



**Second Semester MCA Degree Examination, Dec.2025/Jan.2026  
Data Structures and 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 is Algorithm Analysis? Explain the Time complexity and Space Complexity with suitable example.	08	L2	CO1
	b.	Define Multidimensional Array? Explain how 2D and 3D arrays are declared and initialized.	08	L4	CO2
	c.	Discuss Abstract data types (ADT's) in detail.	04	L2	CO1
OR					
Q.2	a.	What is Data structure? Explain the classification of data structure.	10	L2	CO1
	b.	Write a C Program to simulate the working of a singly linked list providing the following operations i). Display & insert ii). Delete from the beginning end.	10	L4	CO2
Module – 2					
Q.3	a.	What is Stack? Explain the push and pop operation with diagram.	08	L2	CO1
	b.	Define Queue? Explain Enqueue and Dequeue operations with algorithm.	08	L2	CO1
	c.	Write a C Program to find Factorial of a number using recursion.	04	L4	CO2
OR					
Q.4	a.	Implement a program in C for converting an Infix expression to Postfix expression.	10	L4	CO2
	b.	Convert Infix to Postfix expression $((P+Q)*(R+S))/T + (A*(B+C))$ .	10	L4	CO2
Module – 3					
Q.5	a.	Define Tree? Explain the Tree terminologies.	04	L4	CO2
	b.	What is Binary Tree? Write a program to create binary tree and perform Inorder, preorder and postorder traversal.	10	L4	CO2
	c.	Differentiate between DFS and BFS.	06	L4	CO2
OR					
Q.6	a.	From a given vertex 'a' as the source in a weighted connected graph Fig6(a), find shortest paths to other vertices using Dijkstra's algorithm.	10	L4	CO2

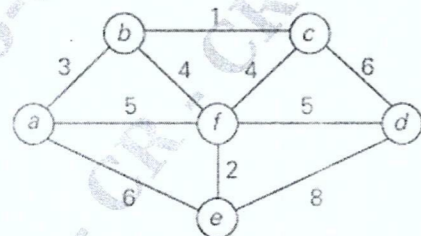


Fig 6(a)

b. For a graph shown in Fig 6(b) find all the shortest path's using Floyd's algorithm.

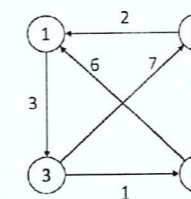


Fig 6(b)

Module – 4			M	L	C
Q.7	a.	Explain Comparison based sorting with example.	06	L2	CO3
	b.	Write a c program to implement the following sorting techniques i). Bubble sort ii). Selection sort	10	L2	CO3
	c.	What is hashing? What are the operations in hashing.	04	L2	CO3
OR					
Q.8	a.	Explain the radix sort and counting sort with example.	10	L2	CO3
	b.	Define and explain open addressing. Discuss linear probing a, quadratic probing and double hashing.	10	L2	CO4
Module – 5					
Q.9	a.	Explain the divide and Conquer paradigm. Use merge sort or quick sort as an example.	10	L4	CO3
	b.	What is Dynamic programming? Explain with an example like 0/1 knapsack problem.	10	L2	CO5
OR					
Q.10	a.	Define a Heap? Explain heap operations with suitable example.	10	L4	CO5
	b.	Present a case study of how segment trees or tries are used in text processing or gaming engines.	10	L4	CO5

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