

- -> The Assignment problem is a fundamental "combinational optimization" problem.
- It is a special type of problem in which the objective function is to find the optimum allocation of a number of jobs (tasks) to an equal number of agents (pexsons).
- JH is assumed that each person can perform each job (task), but with vasying efficiency.

General-form of an Assignment problem:

The assymment problem can be stated in the form of nxn motorix; where each entry [Cij] represents the cost of effectiveness matrix i.e. the cost of assigning it person to jth job.

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A person can be assigned to n jobs in n! possible ways. One method can be to find all possible n! assignments and evaluate total cost in all cases. Then the assignment with the minimum cost will give the optimal assignment. But this method is extremely infeasible (laborious).

Mathematical Formulation

 $Minimum = \sum_{i=1}^{n} \sum_{j=1}^{n} C_{ij} X_{ij}$

where $x_{ij} = \{ 1; if ith person is assigned to job j' or if ith person is not assigned to job j'$

subject to the conditions:

 $\sum_{i=1}^{n} x_{ij} = 1, j = 1, 2, 3, \dots, n$ (It means that only one job is done by the ith person (i=1,2,---,n)

Hungavian Assignment Method (Reduced Matrix method)

1) Row reduction (Identify min. element in each your and subtract it from each element of that row).

(Identify min. element in each column and subtract it from each element of that column).

3) Perform row-scan and column-scan respectively, and allocate the job "i" to the person "j" according to the placement of "O".

Girl optimal allocation of jobs to persons for the following:

	1	2	3	4
	5	9	3	6
JZ	8	7	8	2
J3		10	12	7
Jy	3	10	8	6

Sol':- 1) Row reduction

	(2	3	4
J1 J2	2	- 6	0	3
	6	5	6	0
73	0	4	6	1
J4]	0	7	5	3

2) Column reductivi

3) Row-scan and Column-scan

Allocation:	
J1 -> 3	
J2 -> 4	
J3 -> 2	
Jy -> 1	

0-2

Sol :-

Ruw geduction

2) Column seduction

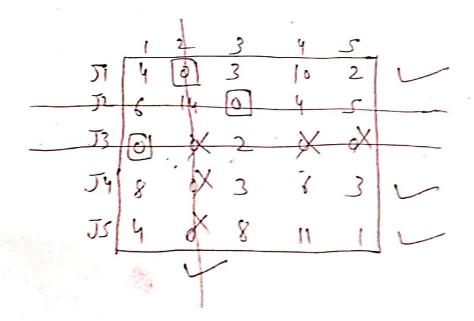
-	1	2	.3	4	2
JI	4	O	3	0	2
JI	6	14	٥	4	5
J3	O	0	2	O	0
Ĵ٩	8,,	٥	3	ζ	3
JS	4	0	8	11	. [

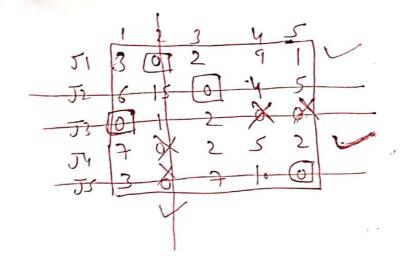
	1	2_	3	4	,5
51	4	0	3.	10	2
JZ	6	14	0	4	5
<u>J3</u>	0	×	2	X	*
JY	8	X	3	6	3
25	4	X	8	11	1
0	,				

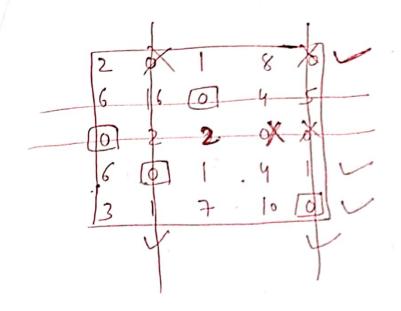
(only 3 assignments have been made)

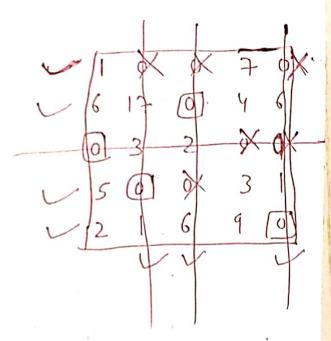
Procedure:-

- 1) Tick the unassigned rows. (1)
- 2). If the marked you contains a jobo, then mark the corresponding column.
- 3) If the marked column contains an assignment, then mark the corresponding row.
- 4) Draw lines through unticked your and ticked columns.









	1	2	3	4	5
71	0	0X	X	6	9
Tz	5	17	0	3	6
JJ	X	4	3	0	1
J4	4 1	0	×	2	1
Tr	1	1	6	8	0)

Total cost :
11+7+13+10+10

= 51 Rs.

Scanned with CamScanner