MANGALORE UNIVERSITY

DEPARTMENT OF M.Sc. COMPUTER SCIENCE

MASTER OF COMPUTER APPLICATIONS (MCA) PROGRAMME

MCAH204 :ADVANCED DATA STRUCTURES		
Hours/Week: 4 **Credits : 4**		**I.A. Marks: 30** **Exams. Marks: 70**

Course Outcomes:

CO1: Ability to analyze algorithms and algorithm correctness.

CO2: Ability to summarize searching and sorting techniques

CO3: Ability to describe stack, queue and linked list operation.

CO4: Ability to have knowledge of tree and graphs concepts.

CO5: Learn the notions of data structure, Abstract Data Type.

CO6: Understand Big(O) notation and role of algorithm complexity in computing

CO7: To evaluate various methods of linked list formulation. Also explore different kinds of linked lists and their applications in day to day problem solving.

CO8: To evaluate various formulation of queues. Also explore different kinds queues and their applications and implementations in simulations.

	UNIT-I	**12 Hours**

Introduction: Algorithms, performance analysis-time complexity and space complexity, Pseudo-Code, Quick Mathematical Review, O-notation, Omega notation and Theta notation. Stacks, Queues, Linked Lists, Double-Ended Queues. Trees: The Tree Abstract Data Type, Basic Algorithms on Trees, Binary Trees,Data Structures for Representing Trees, Priority Queues Abstract Data Type , Heaps

	UNIT-II	**12 Hours**

Search Trees: Binary Search Trees, definition, ADT, implementation, operations-searching, insertion and deletion, Balanced search trees- AVL trees, definition, height of an AVL tree, representation, operations-insertion, deletion and searching. Introduction to Red – Black trees and Splay Trees, B-Trees, insertion, deletion and searching, Comparison of Search Trees.

	UNIT-III	**12 Hours**

Introduction to Set, Implementation, Basic Operations on Set,Graphs, Directed Graphs ,Shortest Path Problem ,Undirected Graph ,Spanning Trees ,Graph Traversals, hash table representation, hash functions, collision resolution, separate chaining, open addressing, linear probing, quadratic probing double hashing, rehashing.

	UNIT-IV	12 Hours

Searching Techniques, Sorting, Internal Sorting, Bubble Sort, Insertion Sort, Quick, Sort, Heap Sort, Bin Sort, Radix Sort, External Sorting, Merge Sort, Multiway Merge Sort, Polyphase Sorting, Design Techniques: Divide and Conquer, Dynamic Programming, Greedy Algorithm, Backtracking, Local Search Algorithms

REFERENCE BOOKS

1. Mark A. Weiss, "Data structures and Algorithm analysis in C++(Java)", Fourth Edition, PHI ,2013
2. Michael T.Goodrich, R.Tamassia and D.Mount "Data structures and Algorithms in C++", Wiley student edition, John Wiley and Sons.
3. Data Structures and Algorithms in C++, Second Edition, Adam Drozdek, Vikas Publishing House, Thomson International Student Edition.
4. Ellis Horowitz, SartajSahni and SanguthevarRajasekaran, "Computer Algorithms/ C++", Second Edition, Universities Press, 2007.
5. Michael T. Goodrich and Roberto Tamassia, "Data Structure and Algorithms in Java", 3rd edition, ISBN: 0-471-46983-1.