Enrollment No.: _____

Darshan UNIVERSITY

Darshan Institute of Engineering & Technology

B.Tech. | Sem-3 | Winter-2023

Course Code	:	2101CS301	**Date**	:	30-10-2023
Course Name	:	Data Structure	**Duration**	:	150 Minutes
			Total Marks	:	70

Instructions:

1. Attempt all the questions.
2. Figures to the right indicate maximum marks.
3. Make suitable assumptions wherever necessary.

Q.1	**(A)**	Define Data structure and draw classification of Data Structure.	**4**
	(B)	Explain a tradeoff between time and space complexity.	**3**
		OR	
		Explain a push and pop operation on stack with an example.	
	(C)	Write an algorithm that convert an infix expression into a postfix expression.	**7**
		OR	
		Write a program that takes a postfix expression from the user and evaluates it.	
Q.2	**(A)**	Write a short note on priority queue.	**4**
	(B)	Explain a circular queue in detail.	**3**
		OR	
		Explain a doubly linked list in detail.	
	(C)	Write an algorithm that inserts an element into a singly linked list and sort it.	**7**
		OR	
		Write a program that makes a new separate singly linked list for odd number and even number from singly linked list. E.g. Given singly linked list: 1,2,3,4,5,6,7 Odd list: 1,3,5,7 Even list: 2,4,6	
Q.3	**(A)**	Write a short note on Dijkstra's Algorithm.	**4**
	(B)	Given Inorder and Preorder traversal, compute Postorder traversal. In-order sequence: D B E A F C Pre-order sequence: A B D E C F	**3**
		OR	
		Explain a Breadth First Search traversal in detail.	
	(C)	Prepare an AVL tree for the following scenario (draw tree after each operation) Insert: 1,2,3,4,5,6,7,8,9,10 Delete: 5,4	**7**
		OR	

Prepare a BST for the following scenario (draw tree after each operation)
Insert: 45, 15, 79, 90, 10, 55, 12, 20, 50
Delete: 45, 79
Insert: 45, 79

Q.4 **(A)** Explain Hashing and Hash function in detail. **4**

(B) Using hash function K mod 11, insert following sequence of keys in the hash table: (Using Linear Probing) **3**
11,50,700,76,85,92,73,101,22,33,44

OR

Using hash function Kmod7, insert following sequence of keys in the hash table: (Using Quadratic Probing)
11,50,700,76,85,92,73,101,22,33,44

(C) State and explain collision resolution techniques in hashing. **7**

OR

Find out the hash value of following key using multiplicative hashing method Where hash table size(M)=50 and A is 0.5 constant value.
Key value: 10, 20, 30, 40, 50, 60

Q.5 **(A)** Apply a linear search algorithm on the following array and find out the index of element 19 **4**
20, 10, 30, 40, 50, 19, 90, 100

(B) Apply merge sort algorithm to the following elements: **3**
20, 10, 5, 15, 25, 30, 50, 35

OR

Apply quick sort algorithm to the following elements:
11, 15, 13, 14, 2, 8, 10

(C) Apply binary search algorithm to the following elements and find out a index of element 10 **7**
11, 15, 13, 14, 2, 8, 10

OR

Apply selection sort algorithm to the following elements:
20, 10, 5, 15, 25, 30, 50, 35

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