teaching Scheme: Theory - 05 Lectures/ Week

Course Objective:
- To study the various structures or methods of organizing data in computer's memory and efficiently implement them.

Prerequisite: Knowledge of C programming language

Unit No.	Content	No. of lecture

1	**Introduction to data structure**
	1.1 Data type and data object
	1.2 Abstract Data Type (ADT)
	1.3 Type of data structure
	1.4 Algorithm analysis
	    1.4.1 Space and Time complexity
	    1.4.2 Asymptotic notation – BigO, OmegaΩ
	    1.4.3 Simple algorithms and its complexity as examples
		4

2	**Array as a data structure** 2.1 Array representation- Row and column major 2.2 Sorting techniques with time complexity: Bubble sort, Insertion sort, Merge sort, Quick sort 2.3 Searching techniques with time Complexity: Linear search, Binary search	8
3	**Linked List** 3.1Introduction 3.2 Representation -Static &Dynamic 3.3 Types of linked lists- singly, doubly, circular 3.4.Operations-create, display, insert, delete, reverse, search, sort, concat, merge 3.5 Applications –single variable polynomial manipulation	12
4	**Stack** 4.1 Introduction 4.2 Representation -Static &Dynamic 4.3 Operations– push, pop 4.4 Applications – Recursion, Infix to postfix, Infix to prefix, postfix evaluation	9
5	**Queue** 5.1 Introduction 5.2 Representation -Static &Dynamic 5.3 Operations– insert, delete 5.4 Circular queue 5.5 Priority queue 5.6 Applications	8

| 6 | **Tree**
6.1 Introduction
6.2 Tree terminologies- all definitions, root, leaf, level, height, depth
6.3 Binary tree
    6.3.1 Types
    6.3.2 Types of Traversal– Preorder, Inorder, Postorder
    6.3.3 Representation – Static &Dynamic
6.4 Binary Search Tree (BST) | 13 |
| 7 | **Graph**
7.1 Introduction
7.2 Graph terminologies
7.3 Representation – Adjacency matrix, Adjacency list, Adjacency multilist
7.4 Traversal– DFS, BFS
7.5 Applications
    AOV network – Topological sort
    AOE network – Critical path | 6 |

Reference Books:

1. Fundamentals of Data Structures-Horowitz Sahani (Galgotia)

2. Introduction to Data Structures using C-Ashok Kamthane

3. Data Structures using C-Bandopadhyay & Dey(Pearson)

4. Data Structures using C-By Srivastava BPB Publication