

2MCACC3: DATA AND FILE STRUCTURES

Total No. of Hours: 52

Hours/Week: 04

Course Objective: To know higher order concepts in data and structuring file using C language.

Course Outcome: Students will be able to

CO1: Determine preferred data structures (Arrays, linked lists, stack, queues, trees, graphs) for a given problem

CO2: Design algorithms for various operations (creation, insertion, deletion and traversal) on data structures

CO3: Explain the applications of data structures

CO4: Understand and apply searching techniques (linear, binary, and hashing)

CO5: Understand & Apply sorting techniques (Insertion sort, Selection sort, Quick sort, Merge Sort, Exchange sort)

CO6: Implement the data structures using a programming language

Unit I	Introduction to Abstract Data Types: Data management concepts, Data types – primitive and non-primitive, Abstract data type. Performance analysis and measurement (Best, Average and Worst case analysis and time space tradeoff). Definition and Classification of Data Structures –Operations on Data Structures.	7 hrs
Unit II	Arrays: Definition, representation of arrays (row-major, column-major), Types of arrays (1D, 2D, multi-dimensional), operations on arrays (insertion, deletion, traversal). Strings - String operations - Character manipulation, String length, Concatenation, Sub string and Pattern Matching. Linked Lists: Definition, Types of Linked List (Singly Linked List, Doubly Linked List, Circularly Linked List), Operations on Linked List (Insertion, Deletion, and Search). Applications of Linked lists. Array and Linked list comparison.	10 hrs
Unit III	Stack: Definition, Primitive Operations (Push, Pop), Stack- implementation using Linked List. Applications of stacks (Function calls, recursion, infix to postfix expression, evaluation of postfix expression). Queues: Definition, Primitive Operations (Insertion, Deletion), Queue - Implementation Using Linked List, Double Ended Queue, priority queues, Garbage Collection. Applications of queues.	10 hrs
Unit IV	Trees: Definition of Trees, Binary Tree -Definition with example, Linear and Linked List Representation of Binary Tree, Expression trees. Binary search trees - concept, Operations -Creation, Insertion, Traversals. Height Balanced Trees – AVL trees, Multi way trees, B-trees, operations on B-tree. Graphs: Concepts, representation of graphs, applications of graphs, BFS & DFS traversal, Shortest path algorithm.	12 hrs

Unit V	Searching & Sorting: Linear search, Binary search, and hashed list searches. General sort concepts, external & internal sorting (insertion sort, selection sort, quick sort, merge sort, Exchange sort). Hashing & File Structures: Hashing: The symbol table, Hashing functions, Collision-Resolution techniques. File Structure: Physical Storage Media File Organization, Organization of records into Blocks, Sequential Files, Indexing and Hashing, Primary indices, Secondary indices, index Files, Indexing and Hashing Comparisons.	13 hrs
--------	--	--------

REFERENCE BOOKS

- [1] Horowitz and Sahani, “*Fundamentals of data Structures*”, Galgotia Publication Pvt. Ltd., New Delhi, Second Edition.
- [2] Michael J. Folk, Bill Zoellick, Greg Riccardi, “*File Structures-An Object Oriented Approach with C++*”, Addison-Wesley, Third edition.
- [3] Mark Allen Weiss, “*Data Structures and Algorithm Analysis in C*”, Addison-Wesley, 2011.
- [4] Ellis Horowitz, Sartaj Sahani, Susan Anderson-Freed, “*Fundamentals of Data Structures*”, Universities Press, Second Edition.
- [5] Robert L. Kruse, Bruce P. Leung, Clovis L. Tondo, “*Data Structures and program Design in C*”, Prentice Hall India, Second Edition.