Hall Ticket Number:

Code No. : 14465 N

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD
Accredited by NAAC with A++ Grade

B.E. (E.C.E.) IV-Semester Main & Backlog Examinations, July-2023

Data Structures

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.	What is self – referential structure? Give an example?	2	1	1	1

2.	For the code given below, analyze the time complexity?
	 for(i=1;i<=n;i++)
	 {
	    for(j=1;j<=i;j++)
	    {
	       Stmts;
	    }
	 }
		2	3	1	2

3.	Consider the following stack operations push(8); push(7); pop(); push(4); push(5); pop(); pop(); pop(); push(1); pop(); Write the order of popped data from stack?	2	2	2	2
4.	List and specify the various reasons, why the Linked List is better than an Array?	2	1	2	1
5.	Define depth of the node and height of the node of a Binary Tree with an example?	2	1	3	1,2
6.	Draw a Right skewed Binary Search Tree and write it's Time Complexity?	2	2	3	1,2
7.	Define a Complete Graph? Draw a 3-node complete Graph?	2	1	4	1,2
8.	What are the time complexities of the "Selection Sort" and "Insertion Sort" algorithms?	2	2	4	2
9.	What is Collision in Hash Table, Give an Example?	2	3	5	12
10.	What is the condition that the BST must meet to be an AVL tree? Give example?	2	2	5	12

Part-B (5 × 8 = 40 Marks)

11. a) Explain the importance of efficient algorithms and the significance of asymptotic analysis in this regard?	4	1	1	1,2
b) Define an ADT t_term with row, col and val as members and write a C function "SparseTranspose" which accepts the sparse matrix in triple term format as parameter. Find the Transpose of the sparse matrix? (follow the prototype as void SparseTranspose(t_term [], t_term []);	4	3	1	2,3
12. a) Define Queue data structure? Write C functions to implement Queue operations using arrays?	4	3	2	3
b) Define the node of a Single Linked List with integer data element as a member. Construct the functions to perform following operations.	4	3	2	3

    i)   Create the Head node.
    ii)   Add a node at end.
    iii)   Delete the specified node.

13. a) Write a C function to delete a node specified by its data value from a Binary Search Tree (BST)?	4	3	3	2
b) Given set of data values are {29, 32, 36, 20, 14, 17, 28}	4	2	3	3

    i)   Construct the Max – Heap Tree.
    ii)   Insert data value 22, draw updated Max – Heap Tree.

14. a) Find the Minimum Cost Spanning Tree of the given Graph using Kruskal's algorithm, show step – by – step procedure?	4	2	4	3

b) Write C program to arrange the given set of data values in sorted order using "Quick Sort" algorithm?	4	3	4	3
15. a) Explain the Four Rotations used to convert an unbalanced BST into Balanced AVL Tree?	4	1	5	2

		M	L	CO	PO

b)	Consider the list of the data values 50, 700, 76, 85, 92, 73, 101 and the hash function is given by H(k) = k Mod 7, the size of the Hash table is 7.
	  i) Construct the Hash Table using "Linear Probing" method.
	  ii) Construct the Hash Table using "Quadratic Probing" method.
		4	2	5	2

16. a)	Write a C program to read a matrix of size n – by – n by user's choice, check whether the given matrix is Symmetric or non-Symmetric?	4	3	1	3
b)	Write steps to convert the infix expression into a postfix expression using Stack operations, and convert the given infix expression a/b-c+d*e into postfix?	4	2	2	2
17.	Answer any *two* of the following:				
a)	Write the algorithms for the pre order, in order and post order Traversals with examples?	4	2	3	2
b)	Explain the Breadth First Search (BFS) algorithm to visit all the vertices of a Graph with example?	4	2	4	2
c)	Construct the Red – Black Tree for the set of data values {10, 18, 7, 15, 16, 30}, give step – by – step procedure?	4	3	5	3

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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