

1	<p>a) Data Structures not only help in better storage and handling but good choice of data structure can also help in making the algorithm faster. Discuss and validate the above with an example.</p> <p>b) For many problems the elementary data structures are not suffice and we need to augment these data structures. Take the example of “finding overlapping intervals” to prove your point.</p>
2	<p>Write an efficient algorithm for the following</p> <p>a) Knuth-Morris Pratt Algorithm for string matching</p> <p>b) Imagine four railroad cars positioned on the input side of the track numbered 1,2,3,4 respectively. Suppose we perform the following operations: move car 1 into stack, move 2 into stack, move 2 out, move 3 into stack, move 4 into stack, move 4 out, move 3 out, move 1 out. As a result the original order has been changed from 1234 to 2431. What permutations of the number 1,2,3,4 are possible that can be get using the above method? Input that permutation and get the output as yes or no indicating it is possible or not.</p>
3	<p>a) Fibonacci Heaps are an efficient data structure for many problems. Explain the construction of Fibonacci Heap Data Structure. How various operations are done on the Fibonacci Heap Data Structure including Delete, Insert and Decrease Key?</p> <p>b) How a key is deleted from a B-Tree. Explain with the help of proper example and diagram.</p>
4	<p>a) Give the linked list representation of Sparse Matrices</p> <p>b) How the deletion is performed in a red black tree, if both parent and leaf are both black.</p> <p>c) What are the two improvements done in Disjoint Set Data structure which improves its time complexity for doing the updations?</p> <p>d) Write an algorithm to find cycles in a graph.</p>