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ROLL NO: 41

SUBJECT: AOA

EXPERIMENT NO.:7

To implement Kruskal's MST Algorithm using greedy method

Program code:

#include <stdio.h>

#include <stdlib.h>

#define MAX\_EDGES 1000

typedef struct Edge {

int src, dest, weight;

} Edge;

typedef struct Graph {

int V, E;

Edge edges[MAX\_EDGES];

} Graph;

typedef struct Subset {

int parent, rank;

} Subset;

Graph\* createGraph(int V, int E) {

Graph\* graph = (Graph\*) malloc(sizeof(Graph));

graph->V = V;

graph->E = E;

return graph;

}

int find(Subset subsets[], int i) {

if (subsets[i].parent != i) {

subsets[i].parent = find(subsets, subsets[i].parent);

}

return subsets[i].parent;

}

void Union(Subset subsets[], int x, int y) {

int xroot = find(subsets, x);

int yroot = find(subsets, y);

if (subsets[xroot].rank < subsets[yroot].rank) {

subsets[xroot].parent = yroot;

} else if (subsets[xroot].rank > subsets[yroot].rank) {

subsets[yroot].parent = xroot;

} else {

subsets[yroot].parent = xroot;

subsets[xroot].rank++;

}

}

int compare(const void\* a, const void\* b) {

Edge\* a\_edge = (Edge\*) a;

Edge\* b\_edge = (Edge\*) b;

return a\_edge->weight - b\_edge->weight;

}

void kruskalMST(Graph\* graph) {

Edge mst[graph->V];

int e = 0, i = 0;

qsort(graph->edges, graph->E, sizeof(Edge), compare);

Subset\* subsets = (Subset\*) malloc(graph->V \* sizeof(Subset));

for (int v = 0; v < graph->V; ++v) {

subsets[v].parent = v;

subsets[v].rank = 0;

}

while (e < graph->V - 1 && i < graph->E) {

Edge next\_edge = graph->edges[i++];

int x = find(subsets, next\_edge.src);

int y = find(subsets, next\_edge.dest);

if (x != y) {

mst[e++] = next\_edge;

Union(subsets, x, y);

}

}

printf("Minimum Spanning Tree:\n");

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

printf("(%d, %d) -> %d\n", mst[i].src, mst[i].dest, mst[i].weight);

}

}

int main() {

int V, E;

printf("Enter number of vertices and edges: ");

scanf("%d %d", &V, &E);

Graph\* graph = createGraph(V, E);

printf("Enter edges and their weights:\n");

for (int i = 0; i < E; ++i) {

scanf("%d %d %d", &graph->edges[i].src, &graph->edges[i].dest, &graph->edges[i].weight);

}

kruskalMST(graph);

return 0;

}

Output -

