MSC (CA&IT) - Semester: III

(Effective from year 2024-25)

Course Code:	**CAIT-301**	**Course Title:**	Data Structure and Algorithm
Course Credits:	02	**Hour of Teaching/Week:**	02
Internal Assessment Marks:	25	**External Exam Marks:**	25
Exam Duration	**2 Hrs**		

Unit	**Contents**
1.	Algorithm Specifications: Performance Analysis and Time and space analysis of algorithms- Average, best and worst case analysis. Types of Data Structures- Linear and Non-Linear. Data types – primitive and non-primitive. Array: Representation of arrays, Applications of arrays, Stack: Stack-Definitions, sparse matrix and its representation., & Concepts, Operations On Stacks, Applications of Stacks, Polish Expression, Reverse Polish Expression. Queue: Representation Of Queue, Operations On Queue, Recursion, Tower of Hanoi, Circular Queue, Priority Queue, Array representation of Priority Queue, Double Ended Queue, Applications of Queue.
2.	Linked List: Singly Linked List, Doubly Linked list, Circular linked list ,Linked implementation of Stack, Linked implementation of Queue, Applications of linked list. Tree-Definitions and Concepts, Representation of binary Applications Of Trees- Some balanced tree mechanism, Conversion of General Trees To Binary Trees, Binary search trees, Threaded binary tree, tree, Binary tree traversal (Inorder, postorder, preorder), eg. AVL trees, 2-3 trees, Height Balanced, Weight Balance Searching & Sorting: Linear Search, Binary Search, Bubble Sort, Selection Sort, Insertion Sort, Quick Sort and Merge Sort

References

1. An Introduction to Data Structures with Applications. by Jean-Paul Tremblay & Paul G. Sorenson Publisher-Tata McGraw Hill.
2. Data Structures using C & C++ -By Ten Baum Publisher – Prenctice-Hall International.
3. Fundamentals of Computer Algorithms by Horowitz, Sahni,Galgotia Pub. 2001 ed.
4. Fundamentals of Data Structures in C++-By Sartaj Sahani.
5. Data Structures: A Pseudo-code approach with C -By Gilberg & Forouzan Publisher-Thomson Learning

MSC (CA&IT) - Semester: III

(Effective from year 2024-25)

Course Code:	**CAIT-301-P**	**Course Title:**	Lab: Practical based on CAIT-301
Course Credits:	02	**Hour of Teaching/Week:**	04
Internal Assessment Marks:	**25**	**External Exam Marks:**	25
Exam Duration	**1Hr**		

Sample List of Experiments (Programming Language can be Python or C)

1. Stack operations:

   Write a program to perform PUSH, POP, PEEP & CHANGE operations on Stack.

2. Queue Operations:

   Write a program to implement insertion & deletion in a queue.

3. Circular Queue Operations:

   Write a program to implement insertion & deletion in a circular queue

4. Write a program for linked list insertion, deletion & copy

5. Sorting and searching:

   Write a program to perform Sequential and binary search

   Quick sort, Merge sort, bubble sort, Selection sort