Enrollment No......................................

Faculty of Engineering
End Sem Examination Dec 2024
EE3CO59 Data Structures through C

Programme: B.Tech.   Branch/Specialisation: EE

Duration: 3 Hrs.   **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

			Marks	BL	PO	CO	PSO
Q.1	i.	What is a data structure?	1	1	1	1	1
		(a) A programming language					
		(b) A collection of algorithms					
		(c) A way to store and organize data					
		(d) A type of computer hardware					
	ii.	Which is the most appropriate data structure for reversing a word?	1	1	1	1	1
		(a) Stack (b) Queue					
		(c) Graph (d) Tree					
	iii.	What is the time complexity for inserting an element at the end of a singly linked list?	1	2	2	2	1
		(a) O(1) (b) O(n)					
		(c) O(log n) (d) O(n log n)					
	iv.	In a circular linked list, the last node points to which node?	1	2	2	3	1
		(a) The next node in sequence					
		(b) The head node					
		(c) Itself					
		(d) The previous node					
	v.	The number of edges from the node to the deepest leaf is called _____ of the tree.	1	2	2	3	1
		(a) Height (b) Depth					
		(c) Length (d) Width					

vi. What is a full binary tree? **1**   1   1   1   1
   (a) Each node has exactly zero or two children
   (b) Each node has exactly two children
   (c) All the leaves are at the same level
   (d) Each node has exactly one or two children

vii. Which of the following properties a simple graph does not hold? **1**   1   1   1   1
   (a) Must be connected
   (b) Must be un-weighted
   (c) Must have no loops or multiple edges
   (d) Must have no multiple edges

viii. Which of the following ways can be used to represent a graph? **1**   2   1   2   1
   (a) Adjacency list and adjacency matrix
   (b) Incidence matrix
   (c) Adjacency list, adjacency matrix as well as incidence matrix
   (d) None of these

ix. Which of the following search algorithms requires the data to be sorted? **1**   3   1   4   1
   (a) Linear search   (b) Binary search
   (c) Fibonacci search   (d) All of these

x. Which of the following sorting algorithms is based on the divide-and-conquer technique? **1**   3   1   4   1
   (a) Insertion sort   (b) Bubble sort
   (c) Quick sort   (d) Selection sort

Q.2 i. Define arrays and stacks in short. **2**   1   1   1   1

ii. Write three applications of stacks. **3**   2   2   3   1

iii. Demonstrate the arithmetic expressions Conversion from Infix to Postfix for expression A+B*C+D. **5**   2   2   3   1

OR iv. Demonstrate the array representation of queue with suitable diagram using an example. **5**   2   2   3   1

Q.3 i. Give any two classification of different linked list in detail. **3**   1   1   1   1

ii. Illustrate the searching operation considering single linked list using an example. **7**   3   4   3   1

OR iii. Illustrate the sparse matrix representation using arrays and linked list using examples. **7**   3   4   3   1

Q.4 i. Discuss three properties of binary trees. **3**   2   2   2   1

ii. Illustrate in detail the min heap binary trees and max heap binary trees with examples. **7**   3   5   3   1

OR iii. Illustrate in detail the in-order and pre-order transversal in binary tree with an example. **7**   3   5   3   1

Q.5 i. Explain the breadth first search graph operations with an example. **3**   1   1   1   1

ii. Illustrate Prim's algorithm to find minimum spanning tree with an example. **7**   3   4   3   4

OR iii. Discuss the Warshall's algorithm for finding the transitive closure of a graph with an example. **7**   3   4   3   4

Q.6   Attempt any two:

i. Differentiate iterative and recursive merge sort. **5**   2   2   4   1

ii. Illustrate bubble sort method using an example. **5**   3   4   4   1

iii. Illustrate Fibonacci search method using an example. **5**   3   4   4   1

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Q.1 i)   (c) A way to store and organize data   **1**

     ii)   (a) stack   **1**

     iii) (c) O(n)   **1**

     iv)   (b) The head node   **1**

     v)   (a) Height   **1**

     vi)   (a) Each node has exactly zero or two children   **1**

     vii) (a) Must be connected   **1**

     viii) (c) Adjacency List, Adjacency Matrix as well as Incidence Matrix **1**

     ix)   (b) Binary Search   **1**

     x)   (c) Quick Sort   **1**

Q.2 i.   Define arrays **1M**   **2**
           stacks in short.**1M**

     ii.   Write three applications of Stacks. **1x3**   **3**

     iii. Demonstrate the arithmetic expressions **2M**   **5**
           Conversion from Infix to Postfix **2M**
           for expression A+B*C+D. steps **1M**

OR   iv.   Demonstrate the Array Representation of Queue **2x2 = 4M** **5**
           with suitable diagram using an example. **1M**

Q.3 i.   Give classification of different linked list in detail. (Any two) **3**
           (**1.5x2**)

     ii.   searching operation considering single linked list, example. **7**
           (**3,4**)

OR   iii. Define a sparse matrix. How can sparse matrices be represented **7**
           using linked lists? (**3,4**)

Q.4 i.   Discuss three Properties of Binary Trees. (**1x3**)   **3**

     ii.   min heap binary trees   **7**
           max heap binary trees with examples. (**3.5x2**)

OR   iii. Illustrate in detail the in-order **3.5M**   **7**
           pre-order transversal in binary tree with an example. **3.5M**

Q.5 i.   Explain the Breadth First Search Graph Operations with an **3**
           example.

     ii.   Illustrate Prim's Algorithm to find minimum spanning tree, **7**
           example (**3, 4**)

OR   iii. Discuss the Warshall's Algorithm for finding the transitive **7**
           closure of a graph with an example. (**3, 4**)

Q.6   Attempt any two:

     i.   Differentiate Iterative **2.5M**   **5**
           Recursive Merge Sort. **2.5M**

     ii.   Illustrate Bubble Sort method using an **3M**   **5**
           example. **2M**

     iii. Illustrate Fibonacci Search method using an **3M**   **5**
           example. **2M**

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