# ASSIGNMENT FOR 4TH SEMESTER
# INTRODUCTION OF ALGORITHMS AND ITS APPLICATIONS

## THEORY

1) What do you mean by efficiency of an algorithm? Differentiate between Recursive and Non-recursive Algorithm.

2) What is Master theorem,explain with proper example.

3) What is Asymptotic Notation.Define different types of notation.

4) Analysis the complexity of Quick sort and Merge sort.

5) Solve the following problem using Greedy approach. State the implementation regarding the following problem using both Greedy method.

A thief enters a house for robbing it. He can carry a maximal weight of 60 kg into his bag. There are 5 items in the house with the following weights and values. What items should thief take for the maximum profit?

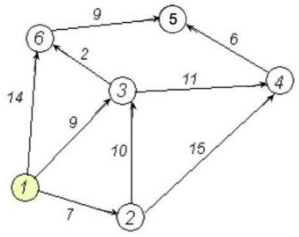
| Item | Weight | Value |
|---|---|---|
| 1 | 5 | 30 |
| 2 | 10 | 40 |
| 3 | 15 | 45 |
| 4 | 22 | 77 |
| 5 | 25 | 90 |

6) Write the algorithm of BFS and DFS.

7) Explain the differences of All Pairs Shortest path algorithm and Warshall's algorithm.

8) What do you mean by P and NP algorithm? All NP -complete problems are NP- hard but all NP-hard problem is not NP complete.

9) Find the shortest path of the following graph from the node 1 to any other node.




10) Prove the followings:
    a) $1/2(n^2)-3n=\Theta(n^2)$

b) For any two functions f(n) and g(n),we have $f(n)=\Theta(g(n))$, iff $f(n)=O(g(n))$ and $f(n)=\Omega(g(n)n)$

c) Show that for any real constants a and b where$b>0$, $(n+a)^b=\Theta(n^b)$

d) Explain the statement "the running time of algorithm A is at least $O(n^2)$",is meaningless.

e) Prove that $o(g(n))\cap\omega(g(n))$ is the empty set

f) Is $2^{(n+1)}=O(2^n)$? and is $2^{2n}=O(2^n)$?

## ASSIGNMENT FOR 4TH SEMESTER
## INTRODUCTION OF ALGORITHMS AND ITS APPLICATIONS

PRACTICAL

1) Write a C program to find the spanning tree of a weighted graph using Prim's algorithm.
2) Write a C program to find the cost of the minimum spaning tree of a weighted graph along with the edges using Kruskal's algorithm.
3) Write a C program to perform tree traversal using BFS algorithm.
4) Write a C program to perform tree traversal using DFS algorithm.
5) Write a C program to input a graph and apply warshall's algorithm to determine the existence of path between all pair of vertices.
6) Write a C program to input a graph along with a source vertex.Use Dijkastra's algorithm to find the shortest distance between the source vertex to all other vertices.