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 - THEORY EXAMINATION (2023 - 2024)
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. Which of the following is a linear data structure? (CO1) 1

(a) Array
(b) AVL Tree
(c) Binary Tree
(d) Graph

1-b. Two main measures for the efficiency of an algorithm are (CO1) 1

(a) Processor and memory
(b) Complexity and capacity
(c) Time and space
(d) Data and space

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

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

1-d. 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-e. A Binary Tree has ..... (CO3) 1

(a) Can have 2 children

(b) Can have 1 children

(c) Can have 0 children

(d) All of the options

1-f. The balance factor of a node in a binary tree is defined as _____ . (CO3) 1

(a) addition of heights of left and right subtrees

(b) height of right subtree minus height of left subtree

(c) height of left subtree minus height of right subtree

(d) height of right subtree minus one

1-g. The Data structure used in standard implementation of Breadth First Search is? (CO4) 1

(a) Stack

(b) Queue

(c) Linked List

(d) Tree

1-h. A Graph is called _____ graph if there exists a path from any vertex to any other vertex. (CO4) 1

(a) connected

(b) Complete

(c) directed

(d) weighted

1-i. The worst-case occur in linear search algorithm when ……. (CO5) 1

(a) Item is somewhere in the middle of the array

(b) Item is not in the array at all

(c) Item is the last element in the array

(d) Item is the last element in the array or item is not there at all

1-j. The complexity of bubble sort algorithm is ….. (CO5) 1

(a) O(n)

(b) O(logn)

(c) O(n2)

(d) O(n logn)

2. Attempt all parts:-

2.a. What is the difference between elementary data item and grouped data item? (CO1) 2

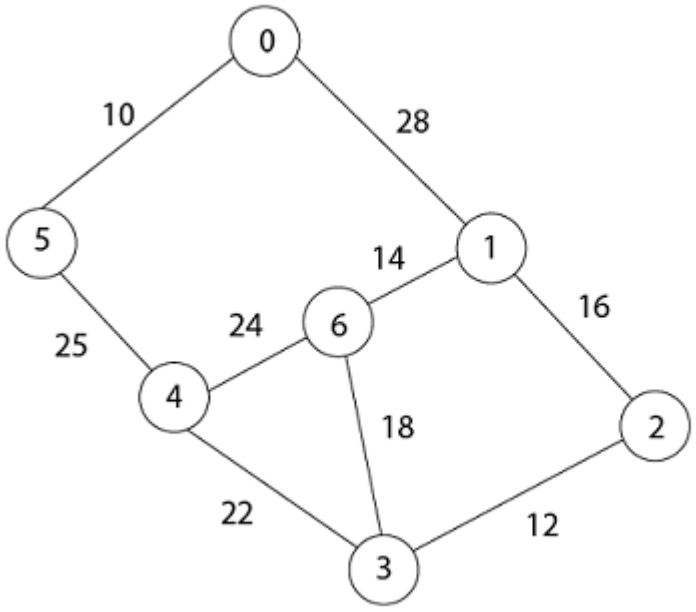
2.b. Define double ended queue. (CO2) 2

2.c.	Define Height of a Tree. (CO3)	2
2.d.	What do you mean by directed graph? (CO4)	2
2.e.	Name different types of file organizations. (CO5)	2

SECTION-B 30

3. Answer any five of the following:-

3-a.	What are various operations in data structure? Explain in brief. (CO1)	6
3-b.	Given a 2D array A [-100:100, -5:50]. Find the address of element A [99,49] considering Base address is 10 & each elements require 4 bytes for storage. (CO1) a) Row major method b) Column major method	6
3-c.	Write an algorithm to insert an element into a queue. (CO2)	6
3-d.	Convert the infix expression to postfix expression (A+B^D-E)/(E-F)+G (CO2)	6
3.e.	What is threaded binary tree? Explain two-way threaded binary tree with an example. (CO3)	6
3.f.	Find the minimum spanning tree for the following graph using kruskal's algorithm. (CO4)	6



3.g.	Differentiate between Linear Search and Binary Search. (CO5)	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	Explain memory representation techniques of sparse matrix with example. (CO1)	10
4-b.	What is Linked List? What are types of Linked List? Write an algorithm to traverse a linked list. (CO1)	10

5. Answer any one of the following:-

5-a. Explain the addition and deletion operations performed on a circular queue with necessary algorithms. (CO2) 10

5-b. Write an algorithm for Tower of hanoi problem and explain it in detail. (CO2) 10

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

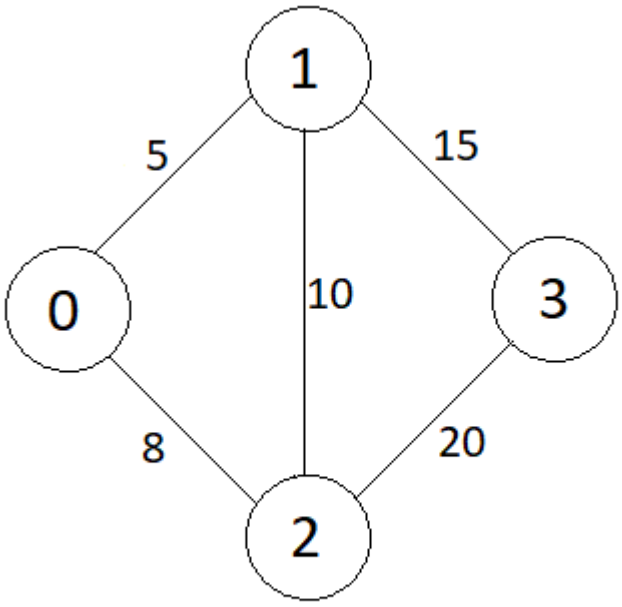
6-a. Can you find a unique tree when any two traversals are given? Using the following traversal construct the corresponding binary tree: (CO3) 10
INORDER: H K D B I L E A F C M J G
PREORDER: A B D H K E I L C F G J M
Also find the Post Order traversal of obtained tree.

6-b. Explain In-order, Pre-order and Post-order Traversal operations on Binary tree with example. (CO3) 10

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

7-a. What do you understand by weighted 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

7-b. Differentiate between graph and minimum spanning tree. Find the minimum spanning tree for the following graph using prim's algorithm: (CO4) 10



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

8-a. Write down algorithm of Merge Sort and analyze the complexity of Merge Sort. (CO5) 10

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