VIT-AP UNIVERSITY

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QUESTION PAPER

Name of the Examination: SHORT SUMMER-1 (2022-23) – FAT

Course Code: CSE2001 | **Course Title: Data Structures and Algorithms**

Set number: | **Date of Exam:** 23/06/2023 (FN) (C1)

Duration: 120 Minutes | **Total Marks: 60**

Instructions:

1. Assume data wherever necessary.
2. Any assumptions made should be clearly stated.

Q1.

a) Compute the time complexity of the following code **(5M)**

```
int i, j = 0;
for ( i = 1; i < n; i ++)
{
    for ( j = 1; j < n; j ++)
    {
        System.out.println( " Hello !! " );
    }
}
```

b) Illustrate whether the equation $4n^3 + 2n + 3 = (n^3)$ (i.e. little- Oh (n^3)) or not. **(5M)**

Q2.

Given two linked lists, merge their nodes into the first list by taking nodes alternately between the two lists. If the first list runs out, the remaining nodes of the second list should not be moved. **(10M)**

Input :

First List: 0 —> 1 —> 2 —> 3 —> NULL

Second List: 4 —> 5 —> 6 —> 7 —> 8 —> 9 —> 10 —> NULL

Output:

First List: 0 —> 4 —> 1 —> 5 —> 2 —> 6 —> 3 —> 7 —> NULL

Second List: 8 —> 9 —> 10 —> NULL

Q3. a) Construct the Binary tree from the following In-order and Pre-Order traversal **(5M)**

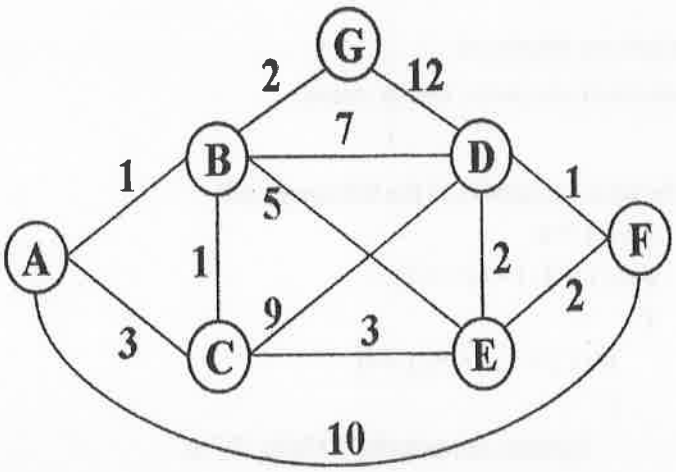
In-Order: H,D,I,B,J,E,A,K,F,L,C,G

Pre-Order: A,B,D,H,I,E,J,C,F,K,L,G

b) Draw the AVL tree that results from inserting the keys 63,9,19,27,18,108,99,81 in that order into an initially empty AVL tree. You are only required to show the final tree, although if you draw intermediate trees? **(5M)**

Q4. Write an algorithm/ pseudocode for Merge sort. Illustrate the working of Merge sort on the following array with elements: 19,17,15,12,16,18,4,11,13. Find out the best case and worst-case time complexity of Merge sort algorithm? **(10M)**

Q5. Consider the following undirected, weighted graph: **(10M)**



Step through Dijkstra's algorithm to calculate the single-source shortest paths from A to every other vertex. Show your steps in the table below. Cross out old values and write in new ones, from left to right within each cell, as the algorithm proceeds. Also list the vertices in the order which you marked them known. Finally, indicate the lowest-cast path from node A to node F.

Q6. Apply Modulo division hashing of the hash table size : 10 and use separate chaining when collision occurs. Input : 32,43,21,54,52,71,82,91. **(10M)**

i) Apply Separate Chain method and linear probing on the same input and find out the hash table.

ii) Apply Quadratic probing on the same input and find out the hash table.

QP MAPPING

Q. No.	Module Number	CO Mapped	PO Mapped	PEO Mapped	PSO Mapped	Marks
Q1	1	1,2	1,2	PEO1,2	PSO 1,2	10
Q2	2	1,2	1,2	PEO1,2	PSO 1,2	10
Q3	3	3,4	1,2,3,4,5,6,7	PEO 3,4	PSO 2,3	10
Q4	4	3,4,5	1,2,3,4,5,6,8	PEO 3,4	PSO 2,3	10
Q5	6	3,4,5	1,2,3,4,5,6,8	PEO 3,4	PSO 2,3	10
Q6	5	4,5,6	1,2,3,4,5,6,8	PEO 3,4	PSO 2,3	10