



THIRUTHANGAL NADAR COLLEGE

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Selavayal, Chennai-51.

A Self-Financing Co-educational College of Arts & Science

Affiliated to the University of Madras

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NAME OF THE DEPARTMENT : MATHEMATICS

SUBJECT : OPERATIONS RESEARCH

TOPIC : ASSIGNMENT PROBLEM

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WHAT IS ASSIGNMENT PROBLEM ?

- **Assignment problem refers to special class of linear programming problems that involves determining the most efficient assignment of people to projects, salespeople to territories, contracts to bidders and so on.**
- **It is often used to minimize total cost or time of performing task.**
- **One important characteristic of assignment problems is that only one job (or worker) is assigned to one machine (or project).**

ASSIGNMENT PROBLEM WITH PROCEDURE

QUESTION

MACHINES	MACHINE 1	MACHINE 2	MACHINE 3	MACHINE 4
JOB 1	5	7	11	6
JOB 2	8	5	9	6
JOB 3	4	7	10	7
JOB 4	10	4	8	3

- **Step 1: Check whether the given matrix is balanced or not. Here it is a balanced one. (if it is not balanced make it balance by adding row or column with zero cost.**
- **Step 2: Check whether every row or column has atleast one zero.**
- **Step 3: Here in the given problem no rows have zero cost. So we try to make it zero by finding the least cost in each row and then subtracting it form each cost at that row.**
- **Step 4: After finishing row we have to do the same thing in column.**
- **After making each row and column with atleast one zero, our sum look like this**

	MACHINE 1	MACHINE 2	MACHINE 3	MACHINE 4
JOB 1	0	2	2	1
JOB 2	3	0	0	1
JOB 3	0	3	2	3
JOB 4	7	1	1	0

- **Step 5: Now we have to assign the zero cost starting with each first row. (Note – if we assign a row then the zero cost in the same row and in the same column should be eliminated.)**

	MACHINE 1	MACHINE 2	MACHINE 3	MACHINE 4
JOB 1	0	2	2	1
JOB 2	3	0	0	1
JOB 3	0	3	2	3
JOB 4	7	1	1	0

- **Step 6: Find the Number of Assignment made. Here it is 3, but we have to get 4 assignment since the order is 4.**
- **Hence Optimal sequence cannot be made hence now we now to cover the zero cost element with 3 horizontal or vertical lines since only 3 assignment are made.**

- **Step 7: After cover zero elements our sum look like this.**

	MACHINE 1	MACHINE 2	MACHINE 3	MACHINE 4
JOB 1	0	2	2	1
JOB 2	3	0	0	1
JOB 3	0	3	2	3
JOB 4	7	1	1	0

- **Step 8: Now find the least uncovered elements and subtract from the uncovered elements and add least number with the intersection of 2 lines leave the remaining element as it is**

- **Step 9: After doing the above procedure our sum look like this**

	MACHINE 1	MACHINE 2	MACHINE 3	MACHINE 4
JOB 1	0	1	1	1
JOB 2	4	0	0	2
JOB 3	0	2	1	3
JOB 4	7	0	0	0

- **Step 10: But now also we get only 3 assignment. Again Repeat step 8 and Step 9**

	MACHINE 1	MACHINE 2	MACHINE 3	MACHINE 4
JOB 1	0	1	1	1
JOB 2	4	0	0	2
JOB 3	0	2	1	3
JOB 4	7	0	0	0

- **Step 11: Finally we get four assignment.(Note-Repeat the above till you get the corresponding assignment.)**

	MACHINE 1	MACHINE 2	MACHINE 3	MACHINE 4
JOB 1	0	0	8	9
JOB 2	5	0	8	2
JOB 3	9	1	0	2
JOB 4	8	9	9	0

- **Step 12: Now the optimal assignment can be made
Job1→Machine1, Job2→Machine2, Job3→Machine3,
Job4→Machine4.**
- **Step 13: Now add the value of cost where we had made the assignment to get the optimum cost.**
- **Here the optimal cost =5+5+10+3
=23.**

MAXIMISATION PROBLEM

- **Assignment problems can also be used solve cases of maximization model.**
- **For instance, Travelling Salesman problem, milk van routings and so on.**
- **Problem can be solved by first subtracting the biggest element in the problem from all other elements (i.e. converting cost table in to opportunity loss table.).**
- **Later steps, are similar as the minimization problem.**



Thank
you