VIT
Vellore Institute of Technology

SLOT: G2+TG2

## School of Computer Science Engineering and Information Systems

**Winter Semester 2023-2024**

**Continuous Assessment Test – II**

**Programme Name & Branch** M.TECH SE

**Course Name & code:** Data Structures and AlgorithmsISWE102L

**Class Number (s):** VL2023240503062, VL2023240503050,VL2023240503066

**Faculty Name (s):** (10295 - MYTHILI N, 10939 - VIJAYAN E, 19522 - ADLA PADMA )

**Exam Duration:** 90 Min. **Maximum Marks:** 50

**General instruction(s):**

1. Write C code wherever it is asked and not necessary to write C Code for all questions
2. Give detailed solving of the problem in a step by step fashion. This carries marks.
3. Support your answers with necessary diagrams in the required places.

| Q.No. | Question | Max Marks |
|---|---|---|
| 1. | Derive the time complexity of the following code snippets | 2 |

a) O(n)

```
int main()
{

        for (i = 1; i<= n; i++)
        printf("\n Hello VIT");
}
```

4

b)

```
int main()  = O(n*m)
{
        int n = 3;
        int m = 3;
        intarr[][3]= { { 3, 2, 7 }, { 2, 6, 8 }, { 5, 1, 9 } };
        int sum = 0;

        for (inti = 0; i< n; i++) {

        for (int j = 0; j < m; j++) {

                sum += arr[i][j];
                }
        }

}
```

4

c) O(m*n)

```
for (c = 0; c < m; c++)
{
for (d = 0; d < n; d++)
{
```

```
three[c][d] = one[c][d] + two[c][d];
printf("%d\t", three[c][d]);
}
printf("\n");
}
```

2. Find the recurrence relation of the following function. 2

```
void test(int n)
{
  if(n>0)
{
  for(i=0;i<n;i++)
printf("%d",n);
}
test(n-1);
}
```

a) For the obtained recurrence relation use substitution method to find its time complexity. ( 4 marks) 4

b) Verify the obtained time complexity using recurrence tree method. (4 marks). 4

3. Identify and apply a suitable sorting algorithm to sort the following data which works on the principle of initially comparing elements far apart, then elements less far apart and finally comparing adjacent elements. 10

**x =36,125,88,97,213,55,113,14,27,16,56.**

4. Apply merge sort to sort the following data sequence. Write down the step by step working of dividing the data and assembling back with the merging sequence to get the sorted output. 10

**200,14,90,85,60,11,33,45,96,22**

5. a. Assume you are given an array which consists of integers. Further assume that the array is partially sorted. Identify a suitable sorting algorithm which works better for the given array. Explain with your own example how the algorithm works. 6

b. Write functions to perform the following operations on singly circular linked list.

i. creation 2

ii. display 2