

Name of Faculty	:	Faculty of Computer Science & Applications
Name of Program	:	Bachelor of Computer Application (BCA)
Course Code	:	2BCA02
Course Title	:	Data Structure
Type of Course	:	Professional Core
Year of Introduction	:	2023-24

Prerequisite	:	Basic of 'c' Programming
Course Objective	:	To understand rate of change, Difference between Permutation and combination, to understand the geometric representation of any objects which are related,
Course Outcomes	:	At the end of this course, students will be able to:
	CO 1	Define and classify various data structures, storage structures and common operations on them
	CO 2	Create various linear data structures with their representation and perform different operations on them
	CO 3	Create various nonlinear data structures with their representation and perform different operations on them
	CO 4	Apply various searching sorting techniques on data set.

Teaching and Examination Scheme

Teaching Scheme (Contact Hours)			Credits	Examination Marks				
L	T	P		Theory Marks		Practical Marks		Total Marks
				SEE	CIA	SEE	CIA	
3	0	2	4	50	25	50	25	150

Legends: L-Lecture; T-Tutorial/Teacher Guided Theory Practice; P-Practical, C - Credit, SEE - Semester End Examination, CIA - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)

Course Content

Unit No.	Topics	Hrs.	Weightage	Mapping with CO
1	Introduction to Data Structures: Algorithms and Flowcharts, Basics Analysis on Algorithm, Complexity of Algorithm, Introduction and Definition of Data Structure, Classification of Data, Various types of Data Structure.	8	20%	CO 1
2	Linear Data Structure: Array- Introduction to Arrays, Definition, One Dimensional Array and Multidimensional Arrays, Representation of arrays, Applications of arrays, sparse matrix, and its representation Stack: Stack-Definitions & Concepts, Operations On Stacks, Applications of Stacks, Polish Expression, Reverse Polish Expression And Their Compilation, Recursion, Tower of Hanoi Queue: Representation Of Queue, Operations On Queue, Circular Queue, Priority Queue, Array representation of Priority Queue, Double Ended Queue, Applications of Queue Linked List: Singly Linked List, Doubly Linked list, Circular linked list, Linked implementation of Stack, Linked implementation of Queue, Applications of linked list	15	25%	CO 2
3	Nonlinear Data Structure: Tree- Definitions and Concepts, Representation of binary tree, Binary tree traversal (Inorder, postorder, preorder), Threaded binary tree, Binary search trees, Trees To Binary Trees, Applications Of Trees, Some balanced tree mechanism, e.g. AVL trees, 2-3 trees, Height Balanced, Weight Balance, Graph-Matrix Graphs: Introduction, Representation to Graphs, Graph Traversals Shortest Path Algorithms.	10	25%	CO 3
4	Searching, Sorting and Hashing: Searching and Sorting- Searching, Types of Searching, Sorting, Types of sorting like quick sort, bubble sort, merge sort, selection sort. Hashing: Hash Function, Types of Hash Functions, Collision, Collision Resolution Technique (CRT), Perfect Hashing	12	30%	CO 4

Suggested Distribution of Theory Marks Using Bloom's Taxonomy						
Level	Remembrance	Understanding	Application	Analyse	Evaluate	Create
Weightage	30	40	30	-	-	-

NOTE: This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Suggested List of Experiments/Tutorials

Sr. No.	Name of Experiment/Tutorial	Teaching Hours
1	Write a C program that uses functions to perform: a) Create a singly linked list of integers. b) Delete a given integer from the above linked list. c) Display the contents of the above list after deletion	4
2	Write a C program that uses functions to perform: a) Create a doubly linked list of integers. b) Delete a given integer from the above doubly linked list. c) Display the contents of the above list after deletion.	4
3	Write a C program that uses stack operations to convert a given infix expression into its postfix equivalent. Implement the stack using an array.	4
4	Write C programs to implement a double ended queue ADT using: array and doubly linked list respectively.	4
5	Write a C program that uses functions to perform the following: a) Create a binary search tree of characters. b) Traverse the above Binary search tree recursively in Postorder.	4
6	Write a C program that uses functions to perform the following: a) Create a binary search tree of integers. b) Traverse the above Binary search tree non recursively in Inorder.	4
7	Write C programs for implementing the following sorting methods to arrange a list of integers in ascending order: a) Insertion sort b) Merge sort	4
8	Write C programs for implementing the following sorting methods to arrange a list of integers in ascending order: a) Quick sort b) Selection sort	4
9	Write a C program: i) to perform operation Insertion into a B-tree ii) for implementing Heap sort algorithm for sorting, a given list of integers in ascending order	4
10	Write a C program to implement all the functions of a dictionary (ADT) using hashing.	4
11	Write a C program for implementing Knuth-Morris- Pratt pattern matching algorithm.	4
12	Write C programs for implementing the following graph traversal algorithms: Depth first traversal & Breadth first traversal	4

Major Equipment/ Instruments and Software Required

Sr. No.	Name of Major Equipment/ Instruments and Software
1	DEV C++
2	Microsoft C
3	Turbo C

Suggested Learning Websites

Sr. No.	Name of Website
1	https://www.tutorialspoint.com/data_structures_algorithms/data_structures_algorithms_tutorial.pdf

Textbook

Sr. No.	Name of Textbooks
1	Gilberg and Forouzan, "Data Structure- A Pseudo code approach with C" , Thomson publication
2	Tanenbaum, "Data structure in C", PHI / Pearson publication.
3	Pai, "Data Structures & Algorithms; Concepts, Techniques & Algorithms, Tata McGraw Hill

Reference books

Sr. No.	Name of Reference Books
1	Jean-Paul Tremblay & Paul G. Sorenson, An Introduction to Data Structures with Applications, Tata McGraw Hill.
2	Ten Baum, Data Structures using C & C++, Prentice-Hall International.
3	Horowitz, Sahni, Fundamentals of Computer Algorithms, Galgotia Pub. 2001 ed.