



**SRM Institute of Science and Technology**  
**Faculty of Engineering and Technology**  
**DEPARTMENT OF CSE**  
Vadapalani Campus, Chennai 600026, Tamilnadu  
**Academic Year: 2024-25 Semester: ODD**

Mode of Exam  
**OFFLINE**  
**SET-A**

<b>Test: CLAT-1</b>	<b>Date: 16.10.2024</b>
<b>Course Code &amp; Title: 21CSC551J Advanced Data Structures &amp; Algorithms</b>	<b>Duration: 110 mins.</b>
<b>Year &amp; Sem: I MTech / 1 SEM</b>	<b>Max. Marks: 60</b>

**Course Articulation Matrix:**

PROGRAM OUTCOME(POs)																
		GRADUATE ATTRIBUTES												PSO		
CO	COURSE OUTCOME (COs)	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	Analyze the complexity of algorithm and if needed, modify it to improve its efficiency	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Apply self balancing tree structures for developing search algorithms	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	Identify and Use appropriate data structure for multi-dimensional search solution	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	Implement the Graph structure and use heaps for graph algorithms	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	Understand the complexity classes of algorithms and conversion to another class.	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-

<b>Part – A (20 x 03 = 60 Marks)</b> <b>Instruction: Answer Any 3 Questions</b>						
Q. No.	Question	Marks	BL	CO	PO	
1	Design a data structure for creating a dictionary with a numeric key and an associated word as item. a) Design an algorithm to insert records into the data structure at the beginning. Discuss its time complexity. (8 marks) b) Design an algorithm to delete the record at the beginning. Discuss its time complexity. (6 marks) c) Design an algorithm to search for an item with the given key and print it. (6 marks)	20	3	1	1	
2	a) Illustrate the Enqueue and Dequeue operations are performed in a Queue. Explain with suitable pseudocode. (8 marks) b) Solve using recurrence tree method $T(n) = 2 * T(n/2) + c$ (6 marks) c) State master theorem and solve $T(n) = 2T(n/4) + n^{0.51}$ using it. (6 marks)	20	3	1	1	
3	a) Design the insert algorithm in a BST and Illustrate the tree formation with the input sequence JAN, FEB,	20	3	2	1	

	<p>MAR, APR, MAY, JUN, JUL, AUG and SEP where <math>A &lt; B &lt; C \dots &lt; Z</math>. (8 marks)</p> <p>b) Sort the input sequence in ascending order and show the BST formation with the sorted input sequence (7 marks)</p> <p>c) Compare the two BSTs in terms of their efficiency for search. (5 marks)</p>				
4	<p>a) Compare and contrast AVL trees and splay trees. (5 marks)</p> <p>b) Construct a RED BLACK tree for the following sequence of numbers 8, 18, 5, 15, 17, 25, 40 &amp; 80. Design the pseudocode for recolor and rotation operations. (15 marks)</p>	20	3	2	2

#### Course Outcome (CO) and Bloom's level (BL) Coverage in Questions

