Printed Page:- 3 **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 (2023 - 2024)

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. Which of the following case exist in complexity theory? (CO1) 1

(a) Best case

(b) Worst case

(c) Average case

(d) All of the mentioned

1-b. An array Index starts with _____ (CO1) 1

(a) 0

(b) 1

(c) 2

(d) 3

1-c. A data structure in which elements can be inserted or deleted at/from both ends but not in the middle is? (CO2) 1

(a) Queue

(b) Circular queue

(c) Dequeue

(d) Priority queue

1-d. A queue follows _____ (CO2) 1

(a) FIFO

(b) LIFO

(c) Ordered array

(d) Linear tree

1-e. The adjacency matrix of a directed graph the row sum is the _____ degree and the column sum is the _____ degree. (CO3) 1

(a) in,out

(b) out,in

(c) out,Out

(d) None

1-f. Directed Graphs is- (CO3) 1

(a) A directed graph is a set of vertices and edges.

(b) A directed graph is a graph in which the edges have a direction.

(c) Edges are usually represented by arrows pointing in the direction.

(d) All the Above

1-g. What is a full binary tree? (CO4) 1

(a) Each node has exactly zero or two children

(b) Each node has exactly two children

(c) Each node has exactly one or two children

(d) None of These

1-h. What is an AVL tree? (CO4) 1

(a) A tree which is balanced and is a height balanced tree

(b) A tree which is unbalanced and is a height balanced tree

(c) A tree with three children

(d) A tree with atmost 3 children

1-i. Bellmann Ford Algorithm is an example for: (CO5) 1

(a) Dynamic Programming

(b) Greedy Algorithms

(c) Linear Programming

(d) Branch and Bound

1-j. Following are a properties of the spanning tree connected to graph G: (CO5) 1

(a) A connected graph G can have more than one spanning tree.

(b) The spanning tree does not have any cycle

(c) Spanning tree has n-1 edges, where n is the number of nodes

(d) All The Above

2. Attempt all parts:-

2.a. Define Circular linked list. (CO1) 2

2.b. Define Priority Queue. (CO2) 2

2.c. Define graph with an example. (CO3) 2

2.d. Define Tree and Binary Tree. (CO4) 2

2.e.	Define sorting. (CO5)	2
SECTION-B		30
3. Answer any five of the following:-		
3-a.	Differentiate between Array and Linked list. (CO1)	6
3-b.	Define Big Theta notation with an example. (CO1)	6
3-c.	Define searching? List different types of searching available? Write algorithm for linear search. (CO2)	6
3-d.	Explain & write down the algorithm for pop operation in stack. (CO2)	6
3.e.	Compare adjacency matrix and adjacency list representations of graph. (CO3)	6
3.f.	Define B Tree and its advantages. (CO4)	6
3.g.	Define Spanning Tree, Minimum Spanning Tree and its applications. (CO5)	6
SECTION-C		50
4. Answer any one of the following:-		
4-a.	Define single linked list and write an algorithm to delete the first node of Singly Linked List. (CO1)	10
4-b.	What do you mean by Asymptotic Notation? (CO1)	10
5. Answer any one of the following:-		
5-a.	Evaluate the postfix expression ab + cd/- where a=5, b=4, c=9, d=3. (CO2)	10
5-b.	What is Tower of Hanoi problem? Explain solutions of Tower of Hanoi problem using proper tree representation where number of disks n= 3 and towers are labeled as A, B, C. (CO2)	10
6. Answer any one of the following:-		
6-a.	Explain different types of Graphs in detail with help of example. (CO3)	10
6-b.	Differentiate between DFS and BFS? (CO3)	10
7. Answer any one 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.	Explain Inorder, Preorder and Postorder Traversal operation on Binary tree with example. (CO4)	10
8. Answer any one of the following:-		
8-a.	Explain & write an algorithm of Quick sort with example. (CO5)	10
8-b.	Write Kruskal's algorithm to find the minimum cost spanning tree. (CO5)	10