

Total No. of Pages: 02

Roll No.....

B.Tech. IV Semester

Mid Sem. Exam. 2019

CS 262 ALGORITHMS DESIGN AND ANALYSIS

Time: 1 Hour 30 Minutes

Max. Marks: 25

Note: Attempt all the questions. All questions carry equal marks

Q.1 Insertion Sort is applied to sort the given array of five elements: {6,4,8,1,3}. Each iteration of the Insertion Sort takes 25 \$. How much cost is incurred till the element 1 reaches at the first position of the array.

Q.2 Find the time complexity of the given function f(x):

```
int f (int x)
{
    if (x<1) return 1;
    else return (f(x-1) + g(x));
}
int g (int x)
{
    if (x<2) return 2;
    else return (f(x-1) + g(x/2));
}
```

Q.3 Consider a weighted complete graph G on the vertex set $\{v_1, v_2, \dots, v_n\}$ such that the weight of the edge (v_i, v_j) is $4 |i - j|$. What is the weight of minimum cost spanning tree of G with n nodes?

P.T.O

Q.4 Write the pseudocode/algorithm for Heap Sort, and hence find its time complexity.

Q.5 Consider the matrix representation of the directed graph where any non-zero entry (i,j) in the matrix represents the weight of the directed edge from vertex i to vertex j. Consider the vertex set as {A,B,C,D,E,F}. Let first row of the matrix represents the weighted edges for vertex A, second row for vertex B, third row for vertex C and so on. Similarly, first column represents vertex A, second column for vertex B and so on.

$$\begin{bmatrix} 0 & 6 & 90 & 0 & 0 & 80 \\ 0 & 0 & 0 & 40 & 0 & 0 \\ 0 & 8 & 0 & 0 & 0 & 10 \\ 2 & 0 & 12 & 0 & 50 & 0 \\ 4 & 3 & 16 & 0 & 0 & 0 \\ 0 & 0 & 0 & 5 & 8 & 0 \end{bmatrix}$$

- (a) Output the sequence of vertices as identified by Dijkstra's shortest path Algorithm when the algorithm starts from source vertex A.
- (b) What will be the shortest path and the cost of the path from vertex A to vertex E.

-END-