

DATA STRUCTURES

(Common to CSE and IT)

Time: 3 hours

Max. Marks: 70

PART – A

(Compulsory Question)

- 1 Answer the following: (10 X 02 = 20 Marks)
- (a) What is best case and worst case performance?
 - (b) Let P be a singly linked list and Q be the pointer to an intermediate node x in the list. What is the worst-case time complexity of the best known algorithm to delete the node x from the list?
 - (c) Assume that the operators +, -, x are left associative and ^ is right associative. The order of precedence (from highest to lowest) is ^, x, +, -. What is the postfix expression corresponding to the infix expression $a + b \times c - d \wedge e \wedge f$?
 - (d) What are the prerequisites for implementing the queue using array?
 - (e) Suppose the numbers 7, 5, 1, 8, 3, 6, 0, 9, 4, 2 are inserted in that order into an initially empty binary search tree. The binary search tree uses the usual ordering on natural numbers. What is the in-order traversal sequence of the resultant tree?
 - (f) Define transitive closure of a graph.
 - (g) Consider a file sorted in the reverse order. Calculate the total number of comparisons when the file is sorted using insertion sort.
 - (h) Suppose we have a $O(n)$ time algorithm that find median of an unsorted array. Now consider a Quick Sort implementation where we first find median using the above algorithm, then use median as pivot. What will be the worst case time complexity of this modified Quick Sort?
 - (i) Write non recursive pseudo code for binary search.
 - (j) What are the ways in which rehashing can be implemented?

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

- 2 Describe different notations used to represent complexities.

OR

- 3 Write an algorithm to delete a node having minimum value from a single linked list.

UNIT – II

- 4 Write an algorithm to convert infix expression into polish notation.

OR

- 5 Write the procedure to insert and delete a data in queue. Illustrate with an example.

UNIT – III

- 6 Construct a binary tree given the pre-order and in-order sequences as below:

Pre order : a b c e l f j d g h k l

In order : e i c f j b g d k h l a

OR

- 7 Write and explain Dijkstra's algorithm for finding shortest path. Give an example.

UNIT – IV

- 8 Trace the quick sort algorithm to sort the list J, N, T, U, A in alphabetical order.

OR

- 9 Explain heap sort algorithm. Illustrate with an example.

UNIT – V

- 10 Illustrate the idea of searching a hash table using chaining techniques.

OR

- 11 Compare bucket hashing with open hashing and closed hashing. Write algorithm to search for a value