Total No. of Questions : 4]

SEAT No. :

PC409

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[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