

Total No. of Questions : 4]

SEAT No. :

PC409

[Total No. of Pages : 2

[6359]-529

S.E. (Information Technology) (Insem)
DATA STRUCTURES AND ALGORITHMS
(2019 Pattern) (Semester - III) (214443)

Time : 1 Hour]

[Max. Marks : 30

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume suitable data, if necessary.

- Q1)** a) Explain Big-oh, Omega and Theta notation with example. [5]
b) Analyse the time complexity of the following code using frequency count. [5]

```
i) for (i = 1; i <= n; i++)  
    for (j = 1; j <= i; j++)  
        for (k = 1; k <= j; k++)  
            x = x + 1;  
ii) int i = 0, j = 1;  
    while (j <= n))  
    {  
        a = a*a;  
        j++;  
    }  
    i++;
```

- c) Consider integer array `int arr[4][5]`. If the base address is 1020, find the address of the element `arr[3][4]` with row major representation of array. (Consider size of integer as 4 byte). [5]

OR

- Q2)** a) Explain the following Data Structures with example. [5]
i) Linear and Non-linear
ii) Persistent and Epharmal
b) Explain what is an algorithm. List and explain the characteristics of an algorithm. [5]
c) Write a C++ function to search a node in singly linked list. [5]

P.T.O.

- Q3)** a) Sort the following array using quick sort method. Show all steps.
6, 13, 17, 61, 29, 21, 5, 94, 7. [5]
- b) Differentiate between linear and binary search algorithm. [5]
- c) What do you mean by sort stability. Explain with example. [5]

OR

- Q4)** a) Sort the following array using merge sort method. Show all steps.
10, 5, 7, 6, 1, 4, 8, 3, 2, 9. [5]
- b) Write a C++ function to search a key using binary search in non-recursive method. [5]
- c) Explain the following concepts. [5]
- i) Internal Sorting
 - ii) External Sorting