Department of Computer Science and Engineering,
Anna University, Chennai- 600025
CS6104 – Data Structures and Algorithms (R 2018)
Practical
August – December 2023
Year/Sem/Batch : II/III/Q

Exercise: 03	Review of C Programming	30 – Aug- 2023

Observation (5 Marks)

1. What is the time complexity of following code:(1)

```
int a = 0, b = 0;
for (i = 0; i < N; i++) { a = a + rand();
}
for (j = 0; j < M; j++) { b = b + rand();
}
```

2. What is the time and space complexity of following code:(2)

```
int a = 0;
for (i = 0; i < N; i++) {
        for (j = N; j > i; j--) {
                a = a + i + j;
        }
}
```

3. What is the time and space complexity of following code:(2)

```
int i, j, k = 0;
for (i = n / 2; i <= n; i++) {
        for (j = 2; j <= n; j = j * 2) { k = k + n / 2;
        }
}
```

Execution (15 Marks)

4. Write a C program for the following and find the time and space complexity.

a. Reverse a string using recursion and iteration
b. Copy one string to another using recursion
c. Search an element in an array using recursion
d. To implement binary search using recursion

5. Write a program to print following :
i)
****
****
****
****

ii)

```
*
**
***
****
*****
```

iii)

```
    *
   **
  ***
 ****
*****
```

iv)

```
    *
   ***
  *****
 *******
*********
```

v)

```
    1
   222
  33333
 4444444
555555555
```

vi)

```
    1
   212
  32123
 4321234
543212345
```

6. Write a program to calculate the sum of following series where n is input by user. Write the recurrence relation and find the time complexity.
1 + 1/2 + 1/3 + 1/4 + 1/5 +……1/n

Spot (5 Marks)

1. Given an array e.g. 17, 23, 10, 1, 7, 16, 9, 20, sort it on paper using mergesort. Write down explicitly each step.
2. Show that the complexity of mergesort algorithm is O(NlogN) by using recurrence relations.