Assignment No - 6.

Title - Prims Algorithm

Problem- Statement - You have a business with several office; you want to lease phone lines to connect them up with each other; and the phone company charges different amounts of money to connect different pairs of cities. You want a set of lines that connect all your office with a minimum total cost. Solve the problem by suggesting appropriate data structures.

objectivies -
 Student will be able to understand concept of minimum Spanning tree with Prims algorithm.

Software requirement -
1. 64-bit open source linux or its derivative
2. open Source C++ Programming tool like G++|GCC
3. Turbo C++ Compiler.

Theory -
 Data structure to be used- Arrays: Two dimensi -onal array (adjacency matrix) to store the adjacent vertices & the weights associates edges. one dimensional array to store an indicator for each vertex whether visited or not.
 # define max 20.

```
int adj-ver [max][Max]; int edge-wt [max]
[Max]; int ind [Max];
```

Concepts to be used.

- Arrays
- Function to construct head List & adjacency matrix for a graph.
- Function to display adjacency matrix of a graph.
- Function to generate minimum Spanning Tree for a graph using Prim's algorithm

Spanning Tree - A Spanning Tree of a graph $G=(V,E)$ is sub graph of G having all vertices of G and no cycles is it.

Minimal Spanning Tree - The cost of a graph is the sum of the costs the edges in the weighted graph.

- when a graph G is connected, depth first or breadth first search starting at any vertex visits all the vertices in G.

- The edges of G in T form a tree which includes all the vertices of Graph G and this tree is called Spanning Tree.

Prim's Algorithm - Any Tree, which consists is an algorithm is graph Theory that finds a minimum Spanning Tree

This means it Finds a subset of the edges that forms a tree that includes every vertex, where the total weight of all the edges in the tree is minimized.

Prims in 1957 and rediscovered by Edsger Dijkstra in 1969.

Algorithm / Pseudo code :

Prim's Algorithm - All vertices of a connected graph are included in the minimum spanning Tree.

Prim's Algorithm starts from one vertex and grows the rest of tree by adding one vertex at a time by adding associated edge in T.

```
void prims (vertexi)
1. Start
2. initialize visited [ ] to o for (i=0; i<n; i++)
       visited [i]=0;
3. Find minimum edge from i for (j=0; j<n; j++)
   {
   if (min > a [i][j])
   {
      min = a [i] [j] x=i;
         y=j;
   }
   }
4. print the edge between i and j with weight.
5. Make visit [i++]=x.
```

visit [j++] = y

6. Find next minimum edge starting from nodes of visit array.

7. Repeat step 6 until all the nodes are visited.

8. End.

Conclusion- Thus we have studied and imple-mented minimum Spanning Tree Concept with the help of Prims Algorithm.