MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL (A constituent unit of MAHE, Manipal)

I SEMESTER M.TECH. (COMPUTER NETWORKING AND ENGINEERING / SOFTWARE ENGINEERING) END SEMESTER EXAMINATIONS, FEB. 2022 SUBJECT: ADVANCED DATA STRUCTURES AND ALGORITHMS [ICT 5151] REVISED CREDIT SYSTEM

(07/02/2022)

PART B

TIM	E: 75 Minutes MAX. MAI	RKS: 20
Instru	ctions to candidates	
•	Answer ALL questions.	
•	Missing data, if any, may be suitably assumed.	
Q.No.	Questions	Marks
1A.	Discuss the fast method to multiply two n-bit numbers which uses Divide and Conquer strategy and analyse its time complexity. Justify how it is faster than the normal Divide and Conquer method. Demonstrate the working of the fast method considering the numbers 1011 and 0101.	5
1B.	Show the result of the following sequence of instructions: union(1,3), union(2,4), union(1,5), union(2,7), union(3,6), union(8,10), union(1,8), union(3,10), union (3,11), union(3,12), union(3,13), union(14,15), union(16,0), union(14,16), union (1,3), union(1, 14) when the unions are i. performed by considering b joined to a if it is union(a,b) ii. performed by height iii. performed by size	3
1C.	Consider the dataset given below and sort the elements using shell sort. Show all the steps clearly. (Assume the data initially to be split into 4 columns). 16 4 3 13 5 6 8 9 10 11 12 17 15 18 19 7 1 2 14 20	2
2A.	Given the keys and their probabilities as shown in Table Q.2A, Construct an Optimal Binary Search Tree. Show all the intermediate computations. Which design technique does it follow? Table O 2A	5
	Kave 1 2 2 4 5	
	$\mathbf{R} \mathbf{C} \mathbf{y} \mathbf{S} \qquad \mathbf{I} \qquad \mathbf{Z} \qquad \mathbf{S} \qquad \mathbf{H} \qquad \mathbf{J}$ $\mathbf{P} \mathbf{r} \mathbf{o} \mathbf{b} \mathbf{a} \mathbf{b} \mathbf{i} \mathbf{i} \mathbf{f} \mathbf{o} \mathbf{g} \qquad 20 \qquad 10 \qquad 15 \qquad 25 \qquad 2$	
2B.	Use Extendible hashing to store the following keys. Assume the block size as 4. 11, 16, 13, 35, 57, 24, 62, 23, 56, 37, 3, 45, 59, 50, 25, 52, 28	3
2C.	Show the result of accessing the key 5 and deleting 6 in the splay tree given in Fig.Q.2C.	2



Fig.Q.2C