BVM ENGINEERING COLLEGE [AN AUTONOMOUS INSTITUTION]

2CP06: DATA STRUCTURES AND ALGORITHMS
CREDITS - 4 (LTP:3,0,1)

Course Objective:
To impart the knowledge of linear, non-linear data structures and algorithms.

Teaching and Assessment Scheme:

Teaching Scheme (Hours per week)			Credits	Assessment Scheme				
				Theory		Practical		Total Marks
L	T	P	C	ESE	CE	ESE	CE	
3	0	2	4	60	40	20	30	150

Course Contents:

Unit No.	Topics	Teaching Hours
1	**Introduction to Data Structure**: Data types: primitive andnon-primitive, Types of Data Structures: Linear &Non Linear Data Structures.	2
2	**Stack & Queue:** Representation of arrays; Applications of arrays; Sparse matrix and its representation; **Stack:** Definition& Concepts, Operations, Applications, Infix to postfix & prefix conversions and evaluation, Recursion, Tower of Hanoi **Queue:** Representation, Operations, Circular Queue, Priority Queue, Array representation of Priority Queue, Double Ended Queue, Applications of Queue	10
3	**Linked Lists:** Singly; Doubly and Circular linked list; List with header node; Operations; Implementation of Stack and Queue using linked list; Applications	5
4	**Performance Analysis and Measurement**: Time and space analysis of algorithms-Average; best and worst case analysis; Asymptotic Notations	2
5	**Trees and Graphs**: **Tree:** Definitions and Concepts; Representation of binary tree; Binary tree traversal - Inorder, Postorder, Preorder; Threaded binary tree; Binary search trees; Conversion of General Trees to Binary Trees; Applications of Trees; Height Balancing - AVL trees; Weight Balance; Red black tree; Multi-way search tree: B and B+ tree; 2-3 trees; **Graph:** Definitions; Adjacency Matrices and List Representations of Graphs; Elementary Graph Operations: Depth First Search & Breadth First Search; Applications	13

Unit No.	Topics	Teaching Hours
6	**Hashing and File Structures**: **Hashing:** The symbol table, Hashing Functions, Collision Resolution Techniques, **File Structure:** Concepts of fields, records and files, Sequential, Indexed and Relative/Random File Organization, Indexing structure for index files, hashing for direct files, Multi-Key file organization and access methods	6
7	**Sorting& Searching Algorithms**: Bubble Sort, Selection Sort, Shell Sort, Quick Sort, Merge sort, Insertion sort, Radix sort, Bucket sort etc.; Sequential, Indexed Sequential Search, Binary Search and Interpolation Search	7
	Total	**45**

List of References:

1. Tanenbaum, "*Data Structures using C & C++",* Prentice-Hall International
2. Jean-Paul Tremblay & Paul G. Sorenson, "*An Introduction to Data Structures with Applications*", Tata McGraw Hill
3. Sartaj Sahani, "*Fundamentals of Data Structures in C++",* Galgotia Publishers
4. Gilberg & Forouzan, "*Data Structures: A Pseudo-code approach with C*", Thomson Learning
5. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, "*Introduction to Algorithms*", PHI
6. Sanjeev Sofat, "*Data Structures using C & C++*", Khanna Book Publishing Pvt. Ltd.

Course Outcomes (COs):

At the end of this course, the students will be able to

1. Differentiate characteristics of linear and non-linear data structures
2. Identify suitable data structures to solve complex computing problems
3. Solve different problems usingappropriate data structures
4. Apply suitable sorting and searching algorithms on datasets
5. Demonstrate an understanding of complexity analysis of algorithms.
6. Enhance logical reasoning and programming skills