CSPE43 – ADVANDED DATA STRUCTURES AND ALGORITHMS

COMPENSATION EXAMINATION

Professor: Dr. Nithya

Date: 28/04/2023 Maximum Marks:20

Question-1

Your roll number has 9 digits, in the format of 106121XXX. Concatenate this with the reverse of the successor of your roll number. Split the resultant string into an array of numbers such that the array consists of a one-digit number, immediately followed by a two-digit number, which is then followed by a one-digit number and so on. Construct a height biased leftist heap with these numbers. This is a unique heap which follows the min-heap property in a different way – the sum of digits of the root is lesser than or equal to the sum of digits of both its children. In case of a tie, the values of the numbers are directly compared and the lesser one is taken as the root. [4]

Question-2

In an initially empty B-Tree of order 3, insert {10, 20, 30, 40, 50, 60, 70, 80, 90, 100}. From the resultant tree, delete the elements {10, 20, 30, 40, 50, 60, 70, 80, 90, 100}. [4]

Question-3

Solve the 6x6 N-Queen Problem. Take any one solution of the problem and construct a quad tree using the points on which the queens are placed. [4]

Question-4

Kamal loves multiplication a lot. He is in class 10 and wants to practice matrix multiplication. He has five matrices in his hand – the matrix sequence is given by {4, 10, 3, 12, 20, 7}. In what order must he multiply the matrices to ensure he performs the maximal number of multiplications? [4]

Question-5

Using the same array as constructed in Q1, construct the sparse table. Now, if the number of elements in the array is n, find the minimum element in range [[n/4], [3n/4]] ([.] represents the greatest integer function) using the constructed sparse table. [4]
