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 - CARRY OVER THEORY EXAMINATION - JUNE **2023**

Subject: Data Structures 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 amount of time the computer needs to run to completion is known as_____ (CO1) 1

(a) Time complexity

(b) Recursive function

(c) Space complexity

(d) None of the above

1-b. A singly linked list is also called as …….. (CO1) 1

(a) Linked list

(b) One way chain

(c) Right link

(d) Two way chain

1-c. Queues serve major role in _____ (CO2) 1

(a) Simulation of recursion

(b) Simulation of limited resource allocation

(c) Simulation of arbitrary linked list

(d) All the above

1-d. In a circular queue, how do you increment the rear end of the queue? (CO2) 1

(a) rear++

(b) (rear+1) % CAPACITY

(c) (rear % CAPACITY)+1

(d) rear–

1-e. In C, what are the basic loops required to perform an insertion sort? (CO3) 1

(a) for and while

(b) do- while

(c) if else

(d) for and if

1-f. Select the typical running time of a heap sort algorithm? (CO3) 1

(a) O(N)

(b) O(N log N)

(c) O(log N)

(d) None of These

1-g. Which of the following need not to be a binary tree ? (CO4) 1

(a) Binary Search tree

(b) Heap

(c) AVL-Tree

(d) B-Tree

1-h. Visiting root node after visiting left and right sub-trees is called .....(CO4) 1

(a) In-order Traversal

(b) Post-order Traversal

(c) Pre-order Traversal

(d) None of these

1-i. Bellmann Ford Algorithm can be applied for (CO5) 1

(a) Undirected graph

(b) Undirected and unweighted graph

(c) Directed and weighted graphs

(d) None of these

1-j. Floyd Warshall Algorithm can be used for finding _____ (CO5) 1

(a) Single source shortest path

(b) Topological sort

(c) Minimum spanning tree

(d) Transitive closure

2. Attempt all parts:-

2.a.	State the reason that why Double linked list is more useful than single linked list. (CO1)	2
2.b.	Write the steps involved in deletion of an element in stack . (CO2)	2
2.c.	What is the Worst case running time of an insertion sort algorithm? (CO3)	2
2.d.	Differentiate between Strictly binary tree and Complete Binary tree. (CO4)	2
2.e.	Differentiate between merge sort and quick sort. (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 end in double linked list. (CO1)	6
3-b.	Show that 3n + 2 = O (n) (CO1)	6
3-c.	Define Indexing and its types. List down index evaluation matrix. (CO2)	6
3-d.	Explain Linear search optimization. (CO2)	6
3.e.	Illustrate the operation of Counting sort on the array A = < 3, 6, 4, 1, 3, 4, 1, 4 > (CO3)	6
3.f.	Write an algorithm of preorder traversal and explain with help of example. (CO4)	6
3.g.	Write a C program to sort a list of elements using the quick sort algorithm. (CO5)	6

SECTION C **50**

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

4-a.	Write a program in C to insert a new node at the beginning of a Singly Linked List. (CO1)	10
4-b.	How can someone insert a node in a random location of the Linked List? (CO1)	10

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

5-a.	Give an algorithm to Check if a queue can be sorted into another queue using a stack. (CO2)	10
5-b.	Write a program in C to insert a node at the beginning of a circular linked list.	10

(CO2)

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

6-a. Define Graphs representation methods in details. (CO3) 10

6-b. Write a program to illustrate Bubble sort with help of two Stacks (CO3) 10

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

7-a. Find n-th node in Postorder traversal of a Binary Tree along with its algorithm. (CO4) 10

7-b. What is Binary Tree? Explain Representation of Binary tree. Also explain different operation that can be performed on Binary tree. (CO4) 10

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

8-a. Explain stable sorting method. Is merge sort a stable sorting method? Justify. (CO5) 10

8-b. Write a quick sort algorithm and derive the worst case and best case complexity of this algorithm. (CO5) 10