# **Frequently Asked Questions**

### 1. What is an Assignment Problem?

#### Answer:

An assignment problem is a particular case of a transportation problem where the sources are assigned and the destinations are tasks. Furthermore, every source has a supply of 1 (since each assignee is to be assigned to exactly one task) and every destination has a demand of 1 (since each task is to be performed by exactly one assignee).

2. What is the objective of an Assignment Problem?

### Answer:

The objective of an Assignment Problem is to minimize the total cost or to maximize the total profit of allocation.

3. Why does the problem of Assignment arise?

### Answer:

The problem of assignment arises because the resources that is available such as men, machine etc has varying degree of efficiency for performing different activities. Therefore, the cost, profit or time of performing different activities is also different. Thus, the problem is 'how the assignments should be made so as to optimize the given objective'.

4. Where is the Assignment Problems used?

### Answer:

The problem where the assignment technique may be useful are assignments of workers to machine, salesman to different sales areas, clerks to various check counters, classes to rooms, vehicle to routes, contracts to bidders, etc.

## 5. What is the mathematical model of the Assignment Problem?

### Answer:

Given n resources ( or facilities) n activities (or jobs), and effectiveness (in terms of cost, profit, time, etc) of each resource (facility) for each activity (job), the problem lies in assigning each resource to one and only one activity (job) so that the given measures of effectiveness is optimized.

6. What is a data matrix?

### Answer:

The data matrix is the same as the transportation cost matrix except that the supply (or availability) of each of the resources and the demand at each of the destination is taken to be one. It is due to this fact that the assignments are made one-to-one basis.

7. What are the two characteristics of Assignment Problem?

## Answer:

The assignment problem is nothing but a variation of the transportation problem with two characteristics:

- (1) The cost matrix is square matrix and
- (2) The optimal solution for the problem would always be such that there would be only one assignment in a given row or column matrix

8. What happens when constant is added or subtracted to assignment problem? **Answer:** 

In an assignment problem if a constant is added to or subtracted from every element of any row or column of the given cost matrix, then an assignment that minimizes the total cost in one matrix also minimizes the total cost in the other matrix.

9. What are the different methods through which we can solve the assignment problem?

### Answer:

An assignment problem can be solved by the following four methods:

- Enumeration method
- Transportation method
- Simplex method
- Hungarian method
- 10. What is an Enumeration Method?

### Answer:

In this method, a list of all possible assignments among the given resources (men, machines, etc) and activities (jobs, sales areas, etc) is prepared. Then an assignment that involves the minimum cost (or maximum profit), time or distance is selected. If two or more assignments have the same minimum cost (or maximum profit), time or distance, the problem has multiple optimal solutions.

11. Why is Transportation method inefficient for assignment problem?

### Answer:

The assignment problem is inherently degenerate. In order to remove degeneracy, (n minus 1) number of dummy allocations (deltas or epsilons) will be required in order to proceed with the algorithm for solving a transportation problem. Thus, the problem of degeneracy at each solution makes the transportation method computationally inefficient for solving an assignment problem

12. What is the principle of Hungarian Method?

### Answer:

The Hungarian method works on the principle of reducing the given cost matrix to a matrix of opportunity costs.

## 13. What is opportunity cost?

## Answer:

Opportunity costs show the relative penalties associated with assigning a resource to an activity as opposed to making the best or least cost assignment.

14. When is it possible to make an optimal solution?

### Answer:

If we can reduce the cost matrix to the extent of having at least one zero in each row and column, it will be possible to make optimal assignments (when the opportunity costs are all zero).

15. What is unbalanced Assignment Problem?

### Answer:

The Hungarian method of assignment discussed above requires that the number of columns and rows in the assignment matrix be equal. However, when the given cost matrix is not a square matrix, the assignment problem is called an unbalanced problem. In such cases dummy row(s) or column(S) are added in the matrix (with zeros as the cost element) in order to make it a square matrix.