**Printed Page:-03** 

## Subject Code:- BMCA0102

Max. Marks: 100

**Roll. No:** 

## NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA (An Autonomous Institute Affiliated to AKTU, Lucknow)

MCA

## SEM: I - THEORY EXAMINATION (2024-2025)

Subject: Data Structures

**Time: 3 Hours General Instructions:** 

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<ol> <li>IMP:</li> <li><i>1.</i> Thi</li> <li><i>Quest</i></li> <li><i>2.</i> Ma.</li> <li><i>3.</i> Illu</li> <li><i>4.</i> Ass</li> <li><i>5.</i> Pre</li> <li><i>6.</i> No</li> <li>evalue</li> </ol>	Verify s Que. ions (1 ximun strate ume s ferabl sheet sheet uted/ci	y that you have received the question paper with the correct course, code, branch of stion paper comprises of <b>three Sections -A, B, &amp; C.</b> It consists of Multiple Choice MCQ's) & Subjective type questions. In marks for each question are indicated on right -hand side of each question. your answers with neat sketches wherever necessary. uitable data if necessary. by, write the answers in sequential order. should be left blank. Any written material after a blank sheet will not be hecked.	?tC.
<u>SECT</u>	ION-	$\mathbf{A}$	20
1. Atte	empt a	all parts:-	
1-a.	W	Thich of the following is incorrect? Algorithms can be represented: (CO1, K1)	1
	(a)	as pseudo codes	
	(b)	as syntax	
	(c)	as programs	
	(d)	as flowcharts	
1-b.	Μ	lerge sort is algorithm.(CO1, K1)	1
	(a)	comparison-based	
	(b)	Divide and Conquer based	
	(c)	Greedy Approach based	
	(d)	all of these	
1-c.	T	he time complexity of enqueue operation in Queue is (CO2, K1)	1
	(a)	O(1)	
	(b)	O(n)	
	(c)	O(nlogn)	
	(d)	O(logn)	
1-d.	A de	list of elements in which enqueue operation takes place from one end, and equeue operation takes place from one end is (CO2, K1)	1
	(a)	Queue	
	(b)	Stack	

- (c) Linklist
- (d) Binary Tree

1-e. Which of the following is true regarding polynomial addition?(CO3, K1)

- (a) exponents are added if coefficients are same
- (b) coefficients are added if exponents are same
- (c) only coefficients of all the nodes are added
- (d) exponents and coefficients of all nodes are added
- Linked list is considered as an example of \_\_\_\_\_\_ type of memory 1 allocation.(CO3, K1)

1

(a) Static

1-f.

- (b) Compile time
- (c) Heap
- (d) Dynamic
- 1-g. An AVL tree is a self balancing binary search tree, in which the heights of the 1 two child sub trees of any node differ by \_\_\_\_\_(CO4, K1)
  - (a) At least one
  - (b) At most one
  - (c) Two
  - (d) At most two
- 1-h. Two balanced binary trees are given with m and n elements respectively. They can 1 be merged into a balanced binary search tree in \_\_\_\_\_ time.(CO4, K1)
  - (a) O(m+n)
  - (b) O(mn)
  - (c) O(m)
  - (d) O(mlog n)
- 1-i. A graph with all vertices having equal degree is known as a \_\_\_\_\_(CO5, 1 K1)
  - (a) Multi Graph
  - (b) Regular Graph
  - (c) Simple Graph
  - (d) Complete Graph
- 1-j. For a given graph G having v vertices and e edges which is connected and has no 1 cycles, which of the following statements is true? (CO5, K1)
  - (a) v = e
  - (b) v = e+1
  - (c) v + 1 = e
  - (d) v = e 1
- 2. Attempt all parts:-

2.a.	Write average case and worst case complexity of Binary search algorithm.(CO1, K2)	2
2.b.	Define Direct Recursion.(CO2, K1)	2
2.c.	How many types of Linked List exist?(CO3, K2)	2
2.d.	What is the range of Balance factor in AVL tree?(CO4, K2)	2
2.e.	Explain depth first search (DFS)? (CO5, K2)	2
<b>SECTIO</b>	<u>N-B</u>	30
3. Answe	r any <u>five</u> of the following:-	
3-a.	Explain Big-O notation with example.(CO1, K2)	6
3-b.	Differentiate between Linear and Non-linear Data Structure.(CO1, K4)	6
3-c.	Write down the advantages of Recursion.(CO2, K2)	6
3-d.	Explain Infix to prefix coversion with a suitable example.(CO2, K2)	6
3.e.	Write a function to print alternate elements of a singly linked list.(CO3, K3)	6
3.f.	Write an algorithm for insertion in Binary tree. State different conditions of insertion. (CO4,K2)	6
3.g.	Explain the various applications of Graphs. (CO5, K2)	6
<b>SECTIO</b>	<u>N-C</u>	50
4. Answe	r any <u>one</u> of the following:-	
4-a.	What is Row-major and Column-major order matrix. Explain representation of it with example. (CO1, K2)	10
4-b.	Explain the operations performed on Stack, Queue and List.(CO1, K2)	10
5. Answe	r any <u>one</u> of the following:-	
5-a.	Write a menu driven program in python to implement the various operations on a linear queue.(CO2, K3)	10
5-b.	Explain Tower of Hanoi problem and write its code using recursion. (CO2, K2)	10
6. Answe	r any <u>one</u> of the following:-	
6-a.	What are the main differences between the Linked List and Linear Array?(CO3, K2)	10
6-b.	Write functions in Python to delete a node (i) from the beginning, (ii) from the end in a doubly linked list. Illustrate with an example.(CO3, K3)	10
7. Answe	r any <u>one</u> of the following:-	
7-a.	Define B-Tree? Generate a B-Tree of order 4 with the alphabets (letters) arrive in the sequence as follows: a g f b k d h m j e s i r x c l n t u p (CO4, K6)	10
7-b.	Explain threaded binary tree ADT in detail. (CO4, K2)	10
8. Answe	r any <u>one</u> of the following:-	
8-a.	Discuss how to represent graph storage using Adjacency matrix. (CO5, K2)	10
8-b.	Define graph. Explain various operations on graphs. (CO5, K2)	10

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