

JK Lakshmipat University, Jaipur

INSTITUTE OF ENGINEERING AND TECHNOLOGY

Theory Exam-III, December 2021
B. Tech. in CSE, Semester VII

Roll No.....

CS1213: Advanced Data Structures and Algorithms

Time: 2 hours

Max. Marks: 20

Instructions to students:

1. Do not write anything other than your roll number on the question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/flowcharts wherever required is an integral part of the answer.
4. COs refers to the course outcomes of the course structure.

- | | Marks | LOs |
|---|-------|------------|
| <p>1. Fibonacci heap is a mergeable heap and supports all its operations, including the decrease key. Consider the Fibonacci heap operations with priority queue and try to solve any one of the following operations:</p> <ol style="list-style-type: none"> a. Single source shortest path using Dijkstra's Algorithm. b. Minimum spanning tree using Prim's Algorithm. <p>It is observed that in both the algorithms first step is to extract the minimum. Now complete the rest process by using the concepts of the Fibonacci heap.</p> | 4 | CO3
CO5 |
| <p>2. Create a Red-Black Tree and AA tree for the sequence: 2, 1, 4, 5, 9, 3, 6, and 7. Find the black height and level order of the created tree, respectively. Comment on amortized cost analysis of both the trees if five more elements are inserted in sequence.</p> | 6 | CO4
CO2 |
| <p>3. Show the Binomial Heap Union on given Binomial heaps as following</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p><i>new[H₁]</i> →</p> </div> <div style="text-align: center;"> <p><i>head[H₂]</i> →</p> </div> </div> | 5 | CO5 |
| <p>4. Apply disjoint set FIND and UNION operations on the given graph to compute the minimum spanning tree. Compare the running time with Prims/Kruskal algorithms to decide on an energy-efficient algorithm.</p> | 5 | CO6
CO7 |

