22AIE203 – Data Structures and Algorithm - 2

LAB EXP 3

Kruskal's algorithm

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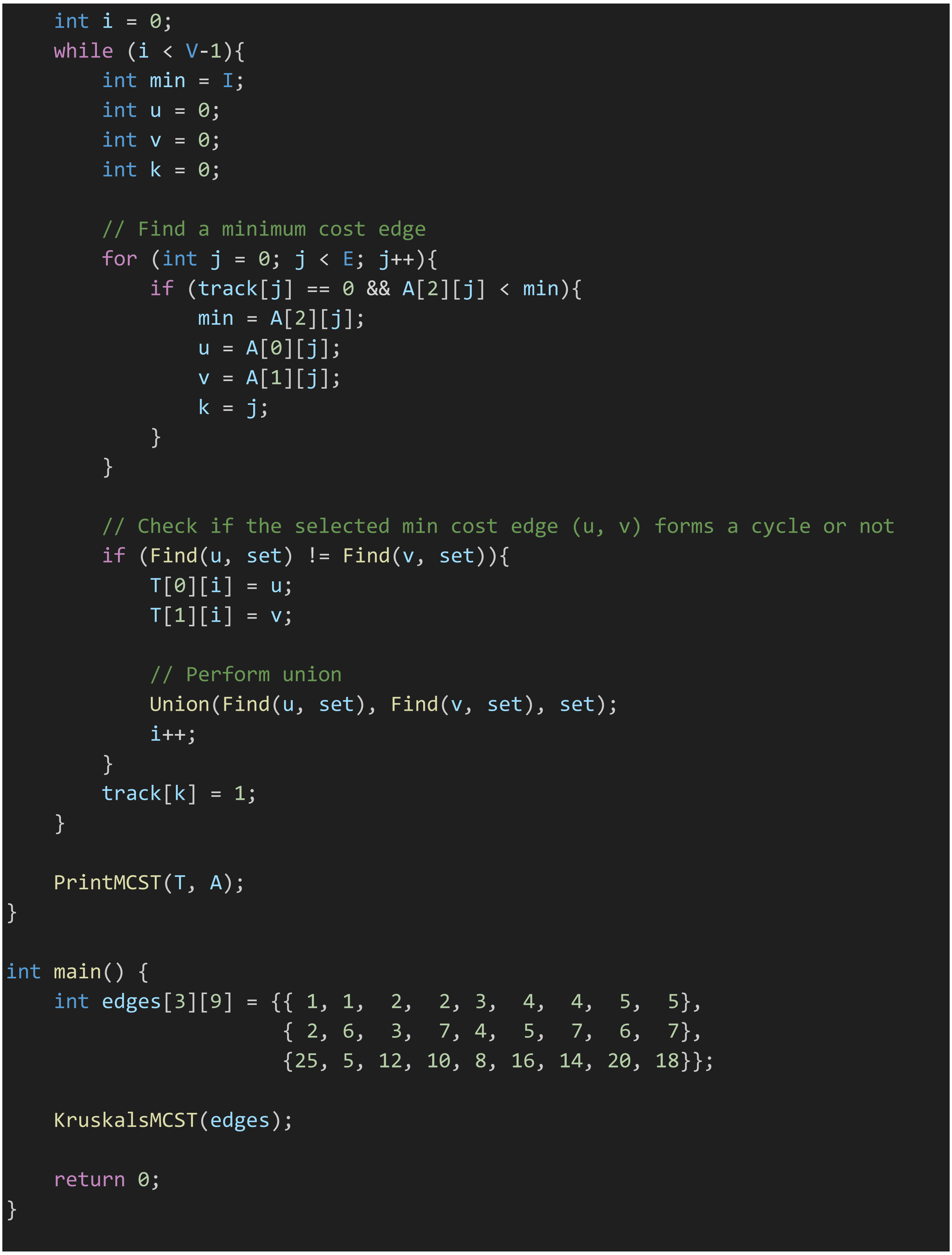
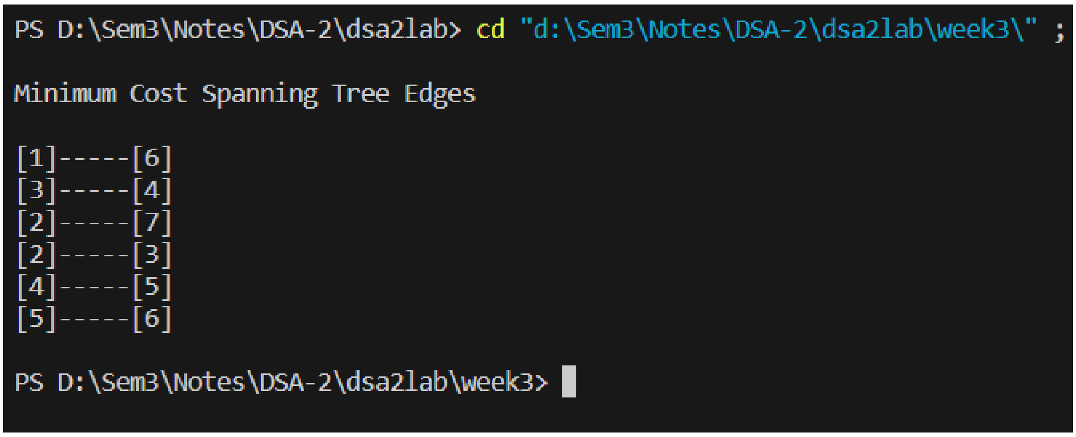
Code

```c
#include <stdio.h>

#define I 32767  // Infinity
#define V 7  // # of vertices in Graph
#define E 9  // # of edges in Graph

void PrintMCST(int T[][V-1], int A[][E]){
    printf("\nMinimum Cost Spanning Tree Edges\n\n");
    for (int i = 0; i < V-1; i++){
        printf("[%d]-----[%d]\n", T[0][i], T[1][i]);
    }
    printf("\n");
}

// Set operations: Union and Find
void Union(int u, int v, int s[]){
    if (s[u] < s[v]){
        s[u] += s[v];
        s[v] = u;
    } else {
        s[v] += s[u];
        s[u] = v;
    }
}

int Find(int u, int s[]){
    int x = u;
    int v = 0;

    while (s[x] > 0){
        x = s[x];
    }

    while (u != x){
        v = s[u];
        s[u] = x;
        u = v;
    }
    return x;
}

void KruskalsMCST(int A[3][9]){
    int T[2][V-1];  // Solution array
    int track[E] = {0};  // Track edges that are included in solution
    int set[V+1] = {-1, -1, -1, -1, -1, -1, -1};  // Array for finding
cycle
```

