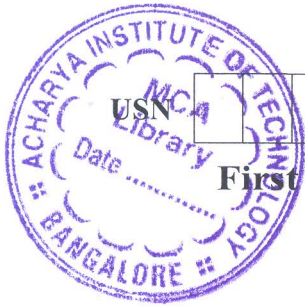


# CBCS SCHEME



22MCA13

First Semester MCA Degree Examination, Dec.2023/Jan.2024

## Data Structures with Algorithms

Time: 3 hrs.

Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.  
2. M : Marks , L: Bloom's level , C: Course outcomes.

Module – 1			M	L	C
Q.1	a.	What are data structures? Explain the classifications of data structures.	08	L1	CO1
	b.	Write a 'C' program to convert postfix to infix expression.	08	L3	CO2
	c.	Evaluate the following postfix expression using stack: 5, 6, 2, +, *, 12, 4, 1, -	04	L3	CO2
OR					
Q.2	a.	Write a 'C' program to convert infix to postfix expression using applications of stack.	10	L3	CO2
	b.	Define STACK. Write a C program to implement stack operations using arrays.	10	L3	CO2
Module – 2					
Q.3	a.	Write a 'C' program to implement tower of Hanoi problem using recursion and trace the output for 3 disks.	10	L3	CO2
	b.	Write a 'C' recursive functions to implement GCD of 2 numbers and generating Fibonacci sequence.	10	L3	CO2
OR					
Q.4	a.	Define circular queues. Write a 'C' program to implement circular queue operations.	10	L3	CO3
	b.	What are priority queues? Write a program to simulate priority queues with priority 1 and 2.	10	L3	CO3
Module – 3					
Q.5	a.	What are Linked lists? Write a program to implement the following options: (i) Insert a node at the beginning of the list. (ii) Delete a node at the end of the list.	10	L3	CO3
	b.	Give an account of: (i) Static and dynamic memory allocation (ii) Getnode( ) and freenode( ) operations	10	L3	CO3
OR					

Q.6	a.	Write a 'C' program to implement STACK operations using linked lists.	10	L3	CO3
	b.	Give an account of : (i) Memory management functions (ii) Array implementation of lists	10	L3	CO3
<b>Module – 4</b>					
Q.7	a.	Explain the array and linked representation of binary trees with suitable examples.	06	L3	CO3
	b.	Construct the binary search tree for the following array items: 40, 60, 50, 33, 55, 11	06	L3	CO3
	c.	Write a C function to create binary search tree.	08	L3	CO3
<b>OR</b>					
Q.8	a.	Explain binary tree traversal methods with 'C' functions and examples.	10	L3	CO3
	b.	Give an account of threaded binary trees.	10	L3	CO3
<b>Module – 5</b>					
Q.9	a.	Define a graph. For a graph shown in Fig.Q9(a), write the adjacency matrix and adjacency list representations.	08	L3	CO3
		<p>Fig.Q9(a)</p>			
	b.	Suppose an array contains 8 elements such as 77, 33, 44, 11, 88, 22, 66, 55. Sort the array using insertion sort algorithm.	08	L3	CO4
	c.	What is hashing? Explain any two hash functions with proper examples.	06	L3	CO4
<b>OR</b>					
Q.10	a.	Briefly explain Breadth-First-Search (BFS) and Depth-First-Search (DFS) traversal of a graph. Also, show the BFS and DFS traversals for the following graphs. [Refer Fig.Q10(a)]	10	L3	CO4
		<p>Fig.Q10(a)</p>			
	b.	Explain the working operation of Radix sort for the following set of data: 348, 143, 361, 423, 538, 128, 321, 543, 366	05	L3	CO4
	c.	Explain Address Calculation Sorting method with suitable example.	05	L3	CO4