Printed Page:- 04 **Subject Code**:- **AOE0662**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM:VI CARRY OVER THEORY EXAMINATION -AUGUST 2023

Subject: Data Structures

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 largest element of an array's index is called its _____. (CO1) 1

(a) lower bound.

(b) upper bound.

(c) range.

(d) extraction.

1-b. Which of these best describes an array? (CO1) 1

(a) A data structure that shows a hierarchical behavior

(b) Container of objects of similar types

(c) Arrays are immutable once initialised

(d) Array is not a data structure

1-c. Out of the following operators (^, *, +, &, $), the one having highest priority is _____. (CO2) 1

(a) +

(b) $

(c) ^

(d) &

1-d. Consider the following operation performed on a stack of size 5. 1

Push(1);
Pop();
Push(2);
Push(3);
Pop();
Push(4);
Pop();
Pop();
Push(5);

How many elements are left in stack? (CO2)

(a) 1

(b) 2

(c) 3

(d) none of these

1-e. Which of the following is not an advantage of trees? (CO3) 1

(a) Hierarchical structure

(b) Faster search

(c) Router algorithms

(d) Undo/Redo operations in a notepad

1-f. The root R of the tree T is assigned the level number _____. (CO3) 1

(a) 0

(b) 1

(c) -1

(d) 5

1-g. 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? (CO4) 1

(a) v=e

(b) v = e+1

(c) v + 1 = e

(d) v = e-1

1-h. Prim’s algorithm is also known as _____. (CO4) 1

(a) Dijkstra–Scholten algorithm

(b) Borůvka's algorithm

(c) Floyd–Warshall algorithm

(d) DJP Algorithm

1-i. The complexity of the sorting algorithm measures the _____ as a function of the number 'n' of items to be sorted. (CO5) 1

(a) average time

(b) running time

(c) average-case complexity

(d) case-complexity

1-j. _____ is the method used by card sorter. (CO5) 1

(a) Radix sort

(b) Insertion

(c) Heap

(d) Quick

2. Attempt all parts:-

2.a. Define traversing. (CO1) 2

2.b. Write any four example of stack from real life. (CO2) 2

2.c. What do you mean by siblings in a tree? (CO3) 2

2.d. Define adjacent vertices. (CO4) 2

2.e. What is linear search? (CO5) 2

SECTION B **30**

3. Answer any five of the following:-

3-a. Differentiate between 1-D & 2-D data array and write application for it. (CO1) 6

3-b. Explain circular linked list and doubly linked list with diagram. (CO1) 6

3-c. What is Stack? Is stack a linear or non-linear data structure? Explain with proper reason. (CO2) 6

3-d. Evaluate the following Postfix expression E:AB+C*D/ ,for A=2,B=3,C=4,D=5. (CO2) 6

3.e. Explain Linked List Representation of Binary Tree with example. (CO3) 6

3.f. Write the adjacency and path matrix for the following graph. (CO4) 6

3.g. State different File Organizations and discuss the advantages and 6

disadvantages of each of them. (CO5)

SECTION C **50**

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

4-a. Explain linear data structure in detail with example. (CO1) 10

4-b. Define a) Data b) Data Item c) Record d) File e) Attribute (CO1) 10

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

5-a. Distinguish between stack and queue. Explain delete and insertion operation with respect to both the types of data structures. (CO2) 10

5-b. What is recursive function and recursive procedure? Explain algorithm for Fibonacci Sequence with reference to recursion. (CO2) 10

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

6-a. Create a Binary Search Tree for the following data and do in-order, Preorder and Post-order traversal of the tree. (CO3) 10
50, 60, 25, 40, 30, 70, 35, 10, 55, 65, 5

6-b. How to add child nodes in Binary tree, Binary Search Tree and AVL Tree? Explain with example. (CO3) 10

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

7-a. Explain BFS algorithm with an example. List any three applications of BFS algorithm. (CO4) 10

7-b. What do you understand by cyclic graph? Write two ways through which a graph can be represented in the memory? What do you mean by in-degree and out-degree of a graph? (CO4) 10

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

8-a. Write a function for quick sort using recursion. (CO5) 10

8-b. Write an algorithm to sort the data in ascending order using quick sort and sort 77,33,44,11,88,22,66,55. Show steps. (CO5) 10