Class test on Design and Analysis of Algorithm
Class-BCSE 3rd, Sem-2nd, Time: 1 hour Marks: 30

1. What is the time complexity of the following function? Give explanation.

```
int recursive (int n)
{   if (n == 1)     return (1);
    else return (recursive (n-1) + recursive (n-1));
}
```

2. Compute the time complexity for the following three functions and compare them.

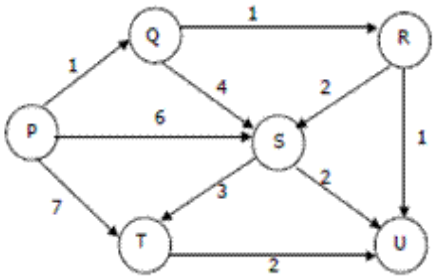
```
void fun1(int n)
{
  int i;
  for (i=1; i<n*n*n; i=i*2)
  {
    // Do some O(1) works
  }
}

void fun2(int n)
{
  int i;
  for (i=1; i<10000; i=i*2)
  {
    // Do some O(1) works
  }
}

void fun3(int n)
{
  int i;
  for (i=1; i<n*n*n; i=i+2)
  {
    // Do some O(1) works
  }
}
```

3. If T(n) = $5n^2$-3n+5, prove that $T(n)=\theta(n^2)$

4. Why prim's algorithm for finding minimum spanning tree is an greedy algorithm?-Explain.
What is its running time if prim's algorithm is implemented using heap data structure?-Explain.

5. State Master theorem and solve recurrence $T(n)=2T(\sqrt{n})+1$ using master theorem. You may assume $n=2^m(m>0)$ if you feel so.

6. Apply Dijkstra's single source shortest-path algorithm on the following edge weighted directed graph with source vertex P and find the order in which the nodes are included into the set of vertices which forms the shortest path tree.


Q
R
P
S
T
U
1
1
4
2
6
1
2
3
7
2