U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

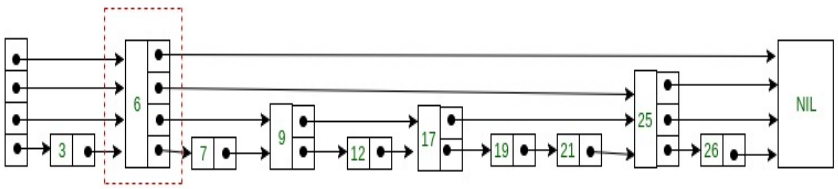
Autonomous Institute Affiliated to VTU

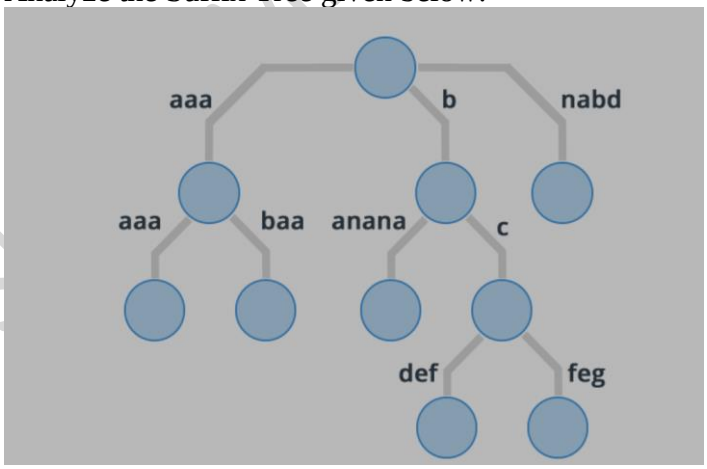
October 2024 Supplementary Examinations

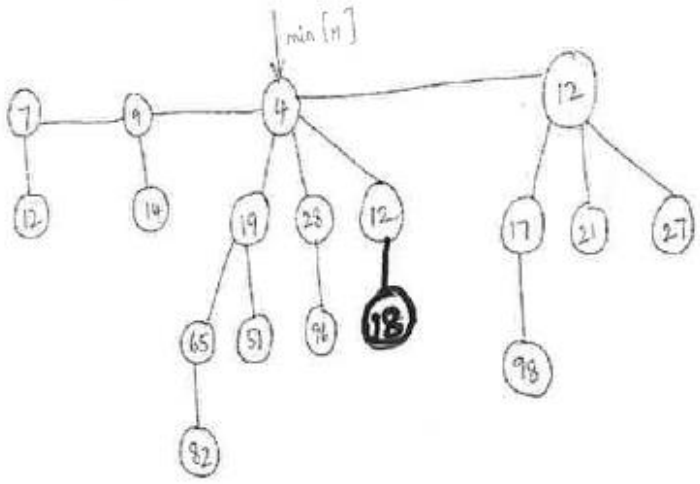
Programme: B.E. **Semester: VI**
Branch: Computer Science and Engineering **Duration: 3 hrs.**
Course Code: 22CS6PEADS **Max Marks: 100**
Course: Advanced Data Structures

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		UNIT - I	*CO*	*PO*	Marks
1	a)	Given an array arr[] consisting of N integers, consisting only of 0's initially and queries Q[][] of the form {L, R, C}, the task for each query is to update the subarray [L, R] with value C. Develop a program to print the final array generated after performing all the queries using Disjoint sets. Sample Input: N = 5, Q = {{1, 4, 1}, {3, 5, 2}, {2, 4, 3}} Output: 1 3 3 3 2 Explanation: Initially, the array is {0, 0, 0, 0, 0} Query 1 modifies the array to {1, 1, 1, 1, 0} Query 2 modifies the array to {1, 1, 2, 2, 2} Query 3 modifies the array to {1, 3, 3, 3, 2}	CO2	PO 2	08
	b)	Consider the following self-organizing list implemented using count method. Input list: 1, 2, 3, 4, 5 Value searched: 4 Output list: 4, 1, 2, 3, 5 Modified input list now: 4, 1, 2, 3, 5 Value searched: 5 Value searched: 5 Value searched: 2 Analyze the input given and draw the output list and justify your answer.	CO 1	PO1	06
	c)	Analyze the skip list diagram given below and delete the node with value 6. Show the updated skip list with appropriate pointers and levels. 	CO 1	PO1	06

			UNIT - II			
	2	a)	Construct AVL tree by inserting the following elements successively from an empty tree 100, 200, 300, 250, 270, 70, 40.	**CO 1**	**PO 1**	**10**
		b)	Construct 2-3 tree for the following numbers: 8, 11, 31, 24, 56, 89, 91, 65, 13, 45, 102, 23, 77, 123, 145	**CO 1**	**PO 1**	**10**
			OR			
	3	a)	Create a B-tree of order 5 for the following: 8, 9, 10, 11, 15, 16, 17, 18, 20, 23	**CO 1**	**PO 1**	**10**
		b)	Construct a Red Black Tree for the following numbers: 24, 63, 2, 84, 51, 74, 31, 29 Show all the steps clearly and clearly indicate the recoloring and rotations performed.	**CO 1**	**PO 1**	**10**
			UNIT - III			
	4	a)	Construct a Fenwick Tree for the following array {2, 1,-1,4,5,-2, 3, 8, 6, -1}. Also show how the sum from 0 to 5 is computed and searching happens in the tree. Clearly show how the parent is computed for each node and how the tree structure is formed.	**CO 1**	**PO 1**	**10**
		b)	Construct a Segment Tree for the following values: {5, 9, -3, 6, 11, 21} and show the maximum of (2,4) is computed using the Segment tree. Show the paths used for computation clearly.	**CO 1**	**PO 1**	**10**
			OR			
	5	a)	Analyze the Suffix Tree given below:  i) Add the string aaabc and bcdff to the above tree and draw the updated tree structure. ii) Also justify how Suffix Tree performs searching faster than Tries.	**CO 2**	**PO 2**	**06**
		b)	Construct a 2-dimensional tree for the following points. (17,2), (3,3), (6,8), (1,13), (9,12), (13,6), (23,13), (5,2) Show each step clearly.	**CO 1**	**PO 1**	**06**

		c)	Discuss the applications of Segment Trees.	CO 1	PO 1	04
		d)	Write the procedure to compute the parent node in a Fenwick tree with an example.	CO 1	PO 1	04
			UNIT - IV			
	6	a)	Apply Cuckoo hashing and construct the hash table for the following numbers: 121, 31, 47, 61, 42, 33, 11, 76, 89, 71 Show collision resolution is achieved and is better than the other existing hashing techniques.	CO 1	PO 1	10
		b)	Apply Hopscotch hashing and construct the hash table for the following numbers: 10, 6, 51, 49, 71, 21, 44, 56, 61, 88, 14, 15 Assume neighborhood=3. Explain the advantages and applications of Hopscotch hashing.	CO 1	PO 1	10
			UNIT - V			
	7	a)	Describe the properties of a Binomial Tree.	CO 1	PO 1	04
		b)	Construct a Binomial Heap with 3 Binomial trees of order 0,3,4 and demonstrate how minimum node is extracted with all the steps clearly.	CO 1	PO 1	08
		c)	For the below Fibonacci Heap, show how the value 65 and 98 are decreased to values 23 and 13 respectively. Node 18 is the marked node. Show all the steps clearly. Then, delete the value 12. 	CO 2	PO 2	08

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