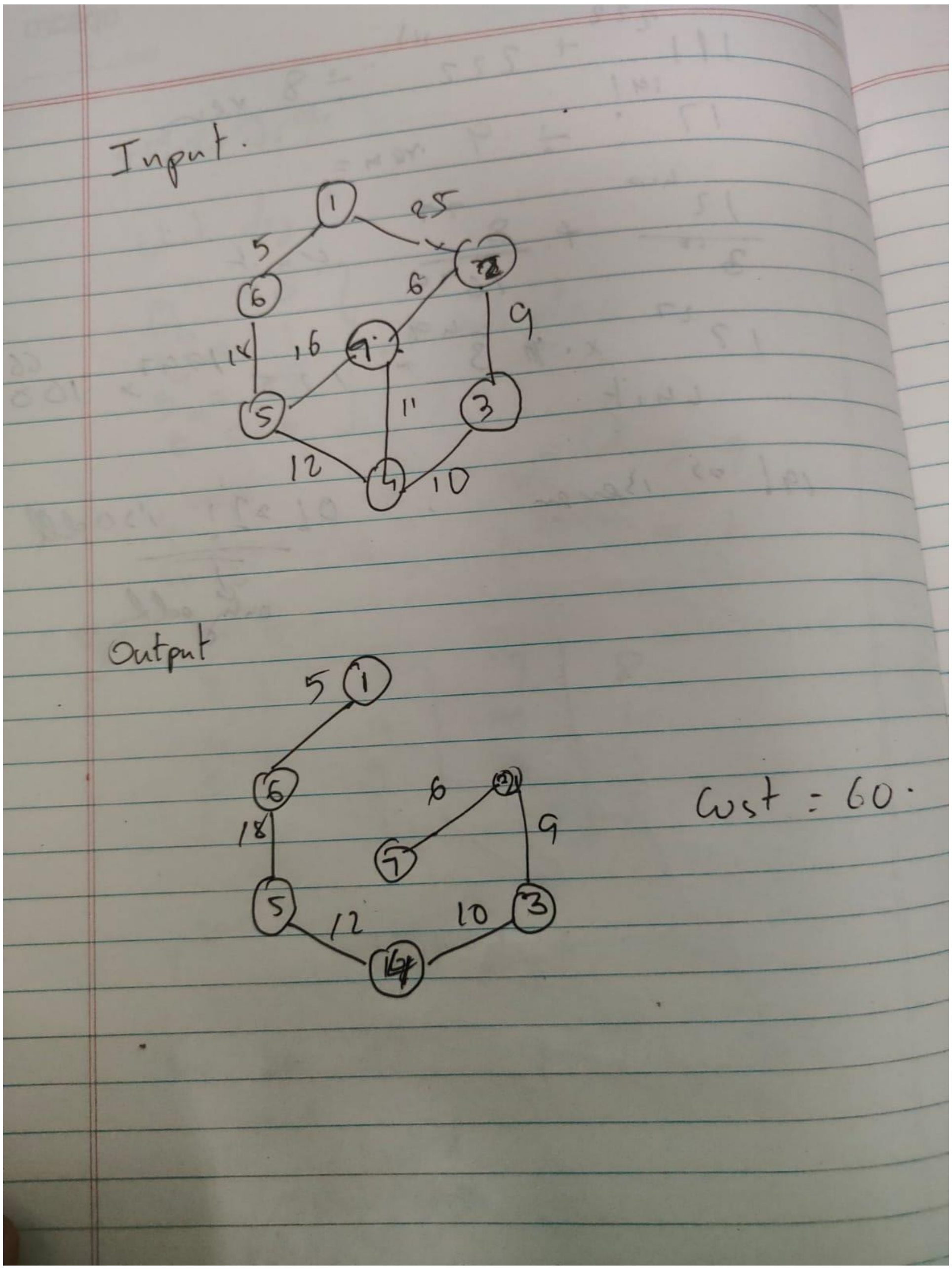


```
    int i = 0;
    while (i < V-1){
        int min = I;
        int u = 0;
        int v = 0;
        int k = 0;

        // Find a minimum cost edge
        for (int j = 0; j < E; j++){
            if (track[j] == 0 && A[2][j] < min){
                min = A[2][j];
                u = A[0][j];
                v = A[1][j];
                k = j;
            }
        }

        // Check if the selected min cost edge (u, v) forms a cycle or not
        if (Find(u, set) != Find(v, set)){
            T[0][i] = u;
            T[1][i] = v;

            // Perform union
            Union(Find(u, set), Find(v, set), set);
            i++;
        }
        track[k] = 1;
    }

    PrintMCST(T, A);
}

int main() {
    int edges[3][9] = {{ 1, 1,  2,  2, 3,  4,  4,  5,  5},
                       { 2, 6,  3,  7, 4,  5,  7,  6,  7},
                       {25, 5, 12, 10, 8, 16, 14, 20, 18}};

    KruskalsMCST(edges);

    return 0;
}
```

Output



```
PS D:\Sem3\Notes\DSA-2\dsa2lab> cd "d:\Sem3\Notes\DSA-2\dsa2lab\week3\" ;

Minimum Cost Spanning Tree Edges

[1]-----[6]
[3]-----[4]
[2]-----[7]
[2]-----[3]
[4]-----[5]
[5]-----[6]

PS D:\Sem3\Notes\DSA-2\dsa2lab\week3> 
```



Input.

Output

Cost : 60.