Shirpur Education Society's

R. C. PATEL INSTITUTE OF TECHNOLOGY, SHIRPUR

An Autonomous Institute

(Affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere)

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(स्वायत्त महाविद्यालय)

Programme: B.TECH (AIDS)/B.TECH (AIML) **Year: II/Semester III (Exam Year: 2024-2025)**

Subject: Data Structures **Time:** 02:30 pm - 04:30 pm (02:00 Hrs.)

Date: 24 Mar 2025 **Max Marks: 60**

RE END SEMESTER EXAMINATION ODD SEM-III(MARCH 2025)

Instructions: 1. This question paper contains 3 pages
2. Answer to each new question to be started on a fresh page.
3. Figure in right hand side indicates full marks

1.		**15**
1. 1.		**10**
	1. What is a List as an Abstract Data Type (ADT)? Discuss the various applications of linked lists in real-world scenarios. Explain how linked lists are used in different domains with appropriate examples.	**10**
	---------- OR ----------	
	2. What is a balanced binary search tree? How can it be used to improve the performance of search and insert operations?	**10**
2.	Suppose we have a sorted array of elements [12, 14, 16, 17, 20, 24, 31, 43, 50, 62] find the location of element 24 in it using Fibonacci Search.	**5**
2.		**15**
1. 1.		**5**
	1. Sort the array [24, 9, 29, 14, 19, 27] using the Quick Sort algorithm and also write time complexity of Quick Sort.	**5**
	---------- OR ----------	
	2. Insert the following sequence of keys in the hash table [3, 2, 9, 6, 11, 13, 7, 12] using modulo division hashing technique & linked list for collision resolution	**5**
2. 1.		**10**
	1. Explain Stack as ADT and their operations. How can a stack be implemented using an array?	**10**
	---------- OR ----------	
	2. Define AVL Tree & Insert following nodes in sequence in AVL Tree: 10, 20, 30, 40, 50, 25, 5, 15, 35, 45	**10**
3.		**15**
1.	Write Algorithm of Breadth-First Search (BFS) traversal for graph data structure and explain it with suitable example. Also write the time complexity of BFS.	**10**
2. 1.		**5**
	1. Explain the difference between best-case, worst-case, and average-case time complexities. Provide examples to illustrate each case.	**5**
	---------- OR ----------	
	2. What is an Abstract Data Type (ADT)? Discuss the difference between an ADT and its implementation. Provide examples of ADTs and explain how they can be implemented using different data structures	**5**

4.		**15**
1. 1.		**10**
	1. What is a circular queue? Write pseudocodes for all of its operations.	**10**
	---------- OR ----------	
	2. Describe how traversal works in different types of linked lists (Singly Linked List, Doubly Linked List, and Circular Linked List). Provide the algorithm for traversal in each type	**10**
2.	Explain Graph representation using matrix and Linked List with suitable example.	**5**