

Optimization Techniques (MAT-2003)

Lecture-19

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Transportation Problem

It deals with the transportation of a product available at several sources to a number of different destinations.

Assumptions of Transpiration problem:

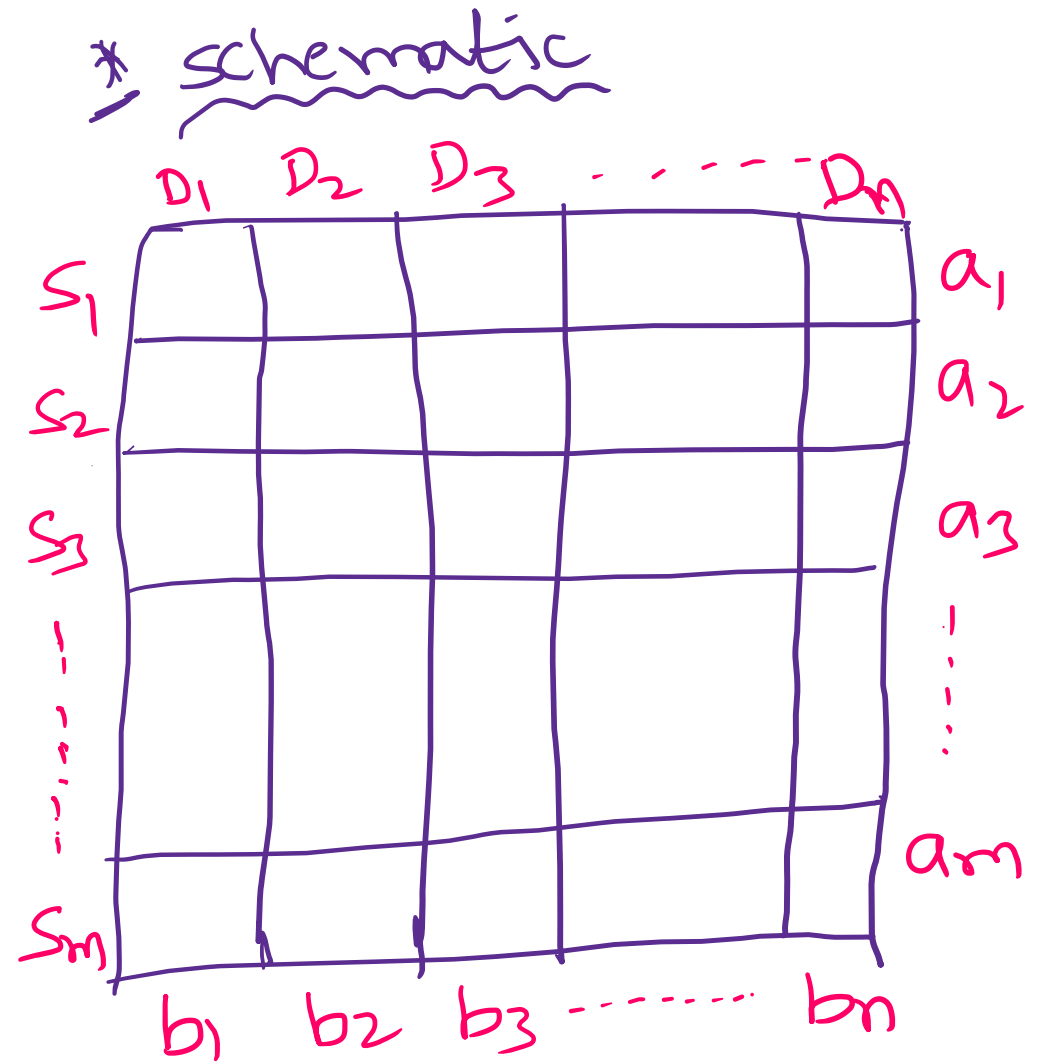
1. Total quantity of the item available at different sources is equal to the total requirement at different destinations.
2. Item can be transported conveniently from all sources to destinations.
3. The unit transportation cost of the item from all sources to destinations is certainly and precisely known.
4. The transportation cost on a given route is directly proportional to the number of units shipped on that route.
5. The objective is to minimize the total transportation cost for the organization as a whole and not for individual supply and distribution centres.

Definition of a transportation Model:

Minimize
$$Z = \sum_{i=1}^m \sum_{j=1}^n c_{ij} x_{ij},$$

Subjected to
$$\sum_{j=1}^n x_{ij} = a_i, \quad i = 1, 2, \dots, m,$$
$$\sum_{i=1}^m x_{ij} = b_j, \quad j = 1, 2, \dots, n,$$

where $x_{ij} \geq 0$.



Where, x_{ij} is the number of units shipped from source i to the destination j .

c_{ij} is the unit shipping cost from source i to the destination j .

a_i is the supply available at the source i .

b_j is the demand at the destination j .

Necessary and Sufficient condition for Transportation problem to have feasible solution:

The transportation problem has feasible solution only if the following condition is satisfied

$$\sum_{i=1}^m a_i = \sum_{j=1}^n b_j.$$

This condition is Necessary as well as sufficient condition for a transportation problem to have feasible solution. Then the transportation problem is said to be **Balanced transportation problem or Standard transportation problem.**