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Printed Page:-4 **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 (2025 - 2026)
Subject: Data Structurers

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:-

(1.1) Which of the following case does not exist in complexity theory? (CO1, K2) 1

(a) Best case
(b) Worst case
(c) Average case
(d) Null case

(1.2) The operation of processing each element in the list is known as..... (CO1, K1) 1

(a) Sorting
(b) Merging
(c) Inserting
(d) Traversal

(1.3) In a stack, if a user tries to remove an element from empty stack it is called _____. (CO2, K3) 1

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

(1.4) Any arithmetic expression can be represented in any of the notation. (CO2, K2) 1

(a) Infix expression
(b) Postfix expression
(c) Prefix expression
(d) all the above

(1.5) What is the speciality about the inorder traversal of a binary search tree? (CO3, K2) 1

(a) It traverses in a non increasing order
(b) It traverses in an increasing order
(c) It traverses in a random fashion
(d) It traverses based on priority of the node

(1.6) What is an AVL tree? (CO3, K2) 1

(a) a tree which is balanced and is a height balanced tree
(b) a tree which is unbalanced and is a height balanced tree
(c) a tree with three children
(d) a tree with atmost 3 children

(1.7) A Graph is called _____ graph if there exists a path from any vertex to any other vertex. (CO4, K2) 1

(a) connected
(b) Complete
(c) directed
(d) weighted

(1.8) ..... are drawn or used to connect two nodes of the graph. (CO4, K3) 1

(a) trees
(b) Graphs
(c) path
(d) edges

(1.9) The Average case occurs in the linear search algorithm …….(CO5,K3) 1

(a) when the item is somewhere in the middle of the array
(b) when the item is not the array at all
(c) when the item is the last element in the array
(d) Item is the last element in the array or item is not there at all

(1.10) The complexity of merge sort algorithm is …… (CO5,K1) 1

(a) O(n)
(b) O(logn)
(c) O(n2)
(d) O(n logn)

2. Attempt all parts:-

(2.1) Define Big Oh notation. (CO1, K1) 2

(2.2) Define Overflow condition in Stack operation. (CO2, K1) 2

(2.3) Write down algorithm for in-order tree traversal.(CO3, K1) 2

(2.4) Define complete graph. (CO4,K1) 2

(2.5) What is sorting? Write the various types of sorting. (CO5,K1) 2

SECTION-B 30

Answer any one of the following:-

(3.1) Differentiate between 1-D & 2-D data array and write application for it. (CO1,K1) 6

(3.2) Write an algorithm to delete a data item from an array.(CO1,K1) 6

Answer any one of the following:-

(3.3) Write an algorithm for Fibonacci sequence. (CO2, K2) 6

(3.4) How is dequeue different from a queue? (CO2, K2) 6

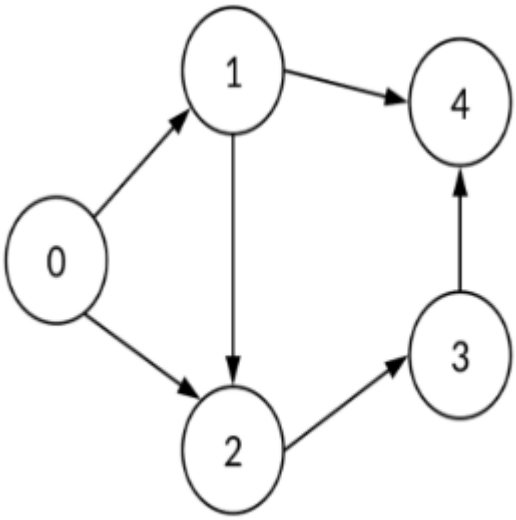
Answer any one of the following:-

(3.5) What is threaded binary tree? Explain one-way threaded binary tree with an example. (CO3, K2) 6

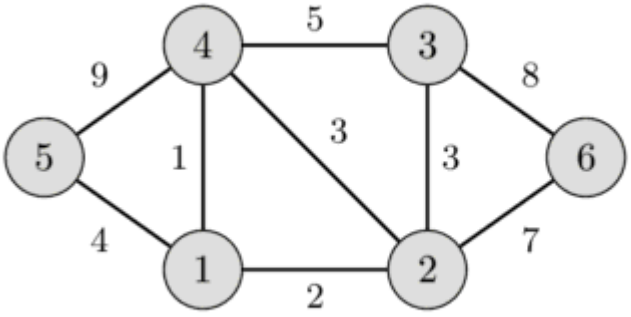
(3.6) Explain the array representation of BST in memory. (CO3, K2) 6

Answer any one of the following:-

(3.7) Construct the adjacency for the following graph. (CO4,K4) 6



(3.8) Find the minimum spanning tree for the following graph using Kruskal's algorithm. (CO4,K4) 6



Answer any one of the following:-

(3.9) Write an algorithm for linear search. (CO5,K1) 6

(3.10) Explain Quick Sort with example. (CO5,K2) 6

SECTION-C 50

4. Answer any one of the following:-

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(4.1)	Define a) Data b) Data Item c) Record d) File e) Attribute (CO1,K1)	10
(4.2)	Describe different types of linked list.(CO1,K2)	10

5. Answer any one of the following:-

(5.1)	LIFO operation is performed in which type of data structure? Explain the operation of insertion and deletion of an element from this type of data structure with the help of algorithm.(CO2,K3)	10
(5.2)	How priority Queue is different from normal queue? Explain in detail.(CO2,K1)	10

6. Answer any one of the following:-

(6.1)	Expression E: [a+(b-c)]*[(d-e)/(f + g-h)], Convert it into corresponding Binary Tree T.(CO3,K3)	10
(6.2)	Construct a Max-heap by using the following elements: 44, 33, 77, 11, 55, 88, 66. Do the pre-order, in-order and post order traversal for the same Max heap tree. (CO3,K4)	10

7. Answer any one of the following:-

(7.1)	Explain DFS algorithm with an example. List any three applications of DFS algorithm. (CO4,K2)	10
(7.2)	Explain Dijkstra algorithm with an example. Discuss its applications in real life. (CO4,K5)	10

8. Answer any one of the following:-

(8.1)	Write down algorithm of Binary Search and write the time and space complexity of Binary search. (CO5,K2)	10
(8.2)	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,K2)	10