Assignment: 8

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1.Write a C program to implement Kruskal's algorithm to find Minimum Spanning Tree.

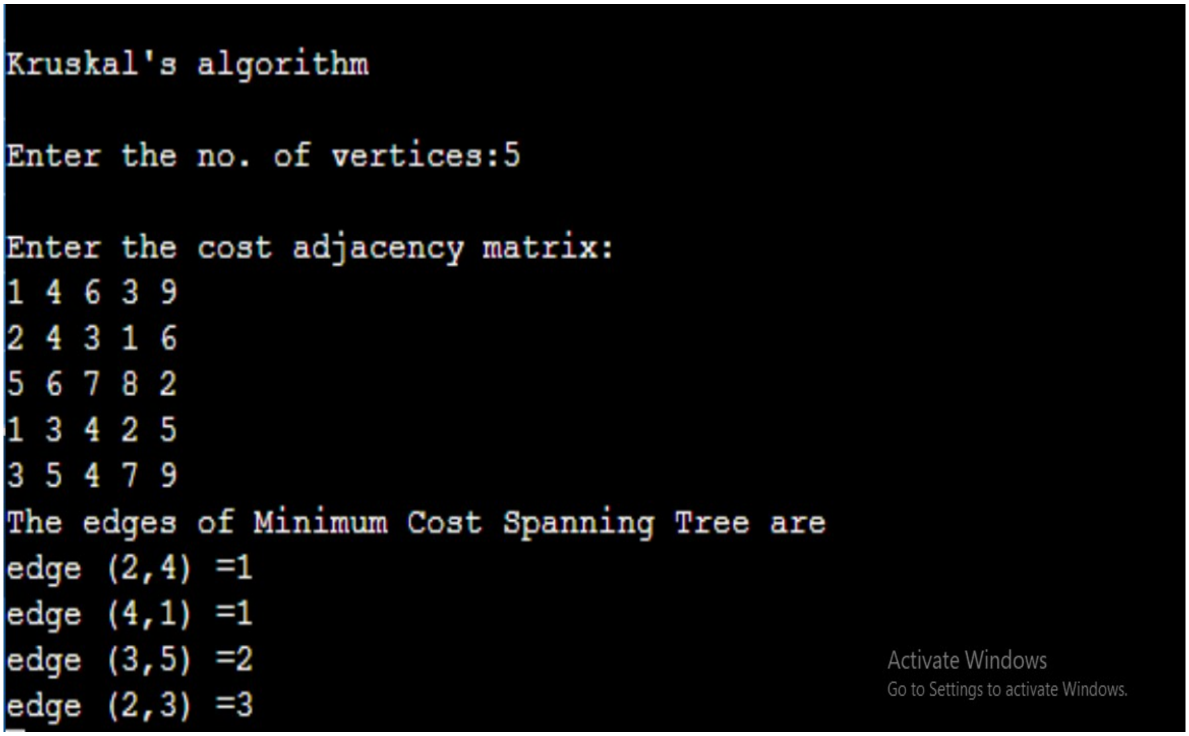
Code:

```
#include<stdio.h>
#include<conio.h>
#include<stdlib.h>
#define max 10000
int cost[100][100],parent[100];
int find(int x)
{
        while(parent[x])
        x=parent[x];
        return x;
}
int uni(int x,int y)
{
        if(x!=y)
        {
                parent[y]=x;
                return 1;
        }
        return 0;
```

```
}
void main()
{

        printf("\nKruskal's algorithm\n");
        int n;
        printf("\nEnter the no. of vertices:");
        scanf("%d",&n);
        printf("\nEnter the cost adjacency matrix:\n");
        for(int i=1;i<=n;i++)
        {
                for(int j=1;j<=n;j++)
                {
                        scanf("%d",&cost[i][j]);
                        if(cost[i][j]==0)
                                cost[i][j]=max;
                }
        }
        int a,b,u,v;
        int min,min_cost=0,t=1;
        printf("The edges of Minimum Cost Spanning Tree are\n");
        while(t < n)
        {
           min=max;
                for(int i=1;i<=n;i++)
                {
```

```
            for(int j=1;j <= n;j++)
            {
                if(cost[i][j] < min)
                {
                    min=cost[i][j];
                    a=u=i;
                    b=v=j;
                }
            }
        }
        u=find(u);
        v=find(v);
        if(uni(u,v))
        {
            printf("edge (%d,%d) =%d\n",a,b,min);
            min_cost +=min;
        }
        cost[a][b]=cost[b][a]=max;
    }
    printf("\nMinimum cost = %d\n",min_cost);

}
```

