B.Sc. (Honours) Examination, 2018
Semester-III
Computer Science
Course : BCSC-31 (Old)
(Design and Analysis of Algorithms)
(Only Back Candidates)

Time : 3 Hours **Full Marks : 40**

Questions are of value as indicated in the margin

Answer Question No.**1** and **any four** from the rest.

1. a) Define big O notation.
   b) Define prefix-free encoding.
   c) Compare adjacency list and adjacency matrix representations of a graph.
   d) Define a closed hashing. Also define load factor in a clased hasting. 2+2+2+2=8
2. a) Present the mergersert algorithm to sort n numbers.
   b) Obtain the worst case time complexity of the algorithm.
   c) Is it an optimal algorithm to solve the sorting problem? 4+3+1=8
3. a) Define matrix chain multiplication problem.
   b) Present a dynamic programming algorithm to solve the problem.
   c) Derive the time complexity of the algorithm. 1+4+3=8
4. a) Present a deterministic algorithm to obtain the k-th smallest element in a set of n numbers.
   b) Obtain the time complexity of the algorithm. 4+4=8
5. a) Obtain a tight lower bound to sort n elements using sorting by comparison.
   b) Present Bucket Sort algorithm to sort elements.
   c) Obtain its time complexity. 3+4+1=8
6. a) What is meant by Breadth First Search of a graph?
   b) Present the algorithm to search a graph using Breadth First search.
   c) Obtain the time complexity of the algorithm. 1+5+2=8
7. a) Present Krushkal's algorithm to obtain a minimum spanning tree of a weighted graph.
   b) Mention the data structure to be used for its implementation.
   c) Obtain the time complexity of the algorithm. 4+2+2=8

———