Hall Ticket Number:

Code No. : 14164 AO

VASAVI COLLEGE OF ENGINEERING *(AUTONOMOUS)*, HYDERABAD

Accredited by NAAC with A++ Grade

B.E. IV-Semester Backlog Examinations, July-2023

Principles of Data Structures (OE-II)

Time: **3 hours** Max. Marks: **60**

*Note: Answer all questions from **Part-A** and any **FIVE** from **Part-B***

Part-A (10 × 2 = 20 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	Define Algorithm. What is the use of analyzing an algorithm?	2	1	1	1
2.	List the types of data with examples.	2	1	1	1
3.	What is a Linked List data structure? Represent it with an example	2	1	2	1
4.	Write the properties of a Linked List data structure.	2	1	2	1
5.	What are Enqueue and Dequeue operations? Give example.	2	2	3	1
6.	List the applications of queues.	2	1	3	1
7.	What is the depth of the node in a binary tree? Give example.	2	1	4	1
8.	What are the properties of a Binary Search tree? Give example.	2	1	4	1
9.	Define Searching. Why searching is required?	2	2	5	1
10.	List the Worst case, Best case, Average case Time complexity and Worst case space Complexity of Quick sort.	2	1	5	1
	Part-B (5 × 8 = 40 Marks)				
11. a)	Write the algorithm for Binary Search using recursion.	4	2	1	1
b)	Differentiate between recursion and iteration. Give examples.	4	2	1	1
12. a)	Write an algorithm to insert a node at the middle of Linked List.	4	3	2	1,2,3
b)	What are the advantages and disadvantages of Arrays?	4	2	2	1
13. a)	Write an algorithm to evaluate the postfix expression using stack.	4	2	3	1,2,3
b)	Given an integer k and a queue of integers, how do you reverse the order of the first k elements of the queue, leaving the other elements in the same relative order? For example, if k=4 and queue has the elements [10, 20, 30, 40, 50, 60, 70, 80, 90]; the output should be [40, 30, 20, 10, 50, 60, 70, 80, 90]. Devise an algorithm	4	3	3	1,2,3

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14. a)	Write an algorithm for inserting an element into binary tree. Construct the binary tree with the following elements 20, 16, 56, 65, 35, 15, 10, 25	4	3	4	1,2,3
b)	What is Postorder Traversal? Explain with an example.	4	2	4	1,2
15. a)	Write an algorithm for checking whether there are any duplicate elements in the array or not.	4	3	5	1,2,3
b)	How is sorting performed using Merge sort technique? Explain the working with an example.	4	2	5	1,2
16. a)	Compare the different types of analysis used to analyze an algorithm.	4	2	1	1
b)	Write an algorithm to delete a node from the beginning of the linked list. Explain with an example.	4	3	2	1,2,3
17.	Answer any ***two*** of the following:				
a)	What are the different operations performed on stacks? Give examples. Show the contents of stack step by step after performing the following operations. PUSH(5), PUSH(2), PUSH(20), POP(), POP(), PUSH(100)	4	3	3	1,2,3
b)	Write an algorithm to check whether two binary trees are structurally identical.	4	3	4	1,2,3
c)	Sort the following elements using selection sort. List all the steps. 6, 8, 1, 4, 5, 3, 7, 2.	4	3	5	1,2

M : Marks; L: Bloom's Taxonomy Level; CO; Course Outcome; PO: Programme Outcome

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	40%
iii)	Blooms Taxonomy Level – 3 & 4	40%

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