Output:



```
Kruskal's algorithm

Enter the no. of vertices:5

Enter the cost adjacency matrix:
1 4 6 3 9
2 4 3 1 6
5 6 7 8 2
1 3 4 2 5
3 5 4 7 9
The edges of Minimum Cost Spanning Tree are
edge (2,4) =1
edge (4,1) =1
edge (3,5) =2
edge (2,3) =3
```

2.Write a c program to implement DFS.

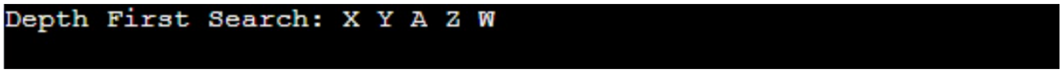
Code:

```
#include <stdio.h>

#include <stdlib.h>

#include <stdbool.h>

#define MAX 100

struct Vertex {

   char label;

   bool visited;

};


//stack variables


int stack[MAX];
int top = -1;

//graph variables
//array of vertices
struct Vertex* lstVertices[MAX];

//adjacency matrix
int adjMatrix[MAX][MAX];

//vertex count
int vertexCount = 0;

//stack functions

void push(int item) {
   stack[++top] = item;
}

int pop() {
   return stack[top--];
}

int peek() {
   return stack[top];
}
```

```
bool isStackEmpty() {
   return top == -1;
}
void addVertex(char label) {
   struct Vertex* vertex = (struct Vertex*) malloc(sizeof(struct Vertex));
   vertex->label = label;
   vertex->visited = false;
lstVertices[vertexCount++] = vertex;
}
void addEdge(int start,int end) {
adjMatrix[start][end] = 1;
adjMatrix[end][start] = 1;
}
void displayVertex(int vertexIndex) {
printf("%c ",lstVertices[vertexIndex]->label);
}

//get the adjacent unvisited vertex
int getAdjUnvisitedVertex(int vertexIndex) {
   int i;

for(i = 0; i<vertexCount; i++) {
      if(adjMatrix[vertexIndex][i] == 1 &&lstVertices[i]->visited == false) {
         return i;
      }
   }
   return -1;
}

void dfs() {
   int i;
lstVertices[0]->visited = true;

displayVertex(0);
push(0);

   while(!isStackEmpty()) {

      int unvisitedVertex = getAdjUnvisitedVertex(peek());
if(unvisitedVertex == -1) {
pop();
      } else {
lstVertices[unvisitedVertex]->visited = true;
displayVertex(unvisitedVertex);
         push(unvisitedVertex);
      }
   }
for(i = 0;i <vertexCount;i++) {
lstVertices[i]->visited = false;
   }
}
```

```
int main() {
   int i, j;
for(i = 0; i< MAX; i++){    // set adjacency  (problem with braces !!)
for(j = 0; j < MAX; j++)  // matrix to 0
adjMatrix[i][j] = 0;
   }

addVertex('X');
addVertex('Y');
addVertex('Z');
addVertex('W');
addVertex('A');

addEdge(0, 1);
addEdge(0, 2);
addEdge(0, 3);
addEdge(1, 4);
addEdge(2, 4);
addEdge(3, 4);

printf("Depth First Search: ");
dfs();

   return 0;
}
```

Output:



```
Depth First Search: X Y A Z W
```