Assignment Maximization Problem

Maximization Problem:

Convert it into a maximization problem by subtracting all the elements from the largest element.

Rest procedure is similar to the maximization problem

Phase 1 : Row and column reduction.

Phase 2 : Optimization of the problem.

Step 1 → Draw a minimum no of lines to cover all the zeros of the matrix.

(a) Row scanning
(b) Column scanning | Repeat the procedure

⇒ Check whether all the zeros are covered with lines.

If yes ⇒ Go to next step.

If no ⇒ Select the zeros diagonally opposite with each other.

Step 2 → No of squares marked = no of rows

If yes ⇒ treat the solution as marked by the squares as an optimal solution.

If no ⇒ Go to Step 3.

Step 3 → Identify minimum value of the undeleted cell values.

- Copy all the deleted values as it is except intersecting points.
- Add the minimum element to the intersecting points.
- Subtract the minimum element undeleted cell values.

Next Go to Step 1 and repeat the process until optimal condition is reached.

Example: Solve the following assignment problem to maximize sales

Salesman	Territories I	II	III	IV
A	45	38	30	22
B	35	29	20	14
C	35	29	20	14
D	27	20	15	10

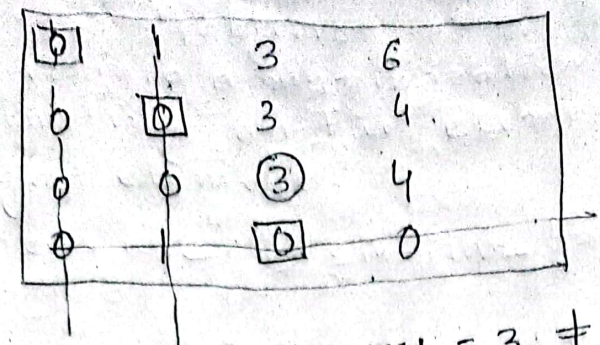
→ Converting to minimization problem by subtracting maximum element.

	I	II	III	IV	Row min
A	0	7	15	23	0
B	10	16	25	31	10
C	10	16	25	31	10
D	18	25	30	35	18

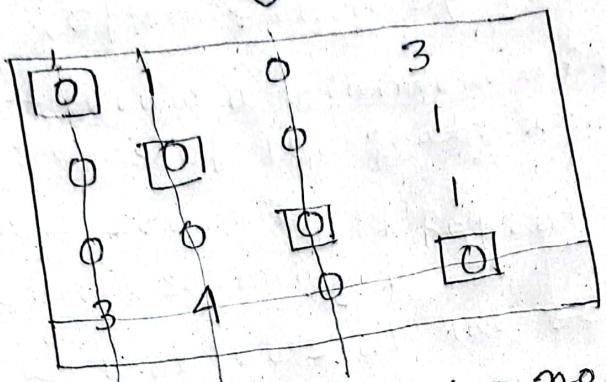
⇓

	0	7	15	23
	10	6	15	21
	0	6	15	21
	0	7	12	17
			12	17
Column min	0	6		

⇓



no of squares = 3 ≠ 4



no of squares = 4 = no of rows

Optimum Assignment

A → I

B → II

C → III

D → IV

Maximize profit = 45 + 29 + 20 + 10

= 104