Electrical Network Design (Application using Prim's Algorithm)

```
import java.util.*;

public class ElectricalNetworkMST {
  static int minKey(int[] key, boolean[] mstSet, int n) {
    int min = Integer.MAX_VALUE, min_index = -1;
    for (int v = 0; v < n; v++)
      if (!mstSet[v] && key[v] < min) {
        min = key[v];
        min_index = v;
      }
    return min_index;
  }

  public static void main(String[] args) {
    Scanner sc = new Scanner(System.in);
    System.out.println("Electrical Network Design using MST (Prim's Algorithm)");
    System.out.print("Enter number of electrical stations: ");
    int n = sc.nextInt();
    int[][] cost = new int[n][n];
    System.out.println("Enter the cost matrix (0 if no connection):");
    for (int i = 0; i < n; i++)
      for (int j = 0; j < n; j++)
        cost[i][j] = sc.nextInt();
    int[] parent = new int[n];
    int[] key = new int[n];
    boolean[] mstSet = new boolean[n];
    for (int i = 0; i < n; i++) {
      key[i] = Integer.MAX_VALUE;
      mstSet[i] = false;
    }
    key[0] = 0;
    parent[0] = -1;
    for (int count = 0; count < n - 1; count++) {
      int u = minKey(key, mstSet, n);
      mstSet[u] = true;
      for (int v = 0; v < n; v++) {
        if (cost[u][v] != 0 && !mstSet[v] && cost[u][v] < key[v]) {
          parent[v] = u;
          key[v] = cost[u][v];
        }
      }
    }
    System.out.println("\nElectrical Connections and Wiring Cost:");
```

```
        int totalCost = 0;
        for (int i = 1; i < n; i++) {
            System.out.println("Station " + parent[i] + " - Station " + i + " : " + cost[i][parent[i]]);
            totalCost += cost[i][parent[i]];
        }
        System.out.println("Total Minimum Wiring Cost: " + totalCost);
        sc.close();
    }
}
```

Output

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"C:\Program Files\Java\jdk-24\bin\java.exe" "-javaagent:C:\Users\RUTIKA\AppData\L
Electrical Network Design using MST (Prim's Algorithm)
Enter number of electrical stations: 5
Enter the cost matrix (0 if no connection):
0 2 0 6 0
2 0 3 8 5
0 3 0 0 7
6 8 0 0 8
0 5 7 9 0

Electrical Connections and Wiring Cost:
Station 0 - Station 1 : 2
Station 1 - Station 2 : 3
Station 0 - Station 3 : 6
Station 1 - Station 4 : 5
Total Minimum Wiring Cost: 16
```