

### THIRD SEMESTER

#### **Details of Course:**

Course Title	Course Structure			Pre-Requisite
MC 201 : Data Structure	L 3	T 0	P 2	Basic Mathematics and Discrete structures

**Course Objective:** To introduce the concept of complexity of algorithms and to introduce different kinds of data structures with their respective operations.

#### **Course Outcome (CO):**

CO1	Represent and organize data using different data structures.
CO2	Design algorithms to create and manipulate data structures.
CO3	Estimate and compare the performance of various operations performed on the data structures.
CO4	Employ various sorting techniques to sort the data.
CO5	Illustrate the usage of hashing functions and collision resolution techniques.

S. No.	Contents	Contact hours
1.	Introduction: Introduction to abstract data types, design, implementation and applications. Introduction to Algorithm, Time complexity and Space complexity Trade off. Introduction Arrays and Strings: Representation of Arrays in Memory: one dimensional, Two dimensional and Multidimensional, operations on array. Strings and String Operations. Stacks: Introduction, Operations on Stacks, Array representation of Stacks Applications of Stacks: recursion, Polish expression and their compilation conversion of infix expression to prefix and postfix expression. Queues: Introduction, Operations of Queues, Representations of Queues Applications of Queues, Priority queues.	10
2.	Linked Lists: Singly linked lists, Representation of linked list, Operations of Linked list such as Traversing, Insertion and Deletion, Searching. Applications of Linked List. Concepts of Circular linked list and Doubly linked list and their Applications. Stacks and Queues as linked list.	7
3.	Graphs: Introduction to types of graphs, representation and transversal, shortest path, and transitive closure. Activity networks, topological sort, and critical paths. Spanning trees, Binary search trees, various operations on Binary search trees like traversing, searching, Insertion and Deletion. Applications of Binary search Trees, Complete Binary trees, Extended binary trees. General trees, AVL trees, Threaded trees, B trees, B+ trees.	10
4.	Sorting: Insertion Sort, Quick sort, Merge sort, Heap sort, sorting on different keys, External sorting.	8
5.	File Structure: File Organization, Indexing & Hashing, Hashing Functions, Collision Resolution Techniques.	7
	Total	42

**Suggested Books:**

S. No.	Name of Books/Authors/Publishers	Year of Publication
1.	"Fundamentals of Data structures in C", E. Horowitz, Sartaj Sahni, Susan Anderson-Freed, Universities Press	2017
2.	"Data Structures using C", Tannenbaum, Yedidyah Langsam, Augenstein, Pearson.	2019
3.	"An introduction to data structures with application", Jean Paul Tremblay & Pal G. Sorenson, McGraw Hill	2017
4.	"Data Structure and Program Design in C", R.L. Kruse, B.P. Leary, C.L. Tondo, PHI	2009