



Student Name: \_\_\_\_\_ Section: \_\_\_\_\_ Roll No: \_\_\_\_\_

Program: CS20 A & B

Semester: Spring – 2021 [*Covid19 Online Exam*]

Time Allowed: 1 hour + 40 Minutes

Course: **Design & Analysis of Algorithms**

Examination: Sessional – I & II

Total Marks: 50 Weightage: 20 %

Date: 28<sup>th</sup> May, 2021

Instructor: Mr. Fazl-e-Basit

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**NOTE:** Attempt all questions. ***NO ANSWER SHEET REQUIRED***

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**Time: 20 Minutes**

**Marks: 11**

**Q.3)** Prove or Disprove the following statements using a careful argument based on the mathematical definition of ‘O’ notation: **[2+2+2]**

(i)  $(n + 1)^2 \in O(n^2)$

(ii)  $n^3 \in O(n^2)$

(iii)  $n! \in O((n + 1)!)$

**Q.4)** Consider the following code in which array  $a[ ]$  is filled with unsorted integer data. ‘x’ is input at run time. **[1+4]**

```
for (i = 0; i < n; i++)  
    if (a[i] == x) return 1;    // 1 means found  
    return -1;                // -1 means not found
```

Give the running time of this algorithm in **Best**, **Average** and **Worst** case in **Theta (Θ)** Notation, if possible.