**Group A: Assignment No:07**

**Problem Statement:**

**You have a business with several offices; 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 connects all your offices with a minimum total cost. Solve the problem by suggesting appropriate data structures.**

**Program:**

**#include<iostream>**

**using namespace std;**

**class tree**

**{**

**int a[20][20],l,u,w,i,j,v,e,visited[20];**

**public:**

**void input();**

**void display();**

**void minimum();**

**};**

**void tree::input()**

**{**

**cout<<"Enter the no. of branches: ";**

**cin>>v;**

**for(i=0;i<v;i++)**

**{**

**visited[i]=0;**

**for(j=0;j<v;j++)**

**{**

**a[i][j]=999;**

**}**

**}**

**cout<<"\nEnter the no. of connections: ";**

**cin>>e;**

**for(i=0;i<e;i++)**

**{**

**cout<<"Enter the end branches of connections: "<<endl;**

**cin>>l>>u;**

**cout<<"Enter the phone company charges for this connection: ";**

**cin>>w;**

**a[l-1][u-1]=a[u-1][l-1]=w;**

**}**

**}**

**void tree::display()**

**{**

**cout<<"\nAdjacency matrix:";**

**for(i=0;i<v;i++)**

**{**

**cout<<endl;**

**for(j=0;j<v;j++)**

**{**

**cout<<a[i][j]<<" ";**

**}**

**cout<<endl;**

**}**

**}**

**void tree::minimum()**

**{**

**int p=0,q=0,total=0,min;**

**visited[0]=1;**

**for(int count=0;count<(v-1);count++)**

**{**

**min=999;**

**for(i=0;i<v;i++)**

**{**

**if(visited[i]==1)**

**{**

**for(j=0;j<v;j++)**

**{**

**if(visited[j]!=1)**

**{**

**if(min > a[i][j])**

**{**

**min=a[i][j];**

**p=i;**

**q=j;**

**}**

**}**

**}**

**}**

**}**

**visited[p]=1;**

**visited[q]=1;**

**total=total+min;**

**cout<<"Minimum cost connection is"<<(p+1)<<" -> "<<(q+1)<<" with charge : "<<min<< endl;**

**}**

**cout<<"The minimum total cost of connections of all branches is: "<<total<<endl;**

**}**

**int main()**

**{**

**int ch;**

**tree t;**

**do**

**{**

**cout<<"==========PRIM'S ALGORITHM================="<<endl;**

**cout<<"\n1.INPUT\n \n2.DISPLAY\n \n3.MINIMUM\n"<<endl;**

**cout<<"Enter your choice :"<<endl;**

**cin>>ch;**

**switch(ch)**

**{**

**case 1: cout<<"\*\*\*\*\*\*\*INPUT YOUR VALUES\*\*\*\*\*\*\*"<<endl;**

**t.input();**

**break;**

**case 2: cout<<"\*\*\*\*\*\*\*DISPLAY THE CONTENTS\*\*\*\*\*\*\*\*"<<endl;**

**t.display();**

**break;**

**case 3: cout<<"\*\*\*\*\*\*\*\*\*MINIMUM\*\*\*\*\*\*\*\*\*\*\*\*"<<endl;**

**t.minimum();**

**break;**

**}**

**}while(ch!=4);**

**return 0;**

**}**

