Multistage Logistics Optimization

OUTPUT:

```
Enter number of stages: 3
Enter number of nodes in Stage 0: 2
Enter number of nodes in Stage 1: 2
Enter number of nodes in Stage 2: 1
Enter edges (fromNode toNode cost) between consecutive stages:
Stage 0 to Stage 1:
Number of outgoing edges from node 0: 2
0 3
1 1
Number of outgoing edges from node 1: 1
0 2
Stage 1 to Stage 2:
Number of outgoing edges from node 0: 1
0 4
Number of outgoing edges from node 1: 1
0 2

Optimal delivery costs from Stage 0 nodes:
Start node 0: Cost = 3
Start node 1: Cost = 6

One optimal delivery path starting from node 0:
Stage 0 Node 0 -> Stage 1 Node 1 -> Stage 2 Node 0
```

Introduction:
In a logistics network, packages often need to pass through **multiple stages**—warehouses, transit hubs, and final delivery points. Optimizing the delivery route ensures **minimum cost, time, or fuel consumption**, improving efficiency and customer satisfaction.

Graph Representation:

- **Nodes:** Represent cities, warehouses, or transit points.
- **Edges:** Represent routes between nodes with weights indicating **cost, time, or distance**.
- **Stages:** The network is divided into **N stages**, and every package must pass through **at least one node in each stage**.

Algorithm Used:
Dynamic Programming (DP) on Multistage Graphs:

1. Start from the last stage (destination) and assign **cost = 0**.

2. Move backward stage by stage, computing the **minimum cost** to reach the destination from each node.
3. Keep track of the **next node** in the optimal path.
4. Repeat until reaching the first stage (source).

Key Points:

- Handles **multiple paths** between stages.
- Flexible for **dynamic updates** (e.g., traffic delays, road closures).
- Efficient for **large datasets** with thousands of nodes.