

```

import heapq

class Graph:

    def __init__(self, vertices):

        self.V = vertices

        self.graph = [] # For Kruskal's algorithm (edge list)

        self.adj_list = {i: [] for i in range(vertices)} # For Prim's algorithm


    def add_edge(self, u, v, w):

        self.graph.append((w, u, v)) # Edge list for Kruskal

        self.adj_list[u].append((v, w)) # Adjacency list for Prim

        self.adj_list[v].append((u, w)) # Undirected graph


# Kruskal's Algorithm
def kruskal_mst(self):

    # Helper functions for Union-Find

    def find(parent, i):

        if parent[i] == i:

            return i

        return find(parent, parent[i])

    def union(parent, rank, x, y):

        xroot = find(parent, x)

        yroot = find(parent, y)

        if rank[xroot] < rank[yroot]:

            parent[xroot] = yroot

        elif rank[xroot] > rank[yroot]:

            parent[yroot] = xroot

        else:

            parent[yroot] = xroot

            rank[xroot] += 1

```

```
# Kruskal's algorithm implementation

self.graph.sort() # Sort edges by weight

parent = []

rank = []

mst = []
```

```
for node in range(self.V):
    parent.append(node)
    rank.append(0)
```

```
for edge in self.graph:
    w, u, v = edge
    x = find(parent, u)
    y = find(parent, v)
    if x != y:
        mst.append(edge)
        union(parent, rank, x, y)
```

```
print("Kruskal's MST:")

for w, u, v in mst:
    print(f"{u} -- {v} == {w}")
```

```
# Prim's Algorithm

def prim_mst(self):
    visited = [False] * self.V

    min_heap = [(0, 0)] # (weight, vertex)

    mst = []

    while min_heap:
        weight, u = heapq.heappop(min_heap)

        if visited[u]:
```

```
        continue

    visited[u] = True

    mst.append((u, weight))

    for v, w in self.adj_list[u]:
        if not visited[v]:
            heapq.heappush(min_heap, (w, v))
```

```
print("Prim's MST:")
for u, weight in mst[1:]:
    print(f"{u} -- {weight}")
```

```
# Example usage
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```
# Nodes: 0 - Admin, 1 - Library, 2 - CSE Dept, 3 - ECE Dept, 4 - Hostel
```

```
g = Graph(5)
g.add_edge(0, 1, 10)
g.add_edge(0, 2, 20)
g.add_edge(1, 2, 5)
g.add_edge(1, 3, 15)
g.add_edge(2, 3, 30)
g.add_edge(3, 4, 10)
g.add_edge(2, 4, 25)
```

```
# Find MST using Kruskal's algorithm
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```
g.kruskal_mst()
```

```
# Find MST using Prim's algorithm
```

```
g.prim_mst()
```