Total No. of Questions: 6 *Total No. of Printed Pages:3*

Enrollment No.....

Faculty of Engineering
End Sem Examination Dec-2023
EE3ES03 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.

Q.1 i. What are the advantages of arrays? **1**
(a) Objects of mixed data types can be stored
(b) Elements in an array cannot be sorted
(c) Index of first element of an array is 1
(d) Easier to store elements of same data type

ii. What is the time complexity of inserting at the end in dynamic arrays? **1**
(a) O(1) (b) O(n)
(c) O(logn) (d) Either O(1) or O(n)

iii. Process of inserting an element in stack is called _____. **1**
(a) Create (b) Push (c) Evaluation (d) Pop

iv. What is the space complexity for deleting a linked list? **1**
(a) O(1) (b) O(n) (c) O(logn) (d) $O(n^2)$

v. The number of edges from the root to the node is called _____ of the tree. **1**
(a) Height (b) Depth (c) Length (d) Width

vi. The maximum number of binary trees that can be formed with three unlabelled nodes is: **1**
(a) 1 (b) 5 (c) 4 (d) 3

vii. The degree of any vertex of graph is _____? **1**
(a) The number of edges incident with vertex
(b) Number of vertex in a graph
(c) Number of vertices adjacent to that vertex
(d) Number of edges in a graph

viii. Which of the following statements for a simple graph is correct? **1**
(a) Every path is a trail
(b) Every trail is a path
(c) Every trail is a path as well as every path is a trail
(d) Path and trail have no relation

ix. What is the average case running time of an insertion sort algorithm? **1**
(a) O(N) (b) O(N log N)
(c) O(log N) (d) $O(N^2)$

x. Which of the following sorting procedures is the slowest? **1**
(a) Quick sort (b) Heap sort
(c) Shell sort (d) Bubble sort

Q.2 i. Explain difference between stack and queue. **2**
ii. Explain deletion of a queue. **3**
iii. Show infix to prefix conversion using stack of following expression: **5**
(A+B)+C-(D-E)^F
OR iv. Explain complexity of algorithms. **5**

Q.3 i. Define different classification of linked lists. **2**
ii. What is polynomial representation of a linked list. **3**
iii. Explain insertion of a linked lists. **5**
OR iv. Explain deletion of a linked lists. **5**

Q.4 i. Discuss AVL search tree. **2**
ii. Discuss six properties of Binary Trees. **3**
iii. Discuss Deletion from a Binary Search Tree. **5**
OR iv. Draw the binary tree from preorder and inorder traversal: **5**
Preorder: ABDGHEICFJK
Inorder: GDHBEIACJFK

Q.5 i. Define Adjacency matrix. **2**
ii. Discuss Kruskal's Algorithm with an example. **3**
iii. Discuss Warshall's Algorithm. **5**
OR iv. Explain depth first search with an example. **5**

Q.6 Attempt any two:
i. Explain how to sort the elements by using insertion sort. **5**
ii. Discuss the Algorithm of merge sort with an example. **5**
iii. Explain Bubble sorting Algorithm. **5**

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Marking Scheme
Data Structures through C (T) - EE3ES03 (T)

Q.1	i)	d) Easier to store elements of same data type		**1**
	ii)	d) Either O(1) or O(n)		**1**
	iii)	b) Push		**1**
	iv)	a) O(1)		**1**
	v)	b) Depth		**1**
	vi)	b) 5		**1**
	vii)	a) The number of edges incident with vertex		**1**
	viii)	a) Every path is a trail		**1**
	ix)	d) $O(N^2)$		**1**
	x)	d) Bubble sort		**1**
Q.2	i.	For each difference	1 Mark	**2**
	ii.	Explanation	1.5 Marks	**3**
		Algorithm	1.5 Marks	
	iii.	++AB-C^-DEF	(1 mark*5)	**5**
OR	iv.	Each classification	1 Mark	**5**
Q.3	i.	Definition	2 Marks	**2**
	ii.	Explanation	1.5 Marks	**3**
		Algorithm	1.5 Marks	
	iii.	Explanation	2.5 Marks	**5**
		Algorithm	2.5 Marks	
OR	iv.	Explanation	2.5 Marks	**5**
		Algorithm	2.5 Marks	
Q.4	i.	Definition	2 Marks	**2**
	ii.	For each property,	0.5 Mark	**3**
	iii.	Explanation	2.5 Marks	**5**
		Example	2.5 Marks	
OR	iv.	for each step	1 Mark	**5**
Q.5	i.	Definition	2 Marks	**2**
	ii.	Explanation	2.5 Marks	**3**
		Example	2.5 Marks	
	iii.	Explanation	2.5 Marks	**5**
		Algorithm	2.5 Marks	
OR	iv.	Explanation	2.5 Marks	**5**
		Example	2.5 Marks	

Q.6

i.	Explanation	2.5 Marks	**5**
	Example	2.5 Marks	
ii.	Explanation	2.5 Marks	**5**
	Example	2.5 Marks	
iii.	Explanation	2.5 Marks	**5**
	Algorithm	2.5 Marks	

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