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Printed Page:-3 **Subject Code:- CCSE0203**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)
B.Tech
SEM: II - THEORY EXAMINATION (2025 - 2026)
Subject: Data Structure

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) An algorithm refers to (CO1,K1) 1

(a) Random set of statements
(b) Finite sequence of steps to solve a problem
(c) Programming language syntax
(d) Hardware component

(1.2) Efficiency of an algorithm depends on (CO1,K1) 1

(a) Font size of code
(b) Time and space used
(c) Variable names
(d) Output format

(1.3) Stack follows which principle(CO2,K1) 1

(a) FIFO
(b) LIFO
(c) Random
(d) Priority

(1.4) How many moves are required to solve Tower of Hanoi for 3 disks?(CO2,K1) 1

(a) 5
(b) 6
(c) 7
(d) 8

(1.5) The topmost node in a tree is called:(CO3,K1) 1

(a) Leaf
(b) Root
(c) Parent
(d) Child

(1.6) A ___ is hierarchical D?(CO3,K1) 1

(a) Array
(b) Stack
(c) Queue
(d) Tree

(1.7) A graph is defined as(CO4,K1) 1

(a) Set of nodes only
(b) Set of edges only
(c) Set of vertices and edges
(d) Set of trees

(1.8) Connected component exists in (CO4,K1) 1

(a) Directed graph only
(b) Undirected graph
(c) Weighted graph
(d) Cyclic graph

(1.9) Searching is the process of: (CO5,K1) 1

(a) Sorting data
(b) Finding a specific element in a collection
(c) Deleting data
(d) Merging files

(1.10) Quick Sort uses:(CO5,K1) 1

(a) Hashing
(b) Pivot element
(c) Heap
(d) Index

2. Attempt all parts:-

(2.1) Explain the meaning of data in computer science. (CO1,K2) 2

(2.2) State the primitive operations of stack.(CO2,K1) 2

(2.3) Explain the structure of a complete binary tree.(CO3,K2) 2

(2.4) Explain the term graph with its basic components. (CO4,K2) 2

(2.5) Explain the procedure of selection sort. (CO5,K2) 2

SECTION-B 30

Answer any one of the following:-

(3.1) Explain built-in data types available in C and Python. (CO1,K2) 6

(3.2) Explain Abstract Data Types with suitable illustration. (CO1,K2) 6

Answer any one of the following:-

(3.3)	Explain prefix expression with suitable example and notation rules. (CO2,K2)	6
(3.4)	Explain the working principle of push and pop operations in stack. (CO2,K2)	6

Answer any one of the following:-

(3.5)	Explain hierarchical structure of a tree and illustrate with an example diagram.(CO3,K2)	6
(3.6)	Compare parent, child, and sibling nodes with a diagram.(CO3,K1)	6

Answer any one of the following:-

(3.7)	Explain the concept of a graph and describe its fundamental components with examples. (CO4,K2)	6
(3.8)	Differentiate between directed and undirected graphs with suitable illustrations. (CO4,K1)	6

Answer any one of the following:-

(3.9)	Apply binary search to locate 45 in the list: 5, 12, 18, 27, 34, 45, 56, 63, 71, 89. Show each iteration and comparisons. (CO5,K3)	6
(3.10)	Explain heap sort and radix sort with suitable examples . (CO5,K2)	6

SECTION-C 50

4. Answer any one of the following:-

(4.1)	Demonstrate insertion operation in singly linked list. (CO1,K3)	10
(4.2)	Explain polynomial representation using linked lists. (CO1,K2)	10

5. Answer any one of the following:-

(5.1)	Explain Stack as an Abstract Data Type, including definition, characteristics, and basic terminology. (CO2,K2)	10
(5.2)	Explain queue as a linear data structure along with its fundamental characteristics. (CO2,K2)	10

6. Answer any one of the following:-

(6.1)	Compare balanced and unbalanced trees with diagrams and discuss their advantages .(CO3,K3)	10
(6.2)	Identify tree from given in-order(2,5,6,10,12,14,15) and pre-order(10,5,2,6,14,12,15) sequences and illustrate the tree.(CO3,K2)	10

7. Answer any one of the following:-

(7.1)	Explain important graph terminologies including degree, path, cycle, and connected graph. (CO4,K2)	10
(7.2)	Describe Dijkstra’s algorithm for finding shortest paths from a single source with an example. (CO4,K2)	10

8. Answer any one of the following:-

(8.1)	Apply insertion sort to arrange 22, 11, 99, 88, 9, 7, 42, 5. Show all passes and compute total comparisons. (CO5,K3)	10
(8.2)	Explain heap sort and radix sort with suitable examples and compare their efficiency, . (CO5,K2)	10