FACULTY OF COMPUTER APPLICATIONS
Bachelor of Computer Applications

- **Sem.** : 3
- **Subject Code** : 05BC3302
- **Subject** : Data Structure using C
- **Course Objectives** :
  1. To impart a thorough understanding of linear data structures such as stacks, queues and their applications.
  2. To impart a thorough understanding of non - linear data structures such as trees, graphs and their applications.
  3. To impart a thorough familiarity with writing recursive methods.
  4. To design and implement various data structure algorithms.
  5. To introduce various techniques for representation of the data in the real world.
- **Prerequisites** : Functional Knowledge of c programming language

Unit No	Topics Covered	No of lectures required
1	**Introduction of data structure :** - Introduction of data and data type - Introduction of data structure, primitive and non-primitive data structure - Define Complexity of Data structure - Time and Space complexity, best case, worst case and average case.	6
2	**Stacks and Queues :** - Stack - introduction, operations, applications of stack recursion and polish notation - Queue - introduction, simple queue and its operations	6

3	**Linked List :** - Introduction, types of linked list - singly and doubly	**6**
4	**Tree :** - Basic terminologies - Binary tree - array and linked representation, operations - Tree traversal - conversion of general tree to binary tree - Binary search tree	**6**
5	**Graph :** - Basic terminologies - Representations of graph - adjacency matrix and adjacency list - BFS and DFS traversal	**6**

Course Outcomes:

1. Students can compare different data structures. Pick an appropriate data structure for a design situation.
2. Students can use appropriate data structures like arrays, linked list, stacks and queues to solve real world problems efficiently.
3. Students can represent and manipulate data using nonlinear data structures like trees and graphs to design algorithms for various applications.
4. Students can implement operations like searching, insertion, and deletion, traversing mechanisms etc. on various data structures.
5. Students can Determine and analyze the complexity of given Algorithms.

Course Outcomes - Program Outcomes Mapping Table:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H	H	L	-	M	-	-	L-
CO2	H	-	L	-	M	-	-	

CO3	M	L	L	-	M	-	-	--
CO4	H	-	L	-	L	-	-	L
CO5	H	H	L	-	H	-	-	

Text Book:

1. Data Structure Using C, Second Edition, Reema Thareja, Oxford University Press.

Reference Books:

1. "Introduction to Algorithm", Cormen, Leiserson, Rivest, Stein, , PHI (2003), 2nd Edition,
2. "Design and Analysis of Algorithms" Parag Dave & Himanshu Dave, Pearson Education (2008).
3. "Data Structures using C", A. K. Sharma, Pearson Education (2011).
4. "Data Structures: A Pseudocode Approach with C", Gilberg & Forouzan , Cengage Learning.
5. "Fundamentals of Data Structures in C", Horowitz, Sahni, Anderson-Freed, University Press (2nd edition-2007)
6. "Data Structures Using C & C++'', Tenenbaum, PHI. (Mention at least 3 reference books)

Web References :

1. https://www.geeksforgeeks.org/data-structures/
2. https://www.javatpoint.com/data-structure-tutorial

App References :

1. Data Structures and Algorithms offline Tutorial - ONAN Mobile Software
2. Data Structure Using C - Super Dream

Syllabus Coverage from text /reference book & web/app reference:

Unit #	Chapter Numbers
1	Chapter-2
2	Chapter-7 and Chapter-8
3	Chapter-6

4	Chapter-9
5	Chapter-13

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PRACTICALS

Unit No	List of Practicals
1	1. Create an array of size 10, input values and print the array, and search an element in the array. 2. Create an array of size 10, input values and display sum and average of all elements in the array. 3. Create arrays A, B and C of size 3, perform C = A + B. 4. Create arrays A, B of size 3, C of size 6, merge A and B into C. 5. Create an array of size 10, find the largest value from the array. 6. Insert an element into the array at user defined position. 7. Delete an element from the array from user defined position. 8. Sort the array into ascending order. 9. Sort the array into descending order. 10.Write a program to multiply two matrices.
2	1. Implement stack using array with following operations: push, pop, print, peek, peep, change, exit. 2. Write a program to find out the factorial of a number using recursion (stack). 3. Write a program to print strings in reverse order using stack. 4. Write a program to find the factorial of a given integer number using stack. 5. Write a program to find the power of a given number using stack. 6. Write a program to find GCD of two numbers. 7. Write a program to find the Smallest Common Divisor of a given number. 8. Write a program to find Minimum and Maximum numbers from the given array using Recursion. 9. Write a program which performs the following operations using a simple queue. : insert() -> delete() -> display()

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3	1. Write a program to perform following operation on singly linked list: a. Create a linked list b. Display it 2. Write a program to perform following operation on singly linked list: a. insert a node at the starting of the list b. insert a node at the end of the list 3. Write a program to perform following operation on singly linked list: a. insert a node after the specific node b. insert a node before the specific node 4. Write a program to perform following operation on singly linked list: a. delete first node b. delete last node c. delete specific node 5. Write a program to perform following operation on Doubly linked list: a. Create a linked list b. Display it 6. Write a program to perform following operation on Doubly linked list: a. insert a node at the starting of the list b. insert a node at the end of the list 7. Write a program to perform following operation on Doubly linked list: a. insert a node after the specific node b. insert a node before the specific node 8. Write a program to perform following operation on Doubly linked list: a. delete first node b. delete last node c. delete specific node

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4	1. Write a program to create a binary tree . Traverse tree in preorder , postorder and inorder. 2. Write a program to perform following operations on Binary search tree: a. insert delete b. height of the tree c. total no. of nodes in the tree d.
5	1. Write a program to find out BFS 2. Write a program to find out DFS