Roll No. | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (IT) (Sem.–3)

DATA STRUCTURE & ALGORITHMS

Subject Code : BTIT-301-18

M.Code : 76391

Date of Examination : 17-05-2023

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. Write briefly :

a. What is the time complexity of finding the minimum or maximum value in a binary heap?

b. How can you optimize the performance of binary search on a sorted array with repetitive elements?

c. What is time-space tradeoff in algorithm design?

d. What is the difference between in-place sorting algorithms and out-of-place sorting algorithms?

e. How does the choice of data structure affect the efficiency of an algorithm?

f. Differentiate between various Graph traversal algorithms.

g. How circular linked list is different from simple linked list and what is its advantage?

h. Write down the algorithm of linear search.

i. What is a minimum spanning tree?

j. What is the different type of notations for algorithm analysis?

SECTION-B

2. How can a graph be represented using an adjacency matrix? What is the time complexity of adding or removing edges using this representation?

3. Whish data structure can be used to implement a breadth-first search algorithm? Elaborate by giving an example.

4. What is the difference between a stack and a deque (double-ended queue)? When would you use one over the other? Illustrate using deletion operation.

5. How does the performance of bubble sort depend on the initial ordering of the input elements? How can this be used to optimize the algorithm for specific types of input?

6. What is the maximum number of elements that can be stored in a stack of fixed size? How can a stack be used to reverse a string or a list? Write down steps for string "UNIVERSITY".

SECTION-C

7. How can a tree data structure be used to represent a hierarchical structure, such as a file system or an organization chart? What is the time complexity of finding the minimum or maximum value in a binary heap? How can this operation be performed efficiently?

8. How can a graph data structure be used to represent a social network? How can Dijkstra's algorithm be used to find the shortest path between two vertices in a weighted graph? What is the time complexity of this algorithm?

9. How does the time complexity of Merge sort compare to other sorting algorithms? Write down steps for Merge sort and Quick sort and explain using a sample array of numbers.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.