Printed Page:- 04 **Subject Code**:- **AMCA0203N**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

MCA

SEM: II - THEORY EXAMINATION (2022-2023)

Subject: Data Structure and Analysis of Algorithm

Time: 3 Hours **Max. Marks: 100**

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*

1. *This Question paper comprises of* **three Sections -A, B, & C.** *It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.*

2. *Maximum marks for each question are indicated on right -hand side of each question.*

3. *Illustrate your answers with neat sketches wherever necessary.*

4. *Assume suitable data if necessary.*

5. *Preferably, write the answers in sequential order.*

6. *No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.*

SECTION A **20**

1. Attempt all parts:-

1-a. The measure of the longest amount of time possibly taken to complete an algorithm is expressed as __. (CO1) 1

(a) Little-O

(b) Little-Omega

(c) Big-Omega

(d) Big-O

1-b. Two main measures for the efficiency of an algorithm are _____? (CO1) 1

(a) Processor and memory

(b) Complexity and capacity

(c) Time and space

(d) Data and space

1-c. parenthesis not required in postfix/prefix expressions ? (CO2) 1

(a) Yes

(b) No

1-d. Which one of the following is an application of Queue Data Structure? (CO2) 1

(a) When a resource is shared among multiple consumers.

(b) When data is transferred asynchronously between two processes.

(c) Load Balancing

(d) All of the above

1-e. On which algorithm is heap sort based on? (CO3) 1

(a) Fibonacci heap

(b) Binary tree

(c) Priority queue

(d) FIFO

1-f. Which of the following is not a stable sorting algorithm in its typical implementation. (CO3) 1

(a) Insertion Sort

(b) Quick Sort

(c) Bubble Sort

(d) selection Sort

1-g. Which of the following is the most widely used external memory data structure? (CO4) 1

(a) AVL tree

(b) B-tree

(c) Spanning tree

(d) None of These

1-h. A _____ is a non-linear data structure representing the hierarchical structure of one or more elements known as nodes. (CO4) 1

(a) Tree

(b) Child nodes

(c) Leaf nodes

(d) None of the above

1-i. How many solutions are available for a graph having negative weight cycle? (CO5) 1

(a) One solution

(b) Two solutions

(c) No solution

(d) Infinite solutions

1-j. Which algorithmic technique does Fibonacci search use? (CO5) 1

(a) Brute force

(b) Divide and Conquer

(c) Greedy Technique

(d) Backtracking

2. Attempt all parts:-

2.a. List down the operations performed on linked list. (CO1) 2

2.b. What are the drawback of array implementation of queue? (CO2) 2

2.c. Define graph. Explain various operations on graphs. (CO3) 2

2.d. Define AVL Tree and its properties. (CO4) 2

2.e. Explain Dijkstra's algorithm with an example. (CO5) 2

SECTION B **30**

3. Answer any <u>five</u> of the following:-

3-a. Write down the algorithm for deletion of a node at the begining of doubly linked list. (CO1) 6

3-b. Define an array and its types. Discuss the limitations of arrays. Write down the syntax declaration for single and multi dimensional array. (CO1) 6

3-c. Write down the algorithm of Enqueue. (CO2) 6

3-d. Write down the algorithm to evaluate prefix notation. (CO2) 6

3.e. Illustrate the operation of insertion sort on the array <9, 4, 6, 8, 3,5> (CO3) 6

3.f. What is threaded binary tree? Explain the operation of threaded binary tree. (CO4) 6

3.g. When would you choose to use Kruskal's algorithm over Prim's algorithm? Give an example. (CO5) 6

SECTION C **50**

4. Answer any <u>one</u> of the following:-

4-a. Write a program in C to create a doubly linked list and display in reverse order. (CO1) 10

4-b. What do you mean by Asymptotic Notation? (CO1) 10

5. Answer any <u>one</u> of the following:-

5-a. How to implement stack using priority queue or heap write algorithm and program of it. (CO2) 10

5-b.	Convert the following infix expression into postfix form (A+B)*(C+D)*E^F . (CO2)	10

6. Answer any <u>one</u> of the following:-

6-a.	Explain DFS algorithm with example.(CO3)	10
6-b.	Illustrate the operation of Bubble sort on the array A = <6, 2, 11, 7, 5, 8, 3, 14 > (CO3)	10

7. Answer any <u>one</u> of the following:-

7-a.	What is a binary search tree? How do you insert an element into a binary search tree? (CO4)	10
7-b.	Wap to Insertion in a Binary Tree and Deletion in a Binary Tree And Algorithm of it (CO4)	10

8. Answer any <u>one</u> of the following:-

8-a.	With an example discuss Warshall's algorithm(CO5)	10
8-b.	What is Spanning Tree ? Describe Kruskal and Prim's algorithm to find the minimum cost spanning tree and explain the complexity. (CO5)	10