SOMAIYA VIDYAVIHAR UNIVERSITY

28/02/24

Semester: January 2024 – April 2024		
Maximum Marks: 30 M	Examination: In-Semester Examination	Duration : 1hr:15 Min
Programme code: 04 **Programme: B. Tech Information Technology**	**Class:** SY	**Semester:** IV(SVU 2020)
Name of the Constituent College: **K. J. Somaiya College of Engineering**	**Name of the department:** IT	
Course Code: 116U04C403	**Name of the Course: Analysis of Algorithms**	

Question No.		Max. Marks
Q1	Simplify using recursion tree and determine a good asymptotic upper bound on the recurrence $T(n)=T(n/6)+T(5n/6)+cn$ and prove the same using substitution method.	10
Q2(a)	<table><tr><td>Job:</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td>Profit :</td><td>13.6</td><td>15.4</td><td>20.1</td><td>13.9</td><td>15.3</td></tr><tr><td>Deadline:</td><td>2</td><td>5</td><td>3</td><td>1</td><td>3</td></tr></table> Answer the following questions :- 1. Find the maximum profit and optimal schedule with deadline. 2. Are all the jobs completed in the optimal schedule, Justify the answer?	04
Q2(b)	<table><tr><td>Item:</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td>Weight :</td><td>6</td><td>2</td><td>3</td><td>1</td><td>3</td></tr><tr><td>Profit :</td><td>100.6</td><td>10.4</td><td>15.1</td><td>27.9</td><td>89.4</td></tr></table> Answer the following questions :- 1. Write the algorithm for 0/1 knapsack using greedy approach. 2. Find the maximum profit with the optimal solution by applying fractional and 0/1 knapsack problem if maximum weight allowed is 11? 3. Explain how fractional knapsack is better than 0/1 knapsack with justification?	06
Q3	Derive the time complexity of Merge Sort using Master method. State the space complexity of Merge Sort Sort the following list of elements in descending order using Merge sort technique. Give the output of each step. {250, 29, 33, 130, 67, 79, 52, 33, 99, 51, 1} **OR** Derive the time complexity of Quick Sort using Master method. State the space complexity of Quick Sort Sort the following list of elements in descending order using Quick sort technique. Give the output of each step. (Consider Last Element as Pivot) {250, 29, 33, 130, 67, 79, 52, 33, 99, 51, 1}	10

1/1