Total No. of Questions : 4]

SEAT No. :

P-5394

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[6186]-520

S.E. (Artificial Intelligence & Data Science/Computer Engineering) (Insem.)

FUNDAMENTALS OF DATA STRUCTURES

(2019 Pattern) (Semester - III) (210242)

Time : 1 Hour] *[Max. Marks : 30*

Instructions to the candidates:

1) ***Attempt questions Q1 or Q2, Q3 or Q4.***
2) ***Draw neat & labelled diagrams wherever necessary.***
3) ***Assume suitable data if necessary.***
4) ***Figures to the right indicate full marks.***

Q1) a) What is time complexity? Why asymptotic notations are important? Find time complexity of following code using step count method. **[6]**

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

b) Write pseudocode to find factorial of a number. Draw the flowchart for the same. **[5]**

c) Explain what is Linear and non-linear data structure with example. **[4]**

OR

Q2) a) Write short note on : **[6]**

ADT

Divide and conquer method.

b) What is meant by time and space complexity? Explain the asymptotic notations used for time complexity? **[5]**

P.T.O.

c) Explain what is static and dynamic data structure with example. **[4]**

Q3) a) What is Row Major and Column Major Representation? Explain with example. Write the formula to find any element A[i][j] in row major and column major representations of A. **[6]**

b) What is meant by sparse Matrix? Write an algorithm to perform addition of two sparse matrices. **[5]**

c) Explain with example how single variable polynomial can be represented using 1-D array? What is advantage and disadvantage of this representation? **[4]**

OR

Q4) a) What is the difference between simple and fast transpose of sparse matrix? Write an algorithm to find simple transpose of sparse matrix. **[6]**

b) Write an algorithm to find addition of two single variable polynomials using array. Polynomial term consists of coefficient and exponent and both are stored as an element in array. Assume terms are arranged in descending order of exponent. State time complexity of the same. **[5]**

c) Draw and explain following terms : **[4]**

2D Array

3D Array