Printed Page:- **Subject Code:- BCSBS0203Z**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: II - THEORY EXAMINATION (20..... - 20.....)

Subject: Data Structures & Algorithms

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. For many problems such as sorting, there are many choices of algorithms to use, some of which are extremely_____. (CO1,K2) 1

(a) Space efficient

(b) Time efficient

(c) Both (a) and (b)

(d) None of the above

1-b. To verify whether a function grows faster or slower than the other function, we have some asymptotic or mathematical notations, which is_____.(CO1,K2) 1

(a) Big Omega Ω (f)

(b) Big Theta θ (f)

(c) Big Oh O (f)

(d) All of the above

1-c. Which of these best describes an array? (CO2,K1) 1

(a) A data structure that shows a hierarchical behavior

(b) Container of objects of similar types

(c) Container of objects of mixed types

(d) All of the mentioned

1-d. Process of inserting an element in stack is called _____. (CO2,K1) 1

(a) Create

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(b) Push
(c) Evaluation
(d) Pop

1-e. A Binary Tree can have. (CO3,K1) 1
(a) Can have 2 children
(b) Can have 1 children
(c) Can have 0 children
(d) All of the above

1-f. In which traversal root node in visited at the last. (CO3,K1) 1
(a) Post-order traversal
(b) Pre-order traversal
(c) In-order traversal
(d) None

1-g. Which of the following sort method is stable? (CO4,K1) 1
(a) Insertion Sort
(b) Binary Sort
(c) Shell Sort
(d) Heap Sort

1-h. The goal of hashing is to produce a search that takes: (CO4,K1) 1
(a) O(1) time
(b) O(n2) time
(c) O(log n) time
(d) O(nlog n) time

1-i. Which of the following is true about graph. (CO5,K1) 1
(a) Linear Data Structure
(b) Non-Linear Data Structure
(c) Both a annd b
(d) None of the above

1-j. In sequential file organization record can be inserted only a_____(CO5,K1) 1
(a) Random position
(b) Beginning
(c) End of the file
(d) None of the above

2. Attempt all parts:-

2.a. Define space complexity of an algorithm (CO1,K1) 2

2.b. Write need of prefix and postfix expression. (CO2,K2) 2

2.c. Give the application of Graph. (CO3,K2) 2

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2.d.	Write short note on perfect hash function. (CO4,K1)	2
2.e.	Write short note on file organization. (CO5,K1)	2

SECTION-B 30

3. Answer any five of the following:-

3-a.	Differentiate iterative and recursive algorithm. (CO1,K2)	6
3-b.	Differentiate linear and non-linear data structure. (CO1,K2)	6
3-c.	Convert following infix expression into postfix expression. (CO2,K2) 1) A - B - D ∗ E / F + B ∗ C 2) (A-B) *C + (C*D) - (F+G)	6
3-d.	Write an algorithm to insert and delete an element from a linear Queue. (CO2,K3)	6
3.e.	Explain in-order, pre-order and post-order traversal with example (CO3,k2)	6
3.f.	Write a program to implement sequential search. (CO4,K3)	6
3.g.	Write short note on file structure and also explain sequential file structure in detail. (CO5,k2)	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	Define algorithm and explain features of an algorithm with example. (CO1,K2)	10
4-b.	Write short note on following asymptotic notation (CO1,K2): 1) Big-Oh. 2) Big-Theta. 3) Big-Omega.	10

5. Answer any one of the following:-

5-a.	Write a short note on 2-D array and also explain memory management of 2-D array with their memory access formula. (CO2,K2)	10
5-b.	Define doubly link list and write a program to implement doubly link list. (CO2,K3)	10

6. Answer any one of the following:-

6-a.	Define AVL tree. Explain the term balance factor in AVL tree? Describe various rotations performed on AVL tree with the help of neat diagram. (CO3,K2)	10
6-b.	Draw the B-tree of order 3 created by inserting the following data arriving in sequence - 92 24 6 7 11 8 22 4 5 16 19 20 78. (CO3,K3)	10

7. Answer any one of the following:-

7-a.	Define is merge sort? Explain the procedure of merge sort with example. (CO4,K2)	10
7-b.	Explain different types of hashing techniques. (CO4,K2)	10

8. Answer any one of the following:-

8-a.	Explain Prim's algorithm of finding minimum spanning tree with an example. (CO5,K2)	10
8-b.	Define graph traversing and also explain DFS with suitable example. (CO5,K2)	10