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Subject Code:- BCSBS0203

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: II - THEORY EXAMINATION (2023 - 2024)

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. Time complexity of an algorithm is the maximum amount of _____ required by it during execution. (CO1) 1

(a) Time
(b) Operations
(c) Memory space
(d) None of the above

1-b. Which of the following notation used to represent upper bound of complexity. (CO1) 1

(a) Big-Oh
(b) Big-Theta
(c) Big-Omega
(d) All of the above

1-c. In a stack, if a user tries to remove an element from empty stack it is called _____. (CO2) 1

(a) Underflow
(b) Empty collection
(c) Overflow
(d) Garbage Collection

1-d. In which of the following link list stepping back is not possible. (CO2) 1

(a) Singly Link List
(b) Doubly Link List
(c) Doubly Circular
(d) All of Above

1-e. In which traversal root node in visited at the first. (CO3) 1

(a) Post-order traversal
(b) Pre-order traversal
(c) In-order traversal
(d) None

1-f. A complete binary tree with the property that the value at each node is at least as large as the value of its children is known as: (CO3) 1

(a) Binary Search Tree
(b) AVL Tree
(c) Completely Balance Tree
(d) Max-Heap

1-g. in a complete binary tree, what is the location of right child of a node in its array representation, if node present at ith location (CO4) 1

(a) i
(b) 2i
(c) 2i+1
(d) i/2

1-h. The algorithm design technology used in the quick sort algorithm is: (CO4) 1

(a) Dynamic programming
(b) Back tracking
(c) Divide and Conquer
(d) Greedy method

1-i. Direct access file organization is efficient for_____ (CO5) 1

(a) Small database
(b) Large database
(c) Both A & B
(d) None of the above

1-j. For a given graph G having v vertices and e edges which is connected and has no cycles, which of the following statements is true? (CO5) 1

(a) v=e
(b) v = e+1
(c) v + 1 = e
(d) None of the mentioned

2. Attempt all parts:-

2.a.	Define space complexity of an algorithm (CO1)	2
2.b.	Write advantages of Linked List over an Array. (CO2)	2
2.c.	Write short on binary tree. (CO3)	2
2.d.	Write short note on divide and conquer technique of algorithm development. (CO4)	2
2.e.	Define out degree of a vertex. (CO5)	2

SECTION-B 30

3. Answer any five of the following:-

3-a.	Differentiate iterative and recursive algorithm. (CO1)	6
3-b.	Define Data Structure and also Explain Various types of Data Structure in detail. (CO1)	6
3-c.	Define circular queue? How it is efficient as compared to linear queue. (CO2)	6
3-d.	Write a program to insert a node in singly link list. (CO2)	6
3.e.	Create a Binary Search Tree for the following data and do in-order, Preorder and Post-order traversal of the tree. 50, 60, 25, 40, 30, 70, 35, 10, 5 (CO3)	6
3.f.	Write a program to implement sequential search. (CO4)	6
3.g.	Write a short note on the following. (CO5) a) Graph b) Cycle c) Path	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	Explain different types of recursion with example. (CO1)	10
4-b.	Explain different types of asymptotic notation with example. (CO1)	10

5. Answer any one of the following:-

5-a.	Define stack? Write algorithm for push, pop and peek operation on stack. (CO2)	10
5-b.	Explain the concept of dynamic memory allocation in linked lists and its significance. (CO2)	10

6. Answer any one of the following:-

6-a.	Create AVL tree for following data- 21, 26, 30, 9, 4 , 14, 28, 18, 15, 10, 2, 3, 7. (CO3)	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)	10

7. Answer any one of the following:-

7-a.	Describe different types of collision resolution techniques with example. (CO4)	10
7-b.	Define quick sort .Arrange the given keys using the Quick Sort algorithm: 10, 5, 8, 12, 15, 6, 3, 9, 16. (CO4)	10

8. Answer any one of the following:-

8-a.	Explain depth first search algorithm with suitable example. (CO5).	10

8-b. List various fundamental file organization techniques and explain each in brief. (CO5) 10