

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST - I EXAMINATION- MARCH-2023

COURSE CODE(CREDITS): 18B11CI211(4)

MAX. MARKS: 15

COURSE NAME: Data Structure and Algorithms

MAX. TIME: 1 Hour

COURSE INSTRUCTORS: Dr. P.K. Gupta, Dr. Ravindara Bhatt, Dr. Amol Vasudeva, Dr. Ekta Gandotra, Dr. Ruchi Verma, Dr. Simran Setia

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- **Note: All questions are compulsory.**
  - **Marks are indicated against each question in square brackets.**
  - **Attempt all parts of a question consecutively.**
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Q1.

[CO2] [1.5+1.5=3]

a) Arrange the following growth rates in increasing order:

$n \log n$ ,  $\log^2 n$ ,  $\sqrt{\log n}$ ,  $\log \log n$ ,  $2^n$ ,  $2^{\log n}$

b) Find the growth rate of following function:

$$\sum_{i=1}^n i(i-1)$$

Q2. Find the worst case time complexity of following function (Justify your answer): [CO2] [3]

```
function(int n) {
    int sum = 0;
    for(int i=0; i<n; i++){
        if(i>j)
            sum=sum + 1;
        else {
            for(int k=0; k<n; k++)
                sum=sum-1;
        }
    }
}
```

Q3. Write an algorithm that perform the insertion of a new node into an existing singly linked list in a given  $O(1)$  time. [CO4] [3]

Q4. We are given a pointer to a node (not the tail node) in a singly linked list. Delete that node from the linked list. [CO4] [3]

Q5.

[CO1] [1.5+1.5=3]

- a) Find the output of following C program:

```
int main()
{
    struct str;
    {
        int s1;
        char st[30];
    };
    struct str s[] = { {1, "struct1"}, {2, "struct2"}, {3,
    "struct3"} };
    printf("%d %s", s[2].s1, (*(s+2)).st);
}
```

- b) What will be the output of the C program (assume size of int as 4 bytes)?

```
int main()
{
    struct employee
    {
        int empid[5];
        int salary;
        employee *s;
    }emp;
    printf("%d %d", sizeof(employee), sizeof(emp.empid));
    return 0;
}
```